



**THE UNIVERSITY OF ZAMBIA  
INSTITUTE OF DISTANCE EDUCATION**

**MASTER OF SCIENCE IN MIDWIFERY  
AND WOMEN'S HEALTH**

**ADVANCED PRACTICE IN INFANT  
HEALTH MODULE (NRS 6435)**

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### **Acknowledgements**

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## INTRODUCTION

Welcome to the advanced practice in Infant health Module. This Module has been produced by the University of Zambia (UNZA), Department of Midwifery, women and child health. The module prepares you for advanced practice in managing the health care of normal and high-risk infants, and children up to 2 years of age. It also prepares you to assume leadership roles in a variety of clinical settings including intensive care nurseries of various levels, newborn nurseries and high-risk follow-up clinics and also participate in research.

The module gives you general information that will help you determine what you can expect from the module and how much time you will need to complete the module. It also provides guidance on:

- Study skills
- Where to get help
- Assignments and assessments
- Activity Icons
- Units

The module is broken down into three units. Each unit comprises:

- Unit number
- Unit title
- Introduction
- Aim
- Objectives of the unit
- Other resources
- Time required
- Content
- Summary
- Formative evaluation
  - Module summary
  - References

The module provides information on care of the new born. It will help you understand the how to look after a newborn. The module will also help you to gain knowledge on selected aspects of child health care.

## **MODULE TITLE: ADVANCED PRACTICE IN INFANT HEALTH (NRS 6435)**

### **AIM OF THE MODULE**

The aim of the module is to increase students' knowledge and improve their clinical competences in the care of normal and high-risk infants, using evidence-based practices.



On successful completion of this module, you should be able to:

### **KNOWLEDGE**

1. Describe the current trends and issues in neonatal care.
2. Describe the care of a normal neonate from conception through to the puerperium.
3. Describe growth and development of a normal infant.

### **ATTITUDE**

1. Advise mothers on infant and young child feeding.
2. Apply scientific approaches in the management of infants and make appropriate referral.

### **SKILL**

1. Manage a normal neonate.
2. Monitor the health of an infant.
3. Identify deviations from normal growth and development.
4. Identify various conditions affecting infant's health.
4. Implement the Baby Friendly Hospital Initiative.

5. Manage a neonate with complications

## COMPETENCES

1. Describes the current trends and issues in neonatal care.
2. Describes the care of a normal neonate from conception through to the puerperium.
3. Manages a normal neonate.
4. Describes growth and development of a normal infant.
5. Advises mothers on infant and young child feeding.
6. Implements the Baby Friendly Hospital Initiative.
7. Manages a neonate with complications.

## Time frame



## How Long?

Minimum expected duration of the module this module is 144 hours of theory

## Study skills



As an adult learner, your approach to learning will be different from that of from your school days: you will choose what you want to study, you will have professional and/or personal motivation for doing so and you will most likely be fitting your study activities around other professional or domestic responsibilities.

Essentially you will be taking control of your learning environment. As a consequence, you will need to consider performance issues related to time management, goal setting, stress management, etc. Perhaps you will also need to reacquaint yourself in areas such as essay planning, coping with examinations and using the internet as a learning resource.

Your most significant considerations will be *time* and *space* i.e. the time you dedicate to your learning and the environment in which you engage in that learning.

We recommend that you take time now—before starting your self-study—to familiarize yourself with these issues. There are a number of excellent resources on the web. A few suggested links are:

- <http://www.how-to-study.com/>

The “How to study” web site is dedicated to study skills resources. You will find links to study preparation (a list of nine essentials for a good study place), taking notes, strategies for reading text books, using reference sources, test anxiety.

- <http://www.ucc.vt.edu/stdysk/stdyhlp.html>

This is the web site of the Virginia Tech, Division of Student Affairs. You will find links to time scheduling (including a “where does time go?” link), a study skill checklist, basic concentration techniques, control of the study environment, note taking, how to read essays for analysis, memory skills (“remembering”).

- <http://www.howtostudy.org/resources.php>

Another “How to study” web site with useful links to time management, efficient reading, questioning/listening/observing skills, getting the most out of doing (“hands-on” learning), memory building, tips for staying motivated, developing a learning plan.

The above links are our suggestions to start you on your way. At the time of writing, these web links were active. If you want to look for more go to [www.google.com](http://www.google.com) and type “self-study basics”, “self-study tips”, “self-study skills” or similar.



[www.unza.zm](http://www.unza.zm)

You may contact the Department of Midwifery, Women and Child health at the University of Zambia from 08 00 hours to 17 00 hours. Telephone number +260 211 2524539 Fax: +260 211 290719

[dns@unza.zm](mailto:dns@unza.zm)

## Help

You could also utilize the services of the phone as well as the email address. For other details, you may visit the website as stated above.

You are free to utilize the services of the University library which opens from 0700 hours to 2400 hours every working day. As for weekends and public holidays, the library opens from 0900 hours to 1800 hours. It will be important for you to carry your student identity card for you to access the library and let alone borrow books. Your contact person in the library is the Librarian and the email address is [library@unza.zm](mailto:library@unza.zm).

For ICT problems, you may contact the Centre of Information Communication Technology [cictdirector@unza.zm](mailto:cictdirector@unza.zm)



## Assessments



How many assessments will there be in this course?

Two written assessments

A written assessment consisting of an essay will carry 20% each

There will be self-assessment and those can be self-marked. Assessments will be placed at the end of each module.

You will seat one final theory examination at the end of the year (The dates are as stated on the sessional dates calendar) that carries 60% of the total mark

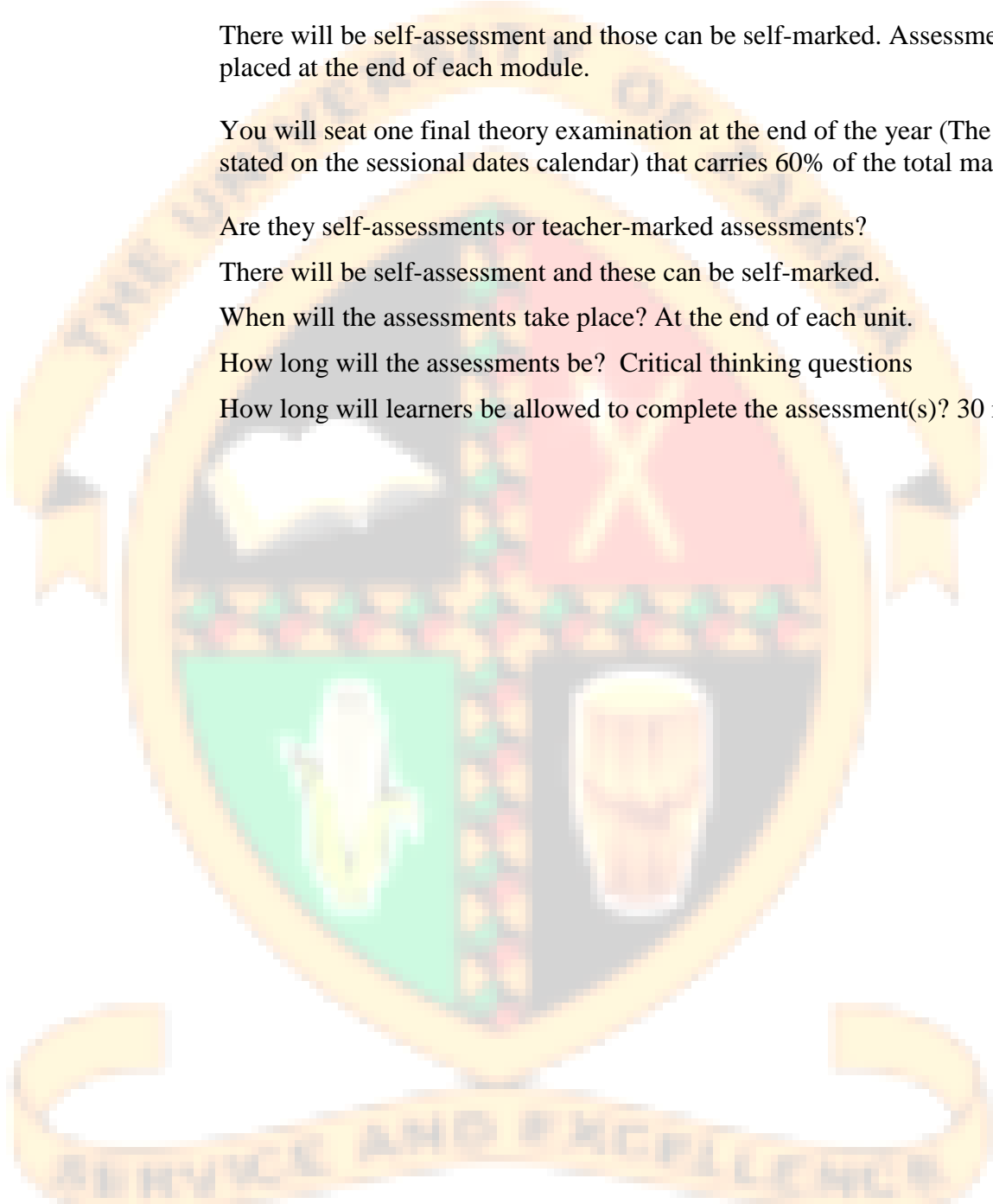
Are they self-assessments or teacher-marked assessments?

There will be self-assessment and these can be self-marked.

When will the assessments take place? At the end of each unit.

How long will the assessments be? Critical thinking questions

How long will learners be allowed to complete the assessment(s)? 30 minutes



















## Getting around this Module

### Margin icons

While working through this module you will notice the frequent use of margin icons. These icons serve to “signpost” a particular piece of text, a new task or change in activity; they have been included to help you to find your way around this module.

A complete icon set is shown below. We suggest that you familiarize yourself with the icons and their meaning before starting your study.

 <b>Activity</b>	 <b>Assessment</b>	 <b>Assignment</b>	 <b>Case study</b>
 <b>Discussion</b>	 <b>Group activity</b>	 <b>Help</b>	 <b>Note it!</b>
 <b>Outcomes</b>	 <b>Reading</b>	 <b>Reflection</b>	 <b>Study skills</b>
 <b>Summary</b>	 <b>Terminology</b>	 <b>Time</b>	 <b>Tip</b>

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## **UNIT 1: OVERVIEW**

### **1.1 Introduction**

The Unit provides information on overview of neonatal care and current issues and trends in neonatal care. In order to provide comprehensive, family centered neonatal care, the midwife must be familiar with current issues and trends in neonatal care. Such understanding allows the midwife to more effectively assess problems and plan, implement and evaluate care for the neonate and the family.

The aim of this Unit is to give an overview and introduce you to current issues and trends in neonatal care.

### **1.2 Objectives for Unit**



After completing this unit, you should be able to:

- Discuss current issues and trends in neonatal care



### **1.3 Other Resource needed**

#### **1.3.1 Prescribed Readings**

Hockenberry, JM and Wilson D. (2013). Wong's Essentials of Paediatric Nursing. Ninth Edition .Elsevier. St Louis, Missouri. ISBN 978-323-08343-0

#### **1.3.2 Supplementary readings**

Lowdermilk, LD and Perry, ET. (2006). Maternity Nursing, Seventh Edition. Mosby/Elsevier, St Louis, Missouri. ISBN 13-978-0323-03366-4

### **1.4 CONTENT**

## **UNIT 1: Overview**

### **Overview of neonatal care**

#### **Current Issues and trends in neonatal care**

## **UNIT 2: Neonatal Care (Normal)**

### **Physiology and adaptation of the Newborn to extra-uterine environment**

#### **Introduction**

The Unit provides information on the physiology and adaptation of the Newborn to extra-uterine environment. Additionally, you will look at the care of the newborn.

#### **Aim of the Unit**

The aim of this Unit is to help you acquire knowledge and skills on the physiological changes of and management of a newborn. The aim of this Unit is to help you conduct physical examination of newborn systematically in order to detect any abnormalities so that correct measures can be taken.

#### **Objectives for Unit**



After completing this unit, you should be able to:

- Describe major physiological changes that take place in a new born.
- Describe the care of a new born.
- Monitor the newborn's daily progress to detect any deviation from normal.
- Describe the head to toes examination of the newborn



#### **Other Resource needed**

##### **Prescribed Readings**

Fraser M.D and Cooper M.A. (2003) 14<sup>th</sup> edition **Myles Textbook for Midwives**, Churchill Livingstone, Toronto.

