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1 Care at Birth

Dr. Ranmali Rodrigo
MBBS, MD, DCH, MRCPCH
Internationally Board Certified Lactation Consultant (IBCLC),
Consultant Neonatologist, Colombo North Teaching Hospital &
Lecturer, Department of Paediatrics, University of Kelaniya

For Small Babies, some basic newborn interventions around the birth, will prevent morbidity and mortality; these include skilled care at birth, antenatal steroids, prophylactic antibiotics for prolong rupture of membranes, delayed cord clamping and proper cord care, skin to skin contact with the mother, first breast feed within 1 hour of birth, prevention of hypothermia , effective bag and mask ventilation and vitamin K prophylaxis.

Antenatal care

Administering **antenatal steroids –** 3 doses of dexamethasone 8mg IM every 12 hours to mothers at risk of giving birth before 35 weeks gestation reduces the incidence of complications of prematurity, especially respiratory distress syndrome, and intra ventricular haemorrhages.

Provision **of prophylactic antibiotics to mothers** who have ruptured their membranes for more than 18 hours is known to reduce the incidence of early onset sepsis.

Care at birth

The following are basic interventions which can be used, to improve the outcome of the Small Baby. These include:

- prophylactic antibiotics for prolong rupture of membranes
- skilled care at birth

- effective bag and mask ventilation
- delayed cord clamping and proper cord care
- skin to skin contact with the mother
- first breast feed within 1 hour of birth
- prevention of hypothermia
- vitamin K prophylaxis.

Delaying cord clamping

Delayed cord clamping for at least 1 minute makes preterm babies more haemodynamically stable in first few days and reduces iron deficiency in term babies. Umbilical cord should be cut in an aspetic manner and left uncovered and dry.

Skin-to-skin contact

Skin to skin with the mother helps establish breastfeeding early, prevents hypothermia, improves bonding and colonises the baby with maternal flora, thereby reducing neonatal infections.(figure 1)

Figure 1

Bathing

The amniotic fluid and any blood on the baby's skin and hair should be wiped away gently while avoiding removal of vernix by vigorous rubbing. Bathing should be done only after 24 hours. Eyes do not require any special treatment in the Sri Lankan setting.

Measuring the baby

Weighing the baby need not be done immediately after birth; allow the mother and baby to have adequate skin-to-skin contact before that. A digital scale which measures upto 2 decimal places should be used. Baby should be weighed without any clothes in a place without cold air draughts. Measure the length using an **infantometer** (**not** measuring tape) and the head circumference using a non-stretchable tape.(Figure2)

Figure 2

Monitoring

Following the first feed, babies should be kept under observation and vital signs monitored by the labour room/operation theatre staff. A rapid neonatal examination should be done before transfer to the ward by the attending skilled healthcare worker (midwife / nurse / doctor) to exclude any major congenital anomalies.

Vitamin K

Vitamin K should be administered IM (1mg for babies >1.5kg) to prevent haemorrhagic disease of the new born. This could be done before transferring out from the labour room.

Keeping the baby warm

Maintenance of normothermia (normal temperature) is imperative from the time of birth and temperature should be checked prior to transfer to the ward. (refer chapter on thermal control)

Blood sugar monitoring

In VLBW babies, Random blood sugar may have to be monitored during their stay in the labour room.

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2 Care in the Post Natal Ward & Community

Prof. Dulanie Gunasekera
MBBS,MD, FRCP(Lon), FSLCP
Professor of Paediatrics,
University of Sri Jaywardenepura

After arrival from the labour room, basic care in the post natal ward should include all of the following:

- Prevention of hypothermia by promoting Kangaroo Mother Care (KMC)
- Prevention of hypoglycaemia by promoting exclusive breast feeding(XBF)
- Prevention of infections
- New born screening
- Care for sick small newborns
- Advice on discharge
- Follow-up in the community

Prevention of Hypothermia

Hypothermia is a problem especially with the "Small Baby". The room temperature should be above 26C. Since the ambient temperature in our environment is usually around 30C, this is usually not a problem in the post natal ward (except in the hill country). However, it is a problem in the SCBU/NICU setting due to air conditioning,

Baby's axillary temperature should be checked on admission and six hourly thereafter. Bedding together (Keeping the baby in the same bed with the mother) is an advantage where possible.

Delay bathing till the second day, do not be in a hurry to bathe! Remember, frequent breast feeding also keeps the baby warm!
When in a cot, cover baby with a hat and wrap in a cloth/blanket (figure 1). This is very important, since they may get cold even in "warm" temperatures. (refer lecture on Thermal control)

Figure 1

Prevention of hypolgycaemia and promotion of breast feeding

The best way to maintain normal blood sugar in a well baby is by promoting exclusive breast feeding. In the high risk groups (i.e small for dates and large for dates babies), the blood sugar should be monitored (pre feeds) regularly. A random Blood sugar(RBS) of less than 40mg/dl needs intervention. (Annexure I)

Prevention of infection - Refer lecture on prevention of sepsis.

New born Screening

New born screening(NBS) is an essential part of routine postnatal care. NBS includes complete neonatal examination, and screening for congenital hypothyroidism, congenital heart disease (Oxygen saturation test) and screening for congenital deafness.(Annexures II to IV)

Caring for the sick newborn

During routine ward care, it is essential to make sure that the baby is well. Sick new-borns have subtle non specific signs, so a high degree of suspicion should be present.

