

**Kingdom of Cambodia**

**Nation Religion King**



**Ministry of Health**

# **Nursing Manual for Neonatal Care Unit**

**2018**



## Foreword

In Cambodia, neonatal care is one of important issue to improve health status of all people. To start all the lives of babies as healthy as possible is closely linked with the prosperity of the country.

According to Cambodia Demographic Health Survey in 2014, 18 babies out of 1,000 livebirths died during the first 28 days in this country. We had the great success to reduce the child mortality and achieved the Millennium Development Goal 4 by 2015. However, there is still space to improve neonatal health in the near future. The Cambodia government has continuously committed this issue. In December 2015, the Ministry of Health developed the 'Five-year Action Plan for Newborn Care in Cambodia, 2016-2020': the road map to improve the quality of early essential newborn care including 'Care for Sick Newborns'. The next goal of neonatal mortality is 14 per 1,000 live births by the year 2020 in Cambodia.

In the National Maternal and Child Health Center (NMCHC), around 7,500 babies including referred or high-risk cases are born annually. 12-13% of them admit to the neonatal care unit (NCU). To improve of quality of care for such sick or small newborn babies at NMCHC, the 'NCU manual for doctors' was developed in the year 2015 in cooperation with National Center for Global health and Medicine (NCGM), Japan. Not only medical doctors but also other staff such as nurses, midwives have referred to this manual and some trainees brought it to provincial hospitals where they are working. At the same time, many staff have requested a manual for nursing care at the NCU. Nursing care at NCU is the key for better quality of care for all newborn babies. Therefore, with the support of technical cooperation from NCGM and Japan International Cooperation Agency (JICA), NMCHC developed this manual for neonatal nursing care.

This manual aims to improve the internal clinical practice at NMCHC-NCU and for all the NCU at Complementary Package Activity (CPA) 3 level facilities.

Phnom Penh, May 18<sup>th</sup>, 2018



Professor Eng Huot  
Secretary of State

## Acknowledgments

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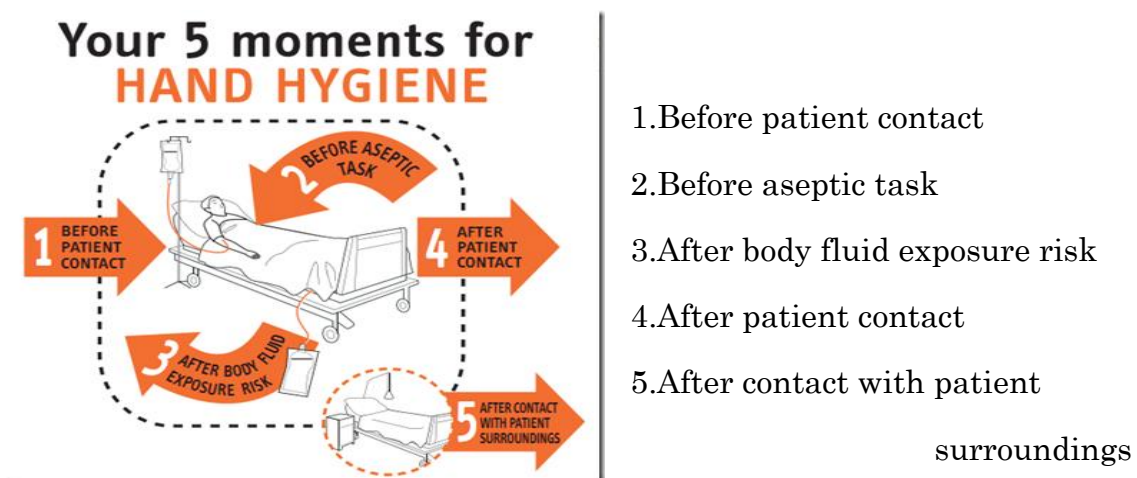
## Abbreviations

<b>CPAP</b>	Continuous Positive Airway Pressure
<b>HR</b>	Heart Rate
<b>IM</b>	Intramuscular
<b>IV</b>	Intravenous
<b>KMC</b>	Kangaroo Mother Care
<b>NCU</b>	Neonatal Care Unit
<b>NEC</b>	Necrotizing Enterocolitis
<b>NGT</b>	Nasogastric Tube
<b>NMCHC</b>	National Maternal and Child Health Center
<b>SpO<sub>2</sub></b>	Arterial hemoglobin oxygen saturation as measured by pulse oximetry
<b>STS</b>	Skin to Skin

# 1. Hand Washing

Hand hygiene is the single most important technique to prevent and minimize the spread of infection within health facility environments. A culture of hand hygiene should be encouraged not only among health care staff but also in patient's family.

When to wash hands in a health facility?



(Reference: Infection Prevention and Control Guidelines for Health care facilities, MOH, 2010)

## Methods of Hand washing

### <Routine hand washing>

Hands and wrists are washed for 40-60 seconds with soap and water. Hands are dried with a paper towel or, if unavailable, a single-use hand towel or air-dried. This type of hand hygiene is suitable for all routine procedures.



(Reference: Infection Prevention and Control Guidelines for Health care facilities, MOH, 2010)

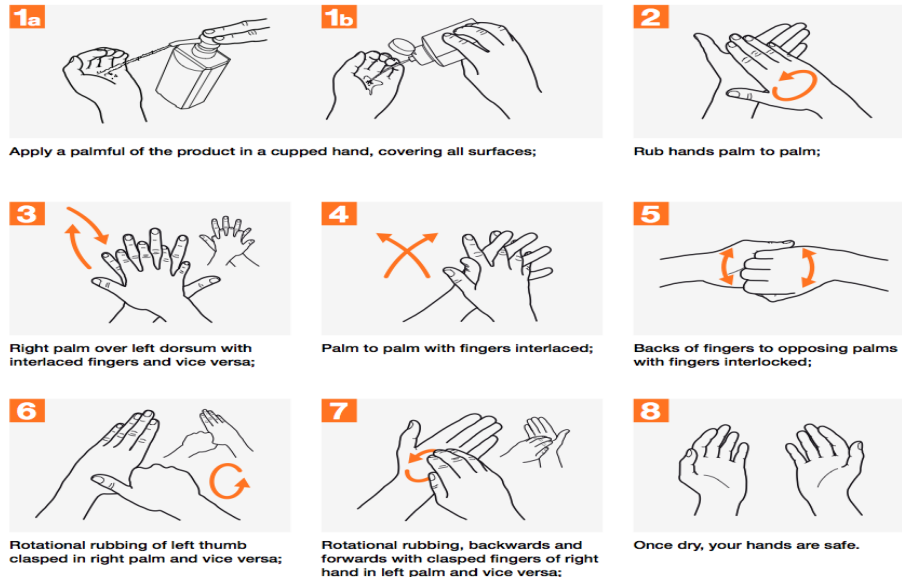
<Hand rub using alcohol rub>

Remove bacteria from hands with a water-less, alcohol-based hand rub. Apply enough hand rub to cover all areas of the hands. This is a standard procedure and should be used by all health care workers routinely.

# How to Handrub?

RUB HANDS FOR HAND HYGIENE! WASH HANDS WHEN VISIBLY SOILED

 Duration of the entire procedure: 20-30 seconds



(Reference: Guidelines on Hand Hygiene in Health Care, WHO, 2009)

Note: If you can access the flowing water and soap with enough time, hand washing is recommended than hand rub using alcohol rub.

## Hand drying

Hands must be properly dried because microorganisms transfer more effectively from wet surfaces. Cloth towels should not be used after they have become damp because they can be a potential source of infection. It is therefore recommended that single-use cloth towels or paper towels be used.

Note: If paper towels are not available, dry hands with a clean towel or airdry. Shared towels quickly become contaminated and should not be used. Using your own towel or handkerchief can help to avoid using dirty towels. If you use your own towel, it should be washed every day.

## References

- 1) Infection Prevention and Control Guidelines for Health care facilities, MOH,2010
- 2) Guidelines on Hand Hygiene in Health Care, WHO,2009



## 2. Taking Vital Signs

Vital signs are sign of life and an indicator of a baby's general physical condition. Nurses are in the best position to monitor the patient's progress, spot problems early and judge what care is needed to solve the problems.

### When to take vital signs?

- 1) On admission
- 2) Routine schedule every 3 hour  
(9am,12pm,3pm,6pm,9pm,12am,3am,6am)
- 3) Intensive schedule every 1 hour if any abnormal vital sign (e.g. respiratory rate  $>60$  per minutes, body temperature  $< 36.5^{\circ}\text{C}$  or  $> 38.0^{\circ}\text{C}$ )
- 4) Before nursing interventions influencing vital signs (e.g. weighing a baby, sponge bath)
- 5) Before treatment (e.g. insertion of IV lines)
- 6) Change in physical condition
- 7) On discharge

Note (1): Vital signs of routine schedule, admission and discharge, and before nursing care be combined together, therefore only one time to take vital signs at the time. (e.g. At 9am as routine schedule, before sponge bath and before feeding)

Note (2): Vital signs should be taken with the patient at rest. It is better to take vital signs in order of respiratory rate, heart rate and body temperature to avoid baby crying.

Note (3): Before taking vital signs, clean hands with soap and water or alcohol gel hand rub.

## Measuring respiratory rate

### <Method>

- 1) Keep baby warm with hat in draft-free room.
- 2) Measure respiratory rate for 60 seconds or 30seconds then multiply by two. (inhale + exhale = 1 breath)
- 3) Check the abnormal signs (see the below).
- 4) Write down respiratory rate on a nursing record.

### <Check points>

- 1) Normal range: 30-60 times/minute
- 2) Abnormal signs (see below):
  - Chest in-drawing (seesaw respiration)
  - Nasal flaring (nares dilation)
  - Labored breathing with retractions (retractive breathing)
  - Grunting (expiatory grunt)



ជង្រើមជីតផត Seesaw Respiration



ជង្រើមជង្រូក់ Retractive breathing



ន្រព្រមុះកែរម Nares dilation



ជង្រើមចូរ Expiatory grunt

(Reference: The NCU clinical manual. NMCHC. 2015)

Notes: small babies (less than 2.5kg at birth or born before 37 weeks gestation) may have some mild chest in-drawing and it is not abnormal for a baby to periodically stop breathing for a few seconds.

### <To evaluate the severity of respiratory disorder>

Silverman score can be used. Please refer the NCU Manual for doctors.

## Measuring heart rate

### <Method using stethoscope>

- 1) Clean a stethoscope with 70% ethyl alcohol on cotton wool and heat it with hand after washing your hand according to guidelines.
- 2) Place the stethoscope softly on the left side of the infant's chest it's just slightly above the nipple.
- 3) Measure the heart rate for 60 seconds or 30seconds then multiply by two.
- 4) Write down heart rate on a nursing record.