##### **Supplementary readings**

1. Novak, Broom. 1994. Maternal and child health nursing. 8<sup>th</sup> edition. Mosby. St Louis.
2. Dickason, JE, Silverman, LB and Schult, O, M.1994. Maternal-infant nursing care. Mosby. St Louis.

3. Wong, LD, Perry, ES, Hockenberry, JM, Lowdermill, LD, and Wilson, D. 2006. Maternal child nursing care. Third edition. Mosby/Elsevier. China

### **Physiological adjustments**

The new born period is time from birth to the 28 days of life. During this period the new born adjusts from intrauterine to extra uterine life. The nurse needs to be knowledgeable about a newborn's normal physiologic adaptation and be able to recognize any deviation from normal. In order to appreciate the need for gentleness and patience in handling the newborn baby the nurse should consider:

- The sheltered life the baby has led in utero
- The ordeal to which he has been subjected
- The physical adjustments he must make to extra-uterine life.

### **Life in utero**

For nine months the fetus lived in a warm environment, protected by fluid, obtaining nourishment without using the intestinal tract and receiving oxygen without pulmonary respiration.

The process of labour causes injury and death to many babies, so because of the strenuous ordeal to which the infant has been subjected, involving pressure on the brain and some degree of hypoxia, the baby should be handled with gentleness. Baby should be wrapped up warmly and left quietly in heated cot to recover from trauma of birth.

The main physiological adjustments to be made are:

- The initiation of pulmonary respiration
- The establishment of changes in the circulation
- The inauguration of digestion
- The regulation of heat
- The reaction to organisms

### **The initiation of respiration**

Breathing is the first function to be established. The lungs in utero are solid because they have not been inflated and aerated. The alveolar cells secrete a substance called surfactant prevents the walls of the alveoli from adhering. Breathing is initiated in response to lack of oxygen and the high levels of carbon dioxide in the blood stream which stimulates the respiratory center in the medulla.

If the CO<sub>2</sub> level is too high, it depresses the respiratory center instead of stimulating it. Respiration is aided by compression of the chest wall during the actual birth, the impact of cool air on the face, and the handling of the limbs and body. The healthy baby cries almost as soon as he is born but he must breathe in order to cry. With the first breath the blood vessels in the lungs expand. To facilitate expansion of the lungs, a healthy baby should be encouraged to cry at birth.

### **Changes in the circulatory system**

The changes in the circulatory system are caused by alterations in systemic and pulmonary pressures that result from the first deep breath and the establishment of respirations.

In fetal life, the circulatory system serves also as a modified respiratory system since oxygen is not obtained through the breathing of air into the lungs but through the umbilical cord vein. Carbon dioxide is eliminated through the two umbilical arteries.

At birth, this type of respiratory function ceases as soon as the placenta becomes detached. The two fetal shunts that directs blood flow away from the pulmonary circulation normally closes as a result of:

- internal pressure,
- loss of maternal oxygen source and
- Lung expansion.

The opening between the two atria of the heart, the foramen ovale, shuts closing off the blood flow to the left atrium from the right heart and forcing more blood into the right ventricle.

The ductus arteriosus, the fetal vessel between the pulmonary artery and the aorta collapses, obliging the pulmonary artery to send its total content to the lungs. When the cord is clamped and cut the two umbilical arteries, the umbilical vein and the ductus venosus close and become ligaments.

### **Digestion**

The baby has to suck, swallow, digest and absorb food as well as defecate. Nature has provided food (Colostrum) which is easily digested. It has a protein consisting of lacto albumin; it is nutritive, quenches thirst, is laxative in effect and contains immune bodies and vitamins. Baby's first stool is meconium which is present in the intestines from about 16<sup>th</sup> wk of intra-uterine life. It is dark green in color and is composed of bile-pigments, fatty acids, mucus and epithelial cells.

### **Temperature regulation**

Heat regulation in the newborn is unstable and because of low metabolic rate heat production is poor. Baby leaves an environment of 37.7degree centigrade and enters one of about 21 degree centigrade being wet; he will lose heat by evaporation. Baby therefore should be wrapped in a warm blanket and placed in a warm cot.

Even with such treatment his temperature may fall around 35.5 degree centigrade within an hour. The first bath should take place in a warm room at a temperature of 21-26 degree centigrade with warm water. Baby should be kept warm after the bath.

When the baby is born, it moves from a warm intrauterine environment to a relatively colder extra uterine environment.

Unless the infant is protected against heat loss body temperature may fall within 5 to 10 minutes of birth.

Most of the heat is lost through:

- Evaporation
- Radiation
- Convection
- conduction

#### **a) Evaporation**

Evaporation is the loss of heat incurred when water is converted to a vapor. The newborn is particularly prone to heat loss by evaporation immediately after birth when the infant is wet with amniotic fluid as well as during baths and application of lotions to the skin.

#### **b) Radiation**

This is the transfer of heat from the heated body surface to cooler surfaces and objects not in direct contact with the body e.g. walls of a room.

Placing cold objects near a baby may increase heat loss by radiation.

#### **c) Conduction**

Conduction is the loss of heat to a cooler surface by direct skin contact. Cold hands, cold examination tables can cause heat loss by conduction.

#### **d) Convection**

This is the loss of heat from the warm body surface to the cooler air currents. Air conditioned rooms can result in heat loss by convection.

#### **Reaction to organisms**

Passive immunity to many specific infectious diseases is inherited from the mother but some weeks elapse before the baby produces an active immunity to various organisms. During passage through the birth canal skin abrasions may occur and the baby's face is exposed to organisms.

The eyes, umbilicus and skin are all vulnerable to infection as a result of staphylococcus aureus therefore thorough domestic cleanliness must be observed.

#### **Heat production**

The newborn has several physiological mechanisms that increase heat production also called thermogenesis. Newborns produce body heat by increasing their metabolic rate and by metabolizing brown fat, a form of adipose tissue. They do not shiver. When the environmental temperature drops down, skin receptors transmit sensation to the CNS which in turn stimulates the sympathetic nervous system. Nor epinephrine is then released by the adrenal gland and the nerve endings in the brown fat causing triglycerides to be metabolized into glycerol and fatty acids. The oxidation of fatty acids produces heat.

#### **Heart beat**

The heart rate is 120 -140 beats per minute usually ascertained by auscultation at the apex beat. The heart is higher in the newborn than in adult.

#### **Blood**

The number of red blood cells necessary during intra-uterine life is in excess of what is required after birth, so the extra cells are broken down and the haemoglobin stored by the liver. The number of red cells at birth is approximately 6,000,000 per cu mm and haemoglobin is 18 g/dl. The clotting power is low because newborn infants are nearly always deficient in Vitamin K, a substance needed by the liver in the production of prothrombin one of the elements necessary for the clotting of blood.



## **Urinary function**

The bladder of the baby at term contains urine which is usually expelled during birth. Most newborn babies void in the first 24 hrs after birth. No concern need be felt if the baby does not pass urine for 24 hrs.

The kidneys of the newborn do not excrete fluids or chlorides efficiently and if insufficient fluid is given, the urine may be dark yellow in colour and may leave brick-like deposit on the napkin which at first glance appears to be blood but it is due to uric acid crystals.

## **Needs of a newborn**

All newborn infants have certain needs that must be met. The following are the needs of the newborn:

- Warmth
- Nourishment
- sleep
- Fresh air
- Exercise
- Mothering
- Protection

### **Warmth**

Newborns may suffer from hypothermia because they are vulnerable to heat loss. Loss of heat by evaporation and particularly from the baby's head should be avoided. The room where the baby is nursed should be warm at a temp between 21-24 degrees centigrade. They should wear warm clothing.

### **Nourishment**

Breastfeeding is the most universally recommended way of providing an infant with nourishment. However, formula-feeding can also be done in certain circumstances. Baby should be exclusively breastfed for the 6 months of life. Advantages of breastfeeding are numerous.

Breast Feeding contributes to the mother's wellbeing by aiding the involution of the uterus. Breastfeeding also promotes the mother's feeling of closeness or attachment to the infant. The return of ovulation and menstruation is delayed by breastfeeding. There is also evidence that the risk of osteoporosis and breast cancer is lower in women who have breast-fed.

The infant also benefits from breast-feeding.

- Breast milk can be easily digested than cow's milk
- The infant receives factors immune from breast milk which helps protect against viral and bacterial infections. Breastfeed babies have fewer respiratory tract infections, fewer alimentary disturbances and fewer allergy problems.
- Breast milk is bacteriological safe
- Breast milk is always fresh, always available and cheaper.
- Has the right content of nutrients



### **Sleep**

Babies sleep for 20 out of 24 hours during the first two months. Mothers should be advised to avoid loud noise which could irritate the baby.

### **Fresh air**

Fresh air is necessary but draughts must be avoided. In warm weather babies should be taken out of doors after the first few days.

### **Exercise**

Exercise is also essential for newborn babies. Babies should be allowed to move their arms and legs freely. They must be allowed to wriggle and kick. This simulates the circulation of blood and strengthens their muscles.

### **Mothering**

Babies need love and affection. Mothers should be encouraged to handle, feed and caress their babies.

### **Protection**

Babies need protection from infections, suffocation, bright lights and strong wind. To avoid suffocation by inhalation of vomitus, babies should be laid on their sides or in the prone position after feeds as vomitus may inhaled if lying on their backs. Baby should sleep in the same room with the mother during the first year of life. A young baby does not require a pillow and because of the risk of suffocation it should not be used. To avoid overlaying on the baby should be advised to provide a separate cot bed for the baby. To protect the baby from infections, home hygiene should be observed, mothers should wash hands before and after handling baby, people with respiratory infections should not handle the baby.

Baby should be kept clean all the time for example should have clean clothes, nappies changed whenever soiled, and should be bathed daily. An infant should have her own bath equipment

Baby's eyes should be shaded from brilliant sunshine; glaring ceiling lights should be dimmed when possible. Babies should be protected from strong winds. Strong wind blowing on the baby's face takes its breath away.

### **Daily Observations**

The thriving baby has a clear, pink skin, firm muscles, a vigorous kick and a lusty cry. He takes his food eagerly, has a clean tongue, normal stools, bright eyes, gains wt and sleeps well.

**Respirations** - The rate and type of respirations should be observed. Normal rate is 40 per minute, usually regular, smooth and quiet. Periods of apnea, grunting respirations, flaring of the nasal alae or indrawn of the chest wall.

**Temperature** - Taken once daily. A high temperature may indicate the presence of infection.

**Weight** - the baby's weight should be taken every 3<sup>rd</sup> day

**Feeding** - this should be done on demand except in situations where the infant requires assistance with feeding, and then may be done every 3 hours.

**Passage of urine** - The baby should pass urine frequently

**Meconium** - when baby starts to feed the meconium stool becomes greenish-brown, then yellowish-brown. After the fourth day the stool becomes soft, yellow semi-fluid stool in breast fed baby.

**Bowel movement**: the baby should open bowels four times or more daily.

**The eyes** - signs of inflammation and discharge should be noted. Eye prophylaxis may be instilled in the eyes as a precaution against ophthalmia neonatorum. The agent used for prophylaxis varies according to hospital protocols, but tetracycline, erythromycin or Silver nitrate may be recommended.

**The mouth** - observed for oral thrush

**The umbilical cord** - inspected daily for signs of inflammation such as oedema, discharge and offensive smell. The cord should be cleaned daily with soap and water or sterile water. The cord usually comes off between the 6<sup>th</sup> and 10<sup>th</sup> day. Delay may be due to low-grade infection.

**Crying** - crying is the baby's language. However, babies may cry because of hunger or thirst and discomfort from soiled napkin, a warm and humid environment, insect bite and sickness. A high pitched cry or a feeble cry may be abnormal. Excessive crying may be a sign of illness.

## **Examination of a newborn**

### **Introduction to the Unit**

The Unit provides information on the physical examination of the newborn. Physical examination findings provide a database for implementing the nursing process and for providing anticipatory guidance for the parents.

### **Physical examination**

#### **Introduction**

The first assessment of the newborn is done immediately after birth to ascertain the neonate's immediate adaptation to extra uterine life and determining the need for resuscitation. A midwife is supposed to carry out a quick head to toe examination before transferring the baby to a postnatal ward. The examination is done systematically from head to toe. A thorough examination is conducted during the first 24 hrs. in the postnatal ward.