The following clinical features are **"Danger signs"** to suggest a seriously ill baby who needs immediate attention/referral:

Danger signs -

- Bleeding – excessive bleeding from any site.
- Jaundice – early (specially within 48 hours of birth), severe, prolonged
- Failure to pass meconium within 48 hours of birth
- Failure to pass urine within 24 hours of birth
- Bile-stained vomiting
- Persistent vomiting
- Poor feeding
- Lethargy (drowsiness)
- Excessive crying

On discharge

- Give BCG before discharge and document on Child Health Clinic Record (CHDR)
- Assess Exclusive breastfeeding:
  - arrange follow-up at Lactation Management Centre (LMC) where necessary

Advice on Discharge

- Keep warm – continue KMC home
- Wash hands before handling (for everyone)
- Avoid unnecessary handling
- Restrict visitors – (don't turn your baby into a doll to be handed round!)
- Know danger signs - seek help
- Continue exclusive breast feeding – in case of trouble shooting seek help from your LMC

Follow up in the Community

- Home visits by the Public Health Midwife (PHM):
  - 2 in the first 10 days
  - PHM should check on the following in the baby at each visit:
    - Immunization – check if BCG given
    - Ensure baby check done & CHDR given by hospital
    - Breast feeding technique
    - Danger signs - If present, refer immediately to the hospital.

(NB: the PHM can directly refer babies/ mothers to hospital/ clinic)

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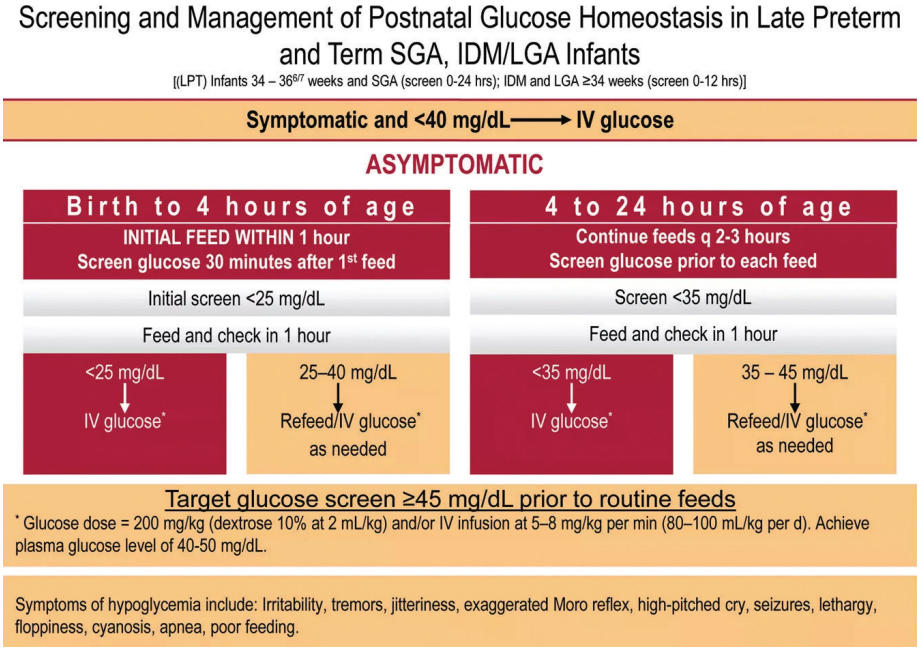
ANNEXURE I