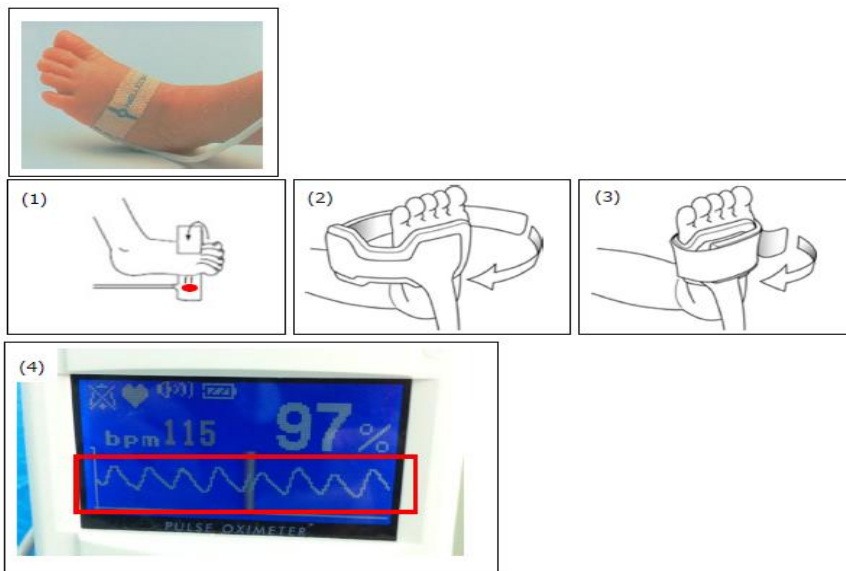
### < Check point>

Normal range: 100-180 /minute

Notes: At NMCHC-NCU, we set the maximum alarm at 200 per minute .

### Method using SpO<sub>2</sub> monitor

Make sure the probe is attached correctly (1-3) and waveform is stable. because the two measure points are opposite to each other (4).



- ពិនិត្យមើលតម្លៃជាគូលេខ Read the numerical values.

(Reference: The NCU clinical manual. NMCHC. 2015)

Note: The American Academy of Pediatrics recommends the sensor put on the **right hand** to avoid the effect of patent ductus arteriosus (PDA) during the first 48 hours after birth.



### **Measuring body temperature**

Ensure the baby as warm as possible during the procedure (warmly wrapped on a warm surface)

#### **<Method using Glass thermometer>**

Shake the thermometer until it is below 35°C.

- 1) Clean the thermometer with 70% alcohol on cotton wool.
- 2) Place the tip of the thermometer high in the apex of the baby's axilla and hold the arm continually against the baby for at least three minutes.
- 3) Remove the thermometer and read the temperature.
- 4) Write down temperature on a nursing record.



(Reference: The NCU clinical manual. NMCHC. 2015)

#### **<Method using Electronic thermometer>**

- 1) Press the button to set the thermometer and make sure 'Lo(Low)' appears in the display.
- 2) Place the tip of the thermometer high in the apex of the baby's axilla and hold the arm continually against the baby until the thermometer beeps.

- 3) Remove the thermometer and read the temperature.
- 4) Write down temperature on a nursing record.

Note: One thermometer per one baby.

**<Check points>**

- 1) Normal range: 36.5-37.5°C
- 2) Incubator setting (At the admission)

Body weight	< 1000g	1000-1500g	1500-2000g	2000-2500g
Incubator temperature	35°C	34°C	33°C	32°C

(Reference: The NCU clinical manual. NMCHC. 2015)

References

- 1) Early Essential Newborn Care, WHO,2014
- 2) Oxygen therapy for children, WHO, 2016
- 3) Safe Motherhood Clinical Management Protocols, Referral Hospital, MOH,2013
- 4) Kumiko Nakata; Method of measurement of vital signs, Neonatal care, vpl. 20 2007 (in Japanese)
- 5) The NCU Clinical manual, NMCHC, 2015
- 6) Managing newborn problems: a guide for doctors, nurses, and midwives. WHO, 2003

### 3. Newborn Resuscitation

For all deliveries and NCU babies, ensure that the all the resuscitation materials should be prepared at all time.

#### Materials

- 1) Infant warmer
- 2) Mask (size 0 and 1) and Ambu-bag (self-inflating bag with pressure release valve and optional intake do oxygen tubing)
- 3) Oxygen, with air-oxygen blender, and oxygen tubing compatible with bag valve mask

Note: if you cannot access oxygen, call help and start resuscitation without oxygen immediately.

- 4) Suction tube
- 5) Suction machine (negative pressure less than 100mmHg) with one bottle
- 6) Sterilized cup and clean water (to clean the suction tube)
- 7) Single-use suction bulb
- 8) Stethoscope
- 9) Clock with second hand

#### Procedure

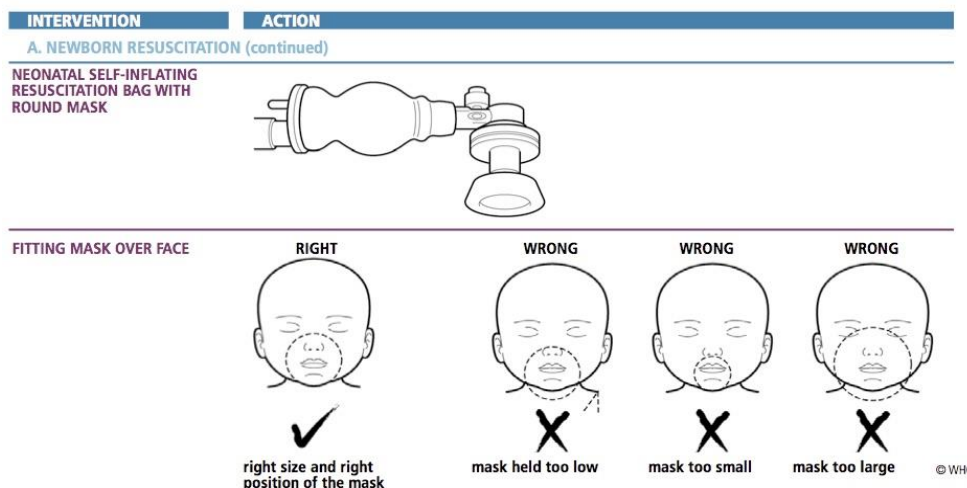
- 1) Immediate newborn and thorough drying with quick check of breathing.
- 2) If baby breathing, skin-to-skin contact covered with blanket and bonnet.
- 3) If baby gasping or not breathing after thorough drying and stimulation (for as close as possible to 30 seconds).
- 4) Call for help and explain gently to the mother that her baby needs help to breath.
- 5) Clamp and cut the cord immediately to allow effective ventilation to be performed.
- 6) Transfer the baby to the resuscitation area (a dry, clean and warm surface).
- 7) Keep the baby wrapped or under a heat source, if available.
- 8) Consider immediate referral at any point, where feasible.
- 9) Position the head so it is slightly extended (neutral position).

- 10) Only if the mouth/nose are blocked, introduce the suction;
- first into the baby's mouth 5cm from the lips and suck while withdrawing;
  - second, 3cm into each nostril and suck while withdrawing;
  - repeat once, if necessary, taking no more than total 20 seconds

Note: DO NOT do routine suction of the mouth and nose of babies with:

- clear amniotic fluid and they are breathing on their own,
- clear amniotic fluid prior to positive pressure ventilation and mouth and nose are free of secretions
- meconium staining but they have started breathing on their own vigorously.

- 11) Start bag/mask ventilation within one minute after birth:  
 12) Place mask to cover chin, mouth and nose to achieve a seal (closely).

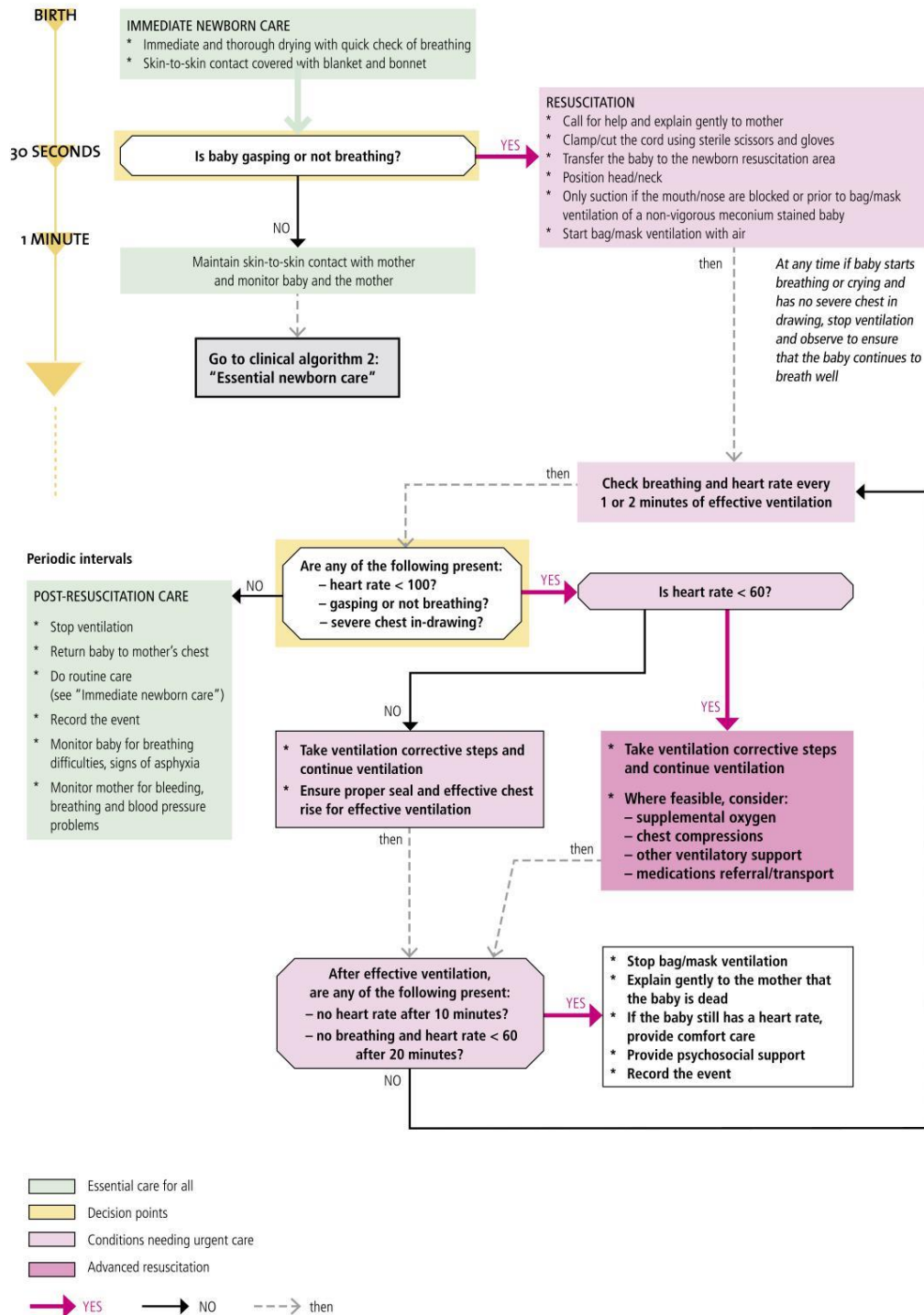


(Reference: Early Essential Newborn Care. WHO. 2014)

- 13) Squeeze bag attached to the mask with two fingers or whole hand, according to bag size, 2-3 times. Observe rise of chest.
- (1) **If chest is not rising;** first, re-position the baby's head.
  - (2) **If chest is still not rising;** check for adequate mask seal.
  - (3) **If chest is still not rising;** squeeze bag harder.
  - (4) **If chest is rising;** ventilate at 40 breaths per minute until baby starts crying or breathing.
- 14) Check breathing; and check heart rate every 1-2 minutes of ventilation.
- Assess chest rise
  - Assess heart rate

if heart rate is <100/minute, take ventilation corrective steps (see the algorithm).