On admission from the delivery ward the Midwife should check the following:

- Note appearance, activity, and breathing, any abnormalities in colour such as cyanosis, pallor or jaundice
- Check for bleeding and re-ligate if necessary
- Record the baby's temperature.
- Check the birth wt. Average wt is 3kg. Physiological wt loss occurs (100-200 g) during the first 3 days of life but infants regain wt by 10<sup>th</sup> day. Amount gained during the first month is about 160g weekly
- The decrease in weight is due to loss of tissue fluid, a deficient food and fluid intake as well as the loss of meconium.
- Length - The average length of a baby at term is 50-25cm. This is measured from the vertex to the heels or crown to rump.

- Head circumference is 35 cm, biparietal diameter is 9.5cm , crown to rump is 34 cm

## **Head**

- Measure head circumference - average is 34 cm.
- Check for excessive moulding and a large caput. Excess moulding may be due to difficult labour and suggests the possibility of intracranial injury.
- Check fontanels – anterior fontanel is diamond –shaped and it closes at 18 months. The posterior fontanel is triangular shaped and closes by 8 to 12 wks.
- Check for depressed fracture

## **Eye**

- Inspect to note size and shape
- Check for subconjunctival haemorrhage (bright red in colour). This disappears spontaneously within a week.
- Check for symmetry and any discharge

## **The mouth and nose**

- Check for nasal patency
- Should be inspected in a good light. Check for cleft palate, cleft lip
- In case of facial paralysis, the mouth may be drawn to one side.
- Check for excessive frothy mucus suggests an esophageal atresia.
- Check for tongue tie
- Check for teeth. Very occasionally babies are born with the two lower incisors erupted.

## **Ears and neck**

- Ear pliability and flexibility: In a full-term baby, the ears are normally soft and pliable and recoil readily when bent forward
- Low-set ears (top of the ear below the level of the eye's canthi) may indicate a chromosomal or organ abnormality.
- Hearing is normally well developed once the Eustachian tube is cleared
- The neck size is normally short with many thick folds
- Neck webbing is associated with chromosomal abnormalities.

## **The arms and hands**

- The arms are normally well flexed with symmetrical movements
- Infant should move arms freely and if not there may be a fracture, dislocation or paralysis
- Check for extra digits and webbed fingers

## **Chest**

- Contour is normally round and symmetrical. Breast engorgement may be evident 2 to 3 days after birth owing to maternal hormones. Respirations are normally shallow, symmetrical and synchronous with abdominal movements.
- Breath sounds may reveal crackles and rhonchi. Crackle may be due to fluid in the lungs and areas of Atelectasis. Rhonchi indicate fluid, mucus or meconium in the large bronchi
- Heart murmurs may be present due to incomplete closure of the foramen ovale and ductus arteriosus.

## **The Body**

- The cord: The umbilical cord is white and gelatinous in the first few hours. Examine for oozing, check the vessels (two arteries and one vein) in the cord.
- external genitalia : Establish the sex, pseudo-hermaphroditism, check for conditions such as hypospadias, phimosis
- Anus : check for imperforate anus - first temp should be taken rectally
- Back: inspect for spina bifida, hips for dislocation. (Do ortolani test).

## **Legs**

- The lower extremities are normally short, bowed and well flexed.
- Check for fractures, paralysis, Talipes and congenital dislocation of the hips, extra toes, and webbed toes.

## **Special senses**

- Taste: The lips and tongue are very sensitive, the sense of taste is not very well developed but babies seem to prefer sweeter foods.
- Hearing: Loud noises cause baby to cry but the ability to discriminate between sounds is not developed.

## **Vision**

- Tears are not present unless the eyes are inflamed.
- The infant can see objects about 6 to 8 inches away and is sensitive light. However the infant has immature muscle coordination.
- Touch: The infant can feel pressure, pain and touch immediately or shortly after birth. The infant is sensitive being cuddled.
- Smell: after mucus and amniotic fluids are cleared from the nasal passages, the infant can differentiate pleasant from unpleasant odors. The infant can distinguish his mother's wet breast pad from another mother at one week.

## **The skin**

- Very delicate, easily irritated, injured and infected.
- At birth it's covered with vernix caseosa which acts as a lubricant during birth.
- It protects the skin and retains heat. Vernix is secreted by sebaceous glands
- Lanugo: seen mostly on the skin of preterm baby.

## **Neurological responses in newborn**

### **a) Moro reflex**

This is done by supporting the baby's body and head in supine position. Then the head is allowed to drop back one or two cm, and then the baby throws out arms briskly with extension of elbows and fingers followed by an arm embracing movement. This reflex is incomplete in preterm babies. Complete absence suggests intracranial damage.

### **b) Rooting response**

When a flat surface e.g. palms of the hand is brought in contact with baby's cheek he turns his head to that side searching for the mother's nipple.

### **c) Swallowing reflex**

The newborn swallows in coordination with sucking when fluid is placed on the back of the tongue.

**d) Extrusion**

The newborn pushes tongue outward when tip of tongue is touched with finger or nipple.

**e) Grasp response or palmar grasp**

The baby grasps firmly a finger placed in the palm of his hand.

**f) Traction response**

When the baby is raised to the sitting position by traction on the wrists, the preterm baby does not resist whereas the full term infant offers strong resistance.

**g) Stepping response**

The baby when grasped by the body in a standing position with his feet on a flat surface makes stepping movements.

**h) Prone crawl**

The newborn will attempt to crawl forward with both arms and legs when placed on abdomen on flat surface.

**i) Tonic neck or fencing**

Extremities on side to which head is turned will extend and opposite extremities will flex when newborn's head is turned to one side while resting.

**j) Startle reflex**

The newborn abducts and flexes all extremities and may begin to cry when exposed to sudden movement or loud noise

**k) Crossed extension**

The newborn's opposite leg will flex and then extend rapidly as if trying to detect stimulus to other foot when placed in supine position or newborn will extend one leg in response to stimulus on the bottom of foot.

**l) Blink**

The newborn will blink in response to bright light or sudden movement toward the eye.

**m) Plantar grasp**

The newborn's toes will curl downwards when a finger is placed against the base of the toes

**n) Babinski**

The newborn's toes will hyperextend and fan apart from dorsiflexion of big toe when one side of foot is stroked upward from the heel and across ball of foot.



### Summary

In this Unit you have discussed Physiology and adaptation of the Newborn to extra-uterine environment. Following delivery, the newborn experiences many changes resulting from the transition to extra uterine life. Nursing care of the newborn is based on knowledge of these changes and of the newborn's impact on the family unit. You should remember that the first few hours after birth represent a critical adjustment period for the newborn and the nurse provides direct care to the newborn immediately after birth.

In this Unit you learnt how to examine a newborn from head to toe. As soon as the baby is born, you must conduct a quick examination of the baby from head to toe to exclude congenital



abnormalities and birth injuries. Unit two discusses management of the new born. After the transition period, you will continue to evaluate the newborn at periodic intervals and adjust your nursing care according the findings. Continued monitoring is necessary to promote survival and decrease the risk of mortality.



### **Activity**

1. Describe the physiological changes that take place in a newborn after birth.
2. Compare and contrast the four types of heat loss in a newborn and describe how to prevent it.
3. Describe nursing measures to assist the newborn in maintaining effective respiration
4. Discuss the needs of a new-born
5. State the daily observations that you will carry on a new-born
6. Describe normal neonatal behavior patterns.
7. Explain the neurological responses in a normal newborn

## **UNIT 3: GROWTH AND DEVELOPMENT**

### **Introduction**

The Unit provides information on growth and development of an infant. Additionally, you will learn tools for monitoring growth and development and factors influencing growth and development.

### **Aim of the Unit**

The aim of this Unit is to help you acquire knowledge growth and development. The aim of this Unit is to help you monitor growth and development of an infant to detect any deviation from normal and take corrective measures.

### **Objectives for Unit**



After completing this unit, you should be able to:

- Describe growth and development of an infant.
- Discuss growth and development tools.
- Describe the factors that influence growth and development of an infant.



## **Other Resource needed**

### **Prescribed Readings**

Fraser M.D and Cooper M.A. (2003) 14<sup>th</sup> edition **Myles Textbook for Midwives**, Churchill Livingstone, Toronto.

### **Supplementary readings**

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### **Definition of growth and development**

The terms growth and development are closely related and are used sometimes interchangeably. Increases in structure (growth) are accompanied by increases in function (development). As children grow in size, they mature mentally, emotionally and socially. As growth and development continue, various levels of maturity are observable. Maturation is the process in which inherited tendencies begin to unfold; children have their own patterns of growth and development.

As children grow, they are constantly changing physically and developmentally. This continuous period of change is the main distinction between the child and the adult. Growth is exhibited by all healthy children, although it may be impaired by malnutrition and disease. Every nurse who cares for children must have a basic understanding of the stages of growth and development. Such an understanding helps when evaluating the physical, intellectual, emotional and social behaviour of the child. It helps the nurse to formulate appropriate care for the child under her care and to give sound advice to mothers or caretakers on what to expect of their at different ages.

Some children mature rapidly while others mature slowly. However, a wide range of normal variations exist in the growth and development rates of children e.g. one child may walk at 12 months of age and the other one may walk at 15 months old. Each child matures. The overall acquisition of developmental milestones is similar in different cultures. Thus some generalization can be made concerning growth and development.

### **Principles of growth and development**

The normal growth and development of a child is guided by certain principles. Growth and development is:

- a) An ongoing process

- b) Occurs in orderly sequence
- c) Progresses at highly individualized rates from child to child
- d) Vary at different ages for their specific structures
- e) Represent a total process involving the whole child where all areas of development are interrelated.

### **Orderly sequence**

Growth and development occur in an orderly sequence and are continuous. The sequence of development is the same for all children. Some children do things earlier than others. Children normally crawl before they stand and stand-alone before they walk. Average children talk before they read usually read before they can write. One child reads at 4 years and another reads at 6 years of age. What happens at one stage influences what happens during the next stage. During the first year of life, babies coo the babble. As they grow, they begin to say simple words. The Toddler uses words in phrases and the preschool child uses words in short sentences. No child speaks clearly before babbling. Each stage in the sequence of development can be anticipated.

### **Continuity**

Growth and development continue from the moment of conception until the individual reaches maturity. At no time, however, is growth even and regular. Growth is greatest during the prenatal period and remains rapid during infancy and early childhood. The rate is slow but constant in middle childhood. A spurt occurs during early puberty and then tapers off in the latter part of puberty.

### **Differences in growth rates**

All children have their own unique growth timetables. Even within the same family siblings may demonstrate individual differences. For instance, one child may sit unaided at six months of age and walk alone at 9 months of age; his or her sibling may sit unaided at 8 months of age and walk at 15 months of age. A child who develops rapidly during the early years of life will continue to develop rapidly.

### **Variations of growth rates**

Not all parts of the body mature at the same time. The brain attains its physical adult size when the child is about 6 or 7 years of age. It does not however, complete mental maturation until many years later. Different phases of physical and mental growth occur at their own individual rates and maturity is reached at different times.

### **Growth and development as a total process**

Children grow physically, mentally socially and emotionally at the same time. The child simultaneously develops as a whole being. Changes in interest and cognitive development are closely related to development in walking and talking. Growth is a total process involving the whole child, not just the body, mind and emotions individually. One aspect of a child cannot be



considered in isolation. All areas of child development are interrelated. The interrelated history of the whole child and his or her environment is a foundation for understanding the child's present need.

## **Physical growth**

Physical growth occurs when cells divide and synthesize new proteins. Physical growth may be divided into four well-defined periods and these are:

- The very rapid growth during infancy
- The slow steady growth during childhood years
- The growth spurt during puberty
- The decreasing growth and attainment of maximum height during adolescence.

The greatest increase in extra uterine growth occurs during the early part of infancy. Small steady gains continue during slower growth periods. This is general pattern of growth is characteristic of all the body systems, with exception of two. The nervous system grows rapidly during infancy, then the growth decrease and stops growing after puberty. The reproductive organs grow very slowly until sexual maturation which occurs during the pubertal growth spurt.

## **Height**

The average length of an infant at birth is about 52 cm. During the first year the child grows approximately half of the birth length and then grows slowly. The maximum height occurs during the pubertal period at the approximate time of sexual maturity. Growth in height reaches a peak for boys at approximately 14 years of age and approximately a year earlier for girls.