Algorithm for management of hypoglycaemia -

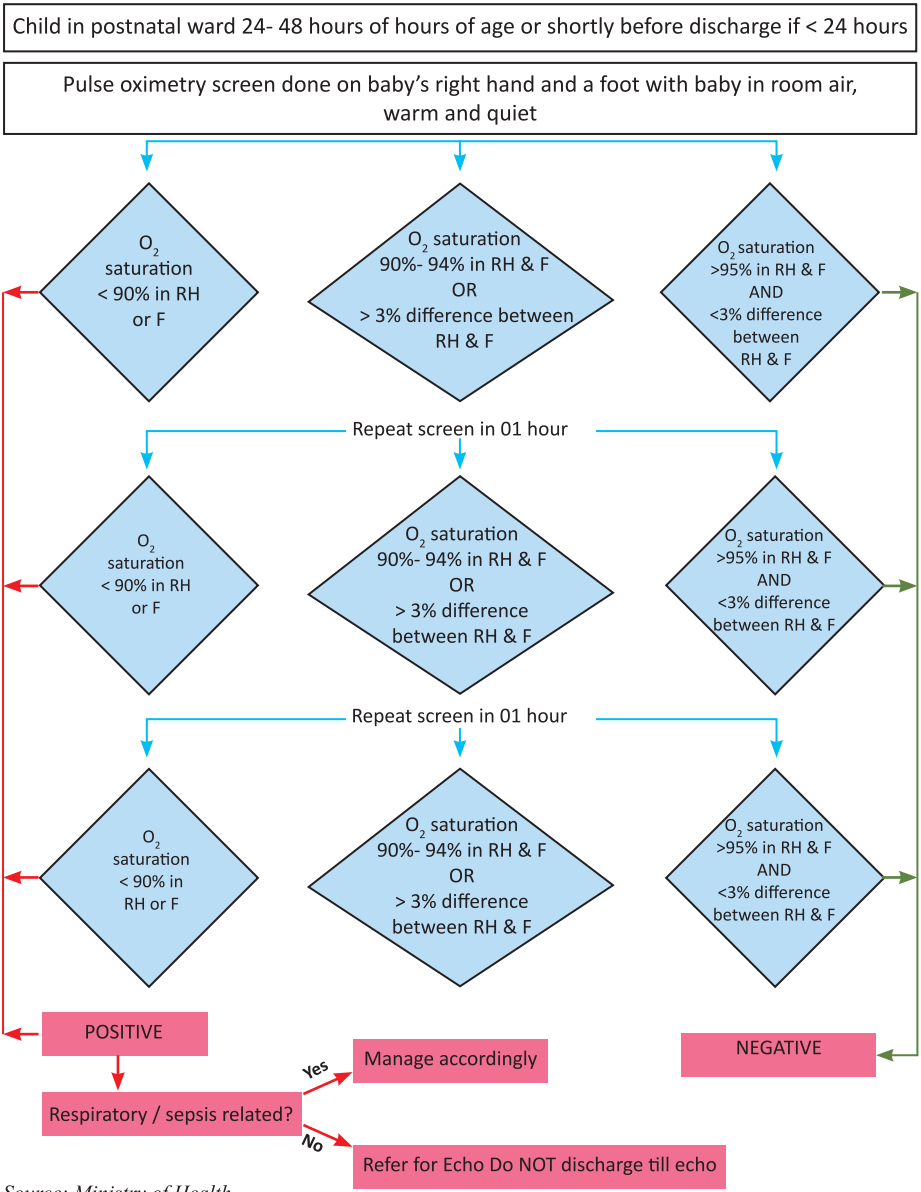


source: American Academy of Paediatrics http://pediatrics.aappublications.org/content/127/3; **ANNEXURE II**

Algorithm for O2 Saturation test

ANNEXURE I

Algorithm for O2 Saturation test



Source: Ministry of Health

ANNEXURE 11

cont. - Application of Oxygen Saturation probes- hand/foot

Saturation Monitor -

ANNEXURE III

Heel Prick test for Congenital Hypothyroidism –

Heel prick blood taken onto filter paper , before discharge of baby

Paper Sent to Karapitiya/ MRI by post, with contact details

Abnormal results will be phoned back to the peadiatrician/ward/MOH of the area where baby was born.

ANNEXURE IV

Acoustic Emission (Hearing) Test

3 Basic care in the neonatal unit

Dr.Nishani Lucas,
MBBS, MD, MRCPCH, DCH, IBCLC
Consultant Neonatologist, Professorial Unit,
De Soysa Hospital for Women,
Senior Lecturer, Department of Paediatrics, Faculty of Medicine,
University of Colombo
Internationally Board Certified Lactation Consultant (IBCLC)

Once a sick or "small" baby is stabilised after the critical phase, feeding growing and maintaining normothermia would be its next set of challenges before planning discharge.

Prevention from infection

- Ensure strict hand washing
- Breast feeding
- Skin to skin
- Minimal handling
- Ensure lines are out as early as possible
- Minimise visitors

Maintaining normothermia(36.5C – 37.5C)

- ***Incubator care***

Initially "small "baby is nursed in the incubator as it has limited ability to control its body temperature. Temperature control improves in the first 7 – 10 days as the skin permeability decreases.The incubator temperature is gradually weaned off, as the baby gradually develops the ability to maintain body temperature. This can be done using "servo control" where

the baby's target temperature is set and the incubator reduces its heat output to maintain the set target temperature or manually setting the incubator temperature which will result in a normothermic baby.

- ***Cot care***

Once the baby is able to maintain body temperature baby is nursed in the **open cot** with ongoing monitoring for hypothermia.

- ***Layering***

Layering with warm clothes is important. Baby shirt, nappy, flannel jacket with trousers / sleep suit, hat, mittens and socks with woollen / thick flannel blankets will help to keep the "small" baby warm

- ***Skin to skin*** (described under the chapter on thermal care)

Breast feeding the "Small Baby"

It is important to ensure that baby receives breast milk irrespective of the mode – direct/ tube or cup depending on the clinical situation. Breast milk is the best milk even for preterm babies as it provides sufficient nutrition. But it has to be supplemented by vitamin, iron, calcium and phosphorus supplements. Feeding should commence as early as possible (within first 6 hours). Support mother to express breast milk correctly; even ½ drop is in-valuable to the baby. Sick babies can be initially fed via tube, then graduated onto cup feeds and supervised breast feeds.

Mothers should be taught to feed and should be tested for competency and safety before planning discharge.

Check weight and head circumference

Ensure that weight is checked at least twice a week to see if weight gain is on track. Head circumference should be measured at least once a week to track brain growth.

Supplementation

Multivitamin (0.3ml/kg/day), folic acid (0.5mg once a week), iron supplements (prophylaxis 3mg/kg/day elemental iron) should be administered for all "**small " babies** until the age of 2 years.

Babies less than 34 weeks should be given calcium (200mg/kg/day), vitamin D 250 – 400IU and phosphate supplements (90mg/kg/day) in addition to the above till the baby is 4kg.