### Algorithm 3: Newborn resuscitation



(Reference: Early Essential Newborn Care. Clinical practice pocket guide. WHO. 2014)



if heart rate is <60/min, where feasible give supplemental oxygen, chest compressions, other ventilatory support and medication. Call help and work with doctors as a team.

#### VENTILATING A NEONATE WITH BAG AND MASK

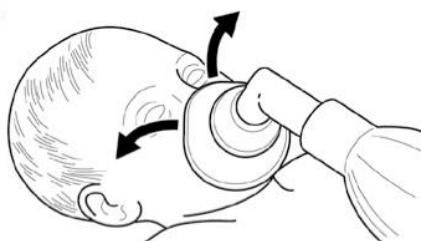
Lift the chin with the third finger of the hand holding the mask.  
Do not hyperextend the neck.



© WHO

#### INADEQUATE SEAL

If you hear air escaping from the mask, form a better seal.  
The most common leak is between the nose and the cheeks.



© WHO

(Reference: Early Essential Newborn Care. WHO. 2014)

**If baby fails to improve, follow ventilation corrective steps (see below)**

#### VENTILATION CORRECTIVE STEPS

- 1) Check position of head.
- 2) Check for adequate mask seal.
- 3) Check for blocked airway.
- 4) Check resuscitator bag (Connection, broken...).

15) At any time if the baby starts breathing or crying and has no chest in-drawing, stop ventilating. Observe to ensure that the baby continues to breath well. Then;

- return the baby to the mother's chest on skin-to-skin contact;
- exclude a second baby, give oxytocin (if not already given);
- wash hands, re-glove and trim the cord, as needed.

**If the baby is gasping or not breathing, or has severe chest in-drawing:**

- call a doctor;
- continue bag/mask ventilation;
- continue assessing at regular intervals while transitioning; and
- where feasible, consider supplemental oxygen, chest compressions, other ventilatory support and medications with doctors.

**If after 10 minutes of EFFECTIVE ventilation, the heart rate remains zero:**

- call a doctor;
- STOP bag/mask ventilation by doctor
- explain to the mother in a kind and gentle tone that the baby is dead;
- give support care and record the event.

**If after 20 minutes of effective ventilation, the baby does not start to breathe or gasp and heart rate is <60/**

- call a doctor;
- STOP bag/mask ventilation by doctor
- explain to the mother in a kind and gentle tone that despite all attempts you were unable to help her baby to breathe;
- provide comfort care, including warmth and psychosocial support and record the event.

Note (1): While ventilating, refer and explain to the mother what is happening, what you are doing, and why.

Note (2): Continue to ventilate, if needed, during transport.

Note (3): Record the event on the referral form and labor record.

Reference

- 1) Early Essential Newborn Care, WHO, 2014
- 2) Early Essential Newborn Care Facilitator Guide for Strengthening Immediate Newborn Care Practices, 2012
- 3) Technical specification of neonatal resuscitation devices, WHO, 2014

## 4. Routine Procedure at Admission

When baby has problems during the pregnancy, delivery or after delivery, the baby need to be observed in NCU for few hours. Then it will be decided where the baby admit according the admission criteria (see the NCU Clinical Manual Chapter 2).

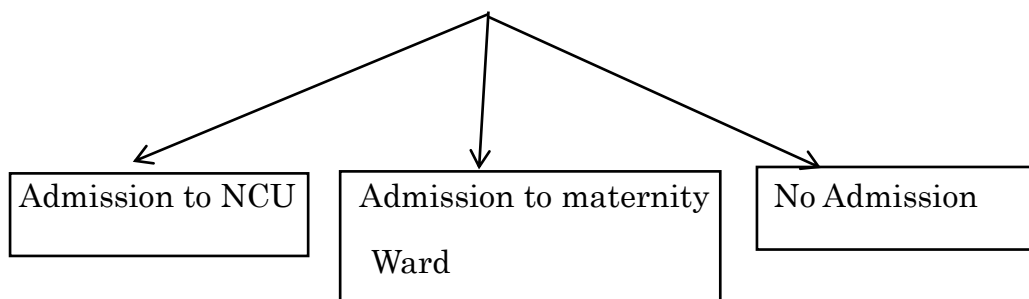
### Observation in NCU

- 1) Check the vital sign
- 2) Give Vitamin K<sub>1</sub> 1mg IM (record in the VitK<sub>1</sub> book )
- 3) Give Yellow Card to the family
- 4) Give baby the Gentamicin\* eye drops

} Routine work

\* Safe Motherhood Protocol recommends tetracycline 1% ophthalmic ointment for routine newborn care.

- 5) Check suck reflex with clean fingers to ensure a baby can breastfeed



### Admission to NCU

#### <Materials>

- 1) Infant warmer
- 2) Oxygen with air oxygen blender
- 3) Ambu-bag for newborn and Masks
- 4) Suction machine
- 5) Thermometer

- 6) Stethoscope
- 7) SpO<sub>2</sub> monitor
- 8) Nasogastric tube (NGT)\* (if needed)

\* We use the size 5Fr. for all babies at NMCHC but ideally it is better to choose adequate size (6Fr. if necessary) based on baby weight.

- 9) CPAP (if needed)

### <Documents>

Prepare the sheets as shown below:

- 1) Admission sheet
- 2) Nursing record/daily follow up sheet
- 3) Doctor's document
- 4) Ballard sheet
- 5) Midwife record (to check the record for admission to NCU)
- 6) Yellow card

### <Routine work>

- 1) Check the vital signs, record on the nursing record.
- 2) If SpO<sub>2</sub> is **less than 90%\***, start **oxygen therapy\*\*** with SpO<sub>2</sub> monitoring.

\*WHO recommends 88% for preterm babies (normal range: 88-95%) because of more oxygen toxicity, especially to prevent eye damage.

#### **\*\*Oxygen therapy:**

##### **[Indications]**

- (1) low SpO<sub>2</sub> (less than 90%),
- (2) central cyanosis,
- (3) respiratory rate > more than 70/min,
- (4) too sick to feed,
- (5) apnea.

**[Method]** with nasal prongs Note: Pay attention to obstruction by mucus

Fig. 12. Nasal prongs correctly positioned and secured



- 3) Insert an intravenous(IV) catheter if needed.
- 4) Insert a nasogastric tube if needed.

**<For the family>**

- 1) Explain importance of hand washing and cut nail properly.
- 2) Ensure that NCU allowed to have one family member to prevent the infection. It is not allowed to take children inside of NCU.
- 3) Give well explanation to take a temperature and change the nappy and record it.
- 4) Tell the family to prepare/purchase nappies and a small container with red lid (to keep the expressed breast milk).
- 5) Ensure that all materials have to be tidy up, it is not allowed to bring foods inside of NCU.

**Admission to the maternity ward (the patient with mild symptoms usually stays with mother)**

**<Routine work>**

- 1) Inform the care tacker to bring the baby to NCU 2 times/day\*.  
\* We should avoid separation of mother and newborn babies so ideally all care for babies who admitted to the maternity ward should be provided at the maternity ward as much as possible.
- 2) Check the yellow card and baby's ID.
- 3) Check the vital signs and record it on a patient chart.
- 4) Provide antibiotic injection 2 times/day (at 9AM and 9PM) for babies at risk for sepsis.

**Reference**

- 1) The NCU Clinical manual, NMCHC,2015
- 2) National Clinical Practice Guideline, NEONATAL SEPSIS, MOH, 2013
- 3) Oxygen therapy for children, WHO, 2016

## 5. Temperature Management

Body temperature of newborn babies is very susceptible to instability due to physical immaturity, illness and environmental factors. Temperature control is very important for neonates to avoid severe adverse outcomes (morbidity and mortality). If the body temperature is kept stable, it can conserve the energy without unnecessary wasting of calories.

### Definition

Normal body temperature range: 36.5°C – 37.5°C (axillary)

Hypothermia: < 36.5°C (axillary)

Hyperthermia: > 37.5°C

### Equipment

#### 1) Incubator

All preterm neonates  $\leq 1500$  grams at the admission should be cared for in an incubator wherever when it is available. The incubator needs to be changed every 14 days.

#### 2) Infant Warmer

Use for short time observation or multiple procedure. Preterm infants should only be nursed on an infant warmer in the event of multiple procedures that are unable to be undertaken in an incubator without loss of substantial heat.

#### 3) Cot (cradle, open crib):

Preterm infants weighing  $> 1500$  grams with a stable temperature. Perspex cots are preferential in the preterm infant to prevent heat loss due to their enclosed design.

### Assessment

- 1) Routine temperature assessment every 3 hours.
- 2) Need frequency of assessment following.
  - At admission.
  - Transfer to incubator, infant warmer, open cot.
  - Commencement or cessation of photo-therapy.

## Initiate incubator temperature

Body weight	< 1000g	1000-1500g	1500-2000g	2000-2500g
Incubator temperature	35°C	34°C	33°C	32°C

Note: Environmental humidity should be delivered via an incubator and commenced as soon as possible. The water reservoir within the incubator should be filled with boiled water to prevent bacterial colonization and change the water completely every 3 days. (mark the changing date on a tape on the drawer of humidity water container) Refill boiled water as required. After discharge, the water must be removed. The container should be disinfected and dried properly before new water for a new patient is inserted.

## Temperature control

### 1) Incubator

Increase or decrease incubator temperature by 0.2-0.5°C hourly. Check axillary body temperature hourly until two-times consecutive measurement in normal temperature range are recorded.

Note: Only alter incubator temperature by **0.5°C maximum at any one time** and allow at least one hour for the infant's temperature to stabilize before making further changes.

- (1) If the patient's body temperature is >38.0°C, initiate above procedure and observe patient for signs of infection, notify doctors when temperature still high.
- (2) If the patient's body temperature is >39.0°C, initiate above procedure
  - Sponge the baby for 10-15 minutes with water that is about 4°C lower than the baby's current temperature.
  - Measure the baby's body temperature every hour.
- (3) Ensure the baby's body temperature every hour.
- (4) If the patient's temperature is <34.9°C or prolonged hypothermia
  - Warm the baby immediately using a pre-warmed infant warmer.

Notes (1) : newborn babies should not be faster than 0.5°C every hour due to risk of brain bleeding and CO<sub>2</sub> metabolites.

Notes (2) : **Don't** open the windows of incubator to reduce temperature. **NEVER** switch the incubator off, as the fan does not work when the incubator is switched off.

**2) Infant warmer**

Increase or decrease the manual heater setting little by little and check axillary temperature hourly until two-times consecutive measurement in normal temperature range.

**3) Cot (cradle, open crib)**

(1) Assess environment (proper room temperature is 25-28°C) and what clothing baby wearing

(2) Correct any environmental factors  
(e.g. turn off fan or air conditioning)

- Ensure patient appropriately dressed for environment, remove or add layer of clothing or blankets if needed.

- Re-measure neonate's temperature one hour after each intervention

- Covered warm bottles with cloth and put them around the neonate to avoid hypothermia if needed.

(be careful for low temperature burn, leak out water from the bottle.