Growth in height ceases sometime before the child reaches her twenties.

## **Weight**

Infant's average weight at birth is about 3 kilograms. This weight is expected to double at six months. By the first birthday, the infant's weight has tripled. After the first year, the rate of weight gain becomes slowly. Generally boys are taller and heavier than girls except in the years preceding puberty. A rapid gain in weight occurs in both genders during puberty corresponding closely with gain in height. Girls begin the preadolescent growth spurt at approximately 10 to 12 years of age, 2 years earlier than boys. In addition, girls reach adult proportions sooner than boys.

## **Body proportions**

Distinct changes in body proportions occur between birth and maturity. The small child not only differs from the adult in size but also in proportion. At birth the child's head is relatively large, comprising approximately one fourth of the total body length. The adult however, has a head measuring approximately one eighth to one tenth of the body length. An infant's arms and legs are relatively short. During infancy, the trunk is longer than the extremities. The midpoint of the total length of an infant is at the umbilicus. In the adult, the length midpoint is at the symphysis

pubis. During puberty, adult proportions are attained. The characteristic mature body shape for each gender becomes differentiated at this time. The straight leg-lines of the young girl become curved by 15 years of age. Her hips grow wider, whereas her shoulder remains narrow. The boy's shoulders become broader, whereas his hips remain narrow. Body proportion and build or physique, are unique to the individual.

### **Bone formation**

During the early days of fetal development, bones are comprised of simple connective tissue.

Later, this tissue becomes cartilage. By the end of the 5<sup>th</sup> month of gestation, mineral salts, especially calcium phosphate are deposited in the cartilage causing it to harden. Cartilage is gradually replaced by bone completing the process called ossification. During the early years of life, cartilage persists between the diaphysis (shaft) and the epiphyses (ends) of the long bones.

Bones grow in length through a continual thickening of the epiphyseal cartilage.

As the child grows, changes occur in the texture, size and shape of the old bone and new bone appears. Bone development continues in an orderly sequence and is complete by the third decade of life. Bone age can be determined by x-ray examination of certain joints. The information gained in this examination is compared with a standard age measurement.

Growth of the long bones is complete when the epiphyses and diaphyses are fused. Bone development of the hand and wrist is a good index of the individual's progress in total skeletal growth.

At birth the ends of the arms (epiphyses) are not yet developed and the bones are not yet present. Shortly after birth the carpal bones and epiphyses gradually appear. Changes in the size and contour of the ends of bones continue throughout the school years. Bone development of the wrist and hand is complete at the seventeenth year of life for girls and 2 years later for boys.

### **Tooth formation**

The foundation of a child's tooth structure is formed early in fetal life. At birth, all of the primary (deciduous) teeth and first permanent teeth are developing within the child's jaw.

It is not always possible to predict exactly when a child's first tooth will erupt. It is however possible to predict with some accuracy which teeth will erupt first. The two lower central incisors usually appear first between 5 and seven months of age.

The upper central incisors appear next. Most children have a total of six teeth at 1 year of age and all 20 primary teeth by 2 years of age.

### **Motor development**

Motor development accompanies physical growth. It is a process of learning, controlling and integrating muscular responses. Great advances in the body control and locomotion are accomplished during the first two years of life. The child who was at first an uncoordinated infant is soon able to sit, stand walk, reach and grasp. Like other phases of growth, motor development unfolds in an orderly sequence that is closely related to the maturation of the nervous system. It follows a definite sequence. The development begins in the child's head region and moves towards the feet (cephalo-caudal). Development also tends to proceed from the center of the body towards the extremities (proximo-distal). At first motor response to

stimulation is diffuse, involving the whole body. As maturation continues the response becomes more specific and may involve only the withdrawal of the foot. The sequence of motor development is similar for all children. The rate at which the development progresses varies with each child. Moving from place to place and walking are examples of gross motor skills. Complete establishment of these skills is usually accomplished during the first year of life for children who walk early and after 15 months for those children who walk late. The child needs adequate space for play and exploration as well as toys to promote the development of fine motor and gross motor skills.

The sequence of motor development is as follows:

At 1 month: lifts head

2—3 month: Raises chest

3-4 months: turns from side to side

5-6 months: sits with support

6-7 months: rolls from back to abdomen, sits alone

8 -10 months: crawls, pulls self-up

11-12 months: walks with help

12-15 months: walks alone with wide stance and short steps, picks up small objects with forefinger and thumb, and drinks from cup with ease.

15-18 months: walks well without support, uses spoon but spills, can throw objects, can walk upstairs holding on.

### **Intellectual development**

- Cognition refers to the process by which individuals become acquainted with the world. Children are born with inherited potential for intellectual growth.
- They must develop this potential through interactions with the environment. Intelligence influences the overall development of a child. Intelligence is defined as the ability to reason abstractly, think in a logical manner to solve problems and achieve goals.
- At birth the centers of higher intellectual activity in the brain are not fully developed.
- As growth proceeds, cognitive development progresses. Reading to children from early infancy onwards, providing safe appropriate stimulating toys and the opportunity for persistent interaction with caring adults will promote the child's cognitive development and emotional growth.

### **Emotional development**

- The reactions that accompany either the satisfaction or frustration of a basic need may be termed an emotion.
- It can also be defined as a psychological reaction caused by internal or external stimuli. Emotions appear early in life.
- The infant usually reacts by crying or restlessness. When the infant's wants are satisfied, it responds by cooing, gurgling or sleep.

- By the end of first year, emotions of fear, rage, excitement, anger and joy become recognized.

### **Love**

Love is most important of all emotions, since it is the foundation on which all positive relationships are built. A child's love is focused on the mother or caretaker. The child's capacity for affection and love develops gradually from this early association. During the course of development children transfer their affection to others who share their pleasures and achievements. These early relationships are the basis of the child's ability to develop relationships throughout life.

### **Fear**

Fear is naturally aroused when infants experience any startling, sudden occurrence such as loud noise or a fall. The characteristic response to these threats to their security is usually crying. As children grow fearful responses become specific. They tend to withdraw or avoid fearful situations. However, if they learn that the situation is not dangerous, the fear diminishes or disappears.

### **Anger**

In infancy, anger arises primarily through the interference with body movement or the lack of gratification of basic needs such as feeding. Crying, screaming, biting, hitting and kicking are physical expressions of anger. In early childhood anger may take the form of numerous acts of disobedience and resistance. Some children express anger in the form of temper tantrums. These negative behaviours occur when the child is hungry or tired. When children learn to talk, they gain command of new ways to express their anger. Children may find outbursts of anger useful for attracting attention to themselves and for obtaining a desired end.

### **Jealousy**

Jealousy is an emotional response comprised of anger, fear, and love. It is an emotion that arises when people threaten to take something away, share something or interfere with something the child feels is a personal belonging. In young children jealousy tends to develop when the child is threatened by possible loss of love. For example, children become jealous as a result of the presence of a newborn brother or sister initiating sibling rivalry. Because of the mother's

preoccupation with the new infant the older child may equate this loss of time and attention with a loss of love.

The child may see the younger sibling as an unwanted competitor and become jealousy. The child's physical reaction may be either aggression toward or competition with the new baby. Thus the jealous child may hit the baby or return to infantile habits to gain the attention desired. Some children may sulk or refuse meals. The form of jealous expression varies with age.

### **Growth monitoring tools**

Growth monitoring and promotion is a regular and systematic monitoring of growth that helps to detect malnutrition early in children before they become severely malnourished. This is in order to provide information to mothers/caretakers on the growth and health of children to help them make informed decisions. Growth monitoring and promotion activities take place in health facilities and outreach points. Growth monitoring should be carried out from birth to 5 years. Encourage mothers/caretakers to take children for weighing for the wellbeing of the children. The commonly used parameters for growth are weight and Mid-Upper Arm Circumference (MUAC). Growth charts can be used to detect growth failure. WHO has developed a weight chart for international use. A weighing scale such as a Salter scale is used to measure a child's weight and the child is weighed with minimum clothing without shoes.

Besides growth in weight and height, the body compartments most affected in malnutrition are those of energy reserve such as subcutaneous fat and the protein store of skeletal muscle. Measuring these two body compartments can provide an indication of the nutritional status of the individual. In a large proportion of malnourished children there is wasting of muscles not only because of lack of protein in the diet but also because muscle is metabolized to provide energy. On the other hand, adequate muscle with lack of fat suggests lack of energy reserve. Circumference of mid- upper arm as an indicator of lean body mass has been used as one of the parameters for measuring nutritional status. It is known that a normal child between the ages of one and five years the Mid-Upper Arm Circumference changes very little. The arm circumference measurement is around 15cm to 17cm.

However, when a child is not eating enough food, the arm circumferences becomes less than 15cm. children with MUAC of 13.5cm and below are thin and undernourished. If the MUAC is between 12.5 cm and 13.5 cm, the child is moderately thin and moderately undernourished. When MUAC is less than 12.5cm, then the child is severely undernourished. A mid-upper arm strip is a simple tool used for screening malnutrition in children and this can be easily made by the community. It can be made from any flexible material that does not stretch.

### **Factors influencing child growth and development**

- Hereditary



- These are aspects determined by genes. The parents' chromosomes determine the child's characteristics and the child has no control over this aspect e.g.
    - Sex: being born male or female. The child's sex determines his physical attributes and therefore his partner of growth.
    - Race: certain races tend to be huge while others are genetically smaller. Therefore if children from these two different backgrounds will have different growth rates because of their genetic influence.
  - Environment
    - Environmental factors include intra uterine and extra uterine factors
- Intra-uterine factors include:
- Metabolic diseases i.e. diabetes mellitus- babies of diabetic mothers tend to be bigger than the average new-born
  - Chromosomal abnormalities i.e. downs syndrome
  - Radiation causing severe brain damage
  - Drugs taken in pregnancy i.e. thalidomide resulting in congenital abnormalities
  - Poor maternal nutrition – the baby in utero suffers from intra-uterine growth retardation
  - Maternal infections i.e. HIV/AIDS and Syphilis.
- Extra uterine factors include :
    - Birth injuries leading to brain damage
    - Cultural influences on child rearing and feeding i.e. Denying children food will retard growth and development
    - Poor socio-economic status of the family

Childhood infections such measles, diarrhoea, tuberculosis- slow down growth as the child is not able to feed well to build up the body and repair body tissues

Hormonal influences; too much or too little growth hormone will lead to an abnormal growth  
 Emotional deprivation especially during infancy - Lack of a loving and secure environment will have an effect on the production of pituitary growth hormone.



### Summary

In this Unit you have discussed growth and development, growth monitoring tools and factors that influence growth and development.



### Activity

1. What is growth and development?
2. Discuss growth monitoring tools
3. Explain factors that influence growth and development

## UNIT 4: INFANT AND YOUNG CHILD FEEDING

### Aim of the Unit

The aim of this Unit is to help you acquire knowledge and skills on infant and young child feeding. The aim of this Unit is to help you

### Objectives for Unit



After completing this unit, you should be able to:

- Describe major physiological changes that take place in a new born.
- Describe the care of a new born.
- Monitor the newborn's daily progress to detect any deviation from normal.
- Describe the head to toes examination of the newborn
- 



### Other Resource needed

### Prescribed Readings

- The Lancet Breastfeeding Series papers  
[www.thelancet.com/series/breastfeeding](http://www.thelancet.com/series/breastfeeding) Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effect.  
[http://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(15\)01024-7/abstract](http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(15)01024-7/abstract)
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Why invest, and what it will take to improve breastfeeding practices?

### Supplementary readings

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## Introduction

Adequate nutrition during infancy and early childhood is essential to ensure the growth, health and development of children to their full potential (UNICEF, 2012.). Hence, the first two years of life provide a critical window of opportunity for prevention of growth faltering and under nutrition through optimal feeding (World Bank, 2006: Victoria, 2010). Improving infant feeding practices especially for children younger than two years of age should therefore be a high global priority (World Bank, 2006).

World Health Organization (WHO) and United Nations Children’s Fund (UNICEF) set a global strategy for optimal infant and young child feeding (IYCF) ([WHO and UNICEF, 2003]). The

strategy recommends the initiation of breastfeeding within one hour of birth, exclusively breastfed for the first six months, after which nutritiously appropriate, adequate, and safe complementary foods should be introduced along with continuing breastfeeding up to two years and beyond. Improving IYCF practices based on this recommendation when children are well and sick is important to ameliorate under nutrition and its consequences (UNICEF, 2012; WHO, 2010).