Retinopathy of Prematurity(ROP) Screening

Screening is indicated for all babies less than 34 weeks, below 1500g birth weight and any sick baby at 2-4 weeks gestation.

Neurodevelopmental assessment before discharge and during subsequent clinic visits

All babies should have a neuro developmental assessment prior to discharge, in order to detect early signs of abnormal neurological development (early hypertonia etc) . This will enable early intervention in the form of physiotherapy, occupational therapy or speech therapy to obtain better outcomes. Hammersmith Neurological Examination, General Movements Assessment are some tools that are useful in this assessment.

Immunization

Ensure immunization is given according to the chronological age according to the Expanded Program of Immunization (EPI).

Educate parents

Parents should be educated about;

- Identification of danger signs – poor activity, apnoea, milk coming through nose
- Plan of action in case of danger signs – first aid, how to transport and which hospital to go
- How to check for hypothermia and how to keep baby warm
- How to breast feed effectively – small babies may need limited time(10 min) at the breast initially followed by ad libitum feeding
- Bathing

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4 Developmental care

Dr. Nishani Lucas
Consultant Neonatologist, Professorial Unit,
De Soysa Hospital for Women,
Senior Lecturer, Department of Paediatrics, Faculty of Medicine, University of Colombo
Internationally Board Certified Lactation Consultant (IBCLC)

Developmental care is a broad category of interventions that is designed to minimize the stress of the NICU environment. Control of external stimuli (vestibular, auditory, visual, tactile) by noise and light reduction as well as minimal handling, clustering of nursery care activities, and positioning of the preterm baby to provide a sense of containment similar to the intrauterine experience is included under the umbrella of developmental care1. The goal of developmental care is to provide a structured care environment which supports, encourages and guides the developmental organization of the premature and/or critically ill infant.

1. Light reduction

Why is light reduction important?

Light reduction is important as this facilitates protected sleep which enhances growth and reduces unlimited light exposure as pupillary constriction is absent until around 32 weeks and light goes in through the thin eyelids even when sleeping[4].

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* (Figure 1) for babies less than 32 weeks gestation nursed in incubators. The incubators can be covered / uncovered using the multiple flaps according to the infant and care givers specific needs over the 24 hour period e.g. ward round examinations and cares vs sleeping. They should be changed every week or earlier if soiled to minimise infection.

Figure 1
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- 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.
- *Avoid fluctuating bright light on the baby's eyes during care giving procedures.*

  Provide eye protection (cover eyes with nappy/ rolled towel) for babies undergoing cannulation, umbilical line insertion etc. and also during phototherapy.

- Babies who undergo *ROP screening* should be *protected from light for a minimum of 12 hours* after the procedure.
- Darkness at night should be provided for infant approaching term by dimming lights near stable babies.

Which babies would benefit from light reduction[5]?

Babies less than 34 weeks gestation and those post Retinopathy of Prematurity (ROP) screening

Visual stimulation of the preterm baby[5]

- Minimise visual stimuli for babies less than 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

Enhance development of circadian rhythms[6]

Dim lights in room at night if safe to do so. A meta-analysis on cycled lighting effects on preterm infants in NICU reports a trend to improved weight gain, shorter length of hospital stay and less incidence of Retinopathy of Prematurity (ROP) when compared to near darkness or bright light[7].

2. Noise reduction

Why is noise reduction important?

Hi
gh frequency noises have been shown to cause impaired language development9 and 3rd trimester hyper-stimulation has been associated with disorganization of the auditory cortex9. Excessive auditory stimulation creates negative physiologic responses such as apnoea and fluctuations in heart rate, blood pressure, and oxygen saturation. Preterm infants exposed to prolonged excessive noise are also at increased risk for hearing loss,

abnormal brain and sensory development, and speech and language problems. Reducing noise levels in the NICU can improve the physiologic stability of sick
neonates and therefore enlarge the potential for infant brain development10.

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. Avoid loud noise and multiple sound sources.
- Attend to alarms promptly and set alarm volume as low as is clinically safe.
- Decrease volume/tone of telephone ring and no radios in rooms. Audio tapes are not recommended for babies less than 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 H2O.

Auditory stimulation of the preterm baby

Encourage parents to talk softly to their baby as cues allow from 28 weeks onwards.11 Start with soft voice leading on to normal conversation volume/ tone.

3. Protect babies from noxious odours

Why it is important?

Taste and smell receptors are thought to be functional and physiologic responses to unpleasant olfactory stimuli have been documented by 27 weeks gestation. Preterm infants will depend on alternate feeding methods like tube or cup feeding with expressed breast milk as they are not able to coordinate sucking, swallowing and breathing. These feeding methods deprive the preterm infant from normal sensory experiences of taste and

smell. Further, the unpleasant and noxious odours arising from the hospital disinfectants, solutions, and antibacterial compounds can have a negative impact on already deprived smell and taste sensations. The extended duration of alternative feeding methods also has a negative impact on the sucking behaviour of these preterm infants7.

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

Parents may familiarize their infant with the smell of breast milk by using milk soaked gauze prior to and during a feed which should be discarded immediately after use.

4. Minimising oral aversion and promoting suckling on the empty breast

Why it is important?