Be aware that no direct skin contact to the warm bottle!)

Note: If the patient's temperature is  $>38.0^{\circ}\text{C}$  or  $<34.9^{\circ}\text{C}$ , follow the procedure of temperature management.

**Transfer neonate from incubator to cot (cradle, open crib)**

(1) If the baby can keep body temperature adequately even with the incubator setting  $32^{\circ}\text{C}$ , the baby can get out of the incubator (it is ideal to keep incubator one day more in case of reuse).

(2) Start Kangaroo Mother Care at least 2 days before moving to the cot.



## References

- 1) Safe Motherhood Clinical Management Protocol Referral Hospital, MOH, 2013
- 2) The Royal Children's Hospital Melbourne (clinical guidelines, nursing)  
[http://www.rch.org.au/rchcpg/hospital\\_clinical\\_guideline\\_index/Temperature\\_Management/](http://www.rch.org.au/rchcpg/hospital_clinical_guideline_index/Temperature_Management/)
- 3) Kumiko Nakata; Method of measurement of vital signs, Neonatal Care, vpl 20 2007 (in Japanese)
- 4) National Protocol on Kangaroo Mother Care Training, MOH, 2017

## 6. Apnea Management

Apnea is a common problem in preterm neonates that may be due to an underlying illness or most commonly apnea of prematurity. In term neonates, apnea is almost always due to a pathological cause but they may rarely experience apnea of prematurity as well.

### Definition

Apnea of prematurity

- 1) Absence of breathing >20seconds
- 2) Any respiratory pause (<20 seconds) associated with bradycardia or cyanosis (oxygen desaturation)
- 3) < 37weeks gestational age

### Acute management

- 1) When the alarm of monitor is ringing, the neonate should immediately be observed for signs of breathing and skin color.
- 2) If apneic, pale, cyanotic or bradycardic, then tactile stimulation needs to be given. (Gentle rubbing stimulation of soles of feet or back is usually, all that is required for episodes that are mild and intermittent)
- 3) If the infant does not respond, bag and mask ventilation, along with suctioning and airway positioning, may be needed and call for doctors.

### General management

- 1) **Monitoring:** Keep the HR and SpO<sub>2</sub> monitor on. (Setting SpO<sub>2</sub> 90-off, HR100-200)
- 2) **Body temperature:** Keep in appropriate body temperature and avoid hyperthermia.
- 3) **Positioning:** Ensure the position the head slightly extended to maintain a patent airway.
- 4) **Feeding:** Ensure enough time for feeding.
- 5) **Clear airway:** Suction mouth and nostrils when needed.

### Family education

- 1) Ensure the neonates of premature babies are aware that apnea of prematurity is a normal occurrence and will resolve by the time 37 weeks' gestation is reached.
- 2) Ensure the parents of premature babies are aware of monitor alarm and able to stimulate then call nurses when needed.
- 3) Explain all interventions and why they are necessary (e.g. CPAP)

#### References

- 1) The NCU clinical guide manual, NMCHC,2015
- 2) Furuse Y, et al: Apnea of premature infants. Clinics in Perinatal Medicine 2010 the practical and essential 650-654, 2010 (in Japanese)

## 7. CPAP care

CPAP (Continuous positive airway pressure) aims to establish and maintain lung volume and it is a relatively simple and effective therapy for respiratory distress syndrome.

### Indications

- 1) Management of Respiratory Distress Syndrome (RDS) (RDS clinical signs: retraction, grunting, cyanosis, tachypnea, low SpO<sub>2</sub>)
- 2) Prevention for Apnea
- 3) Mild upper airway obstruction

### Materials

- 1) Nasal cannula (Size 0,1,2)
- 2) Sponge (for preventing ulcer of nose)
- 3) CPAP machine
- 4) Monitor (HR and SpO<sub>2</sub>)
- 5) Suction machine
- 6) Suction catheters (Fr.8, Fr.6 for preterm babies <1,500g)
- 7) Towels (to keep baby in good position)

### Application

- 1) Clean your hands with water and soap.
- 2) Assemble the CPAP machine and set it up according doctor's prescription.
  - Fill 1<sup>st</sup> bottle with water until red line
  - Fill 2<sup>nd</sup> bottle with water between both red line.
- 3) Put a pillow (towel) under the baby's shoulder.
- 4) Choose the correct size of cannula. (The following can be used as guide; Size 0: <1,500g, Size 1: 1,500 - 2,500g, Size 2: > 2,500g)
- 5) Clear nasal secretion before insert the nasal prongs.

- 6) Connect CPAP tube and cannula and place your hand close to nasal prongs to ensure there is air flow present.
- 7) Place the prongs to nostrils after put small sponge between the nostrils and cannula to prevent ulcer of nostrils.
- 8) Adjust the cannula but should not be too tighten.
- 9) Ensure ventilator tubing is well supported to prevent drag on the nasal interface.

### **Ongoing Care**

- 1) Take vital signs 3 hourly and fill in nursing record.
- 2) Ensure correct alarm settings (HR 100-200, SpO2 90-off\*)
  - \* To minimize the oxygen toxicity especially for preterm babies, the oxygen saturation should not be more than 95% strictly.
- 3) Keep the naso-gastric tube (NGT) open to decompress swallowed air into the stomach if necessary.
- 4) If the baby is being fed while on CPAP; close the tube for 30minutes after feeding and keep it open until the next feeding.
- 5) Keep the body temperature in normal range (36.5 - 37.5°C)
- 6) Change baby's position every 3hours or more frequently. (Supine with head in midline, Side lying with head to side)
- 7) Check cannula and nostrils every 3 hour or more frequently as necessary:
  - Clear secretions as necessary.
  - Assess nostrils for redness, erosion and bleeding and apply Vaseline or
- 8) Put antibiotic ointment on nostrils if with inflammation sign.
- 9) Change CPAP machine and CPAP tube every 7 days if it is used more than 1 week.
- 10) Check for presence of bubbling in bottles, temperature of circuit.
- 11) Check water level of bottles and fill boiled water as required.
- 12) Remove excess water from CPAP tube.

## Reference

- 1) The Royal Children's Hospital Melbourne (Clinical guidelines, nursing)
- 2) [http://www.rch.org.au/rchcpg/hospital\\_clinical\\_guideline\\_index/Continuous\\_Positive\\_Airway\\_Pressure\\_\(CPAP\)\\_-\\_Care\\_in\\_the\\_Newborn\\_Intensive\\_Care\\_Unit\\_\(Butterfly\\_Ward\)/#FlexiTrunk©](http://www.rch.org.au/rchcpg/hospital_clinical_guideline_index/Continuous_Positive_Airway_Pressure_(CPAP)_-_Care_in_the_Newborn_Intensive_Care_Unit_(Butterfly_Ward)/#FlexiTrunk©)
- 3) Oxygen therapy for children, WHO, 2016

## 8. Insertion of Naso-gastric Tube (NGT)

Naso-gastric tube is used for checking gastric contents and **for** feeding the baby. Incorrect placement possible to cause of vomiting, bleeding from a stomach and risk of aspiration pneumonia. Therefore, it is essential to confirm the tube is correctly placed every day.

### Materials

- 1) Gastric tube (Size 5\*)

\* We use the size 5Fr. for all babies at NMCHC but ideally it is better to choose adequate size based on baby weight.

- 2) Syringe (5ml)
- 3) Permanent pen (to record the date on the tape)
- 4) Adherence tape
- 5) Gloves
- 6) Stethoscope

### Methods

- 1) Prepare materials and the baby's position.
- 2) Clean your hands with water and soap
- 3) Wear gloves.
- 4) Estimate the required length of tube to insert: with the tube, measure the distance **from the the tip of the nostril to the lower tip of the ear lobe and the midpoint to the umbilicus**, and place a mark on the tube with pen or a piece of strapping.
- 5) Flex the baby's neck slightly and gently pass the tube through the mouth or through one nostril to the required distance.
- 6) In case of respiratory distress, abnormal crying or cyanosis, remove the tube immediately and let the child recover before starting over.

Note: Never force the gastric tube into the nostril if resistance is encountered.

7) Secure the tube in position with adhesive strapping.

Note: When you insert NGT, put into the nose or month gently, against to avoid to injure to skin or mucous membrane.

8) To Confirm proper placement of gastric tube:

(1) Quickly inject air with the syringe (1-2ml) and check the sound with the stethoscope on the patient's stomach (a characteristic gurgle should be heard).

(2) Aspirate with the syringe - gastric juices should appear in the tube.

Note: Change every 5 days prevent infection. If NGT was removed, insert a new NGT.

#### References

- 1) Safe Motherhood Clinical Management Protocols Referral Hospital, MOH,2013
- 2) <https://globalhealthmedia.org/portfolio-items/inserting-a-nasogastric-tube/?portfolioID=5623>



## 9. Feeding

Adequate nutrition during infancy is essential for lifelong health and well-being. Infants should be exclusively breastfed to achieve optimal growth, development and health. If nutrition is not enough, 1) both physiological and neurological development will be delayed, 2) The chance of catching infection will be increased. Feeding for preterm infants have to be very careful due to prematurity of them to digestive tract.

Oral feeding should not be started until the baby becomes more than 34 weeks of gestational week and/or body weight >1500g\*.

\* Small for Gestational Age (SGA) babies may be exceptions after we can check good sucking.

Colostrum, the yellowish, thick breast milk, which is produced at the end of pregnancy, is recommended as the perfect food for the newborn, and feeding should be initiated quickly after birth when the baby is clinical stable. Even if the baby cannot directly drink at the breast due to the illness, the colostrum can be expressed on a spoon and fed to the baby by dripping into the mouth.

### Keeping breastmilk

Type of breastmilk	Preservation methods	Should be used within
Fresh breastmilk (just expressed from a mother)	Room temperature	4 hours (Room temp: 25-35°C)
	Refrigerator	2-4 days (should be put into refrigerator immediately after expression from a mother)
	Freezer ( $\leq -20^{\circ}\text{C}$ )	1 month
Defrost breastmilk	Room temperature	4 hours (Room temp: 25-35°C)
	Refrigerator	24 hours

(Reference: Oyama M. Handbook of breastfeeding in NICU. 2010)

## Methods

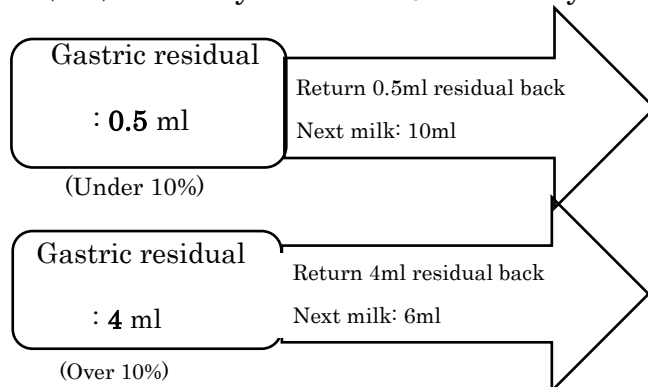
### <Feeding via NGT>

- 1) Clean your hands with water and soap.
- 2) Verify the amount of breast milk according to the order.
- 3) Explain the procedure to the care taker\*  
\* At NMCHC, the care taker feed the baby via NGT.
- 4) Place the patient in a semi-upright position.
- 5) Verify correct placement of the tube.
- 6) If there is any doubt about the tube's position, pull it out and insert another new one.
- 7) Pull softly gastric residual using 5ml syringe.