### **Key facts**

- Every infant and child has the right to good nutrition according to the "Convention on the Rights of the Child".
- Under nutrition is associated with 45% of child deaths.
- Globally in 2016, 155 million children under 5 were estimated to be stunted (too short for age), 52 million were estimated to be wasted (too thin for height), and 41 million were overweight or obese.
- About 40% of infants 0–6 months old are exclusively breastfed.
- Few children receive nutritionally adequate and safe complementary foods; in many countries less than a fourth of infants 6–23 months of age meet the criteria of dietary diversity and feeding frequency that are appropriate for their age.
- Over 820 000 children's lives could be saved every year among children under 5 years, if all children 0–23 months were optimally breastfed. Breastfeeding improves IQ, school attendance, and is associated with higher income in adult life. (1)
- Improving child development and reducing health costs through breastfeeding results in economic gains for individual families as well as at the national level.

Under nutrition is estimated to be associated with 2.7 million child deaths annually or 45% of all child deaths. Infant and young child feeding is a key area to improve child survival and promote healthy growth and development. The first 2 years of a child's life are particularly important, as optimal nutrition during this period lowers morbidity and mortality, reduces the risk of chronic disease, and fosters better development overall.

Optimal breastfeeding is so critical that it could save the lives of over 820 000 children under the age of 5 years each year.

WHO and UNICEF recommend:

- early initiation of breastfeeding within 1 hour of birth;
- exclusive breastfeeding for the first 6 months of life; and
- Introduction of nutritionally-adequate and safe complementary (solid) foods at 6 months together with continued breastfeeding up to 2 years of age or beyond.

However, many infants and children do not receive optimal feeding. For example, only about 36% of infants aged 0–6 months worldwide were exclusively breastfed over the period of 2007–2014.

Recommendations have been refined to also address the needs for infants born to HIV-infected mothers. Antiretroviral drugs now allow these children to exclusively breastfeed until they are 6 months old and continue breastfeeding until at least 12 months of age with a significantly reduced risk of HIV transmission.

## **Breastfeeding**

Exclusive breastfeeding for 6 months has many benefits for the infant and mother. Chief among these is protection against gastrointestinal infections which is observed not only in developing but also industrialized countries. Early initiation of breastfeeding, within 1 hour of birth, protects the newborn from acquiring infections and reduces newborn mortality. The risk of mortality due to diarrhoea and other infections can increase in infants who are either partially breastfed or not breastfed at all.

Breast-milk is also an important source of energy and nutrients in children aged 6–23 months. It can provide half or more of a child's energy needs between the ages of 6 and 12 months, and one third of energy needs between 12 and 24 months. Breast-milk is also a critical source of energy and nutrients during illness, and reduces mortality among children who are malnourished.

Reviews of studies from developing countries show that infants who are not breastfed are 6 (WHO, 2000) to 10 times (Bahl et al, 2005) more likely to die in the first months of life than infants who are breastfed. Diarrhoea (De Zoysa et al, 1991) and pneumonia (Bachrach, 2003) are more common and more severe in children who are artificially fed, and are responsible for many of these deaths. Diarrhoeal illness is also more common in artificially-fed infants even in situations with adequate hygiene, as in Belarus (Kramer et al, 2001) and Scotland (Howie, et al, 1990). Other acute infections, including otitis media (Duncan et al, 1993), *Haemophilus influenzae* meningitis (Silfverda, et al, 1999), and urinary tract infection (Marild et al, 2004), are less common and less severe in breastfed infants.

Artificially-fed children have an increased risk of long-term diseases with an immunological basis, including asthma and other atopic conditions (Gdalevich et al, 2001, Oddy, et al, 2004), type 1 diabetes (Sadauskaite-Kuehne, et al, 2004), celiac disease (Akobeng, et al, 2006), ulcerative colitis and Crohn disease (Klement, et al, 2004). Artificial feeding is also associated with a greater risk of childhood leukaemia (Kwan, 2004). A growing body of evidence links artificial feeding with risks to cardiovascular health, including increased blood pressure (Martin, et al, 2005), altered blood cholesterol levels (Owen et al, 2002) and atherosclerosis in later adulthood (Martins, et al 2005).

Several studies suggest that Children and adolescents who were breastfed as babies are less likely to be overweight or obese. Additionally, they perform better on intelligence tests and have higher school attendance. (Harder, et al, 2005; Burke, 2005)

A meta-analysis of 20 studies (Anderson et al, 1999) showed scores of cognitive function on average 3.2 points higher among children who were breastfed compared with those who were formula fed. The difference was greater (by 5.18 points) among those children who were born with low birth weight. Increased duration of breastfeeding has been associated with greater

intelligence in late childhood (Daniel et al, 2005) and adulthood (Mortensen et al, 2002), which may affect the individual's ability to contribute to society.

Breastfeeding is associated with higher income in adult life. Improving child development and reducing health costs results in economic gains for individual families as well as at the national level.(1)

Longer durations of breastfeeding also contribute to the health and well-being of mothers: it reduces the risk of ovarian and breast cancer and helps space pregnancies—exclusive breastfeeding of babies under 6 months has a hormonal effect which often induces a lack of menstruation. This is a natural (though not fail-safe) method of birth control known as the Lactation Amenorrhoea Method.

Mothers and families need to be supported for their children to be optimally breastfed. Actions that help protect, promote and support breastfeeding include:

- adoption of policies such as the International Labour Organization's *"Maternity Protection Convention 183"* and *"Recommendation No. 191"*, which complements *"Convention No. 183"* by suggesting a longer duration of leave and higher benefits;
- adoption of the *"International Code of Marketing of Breast-milk Substitutes"* and subsequent relevant World Health Assembly resolutions;
- implementation of the *"Ten Steps to Successful Breastfeeding"* specified in the Baby-Friendly Hospital Initiative, including:
  - skin-to-skin contact between mother and baby immediately after birth and initiation of breastfeeding within the first hour of life;
  - breastfeeding on demand (that is, as often as the child wants, day and night);
  - rooming-in (allowing mothers and infants to remain together 24 hours a day);
  - not giving babies additional food or drink, even water, unless medically necessary;
- provision of supportive health services with infant and young child feeding counselling during all contacts with caregivers and young children, such as during antenatal and postnatal care, well-child and sick child visits, and immunization; and
- community support, including mother support groups and community-based health promotion and education activities.

### **Complementary feeding**

Around the age of 6 months, an infant's need for energy and nutrients starts to exceed what is provided by breast milk, and complementary foods are necessary to meet those needs. An infant of this age is also developmentally ready for other foods. If complementary foods are not introduced around the age of 6 months, or if they are given inappropriately, an infant's growth may falter. Guiding principles for appropriate complementary feeding are:

- continue frequent, on-demand breastfeeding until 2 years of age or beyond;



- practise responsive feeding (for example, feed infants directly and assist older children. Feed slowly and patiently, encourage them to eat but do not force them, talk to the child and maintain eye contact);
- practise good hygiene and proper food handling;
- start at 6 months with small amounts of food and increase gradually as the child gets older;
- gradually increase food consistency and variety;
- increase the number of times that the child is fed: 2–3 meals per day for infants 6–8 months of age and 3–4 meals per day for infants 9–23 months of age, with 1–2 additional snacks as required;
- use fortified complementary foods or vitamin-mineral supplements as needed; and
- during illness, increase fluid intake including more breastfeeding, and offer soft, favourite foods.

### **Feeding in exceptionally difficult circumstances**

Families and children in difficult circumstances require special attention and practical support. Wherever possible, mothers and babies should remain together and get the support they need to exercise the most appropriate feeding option available. Breastfeeding remains the preferred mode of infant feeding in almost all difficult situations, for instance:

- low-birth-weight or premature infants;
- mothers living with HIV in settings where mortality due to diarrhoea, pneumonia and malnutrition remain prevalent;
- adolescent mothers;
- infants and young children who are malnourished; and
- families suffering the consequences of complex emergencies.

### **HIV and infant feeding**

Breastfeeding, and especially early and exclusive breastfeeding, is one of the most significant ways to improve infant survival rates. While HIV can pass from a mother to her child during pregnancy, labour or delivery, and also through breast-milk, the evidence on HIV and infant feeding shows that giving antiretroviral treatment (ART) to mothers living with HIV significantly reduces the risk of transmission through breastfeeding and also improves her health.

WHO now recommends that all people living with HIV, including pregnant women and lactating mothers living with HIV, take ART for life from when they first learn their infection status.

Mothers living in settings where morbidity and mortality due to diarrhoea, pneumonia and malnutrition are prevalent and national health authorities endorse breastfeeding should exclusively breastfeed their babies for 6 months, then introduce appropriate complementary foods and continue breastfeeding up to at least the child's first birthday.

## WHO response

WHO is committed to supporting countries with implementation and monitoring of the *"Comprehensive implementation plan on maternal, infant and young child nutrition"*, endorsed by Member States in May 2012. The plan includes 6 targets, one of which is to increase, by 2025, the rate of exclusive breastfeeding for the first 6 months up to at least 50%. Activities that will help to achieve this include those outlined in the *"Global strategy for infant and young child feeding"*, which aims to protect, promote and support appropriate infant and young child feeding.

UNICEF and WHO created the Global Breastfeeding Collective to rally political, legal, financial, and public support for breastfeeding. The Collective brings together implementers and donors from governments, philanthropies, international organizations, and civil society. The Collective's vision is a world in which all mothers have the technical, financial, emotional, and public support they need to breastfeed.

WHO has formed the Network for Global Monitoring and Support for Implementation of the International Code of Marketing of Breast-milk Substitutes and Subsequent Relevant World Health Assembly Resolutions, also known as NetCode. The goal of NetCode is to protect and promote breastfeeding by ensuring that breastmilk substitutes are not marketed inappropriately. Specifically, NetCode is building the capacity of Member States and civil society to strengthen national Code legislation, continuously monitor adherence to the Code, and take action to stop all violations.

In addition, WHO and UNICEF have developed courses for training health workers to provide skilled support to breastfeeding mothers, help them overcome problems, and monitor the growth of children, so they can identify early the risk of undernutrition or overweight/obesity.

WHO provides simple, coherent and feasible guidance to countries for promoting and supporting improved infant feeding by HIV-infected mothers to prevent mother-to-child transmission, good nutrition of the baby, and protect the health of the mother.



### **Summary**

In this Unit you have discussed growth and development, growth monitoring tools and factors that influence growth and development.



### **Activity**

1. Can mothers living with HIV breastfeed their children in the same way as mothers without HIV?
2. Is mixed feeding better than no breastfeeding at all, if the mother is on HIV treatment?

## **UNIT 5: NEONATAL CARE (WITH COMPLICATIONS)**

### **Introduction**

The Unit provides information on the physiology and adaptation of the Newborn to extra-uterine environment. Additionally, you will look at the care of the newborn.

### **Aim of the Unit**

The aim of this Unit is to help you acquire knowledge and skills on the physiological changes of and management of a newborn. The aim of this Unit is to help you conduct physical examination of newborn systematically in order to detect any abnormalities so that correct measures can be taken.

### **Objectives for Unit**



After completing this unit, you should be able to:

- Describe.

- Describe.
- Describe the
- 



### **Other Resource needed**

#### **Prescribed Readings**

- Fraser M.D and Cooper M.A. (2003) 14<sup>th</sup> edition **Myles Textbook for Midwives**, Churchill Livingstone, Toronto.

#### **Supplementary readings**

- Novak, Broom. 1994. Maternal and child health nursing. 8<sup>th</sup> edition. Mosby. St Louis.
- Dickason, JE, Silverman, LB and Schult, O, M.1994. Maternal-infant nursing care. Mosby. St Louis.
- Wong, LD, Perry, ES, Hockenberry, JM, Lowdermill, LD, and Wilson, D. 2006. Maternal child nursing care. Third edition. Mosby/Elsevier. China

## **5.1 Asphyxia**

### **Definition**

- Asphyxia is failure to establish and sustain respiration at birth (Novak and Broom 1999)

### **Introduction**

- During neonatal period a number of serious disturbances are encountered which do not occur during any other age period.
- Some of these relate to events that have taken place during intra uterine life, some are defects during transition to independent life.
- Many of these disturbances are brief critical periods of illness which have no lasting effects on the infant's welfare, while others are early stages of lifelong handicaps.
- Anoxia is one of the disturbances that may occur before birth or during birth.
- Although the majority infants gasp and establish respirations within 60 seconds of birth, others do not.
- Failure to initiate and sustain respirations at birth requires prompt and effective intervention.