- Oral aversion: Preterm neonates have many negative oral experiences like insertion of endotracheal tubes, suctioning and insertion of oro-gastric 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 feeding13.

- 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. A systematic review on the effect of non-nutritive suckling reports significant decrease in the length of hospital stay and no clinically significant changes in weight gain, energy intake, heart rate, oxygen saturation, intestinal transit time, age at full oral feeds and behavioural state.

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 supervision12.

5. Tactile stimulation, minimal handling and clustering nursery activities

Why it is important?

Several studies have made consistent observations on adverse effects of such handling procedures that include hypoxia, bradycardia, sleep disruptions, increased intracranial pressure and behavioural agitation. Therefore appropriate tactile stimulation is indicat-ed at the same time ensuring minimal and gentle handling7.

What we can do?

- Swaddling a baby during the non-contact period provides tactile stimulation. It has been shown that swaddled infants have longer sleep and are less aroused; have lower heart rate and are calmer with prolonged sleep and fewer startles; alle-viates pain and prevents hypothermia. The study also reported improved neuro-muscular development and motor organization following swaddling7.

- Cluster cares, but avoid completing a number of potentially distressing interven-tions at the same time. If an infant indicates signs of stress during handling - stop and provide 'time out' for the infant to recoup from that intervention16.
- Combine doctors' ward rounds, nurses' care, blood sampling, gases etc. and en-sure that the baby has multiple opportunities of undisturbed rest.

- Do not unnecessarily examine stable babies at the end / beginning of each shift

- Gently prepare infant for handling with a soft voice or gentle touch to help promote physiological stability and state organization17 i.e. how babies manage to protect their sleep, comfort themselves and organise their sleep and awake states18.

- Interventions should ideally take place when an infant is in a gently aroused state and with consideration of infants' cues. Slow controlled gentle handling, abrupt/ fast changes in position are likely to be poorly tolerated for babies under 33 weeks16.
- Hold infants during feeding if awake - this includes tube feeding17.
- Vary infant head and body position-mindful of infant physiological status and response to handling17.

- To soothe infant during uncomfortable procedures contain infant-head and hands in midline, shoulders forward, lower limbs flexed and adducted towards the mid-line17. Elicit help from a parent or another nurse.

- Avoid stimulating the infant with stroking or patting babies under 32 weeks. Pat-ting or stroking may be tolerated for after 32 weeks.

- Where clinically possible consider day/night patterns for interventions from 24 weeks onwards like weigh infant, change bedding and encourage socialization in the daytime to enhance sleep/wake organization.

6. Positioning17

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, it helps in ex-utero move-ment development, prevents postural deformities and 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 2).

The nest

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

It can be made with rolled up towels / blankets or cot sheet

Step - - Roll the towel

Step 2- Fold towel into a "U" shape

Step 3 - Add a second rolled towel to snuggly fit the baby in flexed position

Step 4 - Cover with a soft cloth and tuck it in

Step 5 - The completed nest

Which babies need nests?

Nests are indicated for babies below 34 weeks, growth restricted but mature babies and acutely ill immobile newborn

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

Cleaning of the nest

The nest should be cleaned every 48 hours unless visibly soiled and the soft cloth that is used to line the nest should be cleaned daily

Prone position (Figure 2)

In this position 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.

Figure 2 : Prone Position

Figure 3 : Kangaroo care

Kangaroo care is another method of keeping babies in the prone position (Figure 3).

Side lying (Figure 4)

Helps to get their hands to their mouths for comfort, when upset as part of self-regulation. Babies naturally roll out of this position (figure 5)

Figure 4 : Side Lying

Figure 5 : Rolling out of side lying

Therefore need to use a rolled-up towel to support a tucked up, curled in position.

Supine position can be introduced during wake periods e.g. nappy changes when the medi-cal condition has stabilized. Face should look up towards the ceiling and should not be turned to either side. Rolled towels / roll pillows can be used to keep head in the midline. This will help the pressure to go down the back of head symmetri-cally and will prevent premature head shape which will occur if nursed with the cheek on the cot. It will also help the baby to learn to keep the head straight.

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 and emphasise the infant's potential low tolerance for stimulation.
- Encourage parents to assist with cares where they can, in particular gentle touch, containment during and after handling, top and tail wash and Kangaroo care where appropriate.

- Promote independence and enjoyment of maturing infant by encouraging parents with feeding and cares, in particular containment during and after and Kangaroo care.

Understand stress signals of the preterm baby and using consoling strategies18

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

The following indicate a stressed baby:

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

Consoling strategies

Implementation of developmental care in the neonatal unit calls for commitment and dedication rather than sophisticated equipment as mentioned above. Therefore the simple measures mentioned above such as reduction of light, noise, noxious odours, oral aversion as well as use of non-nutritive sucking on the empty breast, appropriate positioning by use of nests, involving parents in care identifying the stresses of the preterm baby and using appropriate consoling strategies can be easily undertaken in

any resource poor setting to improve the neonatal outcomes of our preterm babies.

Figure 7 : Containment holding

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5 Keeping a 'Small Baby' warm

Dr. Ruwanthi Perera
MBBS, MD, MRCPCH
Senior Lecturer in Paediatrics,University of Sri Jaywardenepura

Introduction

A fetus is in a constant temperature of 36^0C to 38^oC of the amniotic fluid throughout the pregnancy. However, it is exposed to a variable environmental temperature of the delivery suite at birth (which can be as low as 16^0C to 18^0C). This wide temperature gradient leads to a rapid heat loss from the new born and may result in hypothermia of the new born. The heat loss occurs via radiation, convection, conduction and evaporation mechanisms (fig 1).