### < How to manage gastric remaining>

- Gastric residual : Under 10% of one time amount → Next milk: full milk
- Gastric residual : Over 10% of one time amount  
→ Next milk: return the remaining back and subtract it from the full amount

(Ex.) If a baby is taken 10ml milk by NGT,



- 1) Verify the amount of breastmilk according to the order.
- 2) Explain the procedure to the caretaker.
- 3) Change a nappy before feeding and clean the hands with water and soap.
- 4) Attach the syringe filled with required milk.

- 5) Push the syringe slowly. (more than 5 minutes)
- 6) Flush the tube with 0.5ml normal saline to prevent obstruction.
- 7) Record the quantity of milk administered on the nursing record.
- 8) Clean your hands with water and soap.

### <Feeding via cup>

- 1) Verify the amount of breast milk according to the order.
- 2) Explain the procedure to the caretaker.
- 3) Change a nappy before feeding and clean the hands with water and soap.
- 4) Hold the baby sitting upright or semi-upright on your lap, wrap the baby with a cloth to provide some support and to stop his or her hands from knocking the cup.
- 5) Hold the cup of milk resting on the lower lip so that the rim touches the baby's upper lip.
- 6) Tip the cup so that the milk just reaches the baby's lips.
- 7) A small baby will start to take all the milk into his mouth with his tongue. A term or big baby will suck the milk, spilling some of it.
- 8) DO NOT POUR the milk into the baby's mouth. Just hold the cup to the baby's lips and let him/her take it by him/herself.
- 9) Record the quantity of milk which the baby took on the nursing record.



(Reference: Early Essential Newborn Care. WHO. 2014)

Note: NEVER feed babies by bottles, for NEITHER breast milk NOR formula.

### <Breast feeding>

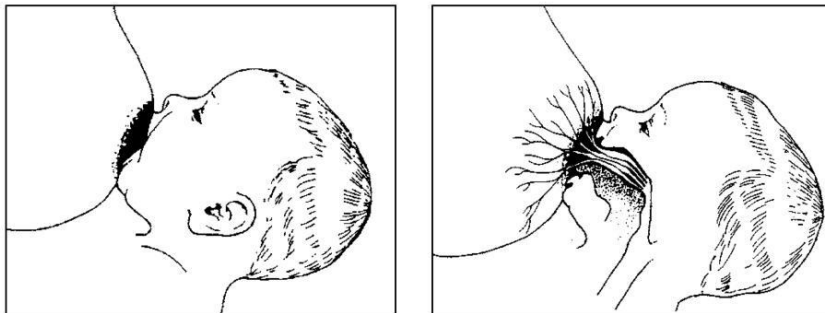
- 1) Explain to change a nappy before breast feeding and clean the hands with water and soap.
- 2) Support mothers for good positioning and attachment for breastfeeding. When the baby is ready, advise the mother to:

- make sure the baby's neck is not flexed or twisted,
- make sure the baby is facing the breast with the baby's nose opposite her nipple and chin touching the breast,
- hold the baby's body close to her body,
- support the baby's whole body, not just the neck and shoulders,
- wait until her baby's mouth is opened wide,
- move the baby onto her breast, aiming the lower lip well below the nipple.

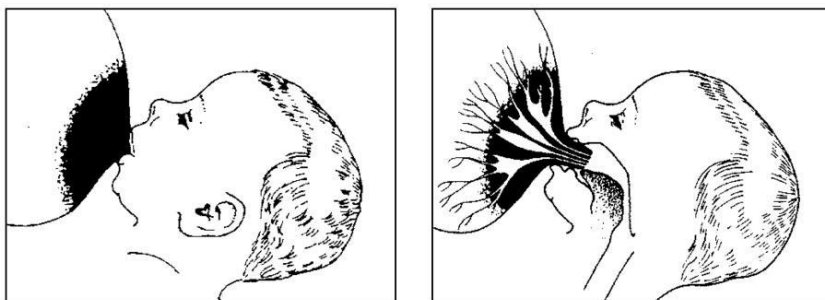
(3) Look for signs of good attachment and suckling, including:

- mouth wide open,
- lower lip turned outwards,
- baby's chin touching breast,
- slow and deep suckling, with some pauses.

**Good attachment to the breast**



**Bad attachment to the breast**



© WHO

(Reference: Early Essential Newborn Care. WHO. 2014)

Note: Breastfeeding is a learned behavior for both baby and mother. Baby will make several attempts to breastfeed before being successful. Health workers needs well explanation but should avoid interfering with this process (e.g. manipulating baby's head and/or body).

All materials (syringes, cups) for feeding must be cleaned with boiled water after cleaning with dish washing detergent and tap water.

#### References

- 1)The NCU clinical manual, NMCHC, 2015
- 2)Early Essential Newborn Care, WHO, 2014
- 3)Safe Motherhood Clinical Management Protocols Referral Hospital, MOH, 2013
- 4) Breastfeeding checklist, MCAT National Protocol, MOH,2016

## 10. Abdominal Care

Premature babies easily have abdominal distention. Abdominal distention hinders baby's breathing. If the abdominal distention is improved after stimulating rectal, performing enema or aspiration by NGT, that can be physiological. If the abdominal distention is not improved after above treatment, that can be abnormal abdominal distention such as neonatal necrotizing enterocolitis (NEC), meconium disease, etc.

### <Check points>

- 1) Regular stool excretion (after feeding, basically).
- 2) Good digestion of milk. (no gastric residual)
- 3) Good/audible bowel sound.
- 4) Good general condition. (stable vital signs)
- 5)

### Rectal stimulation

#### <Indication>

- 1) abdominal distention
- 2) constipation (more than 72 hours)

#### <Materials>

- 1) Cotton swab
- 2) Vaseline® (glycerin gel)
- 3) Gloves
- 4) Nappy
- 5) Wet tissues

#### <Methods>

- 1) Clean your hands with water and soap.
- 2) Prepare all the materials as above.
- 3) Wear gloves.
- 4) Put the baby on supine position and hold both legs with your hand.
- 5) Apply Vaseline® to a tip of cotton swab, insert it into the anus (1-2cm), and twist gently back and forth.

- 6) Remove a cotton swab.
- 7) Observe defecation and gas exhaust, and improvement of abdominal distention after the procedure.
- 8) Clean neonate buttocks and change a nappy.
- 9) Wash your hands carefully with water and soap.

## **Enema**

### **<Indication>**

Severe constipation with abdominal distention, **which cannot be improved by repeated rectal stimulation.**

Note: MICROLAX® includes too much salt do it may induce the misbalance of electrolytes in rectum especially for preterm babies. So, enema should not be recommended for preterm babies (only for term babies).

### **<Materials>**

- 1) MICROLAX® (syring-citrate)
- 2)~ 5): Same materials as rectum stimulation

### **<Methods>**

- 1) ~ 4): Same as rectum stimulation.
- 5) Remove the cap of MICROLAX®, insert the tip of it into anus (1-2cm) and push the contents into the rectum.
- 6) Remove the tube gently.
- 7) Put your finger with glove on the anus and hold after push MICROLAX® tube to avoid content comes out immediately. (amount of MICROLAX® depends on baby's weight. Follow the doctor's prescription.)
- 8) Observe defecation and gas exhaust, and improvement of abdominal distention after the procedure.
- 9) Clean neonate buttocks and change a nappy.
- 10) Wash your hands carefully with water and soap.

## Aspiration by NGT

When gastric residual is:

- 1) large amount of milk was aspirated based on previous feeding;  
➔ check abdominal distention and notify the doctor as soon as possible.
- 2) very few and/or old red color;  
➔ it is not necessarily to stop feeding.
- 3) bloody red and/ or contain bile (greenish, strong yellowish);  
➔ do not return it back. Notify the doctor as soon as possible to consider to skip next feeding based on baby's condition.

If aspiration is not obtained;

- 1) inject air (1-2ml) with the syringe and check the sound with stethoscope,
- 2) move/adjust the NGT 0.5- 1.0cm (pull out or push in),
- 3) try to aspirate again.

## References

- 1) Neonatal Care 2010 vol.23 no.6 (in Japanese)
- 2) Neonatal Care 2009 vol.22 no.2 (in Japanese)
- 3) Neonatal Care 2012 vol.25 no.4 (in Japanese)



## 11. Intravenous (IV) Line management

Notes: All procedure has to follow principles of infection prevention.

### Materials

- 1) Sterile catheter (24,26G)
- 2) Alcohol cotton (70%)
- 3) Sterile infusion set
- 4) IV fluid
- 5) Adhesive tape
- 6) Rubber band
- 7) Tray
- 8) Splint
- 9) Gloves
- 10) Infusion pump (syringe or bullet type)

### Procedure

- 1) Ensure good light (Transfer infant to an infant warmer if needed, **with** careful observation to keep the body temperature).
- 2) Prepare materials in a clean tray.

Note: Air embolism can occur easily in babies' body. It is essential to ensure that all components of the IV infusion set are filled with fluid that without air bubbles in the set before starting the infusion.

- 3) Clean your hands with water and soap.
- 4) Wear gloves.
- 5) Several parts of body can be used to establish an IV line. Common sites used for a baby are:
  - » Peripheral vein on the back of the hand or top of the foot (most common and preferred site),

- »Veins on the forearm, the front of the elbow, or around the ankle or knee  
(minimize use of the veins around the knee because there is a greater risk of the needle coming on contact with the bone),
  - »Scalp vein.
- 6) Prepare the skin over the vein using an alcohol cotton and allow to dry.  
Note: Do not touch the area which was cleaned! If you touch again to see the vein, remember cleaning again!!
  - 7) Use a rubber band to press on the skin near the vein.
  - 8) Insert the needle at a 15-degree angle through the skin, with the level of the needle facing upward:
    - »Once the blood fills the hub of the catheter, withdraw the needle partially while continuing to push the catheter in,
    - »When the hub of catheter reaches the skin at the puncture site, withdraw the needle completely,
    - »Dispose of the needle according to Infection Prevention Control guideline.
  - 9) Remove a rubber band.
  - 10) Connect the infusion set to the catheter:
    - » Check the natural drop smoothly,
    - »Ensure that there are no air bubbles in the infusion set,
    - »Infuse fluid when used a micro dropper, into the vein for a few seconds to make sure, that the vein has been successfully inserted. The fluid should run freely, and there should be no swelling around the site of the catheter,
    - »If swelling developed around the site of infusion, withdraw the needle from the vein and repeat the procedure using a different vein.
  - 11) Secure the inserted catheter in position using strips of adhesive strapping.

12) If using a vein in the hand, arm, foot or legs, immobilize the limb (e.g. an arm splint) and adhesive tape to minimize movement;

»Tape loosely at the top and over the fingers,

» Fingers/toes must be visible,

(See below)



13) Inspect the infusion site every 2 hour:

»Look for redness and swelling around the insertion site of the catheter with indicate that the catheter is not in the vein and fluid is leaking into the subcutaneous tissue;

»If redness or swelling is seen at any time, stop the infusion, remove the needle as soon as possible and establish a new IV line in a different vein; Check the volume of fluid infused and compare to the prescribed volume.

14) Record the findings.