### **Oxygenation of fetus**

Oxygenation of the fetus is dependent on the following;-

- Adequate perfusion of the placenta site.
- Placental functioning
- Fetal placental circulation
- Adequate fetal hemoglobin

### **Predisposing factors to Asphyxia**

- **Maternal conditions**



- Cardiac or respiratory diseases
- Eclamptic fit
- Hypertension or hypotension
- Hypertonic uterine action (over stimulation by oxytocin)
- Maternal sedation
- Difficult or prolonged labour
- **Fetal causes**
  - Fetal hypoxia
  - Obstruction of baby's airway by meconium, blood, mucus etc
  - Respiratory depression by narcotics given to the mother.
  - Prematurity
  - Intranatal infection e.g pneumonia
  - Prolapsed or compression of the umbilical cord.
  - Rhesus incompatibility

### **Fetal response to hypoxia**

The fetus responds to hypoxia by accelerating the heart rate in an effort to maintain supply of oxygen to the brain. If hypoxia persists, glucose depletion will stimulate anaerobic glycolysis resulting in a metabolic acidosis. Cerebral vessels will dilate leading to cerebral edema. Peripheral circulation will be reduced. As the fetus becomes acidotic and cardiac glycogen reserves are depleted, bradycardia develops. Anal sphincter relaxes; fetus may pass meconium in liquor. Gasping breathing movement, triggered by hypoxia may result in aspiration of meconium stained liquor into the lungs, which presents with additional problems after birth. The length of the time during which the fetus is subjected to hypoxia will determine the outcome.

### **Classification of asphyxia**

- **Mild Asphyxia**
  - Apgar score 5-7
  - Heart rate 60 -80 beats per minute
  - Short delay in onset of respiration
  - Good muscle tone
  - Responsive to resuscitation
  - Deeply cyanosed
- **Severe Asphyxia**
  - Slow feeble heart rate (less than 40beats)
  - No attempt to breath
  - Poor muscle tone
  - Limp, unresponsive to stimuli
  - Pale, grey
  - Apgar score is less than 5

### **Resuscitation**

As part of ward routine the resuscitaire should be prepared by the midwife daily when an asphyxiated baby is anticipated equipment should be available and in good working. The personnel in attendance at birth of the baby should be familiar with the equipment and resuscitative technique. Preferably each delivery room should have a resuscitaire.

### **Aims of resuscitation**

- Establish and maintain a clear air way by ventilation and oxygenation
- Ensure effective circulation
- Correct acidosis
- Prevent hypothermia, hypoglycaemia and hemorrhage

### **Equipment**

- Good light
- Resuscitaire with overhead radiant heater
- oxygen
- Clock
- Dry towel
- Suction machine
- Bag and mask
- Two straight blade infant laryngoscopes.
- Spare batteries (AAA or AA) and bulbs size 0 and 1.
- Neonatal endotracheal tubes 2.0, 2.5, 3.0
- Neonatal airway size 0, 00, 000
- Syringes 1ml, 2ml, 5ml and 20ml and assorted needles.
- Stethoscope, cord clamp, adhesive tape

### **Drugs**

- Adrenaline 1/10,000 – 0.25ml/ kg
- Naloxone/ narkan – 0.25ml/ kg
- Sodium bicarbonate 4.2% - 2ml/ kg
- Dextrose 10%
- Normal saline 0.9%
- Vitamin k

### **Resuscitation**

- As soon as the baby is born the clock is started.
- Apgar score is assessed at one minute
- In the absence of respiratory effort resuscitation measures are commenced
- Baby's upper airway is cleared by gentle suction of the oro and nasal pharynx and heart beat verified.
- Baby is dried quickly and transferred to the pre warmed resuscitaire and placed on a firm flat surface, at a comfortable working height and under radiant heat to prevent hypothermia.
- Baby's shoulders may be elevated on a small towel, which causes slight extension of the head and straightens the head

### **Stimulation**

Rough handling of the baby merely increases shock and is unnecessary. Gentle stimulation by drying the baby and clearing the air may initiate breathing. Other different methods of stimulation include; single finger flick to the sole of the foot, gentle back rubbing. Under no circumstances the method used should cause pain or bruise. NEVER slap the neonate.

### **Warmth**

Hypothermia exacerbates hypoxia as the essential oxygen and glucose are diverted from vital centers in order to create heat for survival. Wet towels should be removed and the baby's body and head covered with pre warmed blanket leaving only the chest exposed.

### **Clearing the airway**

If there is still obvious respiratory difficulty a suction catheter size 10 FG (or correct size) may be used. It is recommended that the tip of catheter should be inserted not further than 5cm and that each suction attempt should last no longer than 5 seconds to avoid trauma.

If meconium is present in the airway suction under direct vision should be performed by passing a laryngoscope and visualizing the larynx. Care should be taken to avoid touching the vocal cords as this may induce laryngospasms, apnoea and bradycardia. Thick meconium may need to be aspirated out of the trachea through an endotracheal tube.

### **Ventilation and oxygen**

- If the baby fails to respond to these simple measures assisted ventilation is necessary
- Use face mask ventilation (mask covers nose and mouth)
- To aerate the lungs, deliver 5 sustained inflation using oxygen with a pressure of 30cm of water applied for 2-3 seconds.
- Continue to ventilate at least 40 respirations per minute.
- Insert an airway to prevent obstruction of airway by the tongue.
- If baby fails to respond to IPPV, then endotracheal intubation is done- this requires special skill

### **Cardiac massage**

- Chest compressions should be performed if the heart rate is less than 60 or between 60 and 100.
- The most effective way of achieving this is by encircling the baby's chest with fingers on the spine and thumbs on the sternum.
- The chest is depressed 100- 120 times per minute at a ratio of three compressions to one ventilation at a depth of a third of the baby's chest.

### **Use of drugs**

- If the baby's response is slow or he remains hypotonic after ventilation is achieved, consideration will be given to use of drugs.
- Naloxone – powerful antioioid, is used to reverse the effects of maternal narcotics
- Sodium bicarbonate – given when there is respiratory acidosis
- Adrenaline – indicated if the heart rate is less than 60 despite one minute of effective ventilation and chest compression
- Dextrose 10% - given when hypoglycemia is suspected

### **Observations and aftercare**

- Throughout resuscitation the baby's condition should be monitored and recorded.
- Document a detailed report of resuscitation activities for further management of the baby.
- Endotracheal tube may remain for few minutes after baby has started to breath spontaneously.
- A baby whose Apgar score was less than 6 at 5 minutes or who was slow to respond to resuscitation, or who requires continued ventilatory assistance should be transferred to neonatal unit for a period of observation.

### **Aftercare**

- Explain the need for transfer to neonatal unit to the parents.
- If the baby responded well the following should be done; - keep baby warm, do brief examination, take baby to the mother and encourage kangaroo care.
- Give IEC on eye care, cord care and importance of immunization.

#### **Summary/ key points in resuscitation**

- Anticipate problems
- Check resuscitation equipment
- Start clock
- Suctioning
- Keep warm
- Apgar score
- Oxygen
- Bag and mask ventilation
- Endotracheal ventilation
- Cardiac massage.
- drugs
- If other problems transfer to neonatal unit

#### **Complications of asphyxia**

- Encephalopathy leading to neurologic problems.
- Cerebral palsy
- Mental retardation
- Infection
- death

## **5.2. Neonatal Hypothermia**

### **Introduction**

Neonatal hypothermia is excessive heat loss resulting in the use of compensatory mechanisms such as increased respiration and non-shivering thermogenesis to maintain core body temperature (Olds, London & Ladewig, 1996).

Heat loss in the newborn occurs through the mechanisms of evaporation, convections, conduction, and radiation. The newborn infant's major source of heat production is brown fat metabolism. Pre-term and small for date's babies are prone to hypothermia because they do not have adequate stores of adipose tissue, brown fat and glycogen. Hypothermia can be an important indication of sepsis. It may mask or mimic other illness and frequently accompanies neonatal sepsis.

### **Nursing interventions**

- The newborn should be warmed slowly because rapid temperature elevation may cause apnea.
- The baby should be dressed in warm clothing and wrapped in a warm blanket.
- The environment in which the baby is kept should be warm.
- Monitor the infant's temperature every 30 minutes until it is within normal range.
- Where possible and depending on the condition the infant can be nursed in an incubator.
- The underlying cause should be identified

### 5.3 Respiratory distress syndrome

Respiratory distress syndrome (RDS) is a disease of prematurity caused by a lack of surfactant. Production of surfactant increases with gestational age. Lack of surfactant causes alveoli to collapse leading to Atelectasis (collapse of the alveoli, hypoxia and acidosis. Deficiency of surfactant causes damage to the alveoli and pulmonary capillary epithelium leading to formation of a hyaline membrane consisting of fibrin and sloughed cells. This further compromises gas exchange. Hyaline membrane disease is the commonest cause of neonatal respiratory distress in premature babies. It is rare in full term babies.

#### Clinical signs

- Clinical signs may occur immediately after birth or several hours after delivery.
- Grunting respiration come first followed by cyanosis, tachypnea, pallor, retractions and nasal flaring may present.
- There are decreased breath sounds and scarred rales.
- Vital signs will be altered; there may be tachycardia or bradycardia, hypotension and hypothermia.

### 5.4 Large for dates baby or large for gestational age baby

#### Definition

- Large for gestational age (LGA) baby is one who weighs more than 4,000g, is above the 90<sup>th</sup> percentile or is two standard deviations above the mean (Stright, 2005).

The LGA infant can be preterm, term or premature.

#### Predisposing factor

- Genetic predisposition – Large parents tend to have large babies.
- Maternal diabetes - high levels of maternal glucose crosses the placenta barrier during pregnancy and is transferred to the fetus.
- Multiparous women tend to have large babies due to overproduction of growth hormone in utero.
- Genetic disorder (Beckwith syndrome)

#### Appearance

- Baby is large and fat

#### Complications

- Birth trauma – fractures and nerve injury
- Hypoglycemia because maternal source of glucose is lost
- Hyaline membrane disease due to lack of surfactant
- Hypocalcaemia due to hypo - parathyroidism
- infection

### 5.5. Small for dates

#### Definition

- Small for gestational age baby is a baby born after 37 weeks of gestation whose birth weight is below 2.5 Kg (Novak & Broom, 1996).

- A small-for gestational-age (SGA) infant is one whose length, weight and head circumference are below the 10<sup>th</sup> percentile of the normal variation for gestational age as determined by neonatal examination (Stright, 2005).

### **Characteristics of the infant**

- The SGA infant may be preterm, term, post term.
- The infant is alert, wide-eyed with a worried expression.
- The skin is loose, peeling, dry and scaly
- The baby has a wasted dehydrated look
- Has creases on the sole of the feet
- Meconium staining is present on the following:
  - skin
  - the nails
  - Umbilical cord
- Some babies appear to be dwarfed with a reduced weight
- The hair is sparse, coarse and straight
- The cord dries rapidly
- The baby is active and hungry at birth
- The ear cartilage is well developed
- The skull bones are firm but small
- The infant has a scaphoid (boat-shaped) abdomen.

### **Clinical features during pregnancy**

- The uterus does not increase in size at the normal rate.
- On abdominal palpation the fetus appear to be small for dates.
- There may be history of pre-eclampsia.

### **Contributory factors**

- Women of low socio class are likely to have small for gestational age babies or light for dates babies due to poor nutrition leading to intra-uterine malnutrition or growth retardation of the fetus.
  - Multiple pregnancy
- Maternal disease in pregnancy – any disorder where there is interference in the maternal blood supply to the placenta is likely to result in the baby being light for dates e.g. Pre-eclampsia, hypertension, ante partum hemorrhage, diabetes mellitus, cardiac, pulmonary or renal diseases.
- Ethnic origin - certain ethnic groups such as Asians have a tendency to have much smaller babies.
- Smoking – maternal smoking results in high levels of carbon monoxide in the circulation and this crosses the placenta to the baby. Elevated fetal carbon monoxide levels may result in hypoxia due to reduced availability of haemoglobin for oxygen transport.
  - Fetal hypoxia may lead to growth retardation. In addition Nicotine causes placenta vasoconstriction which impedes the transfer of oxygen and nutrients to the baby.
- Fetal causes - infections such as cytomegalovirus, congenital abnormalities particularly chromosomal defects.