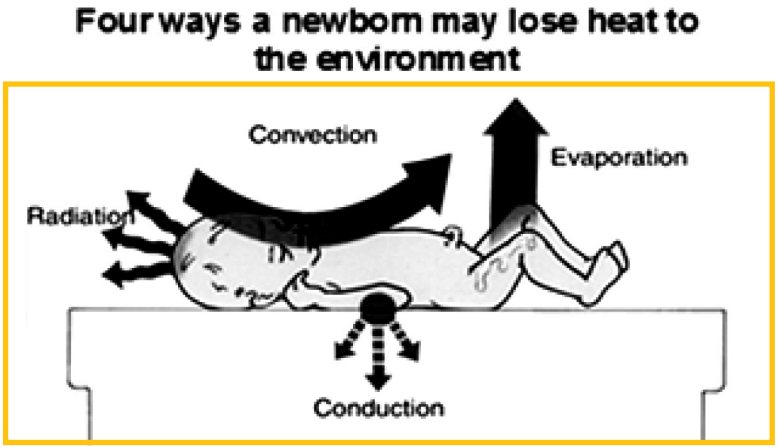


Figure 1

Heat conservation and regeneration mechanisms are not well developed in the new born, especially in the preterm. They have limited capacity to regulate temperature and are prone to drop core temperature. When heat loss requires an increase in metabolic heat production, **"cold stress"** occurs.

The **neutral thermal environment** is the optimal temperature zone for neonates; it is the environmental temperature at which metabolic demands (and thus calorie expenditure) to maintain body temperature in the normal range(36.5 to 37.5°C) are lowest. Prolonged, unrecognized cold stress may divert calories to produce heat, impairing growth.

Normal axillary temperature of a new born should be maintained between **36.5^{0}C to 37.5^{0}C**. This can be done by maintaining the warm chain.

Components of a "warm chain" include:

- a warm delivery room,
- immediate drying of the baby,
- establishment of "skin to skin contact" at the time of delivery
- initiation of breast feeding within one hour of delivery
- delaying the procedures like weighing and bathing
- using appropriate clothing and bedding
- keeping the baby and mother together
- maintaining warmth during resuscitation & transportation

Delivery Room

- The temperature of the delivery rooms should be maintained between 25^{0}C to 28^{0}C.
- **Three** pre warmed towels should be available to receive a baby, one each for drying the head and body and the third to wrap the baby.
- A proper fitting baby cap should be part of the baby attire as the relatively large head of the new born acts as a portal of heat loss.

Delivering a Small Baby –

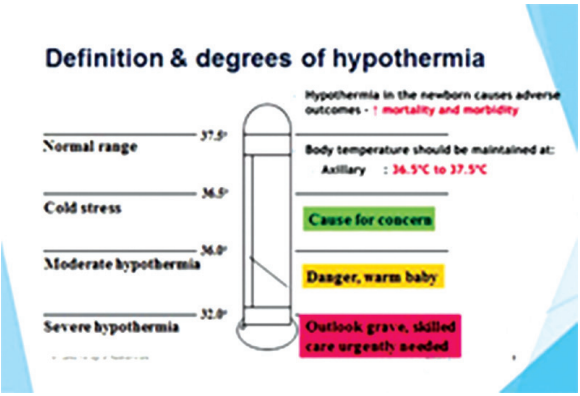
When delivering a very low birth weight baby (birth weight< 1500g), it is useful to use a clean plastic bag to minimize heat loss. In this situation, the baby is not dried, but delivered into the plastic bag. Thus the liquor (which is at body temperature) will keep the baby warm inside the bag. (fig. 2) The head and neck area is exposed, (for resuscitation purposes), therefore a cap should cover the head as in all babies.

Figure 2 – delivering into plastic bag

Postnatal ward

Bathing should be delayed till after 24 hours of age in all babies. Temperature of the post natal wards should at least be maintained at 250C and possible sources of cold air such as fans, windows & air vents should be attended. Rooming in should always promoted and regular, 4 hourly observations of the baby's temperature by way of touching and feeling should be carried out. Mothers should we well educated and trained on prevention of hypothermia (specially for the "Small Babies") before being discharged home.

Any core temperature below the normal range is defined as hypothermia and is graded according to the severity (figure 3).



The clinical features of hypothermia are a spectrum ranging from reduced activity and poor feeding to shallow irregular breathing and bradycardia. Hypothermia yields severe complications such as metabolic acidosis, hypoglycemia, internal haemorrhages, kernicterus and sclerema.

Kangaroo mother Care (KMC)

KMC basically means skin to skin contact of mother and baby, thereby using the moth-er's body heat to keep the baby warm. It is a very cost effective way of preventing hypothermia, especially in preterm babies. KMC enhances weight gain of the newborn. It regularizes breathing and reduces apnoeic attacks. By colonizing the baby with healthy maternal flora, it reduces the incidence of nosocomial infections.