15) Change the IV infusion set every 5-7 days at maximum. (can be a major source of infection)

Note: Solution containing glucose can cause tissue to die and should not be allowed to leak into subcutaneous tissue.

#### Reference

- 1) Safe Mother Hood Clinical Management Protocol Referral Hospital, MOH,2013

## 12.Administration of Intravenous(IV) Fluid

All procedure has to follow principles of infection prevention.

### Materials

- 1) Verified medications
- 2) Syringes
- 3) Extension tube
- 4) Needles (18G)
- 5) Adherence Tape
- 6) Alcohol cotton (70%)
- 7) Clean tray
- 8) Syringe pump
- 9) Microdropper

### Procedure for syringe pump

- 1) Verify the doctor's order.
- 2) Check **5R (1. Right Patient 2. Right Drug 3. Right Dose 4. Right Route 5. Right Time)** and expiry date.
- 3) Prepare materials in a clean tray.
- 4) Clean your hands with water and soap or alcohol glycerin.
- 5) Remove the cap or seal from the bottle and disinfect the tubing insertion site with an alcohol cotton.
- 6) Insert 18G needle into rubber site.
- 7) Pull out fluid into syringe by needle and add the medications carefully as doctor's prescription.
- 8) Put tape on a syringe and write down patient name, date and time on preparation.
- 9) Check **5R (1. Right Patient 2. Right Drug 3. Right Dose 4. Right Route 5. Right Time)** and apply to the patient.

- 10) Observe baby's skin around the catheter inserted and amount of infusion every 3 hourly.
- 11) Prepare the IV fluid just before it is needed. If the IV fluid wouldn't use immediately, keep it with needles (use clean technique) in a refrigerator.

Note: To move any fluid from the bottle to the syringe when you prepare the IV fluid, use a needle to aspirate fluid. Never leave one needle inserted in the vial cap for multiple uses. This provides a direct route for microorganisms to enter the vial and contaminate the fluid between each use.

### **Microdropper**

Microdropper (where 1ml=60 micro drops) allow slow administration of fluid and ensure that babies receive the volume of fluid they need. Main purpose of procedure is same as used a syringe pump.

- 1) Calculate the rate of administration and ensure that the microdropper delivers the fluid at the required rate.
- 2) Change the IV infusion set and fluid every 5days.

### References

- 1) Safe Motherhood Clinical Management Protocols Referral hospital, MOH, 2013
- 2) Infection Prevention Control Guideline For health facilities, MOH, 2010

## 13. Intravenous(IV) Injection

All procedure has to follow principles of infection prevention.

### Materials

- 1) Verified medications
- 2) Syringes
- 3) Needles(18G)
- 4) Alcohol cotton (70%)
- 5) Clean tray

### Procedure using syringe pump

- 1) Verify the doctor's order and the expiration dates.
- 2) Clean your hands with water and soap ~~or alcohol-glycerin~~.
- 3) Check 5R (1. Right Patient 2. Right Drug 3. Right Dose 4. Right Route 5. Right Time) and expiry date.
- 4) Prepare the medicine using clean technique.
- 5) Prepare materials in a clean tray.
- 6) Choose the adequate place for injection in the IV line, where the injection can be given as close as to the insertion site of the catheter (it depends on the type of catheter);
  - »Catheter without IV injection part: disconnect between the IV fluid syringe and extension line, inject with clean technique.
  - »Catheter with IV injection part: use the IV injection part, use clean technique.
- 7) If the IV fluid was infused without problem:
  - »Inject the material slowly, carefully observing the area around the catheter for swelling.

8) If there is any question as to whether the catheter is properly positioned in the vein,

»Stop the IV infusion,

»Flush the IV line if possible (as small volume as possible, maximum 0.5ml), observing the area around the catheter carefully for swelling that indicates that the catheter has come out of the vein,

»If the catheter is still in the vein, inject the material slowly, carefully observing the area around the catheter for swelling.

9) Observe and check for side effect.

Note (1): DON'T mix antibiotics (Gentamicin and penicillin) before IV injection.

Note (2): DON'T mix metronidazole into the IV fluid. Follow the doctor's prescription.

#### Reference

1)Safe Motherhood Clinical Management Protocols Referral Hospital, MOH,2013

## 14. Intramuscular(IM) Injection

All procedure has to follow principles of infection prevention.

### Materials

- 1) Vialified medication
- 2) Sterile syringe (1-5ml, the size available that has adequate markings for proper dose)
- 3) Needle (25G)
- 4) Alcohol cotton (70%)
- 5) Gloves
- 6) Clean tray
- 7)

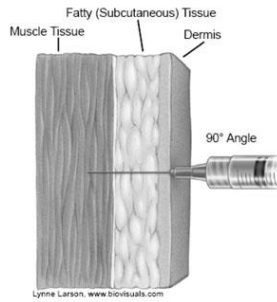
### Methods

- 1) Verify the physician's order.
- 2) Check 5R (1. Right Patient 2. Right Drug 3. Right Dose 4. Right Route 5. Right Time)
- 3) Clean your hands with water and soap.
- 4) Prepare the materials in a clean tray.
- 5) Wear gloves (if without gloves, clean your hands with water and soap).
- 6) Choose the injection site. Upper, outer thigh. (Quadriceps muscle)



- 7) Clean the injection site with alcohol cotton and wait for 35-40 seconds.
- 8) Grasp the center of the target muscle between the thumb and forefinger, if possible.
- 9) Insert the needle at a 90°angle through the skin with a single quick motion.





10) Withdraw the plunger of the syringe slightly to ensure that the tip of the needle is not in a vein (i.e. no blood should enter the needle):

If the needle is in a vein:

- » withdraw the needle gently but quickly without injecting the material,
- » apply gentle pressure to the site with a dry cotton-wool to prevent internal bleeding,
- » replace a new, sterile needle on the syringe,
- » choose a new injection site in other leg,
- » repeat the procedure described above.

After the needle reaches the muscle, inject the material with safety pressure for 3-5 seconds.

- 11) After completion of the injection, withdraw the needle and apply gentle pressure with a dry cotton wool.
- 12) Record the site of the injection on the nursing record and rotate the site of subsequent injections.

#### Reference

- 1) Safe Motherhood Clinical Management Protocols Referral Hospital, MOH, 2013
- 2) Safe Motherhood Clinical Management Protocols Health Centers, MOH, 2016

## 15. Taking Blood Samples

Determine how much blood will be needed to perform all necessary laboratory investigation and take enough blood at one time for all the tests, as much as possible. If only a small volume of blood is needed (e.g. blood glucose, bilirubin, etc.), use a capillary blood sample (heel prick). If a larger volume of blood is needed such as more than 1ml, use vein puncture.

### Vein puncture

#### <Materials>

- 1) Needles (23 or 24G)
- 2) Syringe
- 3) Appropriate blood tubes
- 4) Dry cotton wool
- 5) Alcohol cotton (70%)
- 6) Rubber band
- 7) Gloves
- 8) Adhesive tape
- 9) Clean tray
- 10) Safety box

#### <Procedure>

##### 1. Needle without syringe

Using needles 23-24G without syring is easier to draw blood without coagulation.

- 1) Clean your hands with water and soap
- 2) Prepare materials in a clean try.
- 3) Find a vein in baby's hand.
- 4) Wear a glove on your dominant hand.
- 5) Make circle with your fingers of non-dominant hand or bind with rubber band around the target vein.

- 6) Clean the baby's skin over the vein using alcohol cotton and allow to dry.
- 7) Stretch the skin and hold it firmly with your non-dominant hand.
- 8) Insert the needle (with shallow approach) through the skin, face it up.
- 9) Slightly move the needle until you see blood is coming.
- 10) Hold the tube under the needle. Just gently squeeze baby's hand to bring the blood.

Note: try not to touch the needle with the tube and keep free dripping, to reduce the risk of infection.

- 11) Remove the needle and cover the cotton wool.
- 12) Dispose the needle into the safety box carefully, give gentle pressure to the puncture site with a dry cotton wool for few minutes with adhesive tape.
- 13) Remove gloves and wash your hands with water and soap.

## **2. Needle with syringe**

- 1) Prepare materials in a clean tray.
- 2) Clean your hands with water and soap.
- 3) Wear gloves.
- 4) Find the vein and put the rubber band near the vein.
- 5) Clean baby's skin over the vein using an alcohol cotton and wait for dryness. Do not touch the area which has been cleaned!

Note: For blood culture, this procedure should be strictly complied with.

- 6) Insert the needle into the skin at an angle of about 15 degrees, with the level of the needle's facing upwards.
- 7) Pull generally on the syringe plunger as the needle is advanced. Once blood flows easily into the syringe, do not advance the needle any further.

Note: Take minimum but enough blood to perform all necessary laboratory investigation.

- 8) Remove the rubber band by your non-dominant hand.

- 9) Withdraw the needle from the vein, apply gentle pressure to the puncture site with a dry cotton-wool for several minutes to prevent internal hemorrhage.
- 10) Remove the needle to safety box and carefully transferring the blood into the tube.
- 11) Dispose of the syringe to safety box.
- 12) Remove gloves and wash your hands with water and soap.

### **Capillary blood sample (Heel Prick)**

#### **<Materials>**

- 1) Blood Lancets (28G)
- 2) Capillary tubes
- 3) Alcohol cotton (70%)
- 4) Dry cotton wall
- 5) Gloves
- 6) Adherence tape
- 7) Clean tray
- 8) Safety box

#### **<Procedure>**

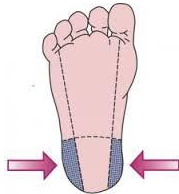
- 1) Prepare materials in a clean try.
- 2) Clean your hands with water and soap.
- 3) Put on gloves.
- 4) Clean the baby's skin of heel using an alcohol cotton and wait for dryness.
- 5) Flex the foot up towards the legs and hold it in this position with your non-dominant hand.
- 6) Squeeze the feel firmly enough to make it flush red (but not so much that is turns white).

Note: Warming heel prior to procedure helps easy flush.

7) Puncture the skin firmly with a lancet and dispose it into the safety box carefully: Aim towards the lancet;

»avoid the heel pad or toes, use the side,

»avoid using previously used sites, if possible.



Heel prick sites

8) Squeeze the heel gently and intermittently to enhance blood flow. Avoid excessive squeezing and rubbing of the heel, as this will cause bruising and dilution of blood with tissue fluid, giving an inaccurate result.

9) Collect blood into the tube, taking enough blood to perform all necessary laboratory investigation.

10) After blood is collected, have an assistant apply gentle pressure to the puncture site with a dry cotton-wall ball to prevent bruising.

11) Remove gloves and wash your hands with water and soap.

Note: A tiny or too shallow prick is more unpleasant for the baby because it will take longer to collect the blood and requires prolonged squeezing of the heel; in some cases, a second heel stick may be required. Excessively deep heel stick, however, can cause cuts, infection, and scarring.

## Reference

1) Safe Motherhood Clinical Management Protocol, MOH, 2013

## 16. Sponge Bath

Protection and preservation of the skin of term newborn babies are significantly important, because this organ acts as a barrier against infection and also is a major contributor to temperature control. However, bed bath requires high energy of babies due to evaporative heat loss. Therefore, it is important to check baby's condition before sponge bath and complete the process in a short time.