- Maternal age - There is a tendency for mothers below the age of 20 or over 35 years to have lighter babies.
- Parity- First babies are normally lighter than those born subsequently.
- Drug addiction – maternal heroin and morphine addiction.

### Diagnosis

- Clinical manifestations – loose dry scaling skin, wasting, respiratory distress, etc
- Laboratory findings – Glucose testing test will reveal decreased glycogen stores, which increase the potential for hypothermia and hypoglycemia. Hematocrit level may increase which indicates polycythemia as a result of chronic fetal hypoxia.

### Management

- Meconium aspiration is life threatening; therefore, care must be taken to prevent meconium from entering the air passages. As soon as baby is delivered :
  - clear airway
  - Resuscitate the baby if necessary
- Provide adequate fluids, electrolytes and nutrition. Early feeding should be encouraged. Breast-feed infant 2 hrly or provide expressed breast milk in NG tube if unable to suck or formula feeding
- Observe for the following signs and symptoms:
  - cyanosis
  - Lethargy
  - Jaundice
  - Seizures
- Monitor glucose levels – if very low 10% glucose infusion should be commenced.
- Provide warmth – keep baby warm all the time to prevent hypothermia.
- Hygiene should be maintained to prevent infections.
- Provide education and emotional support
  - Explain the possible causes of intrauterine growth retardation.
  - Encourage the parents to feed baby frequently.
  - Explain the importance of follow up, under five clinic etc.

### Complications

- Asphyxia due to hypoxia
- Meconium aspiration
- Hypoglycemia due to decreased hepatic glycogen stores and reduced subcutaneous fat stores
- Infections due to dry cracked skin which allow entry of pathogens
- Hypothermia because they have little subcutaneous fat.

## 5.6. Prematurity

A premature or preterm baby is a baby born before 37 weeks gestation (Stright, 2005). The etiology of preterm labour is poorly understood. Possible factors that may contribute to this condition include the following:

- Multiple pregnancy
- Maternal history of preterm delivery
- Hydramnios



- Uterine anomalies
- More than one second-trimester abortions
- Incompetent cervix
- Infection
- Uterine structural anomalies
- Premature rupture of membranes
- Maternal substance abuse especially cocaine
- Maternal age less than 18 years, poor nutrition, and lack of prenatal care.

A preterm baby is an immature baby both anatomically and physiologically. This makes it difficult for the baby to adapt to extra uterine life. On clinical examination, the baby will present with a red skin, lack of subcutaneous fat under the skin, the blood capillaries will be visible and vernix and lanugo will present. The baby will appear small, the sutures and Fontanelles will appear wide, and pinna will be soft and flat. The nipples areola will be flat with little breast tissue. The boys' genitalia will have few rugae on the scrotum with undescended testes where as in girls; the labia minora will be prominent. The baby will have diminished sole creases. Physical and neurological examination will reveal prematurity.

The baby should be nursed in an incubator or in a warm cot, well wrapped in a blanket and in a heated room. This is because the baby is prone to hypothermia because of the immature heat regulating center and very little subcutaneous fat. A premature baby is also prone to respiratory problems because it has increased risk of hypoxia and asphyxia during labour and delivery. It also has weak respiratory muscles and lack of surfactant which predisposes the baby to Respiratory distress syndrome. Respiratory problems have been reduced dramatically by giving the mother dexamethasone. This makes the baby produce surfactant and reduces risk of respiratory distress syndrome. Always be prepared for resuscitation if the baby stops breathing. Have oxygen ready to give whenever necessary.

Feeding is mainly through a Naso gastric tube. The baby is given Expressed Breast Milk or formula milk through the Nasogastric tube e.g. 60 mls/kg body weights 3 hourly. Glucose (10% dextrose) is given 60 mls/kg body weight in 24 hrs. Breast feeding is introduced gradually. Supplements such as vitamins and Iron are given orally.

The baby is prone to feeding problems because of increased risk of vomiting and inhalation of vomitus. The baby has immature enzyme formation which leads to poor absorption of feeds.

Observations are done frequently depending on the baby's condition. These include:

- Apex beat - because the heart is immature and breathing is irregular
- Respiration- because the baby is prone to respiratory problems
- Colour – this is a clinical guide to oxygenation
- Tone and reflexes – these diminished in ill babies
- Feeding – observe the amount of feed, whether it is being tolerated or not, vomiting
- Stool and urine – because of the gut and kidneys that are immature.
- Oedema – the baby tend to retain fluids
- Weight gain- baby should regain birth weight in two weeks.

Possible investigations include dextrostix 3 hourly for 48 hours because of the risk of hypoglycemia. Vitamin K 0.5 – 1 mg is given intramuscularly at birth to prevent bleeding. The baby may be given an antibiotic to prevent infection.

The baby requires minimal handling and strict observation. Daily maintenance of hygiene is very important. Soiled nappies should be changed regularly and care of the cord should be done daily. The baby's position should be turned every 2 hourly. Prevention of infection is very important as the baby is prone to infections. The baby's parents should be involved in the care of their baby. Follow up care is important after discharge.

### **5.7. Post maturity**

A post mature baby is a baby born after 42 weeks of pregnancy (Hogan et al 2007). The cause of post maturity is unknown, post maturity may lead to a large baby or decreased placental function. If the placental function decreases, the fetus may not receive adequate nutrition. The fetus will utilize its subcutaneous fat stores for energy. Wasting of subcutaneous fat occurs resulting in fetal dysmaturity syndrome.

There are three stages of fetal dysmaturity syndrome:

#### **Stage 1 – chronic placental insufficiency**

In this stage the fetus will have a dry, cracked, peeling, loose and wrinkled skin. It will appear malnourished, with eyes wide open and alert.

#### **Stage 2- acute placental insufficiency**

The fetus will have a dry, cracked, peeling, loose and wrinkled skin, and malnourished. In addition there will be meconium staining liquor.

#### **Stage 3 - sub acute placental insufficiency**

In this stage all the features of stage 1 and 2 will appear except that the baby will not be alert. There will green staining of skin, nails, cord, and placental membranes. The fetus has a higher risk of dying in the uterus or shortly after birth.

Furthermore the newborn is at increased risk for developing complications related to compromised utero-placental perfusion and hypoxia (such as meconium aspiration syndrome). Chronic intrauterine hypoxia causes increased fetal erythropoietin and red blood cell production resulting in polycythemia. Post mature babies are susceptible to hypoglycemia because of the rapid use of glycogen stores.

On clinical assessment, the baby will appear long, thin and wasted with meconium stains on the skin, nails and umbilical cord. Finger nails are long and lanugo is absent. Signs and symptoms of meconium aspiration syndrome will be present such as fetal hypoxia, meconium staining of amniotic fluid, respiratory distress).

Immediately the baby's head is born, suction of the airways should be done to prevent meconium aspiration. Dry and keep the infant warm. Give oxygen if necessary. Provide early feeding to

prevent hypoglycemia if the baby's condition allows. The baby is nursed together with the mother.

## **5.8. Neonatal Jaundice**

Jaundice is the yellow discoloration of the skin and mucous membrane and sclera due to an excess of bile pigments in the blood and tissues. Bilirubin is formed by the reticulo -endothelial system from broken down red cells in the normal process of wear and tear. It is insoluble in water and known as indirect bilirubin. A healthy mature liver converts this into soluble or direct bilirubin by a process of glucuronidation. The enzyme concerned with this conversion is called glucuronyl transferase. Unjugated bilirubin is very toxic to tissues especially the brain and the heart. It damages nerve cells irreparably if it accumulates beyond a certain concentration in cells.

### **Types of Jaundice**

- Physiological jaundice
- Haemolytic Jaundice
- Obstructive Jaundice
- Infective jaundice
- kernicterus

#### **5.8.1 Physiological jaundice**

This is the most common form of and is usually seen from around day 3. In utero the foetus has high levels of haemoglobin (Hb 18-20 g/dl) and extra red blood cells. This is to facilitate intra uterine oxygenation. After birth the baby no longer need the excess so the haemoglobin is stored and the excess Red blood cells broken down forming indirect or fat soluble bilirubin that gives the yellow discoloration of the skin. Indirect bilirubin has to be converted to direct bilirubin (water soluble) which is done by the enzyme in the liver. This can then be excreted in stool and urine.

The liver, because of the immaturity of the enzymes, may not be able to cope with the destruction of the red cells to readjust to extra-uterine life and jaundice results. Physiological jaundice may be severe in premature baby owing to immaturity of the liver. It usually clears within the first week of life. Extra fluids to combat dehydration should be given to the baby. The baby will require careful monitoring of bilirubin levels clinically and exposure to sunlight as this helps the conjugation process.



The appearance of jaundice during the first 24 hours of life or persistence usually indicates a potential pathologic process that requires further investigation.

#### **5.8.2 Haemolytic jaundice**

##### **I. Rhesus incompatibility**

Excessive accumulation of bilirubin due to rhesus incompatibility. If the mother is Rh – and the father Rh+ most of the children will be Rh+. A problem arises in utero if there is a foeto-maternal bleed. Should Rh+ foetal cells enter the maternal circulation; the mother will produce

Rh antibodies to destroy them. These antibodies will then cross the placenta and start further haemolysis. The baby will require exchange blood transfusion to prevent brain damage. The prognosis for the mother is poor as once Rh antibodies are formed they will cause haemolysis in the subsequent pregnancies.

## **II. ABO incompatibility**

In this condition, the mother is blood group O and her baby is group A/B or AB. Blood group B contains anti A haemolysins. This is why blood group A cannot be given to a patient with group B and vice-versa. Group O contains both anti A and anti B haemolysins. This is why a patient with group O cannot receive blood group A or B. these haemolysins can sometimes join with an immunoglobulin in the mothers' blood which has the ability to cross the placenta and cause haemolysis of the foetal blood. Jaundice here occurs within the first day of life but is not as severe as Rh incompatibility. Treatment here is the same as for physiological jaundice. Other causes of haemolytic causes of jaundice are:

- Lack of Glucose 6 phosphate dehydrogenase. Lack of this enzyme makes red blood cells resistant to haemolysis and interferes with the disposal of bile pigments.
- Malaria

### **5.8.3. Obstructive jaundice**

In congenital obliteration of the bile duct, bilirubin is converted into bilirubin glucuronide, but is not excreted because of the obstruction in the biliary excretory system.

### **5.8.4. Infective jaundice**

Infection of the liver, causing inflammation, renders the organ incapable of performing its normal functions. Jaundice may be evident in acute pyelonephritis, septicaemia and congenital syphilis.

### **5.8.5. Kernicterus**

This is the accumulation of high levels of serum bilirubin leading to pigmentation of the nuclear masses of the brain with bile pigment with consequent cerebral damage which may be fatal or leave the child mentally retarded.

## **5.9. Birth Injuries**

### **5.9.1. Introduction**

These injuries incurred by fetus during passage through the birth canal or during delivery. The injuries occur frequently with breech presentation, when the infant is large, with use of forceps and if the practitioner is inexperienced.

As soon as possible after birth every baby must be examined to exclude birth injuries. The baby must be observed for at least 48 hours because the result of birth injuries may become apparent in his behaviour.

### **5.9.2 Types of injuries**

#### **a) Caput succedaneum**

Caput succedaneum is an edematous swelling on the presenting part resulting from the pressure of the presenting part on the cervix during labour. The size of the oedema varies. It is not limited

by the suture lines and is apparent at birth. Caput succedaneum is usually seen when labour is prolonged. It does not need treatment and usually subsides within 48 hours.

**b) Cephalhaematoma**

Cephalhaematoma is a collection of blood between the cranial bone and its overlying periosteum. Bleeding is limited to the surface of one bone, because the periosteum is attached at the suture line. This is commonly seen on the parietal bone but may be found on the frontal or occipital bones. Cephalhaematoma is caused by pressure of the head against a bony prominence of the pelvis during labour and delivery. The haematoma may not be seen at birth but gradually increases in size and becomes firm by the second day.

Cephalhaematoma subsides gradually and usually disappears by the end of the sixth week after delivery. In some instances it may take months. Usually it does not need treatment.