KMC benefits mother as well, by improving the bonding with the baby. KMC can be carried out by the mother, father or any care giver. In babies with birth weight more than 1800g, KMC can be started from birth. Babies weighing between 1200g to1799g may take a couple of days to establish KMC. Haemo dynaemic stability is mandatory to start KMC.

Babies should be dressed with a sleeveless, front opening baby shirt and cap & socks. Mother can wear a culturally accepted light garment with a front opening (figure 4).

Figure 4- Attires for KMC

Positioning for KMC

Baby should be placed between mother's breasts in an upright position. Head to be turned to one side and slightly extended. Arms and legs should be flexed into a frog like position. Baby's abdomen should rest on the mother's epigastrium and the bottom should be supported (figure 5).

Figure 5: Positioning of the baby during KMC

Position of the neck, colour and temperature of the baby should be checked regularly while providing KMC. Duration of KMC should be gradually increased and can be carried out in any position (fig 6), even while the mother attends to her daily chores.

Figure 6: KMC Postures

When to start and where

KMC can be started in the SCBU and continued in the post natal ward and at home.

KMC can be discontinued when baby,

- reaches Term gestation(corrected age)
- reaches > 2.5Kg in weight
- feels uncomfortable

The above are guidelines, and there is no real time limit to stop KMC.

References

1. *Integrated management of pregnancy and childbirth: WHO Essential Newborn Care Course- Training Manual*
2. *Thermal protection of newborns, a practical guide, WHO -1997*
3. *Kangaroo Mother Care - A practical Guide - WHO 2003*

6 Prevention of neonatal sepsis

Dr Surantha Perera
MBBS (SL) DCH (SL) MD (SL)
DCH (UK) FRCPCH (UK) FRCP (Edin),
Consultant Neonatologist,
Castle Street Hospital for Women, Colombo

Introduction

More than 85% of infants born at 25 weeks of gestation now survive their preterm birth. A major cause of death in this category is infections The duration of hospitalization is inversely related to gestational age and extreme preterm babies are more susceptible for infection. Nosocomial infections (i.e hospital acquired infections) are a major cause of deaths in this group.

Nosocomial infections are defined as those that occur beyond 48 hours after birth and are caused by pathogens that are not maternally derived. These infections are acquired in the hospital while receiving treatment for other conditions.

They have considerable health and economic consequences. Healthcare associated infections in the neonatal units results in increased morbidity and mortality, prolonged lengths of stay and increased medical costs.

The reasons for increased risk of nosocomial infections

- Impaired host defense mechanisms
- Limited amounts of protective endogenous flora on skin and mucosal surfaces at time of birth
- Reduced barrier function of their skin

- Use of invasive procedures and devices
- Frequent exposure to broad spectrum antibiotic agents

The risk factors for Infection in newborn

- Low birth weight
- Prematurity
- Maternal infections
- Poor barrier functions in the skin
- Premature rupture of membranes >18hrs
- Catheters and central lines
- Ventilation

Signs & Symptoms of Infection in newborn

- Fever or Hypothermia
- Poor feeding
- Abdominal distension
- Apnoea
- Tachypnoea
- Oliguria
- Pallor
- Tachycardia
- Irritability
- High pitched cry
- Jaundice
- Petechiae

Organisms causing infection

- E coli
- Group B Streptococcus
- Staphylococcus aureus
- Coagulase Negative Staphylococcus
- Adenovirus
- Candida

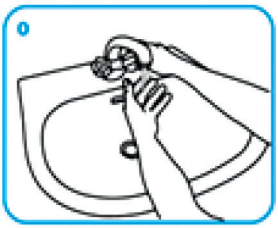
World Health Organization recommendations for hand hygiene

- Wash hands with soap and water when visibly dirty or soiled with blood or other body fluids or after using the toilet.
- Use of an alcohol-based hand rub for all routine antisepsis is recommended for all clinical settings if the hands are not soiled.
- If an alcohol based hand rub is not obtainable, wash hands with soap and water.
- Brushes are no longer recommended (even for surgical scrubs).

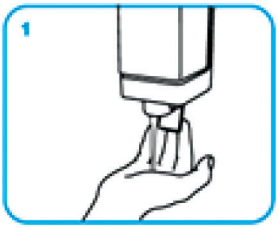
Hand hygiene

Hands are the main pathways of germ transmission during neonatal care. Hand hygiene is therefore the most important measure to avoid the transmission of harmful germs and prevent health care-associated infections.

Hand Washing Technique

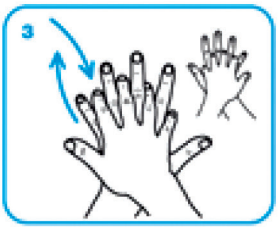


Wet hands with water

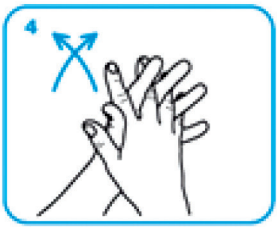


apply enough soap to cover all hand surfaces.