### Materials

- 1) Sterilized pot
- 2) Sterilized gauze
- 3) Sterilized cotton
- 4) Warm water
- 5) Nappy
- 6) Gloves

### Methods

- 1) Check vital signs before bathing and make sure baby's condition is good.
- 2) Prepare materials near the incubator (it is ideal for every material to be set on a table).
- 3) Clean your hands with water and soap.
- 4) wear gloves
- 5) Pour warm water in a pot.
- 6) Put gauze into the pot, take it, and wring it out gently.
- 7) Clean eyes at first then in the following order: face, head, ears, neck, chest, abdomen, arms, legs, back genital area and buttocks **at** last in order with wet gauze. (squeeze well after soak warm water)
  - »baby's eye from inside to outside with wet gauze. Don't repeat cleaning eyes using same side of gauze.
  - »to clean the umbilical cord area is important but when that area has any infectious

signs, do not use the same gauze.

»don't forget cleaning the axilla.

»one hand holds the baby's back to allow seating position then clean the back. Pay attention to baby's chin and chest in the seating position to avoid airway compromise!

»don't force fully to remove the vernix.

8) Change the nappy.

9) Dispose the gauze and wash the pot after use with detergent.

10) Remove gloves and wash hands with water and soap.

11) Write down the time on a nursing record.

Note: **DO NOT** do sponge bath when the baby's condition is unstable (e.g. hypothermia, cyanosis)

#### Reference

1) Care of the High-Risk Neonate, 6th Edition, Klaus & Fanaroff's

## 17. Weighing the Baby

After birth, babies lose weight (up to 20% usually), but most babies will have regained their birthweight by 7-14 days. Proper weighing the baby is important because it is used for the basis of clinical assessment and calculate amount of medicine and feeding.

### Materials

- 1) Weight scale
- 2) Spray ANIOS® (dodecyltrimethylammonium chloride)
- 3) Sterilized towels (to keep baby good position)

### Procedure

- 1) Check the yesterday's weight.
- 2) Clean your hands with soap and water.
- 3) Put the towel on a scale (to prevent heat conduction) and switch on the scale. (can use one of towel the baby has been using.)
- 4) Make sure '0' appears on the display (e.g. '0' for the scale with the towel).
- 5) Take off a nappy and remove a cap and socks if the baby wears.
- 6) Weight the baby quickly and make sure there are no big differences between the weight today and yesterday (If there are big differences, it may be mistake).

Note: Don't remove the SpO<sub>2</sub> sensor to observe baby's condition during weight measurement.

- 7) Lift up the SpO<sub>2</sub> sensor carefully.
- 8) Lift up the line carefully when baby who has IV line.
- 9) Ask assist changing the towels quickly to keep good position during weighing the baby if necessary. Cover the baby with towel during waiting time. (You can use one of towel the baby has been using.)
- 10) Move the baby back to the original place.
- 11) Record the baby's weight on the daily follow up chart.
- 12) Change the towel for next baby.
- 13) Spray ANIOS after you finish one babies weighing.



14) Clean your hands with water and soap ~~or alcohol-glycerin~~.

Note (1): Be careful the hypothermia specially to weigh the baby who are less than 1,500g.

Note (2): Assess the baby's condition before weighing and cancel it if baby is in severe condition and record the situation on the daily follow up chart.

## 18. Umbilical Cord Care

When there are no signs of infection, just keep the stump of cord (no need to put anything of the stump).

When there are any signs of infection of umbilicus or nearby skin (redness, swelling, draining of pus, foul-smelling, etc.), the baby needs appropriate care mentioned below.

### Care for infection of umbilicus

#### <Materials>

- 1) 0.5% Gentian violet

Note: when gentian violet is not available, you can tentatively use Povidone-iodine 10%. But it is not recommended because of too much iodine. Globally, chlorhexidine is recommended.

- 2) Sterilized Gauze
- 3) Gloves

#### <Procedures>

- 1) Clean your hands with water and soap.
- 2) Wear the gloves.
- 3) Clean the umbilicus and the surroundings with 0.5% gentian violet or four times daily until there is no more pus coming from the umbilicus.
- 4) Check other infection signs and notify doctor.

#### <Family education before discharge>

If the umbilical cord has not fallen before discharge;

»explain to the family that keep drying umbilical cord especially after sponge bath.

If the umbilicus or nearby skin is red and swollen, draining pus, or foul-smelling,

»take a baby to the clinic/hospital.

#### Reference

1)Safe Motherhood Clinical Management Protocols Referral Hospital, MOH, 2013

2)Early Essential Newborn Care, WHO,2014

## 19. Care of convulsion

Convulsion of newborn babies are relatively common, with variable clinical manifestations. Convulsion is often the first sign of neurologic dysfunction, and it is powerful predictors of long-term cognitive and developmental impairment. Neonatal convulsion can be difficult to be diagnosed because it may be short and subtle. In addition, the symptoms of neonatal conversion may mimic normal movements and behaviors seen even in healthy babies. However most of these can be prevented with good care and control.

### <Causes of convulsions>

- 1) Perinatal asphyxia
- 2) Intracranial hemorrhage
- 3) Metabolic abnormalities (Hypoglycemia, Hypocalcemia)
- 4) Congenital Malformations
- 5) Infections
- 6) Miscellaneous disorders (Benign neonatal convulsion etc.)

### <Symptoms>

- 1) Unusual bicycling or pedaling movements of the legs
- 2) Sucking, smacking, chewing and protruding tongue
- 3) Random or roving eye movements, eyelid blinking or fluttering, eyes rolling up, eye opening, staring.
- 4) Stiffening or tightening of the muscles
- 5) Continuous extension or flexion of arms and legs, either synchronous or asynchronous.
- 6) Apnea

### <Patients care>

- 1) Observe the baby carefully. If possible, try to dampen the movement with clean hand to differentiate between convulsion and physiological tremor or others.
- 2) Call a doctor quickly when convulsion occurs.
- 3) Check vital signs and observe the movements of a baby.
- 4) Measure blood glucose. If the blood glucose is less than 50 mg/dl, notify it to the doctor.
- 5) Keep airway properly and put baby in safe position.
- 6) If no breathing, give resuscitation with bag and mask and oxygen.
- 7) Give the adequate medicine according to the doctor's order.
- 8) Follow up the baby after giving medications. (vital signs and movements.)
- 9) Record when the convulsion occurs on a nursing record.

### <Family care>

- 1) Ask families to notify a nurse quickly when the baby has abnormal movements.
- 2) Explain the families that they can tough the baby but avoid over stimulation by noise and excessive handling.
- 3) Ask families to handle gently, support the baby's entire body, especially the head, to prevent injury when the baby's muscle tone is low after convulsion.
- 4) Explain to families that Phenobarbital (usually use NG tube for administration) can make the baby very sleepy for several days.

### References

- 1) Safe Motherhood Clinical Management Protocols Referral Hospital, MOH,2013
- 2) The NCU clinical manual, NMCHC,2015
- 3) WHO guidelines on Neonatal Seizures, WHO,2011

## **20.Care for the Infants under Phototherapy**

Physiological Jaundice appears at 24-72 hours of age, maximum intensity at 3-5 days old in term and 7 days in preterm baby after birth. It disappears without any treatment.

Some babies show non-physiological jaundice, which reaches dangerous levels of bilirubin and does not disappear by itself. Such non-physiological hyperbilirubinemia needs phototherapy. It is very important to observe neonatal jaundice regularly to recognize hyperbilirubinemia early and treat with the phototherapy appropriately to prevent severe brain damage.

### **Risk Factors for neonatal jaundice**

- 1) ABO or Rh incompatibility
- 2) Bruising (including due to trauma)
- 3) Delayed passage of meconium
- 4) Prematurity
- 5) Dehydration/poor sucking
- 6) Neonatal sepsis

### **Materials**

- 1) Phototherapy unit
- 2) Eye cover
- 3) Cover to incubator to avoid blue light for caregivers
- 4) Blood lancet 28G
- 5) Capillary tube

### **Methods**

- 1) Clean your hands with water and soap
- 2) Commence photo therapy as the doctor's prescription. Ensure eyes and genital are covered with a cleaned mask and a nappy during the photo therapy.
- 3) Confirm the 50cm distance between the phototherapy unit and the baby.

- 4) Ensure that phototherapy unit is turn off every 3hours for checking vital signs and eyes (discharge/infection/damage) and document any changes in a nursing record.
- 5) Ensure that phototherapy unit is turned off during the nursing procedures. (e.g. weighing the baby, bed bath etc.) Also turn it off when apnea occurs to check baby's cyanosis.
- 6) Ensure that phototherapy unit is not turn off long time during treatment.
- 7) Assess baby's temperature (especially at the time for commencement or cessation of the phototherapy) and manage it if baby's temperature is outside of normal range.
- 8) Covers around the phototherapy unit to avoid blue light outside of the area.

Note: During the phototherapy, he baby need more water intake than usual. Pay attention to the condition (urine and any sign of dehydration).

### **Family care**

- 1) Explain to families why the baby needs phototherapy and importance of covering of eyes and genital. Ask also the families to expose the baby's skin as possible during the phototherapy.
- 2) Encourage the mother to do the breastfeeding if condition allows. Remove eye mask during the breastfeeding.

### References

1) Safe Motherhood Clinical Management Protocols Referral Hospital, MOH,2013

2) The royal children's hospital Melbourne, clinical guideline, nursing

[http://www.rch.org.au/rchcpg/hospital\\_clinical\\_guideline\\_index/Phototherapy\\_for\\_neonatal\\_jaundice/](http://www.rch.org.au/rchcpg/hospital_clinical_guideline_index/Phototherapy_for_neonatal_jaundice/)

## 21. Cleaning Equipment

Dirty equipment can cause infection or transmit the infection to other. It is important to clean equipment properly to prevent the infection.

**Incubator and cot (cradle, open crib) which has been using**

### <Materials>

- 1) Spray ANIOS
- 2) Sterilized Towel
- 3) Gloves

### <Procedure>

- 1) Clean your hands with water and soap.
- 2) Wear gloves.
- 3) Spray the ANIOS to a sterilized towel and wipe the incubator or cot (cradle, open crib) from the top to the bottom.

**Incubator after a baby discharge**

### <Materials>

- 1) 25ml ANIOS STERANIOS (glutaraldehyde solution (2%)) +5liters of water
- 2) Spray ANIOS
- 3) Sterilized Towel
- 4) Water tank
- 5) Gloves

### <Procedure>

- 1) Clean your hands with water and soup.
- 2) Wear the gloves.
- 3) Prepare necessary volume of material 1 in the big basin (total volume: 30 liters) that has been supplied with the part of incubator
- 4) Dismantle the incubator in order.



- 5) Soak all the dismantling parts in the solution for 30 minutes then rinse with boiled or tap water.
- 6) Dry all the parts with sterilized towel.
- 7) Spray ANIOS to the frame, mattress and underside of incubator keep them at least 5minues, then dry it with sterilized towel.
- 8) Assemble the incubator again in order.
- 9) Cover the incubator and keep it for the next patient.
- 10) Remove Gloves and wash hands with water and soap

#### **Cot (cradle, open crib) after a baby discharge**

- 1) Material and procedure is same as “cot has been using”.
- 2) Clean the mattress, underside of mattress and the space of under the cot (cradle, open crib), which normally families keep their materials.

#### **CPAP after a baby discharge**

##### **<Materials>**

- 1) 25ml ANIOS +5liters of water
- 2) Alcohol glycerin (70%)
- 3) Sterilized towel
- 4) Washbasin
- 5) Gloves

##### **<Procedure>**

- 1) Wash your hands with water and soap.
- 2) Wear gloves.
- 3) Gently remove the heating element from the silicon tube and clean it with alcohol glycerin (70%) then keep it until dry.

Note: This sensor is very sensitive, don't hold or twist during the process.

- 4) Wash bottles with dish washing detergent then rinse off the detergent with water.

- 5) Wash the silicon tube with long brush.
- 6) Prepare necessary volume of material 1) in the washbasin (total volume: 20 liters) that has been supplied with the CPAP machine.
- 7) Put the bottle set and the silicone tube inside the basin.
- 8) Connect the small clear tube with the bottle. Use plugs that are hanging inside the basin to seal the bottles and tubing.
- 9) Turn the pump's power switch on to run the pump.
- 10) When small amount of water to flow out of the top of one of the bottles, turn this bottle as needed so the water flows back into the basin.
- 11) Keep the pump running for 1 hour.
- 12) Turn off the pump.
- 13) Disconnect all of the tubing, remove all of the caps, disconnect all of the connectors, and turn the bottles upside down.
- 14) Fully submerge all of the parts in the disinfectant solution to disinfect the parts that were not constantly contacting the solution previously. Let sit for 1 hour.
- 15) Carefully remove all of the pieces from the washbasin and discard the disinfectant solution.
- 16) Rinse all of the bottles, tubing, and connectors inside and out with boiled water.
- 17) Allow all of the CPAP pieces to dry.
- 18) Remove the glove and wash your hands again.
- 19) Wipe the heating element with alcohol glycerin (70%) for the second time.
- 20) Hold the tube-set vertically and ease the heating element back in.

Note: DO NOT under any circumstances forcibly push the heating element into the tube because this can easily cause permanent damage to the heating element.

- 21) Place the dried equipment in a clean plastic bag for storage for the next patient.

## **Monitor and syringe pump after a baby discharge**

### **<Materials>**

- 1) Spray ANIOS
- 2) Sterilized Towel
- 3) Gloves

### **<Procedure>**

- 1) Clean your hands with water and soap
- 2) Wear gloves.
- 3) Remove a tape from SpO<sub>2</sub> sensor.
- 4) Spray the ANIOS on the sterilized towel and wipe the monitor and sensor or syringe pump.
- 5) Keep it tidy for next patient.
- 6) Remove gloves and wash hands with water and soap

Note: After Spray ANIOS, you need 5 minutes at least ready to use.

### References

- 1) CPAP Washbasin manual, MTTS [www.mtts-asia.com](http://www.mtts-asia.com)
- 2) IPC guideline, MOH

## 22. Family Support and Education

It is not surprising that the birth of a fragile child, who is then cared for in a NCU, can be particularly stressful for the parents. The parents of NCU infants were more upset, anxious, and depressed compared with parents of full-term or healthy infants. NCU staff needs to provide psychological support for the parents. Provide the knowledge and skills to the parents (or family members), make sure they are able to take care of the baby during the admission then reduce the anxiety after the discharge.

We cannot rescue all the babies even with all the best treatment at our NCU. It is also very important for the family (especially mother) to be taken care by the staff when the baby die.

### Psychological supports

- 1) Create comfortable environment for parents.  
(e.g. self-introduction, tender voice, silent environment)
- 2) Show always respect and supportive attitude to the family.
- 3) Active listening.
- 4) Organize briefing to the parents (or care-taker) about a disease by doctor when the baby's condition has changed.
- 5) Encourage the parents to ask if they have questions and respond them.
- 6) Encourage the parents to touch the baby as much as possible (in adewuate way supported by staff).

Note: Do not forget that the parents (or care-takers) have never been to NCU, all the procedure in NCU is the first time for them. For them, even small things need explanation.

### Ongoing care

- 1) At least one nurse should stay at nursing station to observe patients and care takers and to provide easy access if family has any problems.
- 2) Check the baby's temperature after care taker took it and apply best solution when needed.

- 3) Stay together and explain all the steps when a baby starts the feeding or change the feeding methods (e.g. from NGT to cup feeding, cup feeding to breast feeding) until the care taker feels enough confidence.
- 4) Explain about what to do when apnea occurs and stay closely until the care taker is able to stimulate baby well. If baby is still not breathing, the care taker needs to call staff.

### **Education before the discharge**

#### **<Warmth>**

- 1) Kangaroo Mother Care (KMC) help maintain the body temperature of baby and protect the newborn baby from every reason of hypothermia.
- 2) When KMC is impossible, dress baby or wrap in a soft dry cloth. For all babies, cover the head with a hat, if needed.
- 3) DO NOT leave the baby in direct sun.

#### **<Hygiene>**

- 1) Careful hand-washing should be encouraged after using the toilet, before feeding and changing the nappy.
- 2) Clean the baby with sponge bath with warm water and small towel until baby become gestation 40 weeks or weight more than 2,500 g.

#### **<Feeding>**

- 1) Encourage breast feeding. Wash hands just before handling newborn babies to position for breastfeeding.
- 2) Let the baby suck the breastmilk as long as he/she wants.
- 3) Small babies need breastfeeding frequently (every 2-3 hours, usually).
- 4) Frequent suck helps expression of breastmilk.
- 5) If the breast is engorged, encourage the mother to express a small amount of breast milk before starting breastfeeding; this will soften the nipple area and it will be easier for the baby to attach to the nipple.

- 6) If the mother has problems for breastfeeding, they need lactation support. Refer them to the staff with enough skill.

### **<Danger signs>**

Advise the mother to take the baby to the health facility as soon as possible, for the following danger signs:

- 1) Difficulty feeding or feeding less than 8 times in 24 hours in the first week of life
- 2) No spontaneous movement
- 3) Body temperature  $>37.5^{\circ}\text{C}$  or  $<35.5^{\circ}\text{C}$
- 4) Respiratory rate more than 60 per minutes or less than 30 per minutes
- 5) Severe chest in-drawing
- 6) Wheezing or grunting
- 7) Floppy or stiff body
- 8) Convulsions
- 9) Pus from eyes
- 10) Skin pustules
- 11) Cord stump which is bleeding, red or draining pus
- 12) Jaundice (yellow skin) especially within 24 hours of birth or yellow on palms and soles at any days

### **Miscellaneous:**

- 1) DO NOT leave the baby by him/herself, always.
- 2) Keep baby away from sick children or adult (other than breastfeeding mother).

### **References**

- 1) STRESS EXPERIENCED BY PARENTS FROM THE NEONATAL INTENSIVE CARE UNIT, University of Canterbury ,2007
- 2) Kangaroo Mother Care a practical guide, WHO,2004
- 3) Safe Motherhood Clinical Management Protocols Referral Hospital, MOH,2013
- 4) Safe Motherhood Clinical Management National Protocols Health Centers, MOH,2016

## 23. Kangaroo Mother Care

Kangaroo mother care (KMC) is care of preterm infants carried skin-to-skin(STS) with the mother. It is powerful, easy-to-use method to promote the health and well-being of infants born preterm as well as full-term.

### Advantages of the KMC

- 1) increases the amount and duration of breastfeeding,
- 2) maintains body temperature and protect the newborn from all reasons of hypothermia,
- 3) Newborn gains more weight.
- 4) Newborn gets natural immunization from the mother.
- 5) good relationship between newborn and mother,
- 6) Newborn doesn't cry much but sleep well and there are less respiratory problems.
- 7) Improves neurodevelopmental outcomes.
- 8) early discharge newborn from hospital but should continue KMC at home.

### When to start KMC

- 1) Baby's condition must be stable.
- 2) The baby must be breathing spontaneously without additional oxygen.

Note: It is possible for the baby even with infusion or NGT to do KMC as far as the condition is stable. In some facilities, KMC is possible even for intubated babies but staff must be trained well.

### Length of KMC

- 1) STS contact should start gradually, with a smooth transition from conventional care to continuous KMC.
- 2) Sessions that last less than 60 minutes should, however, be avoided because frequent changes are too stressful for the baby.

## Duration of KMC

- 1) It tends to be used until the baby reaches term (gestational age around 40 weeks) or 2,500g.

## Procedure

- 1) Ensure room is warm (25°C to 28°C)
- 2) Ensure all fans are turned off and windows and doors are shut to avoid draught.
- 3) The baby is naked, except for the nappy, a warm hat and sock the cap. When temperature drops below 22°C, baby should wear a sleeveless cotton shirt, open at the front to allow STS contact with the mother's chest and abdomen. The mother then covers herself and the baby with her usual dress.
- 4) The mother can wear whatever she finds comfortable and warm in the ambient temperature.
- 5) Encourage the mother to clean her hands with water and soap before KMC.
- 6) Place the baby between the mother's breasts in an upright, chest to chest.
- 7) The head, turned to one side, is in a slightly extended position which keeps the airway open and allows eye-to-eye contact between the mother and the baby.
- 8) Avoid both forward flexion and hyperextension of the head.
- 9) The hips should be flexed and extended in a "frog" position; the arms should also be flexed.
- 10) Secure the baby in this position with the support binder by cover the clothes on the baby and make sure the top of the binder is just under baby's ear.



Positioning the baby for kangaroo



- 11) Ask the mother to sit in a comfortable position and support her to keep the baby in a right position of feeding.
- 12) Explain the mother that she can keep her baby in this position for day and night, if it is possible.
- 13) Mother should start breastfeeding every time her newborn wakes up and has feeding cue
- 14) Explain to the mother that she can breastfeed in kangaroo position and that KMC actually makes breastfeeding easier. Furthermore, holding the baby near the breast stimulates milk production.
- 15) Explain to the mother how to observe the baby, what to look for.
- 16) Encourage her to ask for help if she is worried.

### **Information for mothers**

- 1) Mother should clean her hands often and care the baby well.
- 2) Only breast milk for feeding baby, do not give other food, until 6months of age.
- 3) Do not apply something on the newborn's umbilical and keep baby away from sick child or adult.
- 4) Inform to mother carrying a baby in the KMC position can do whatever she likes: she can walk, stand, sit, or engage in different recreational, educational or income-generating activities, during the daytime. But mothers should always take care of health conditions both for babies and herself.
- 5) Sleep in STS contact in a comfortable position. Mother will best sleep with the baby in kangaroo position in a reclined or semi-recumbent position by using pillows under the back and shoulder.
- 6) All the adult family members can do KMC for allowing the mother to take a rest.



### **Follow up baby's condition during KMC**

- 1) Assess newborn body temperature twice per day at health facility.
- 2) Educate the mother how to observe newborn respiratory condition. (see 17. Family Support and Education)
- 3) Inform the danger signs of the mother. (see 17. Family Support and Education)
- 4) Support all the concerns of taking care newborn.

Note: Ensure that the mother will continue the KMC at home and give advice to her that she must take the newborn back to the health facility twice per week or anytime she finds danger signs such as, no suckling, hypothermia, dyspnea, or skin infection.

### Reference

- 1) National Guideline for Post-natal care, MOH,2012
- 2) Kangaroo Mother Care a practical guide, WHO,2004
- 3) National Protocol on Kangaroo Mother Care Training, MOH, 2017.