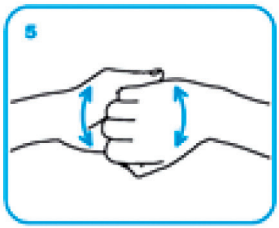
Rub hands palm to palm



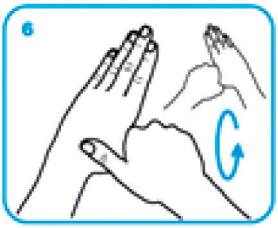
right palm over left dorsum with interlaced fingers and vice versa



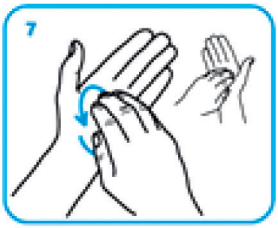
palm to palm with fingers interlaced



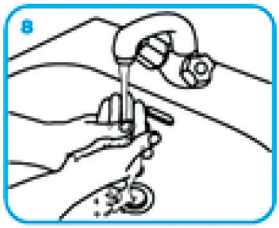
backs of fingers to opposing palms with fingers interlocked



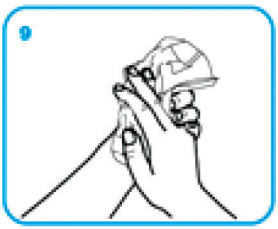
rotational rubbing of left thumb clasped in right palm and vice versa



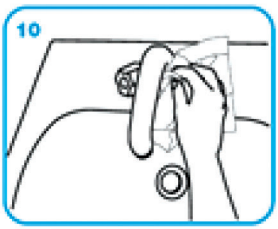
rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa.



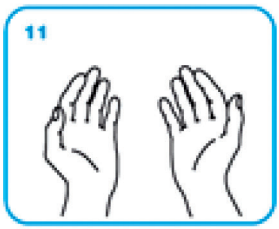
Rinse hands with water



dry thoroughly with a single use towel

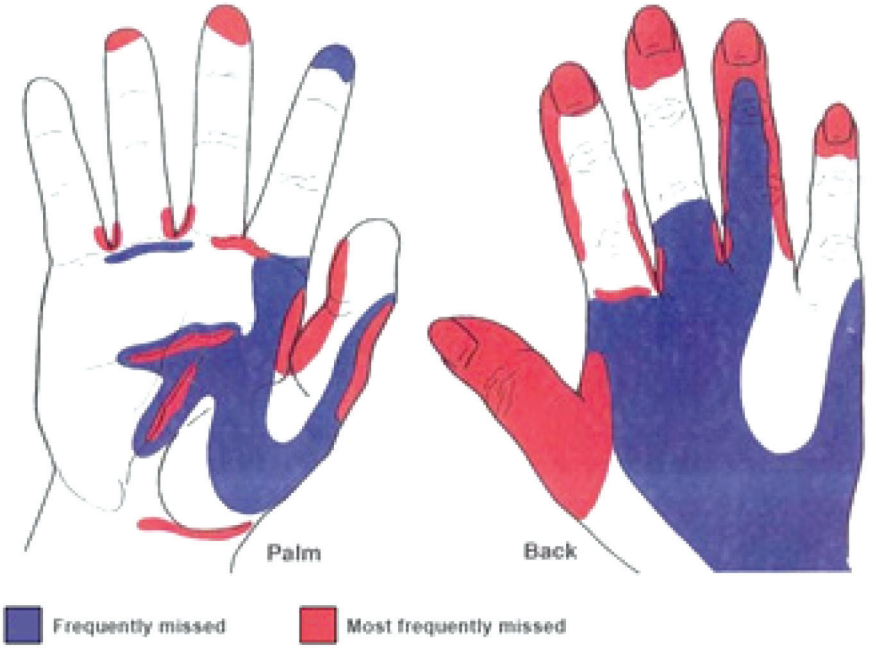


use towel to turn off faucet



...and your hands are safe.

Areas missed during hand washing & applying alcohol gel



Your 5 Moments of Hand Hygiene

When to perform hand hygiene

- Before and after touching the patient.
- Before handling an invasive device for patient care, regardless of whether gloves are worn.
- After contact with body fluids or excretions, mucous membranes, non-intact skin, or wound dressings.
- If moving from a contaminated body site to another body site during care of the same patient.
- After contact with inanimate surfaces and objects (including medical equipment) in the immediate vicinity of the patient.
- After removing sterile or non-sterile gloves.

Selection and handling of hand hygiene agents

- Provide products with a low irritancy potential.
- Ensure that dispensers are accessible at point of care.
- Provide alternative hand hygiene products for health care workers with confirmed allergies or adverse reactions to standard products.
- When alcohol-based hand rub is available, use of antimicrobial soap is not recommended.
- Soap and alcohol-based hand rub should not be used concomitantly

Other aspects of hand hygiene

- Gloves do not replace the need for hand hygiene.
- No artificial fingernails / extenders when having direct contact with the patient.
- Keep natural nails short.

Use of gloves

- Wear gloves for anticipated contact with blood, other potentially infectious materials, mucous membranes and non-intact skin.
- Remove gloves after caring for a patient.
- Do not wear the same pair of gloves for more than one patient.
- Change and remove gloves during patient care if moving from contaminated body site to either another body site (including non intact skin, mucous membrane, or medical device) within the same patient or the environment.

References:

1. *CDC and HIPCAC Guideline for infection prevention in NICU. Meeting of the Healthcare Infection Control Practices Advisory Committee March 14, 2013.*

2. *WHO. Clean hands protect against infection. www.who.int/gpsc/clean_hands_protection/en*