**c) Sub-conjunctival haemorrhage**

This is a deep-red discoloration seen on the conjunctiva. The haemorrhages are usually crescent-shaped and are caused by congestion and rupture of capillaries during birth. The blood will be absorbed within the first two weeks of birth and the condition does not require treatment.

**d) Nerve injuries**

**i. Facial palsy**

This occurs as a result of a difficult delivery such as forceps delivery where there is damage to 7<sup>th</sup> cranial nerve (facial nerve). The baby's face is paralyzed on one side, there is loss of movement on the affected side, the eye is open with a drooping of a corner of the mouth and the absence of wrinkling forehead. This resolves spontaneously within a few days

**ii. Erbs Palsy**

This is as result of paralysis of the brachial plexus in the upper portion of the arm following difficult delivery of the shoulders or head in breech presentation. The baby presents with flaccid arm with the elbow extended and the hand rotated inward. The Moro reflex is absent on the affected side. The infant cannot raise his or her arm. Treatment involves mobilization with a splint or brace and physiotherapy. The condition resolves within 3 months.

**e) Bone injuries**

**i. Fractures**

The clavicle is the bone most frequently fractured during delivery. Other bones fractured during delivery are skull, humerus and femur. Cephalopelvic disproportion is often a predisposing factor. The baby should be assessed for any deformity and bruising, limited range of motion, crepitus over the affected bone, and absence of the Moro reflex on the affected side. The baby should be handled gently on the affected arm and this usually resolves after some time.

## **5.10. Intracranial haemorrhage**

This is bleeding under the soft bones of the skull. Signs of intracranial haemorrhage manifest suddenly or gradually and these may include irritability, cyanosis, restlessness, irregular respiration, lack of appetite. The baby may have a poor sucking reflex, twitching, apnea, seizures



or twitching, projectile vomiting, tense and bulging Fontanelles, unequally dilated pupils with eyes rolled up wards, separated sutures and high pitched cry. These symptoms are as result of rising intracranial pressure.

Diagnosis is made though history, clinical assessment and computerized tomography. The infant is nursed in the incubator in the special baby unit. Ventilator support is provided and vitamin K may be prescribed to stop any bleeding. Sedatives may be ordered to promote relaxation and prevent increased intracranial pressure. Observations of vital signs, breathing partners, colour, muscle tone, stool and urine should be done regularly and any abnormalities noted. Maintenance of body temperature is vital and baby requires minimal handling.

## **5.11. Neonatal infections**

### **5.11.1. Types of infections**

Newborn babies' especially premature babies are prone infections. The common infections are:

- Ophthalmia neonatorum
- Pemphigus neonatorum
- Thrush
- Umbilical cord infections
- Gastro-enteritis
- Respiratory tract infections

#### **i) Site of entry**

- The skin, if there is a break in it
- The umbilicus
- The eyes
- The gastro-intestinal tract

#### **ii) Causative organism**

The source of infection may be the mother, the attendants, equipment and visitors. The common causative organisms are:

- Staphylococcus aureus
- Streptococcus
- Candida albicans,
- Ecoli and tetanus bacillus



Health personnel should use good hand washing techniques before and after handling the baby. This is one of the most measures in the prevention to neonatal infections.

#### **a) Umbilical infection (Omphalitis)**

Inflammation of the umbilicus may be caused by staphylococcus or by tetanus bacilli.

Signs

- Reddening of the area around the umbilicus.
- The cord becomes sticky.
- there may be an offensive odour from the umbilicus



- Delay in separation of the cord may occur owing to low-grade infection
- Jaundice usually follows inflammation of the liver caused by spreading infection. Septicaemia is likely to occur. There may be bleeding from the umbilical cord.

The umbilicus should be cleaned with saline water regularly and antibiotics may be ordered.

#### **b) Ophthalmia neonatorum**

Ophthalmia neonatorum is a purulent discharge from the eyes of an infant starting within 21 days of birth. The causative organisms are staphylococcus aureas, bacillus proteus, pneumococci, streptococci and Gonococci. The predisposing factors are passage of the child through an infected birth canal, use of unclean hands or handkerchief or towel over the baby's face by the midwife or the mother. The baby should be isolated and a smear of the discharge is taken for culture and sensitivity. The doctor may order intramuscular crystalline penicillin, penicillin eye-drops every 10 minutes for one hour then half-hrly for two hours to be followed by an ophthalmic ointment e.g. oxytetracycline or neomycine.

The baby should be laid on the affected side of the eye so that pus can drain on the dressing and to avoid infecting the other eye. Strict aseptic technique is need and both eyes should be treated when one is infected.

#### **c) Pemphigus neonatorum (Bullous impetigo)**

Pemphigus is a highly infectious and contagious skin disease characterized by watery blisters. The causative organism may be the staphylococcus aureas or a streptococcus. The lesions appear within a few hours and they contain fluid and are known as vesicles. Later the water blisters contain pus. When they have broken down, the underlying skin is raw and red and the remaining parts are covered by tags of skin. The fluid is infectious. The baby should be bathed once a day. The dead pustules of the skin are removed and gentian violet or antibiotic cream may be ordered.

#### **d) Thrush**

Thrush is an infection by the fungus Monilia albicans in which whitish spots from on the mucous membrane of the mouth. The condition is common in bottle fed babies because it thrives on cane sugar. Neonates may contract thrush during the birth process or from contaminated hands or feeding equipment.

White patches which look like milk stains appear on the tongue, gums and cheeks. They do not come off easily when cleaned and usually leave a raw surface. The baby is lethargic and may difficulties with sucking the stools may become lose when the alimentary tract is affected. The signs appear a few days after birth. Thrush may be fatal in premature babies. All those handling the baby need to observe strict hygiene. Napkins should be properly disposed off. The doctor may order Nystatin (Mycostatin) drops 100,000 units four times a day orally after feeding. Gentian violet may also be swabbed over the mucosa, gums and tongue.

#### **e) Gastro-enteritis**

This is the commonest cause mortality in infants because of its sudden onset and rapid course. This is characterized by frequent watery stools, restlessness. The baby looks weak cries often.

Signs of dehydration such as sunken eyes, Fontanelles, deep rapid respirations, vomiting and abdominal distension. The baby may need intravenous fluids and antibiotics

#### **f) Respiratory infections**

Respiratory infections can occur anywhere along the respiratory tract. Infections are easily contracted by babies from mother or staff with colds and other infections. Pneumonia can be more fatal in babies. Signs of pneumonia are:

- Rapid respiration
- Grunting with recessions
- Cyanotic attacks
- Refusal to feed
- Vomiting
- Diarrhea may occur
- Fever.

The baby will require frequent observations including respirations, apex beat and colour. Oxygen will be administered as required. Keep the baby warm. Clear the airways of mucus frequently and turn the baby from side to side two-hourly. Change the nappies when ever soiled and maintain the hygiene. Feeding carried out every 3 hourly and intravenous fluids may be required to maintain hydration. Appropriate antibiotics will be ordered by the Doctor. Treatment must be given as ordered by the Doctor.

#### **g) Tetanus**

Tetanus is a fairly common infection and is quite often fatal. The incubation period is seven to 14 days. The causative organism is clostridium tetani. The mode of entry is via the umbilical cord.

Signs and symptoms include;

- Irritability and restlessness
- Inability to suck and difficulty in swallowing owing to spasms of the jaw muscles.
- Stiffness of the neck
- Head retraction or arching of the back
- Anxious facial expression; at times spasms of the facial muscles occur
- Periodic painful muscular contractions or spasms of the body
- The temperature may be elevated
- Rigidity of the abdominal wall.

The airway must be clear all the time. Oxygen is given whenever necessary. All nursing procedures should be done at once to chance the baby to rest. Sedation will be ordered such as paraldehyde 1ml when necessary or diazepam 1-2 mg 6 hrly. Fluid balance chart should be maintained. Antibiotics and antitetanus serum 10,000 to 20 000 unit in one dose will also be ordered if the baby has not had antitoxin. The prognosis is poor. Death is caused by asphyxia or extreme exhaustion.

#### **h) TORTCH INFECTIONS**

The occurrence of certain maternal infections during early pregnancy is known to be associated with various congenital malformations and disorders. The most common and best understood infections are represented by the acronym TORCH. And these infections are:

T= Toxoplasmosis

O= other: Syphilis, Gonorrhea, Varicella, Hepatitis B virus, HIV.

R = Rubella (German measles)

C= Cytomegalovirus (CMV) infections

H= Herpes simplex virus infections

### **i) Syphilis**

Syphilis is caused by *treponema palladium*, a spirochete. Organisms cross the placenta after 16 weeks gestation and infect the foetus; Langhans layer in the chorion prevents foetal infection early in pregnancy until this layer begins to atrophy between 16 and 18 weeks gestation. There is no increased risk of anomalies but spirochete may cause inflammatory and destructive changes in the liver, spleen, kidneys, adrenal glands and bone marrow. If syphilis is untreated during pregnancy, 25% of pregnancies will end in stillbirth and 40 to 50% of neonates born to these women will have symptomatic congenital syphilis.

The most severely affected infants occur in untreated mothers, and the new born may be oedematous, anemic with an enlarged liver and spleen. They may feed poorly with snuffles. By the end of the first week they may develop maculorapular rash on the palms of the hands, soles of the feet, on the buttocks and around the mouth and anus. The rash may extend to the trunk and extremities. In some infants signs of congenital syphilis do not appear until late in the neonatal period.

The treatment for congenital syphilis is a 10 day course of aqueous penicillin G or procaine penicillin G.



The infant with congenital syphilis may be entirely asymptomatic until discharge from the Hospital. It is therefore imperative that caregivers use standard precautions with all newborns.

### **ii) HIV**

During child bearing, transmission can occur across the placenta or through breast milk or contaminated blood. Maternal to newborn transmission rates are 15-25% without prophylactic medication. Transmission rates drops to less than 2% when mothers are given Zidovudine (ZDV) or Niverapin antenatally, deliver by elective cesarean at 38 weeks (prior to rupture of membranes) and avoid breast feeding.

It may take up to 15 months for infants to form their own antibodies against HIV. HIV testing should be done at birth, 1 to 2 months of age and at 4 to 6 months of age. The baby can develop signs and symptoms of the disease a few days after birth. The signs and symptoms include failure to thrive with developmental delays, hepatomegaly and/or splenomegaly, recurrent respiratory infections, urinary system infections, recurrent or persistent oral and genital candidiasis infections, recurrent diarrhea and weight loss.

Nursing care include promotion of comfort, through cord care to prevent infection, maintenance of hygiene and prevention of infection. Encourage bottle feeding and the infant should receive all vaccines except poliovirus. Administer Niverapin as ordered.

### **iii) Toxoplasmosis**

Toxoplasmosis is a multisystem disease caused by the protozoa *Toxoplasma gondii*. Cats who hunt infected birds and mice harbor the parasite and excrete the infective oocysts in their faeces. Human infections follow hand to mouth contact, such as after disposal of cat litter or after handling or ingesting raw meat from cattle or sheep that grazed in contaminated fields. About 30% of pregnant women who contract the disease transmit it to their offspring. The disease results in serious perinatal mortality and morbidity.

Severe toxoplasmosis is associated with preterm birth, growth restriction, Microcephaly or hydrocephaly, chorioretinitis, CNC calcification, thrombocytopenia, jaundice and fever. Petechiae or a maculopapular rash may develop. Some clinical manifestations may not develop until later in life. The affected infant is treated with pyrimethamine and oral sulfadiazine. Folic acid supplement is given to prevent anaemia.

### **iv) Varicella Zoster**

The Varicella zoster virus responsible for chickenpox and shingles is a member of the herpes family. About 90% of women in their childbearing years are immune; therefore the risk of infection in pregnancy is low. Varicella transmission to the foetus may occur across the placenta when the disease is contracted in the first half of pregnancy. When transmission occur the fetus may develop limb atrophy, neurologic abnormalities, eye abnormalities and intrauterine growth retardation may occur.

When maternal infection occurs in the last few days of pregnancy, 20% of infants born to these mothers will develop clinical Varicella. The mortality in severe illness is 30%. Infants born to mothers who develop chicken pox between 5 days before birth and 48 hours birth after should be given Varicella-zoster immune globulin at birth because of the risk of severe disease. Acyclovir can be used to treat infants with generalized involvement and pneumonia.

### **v) Hepatitis B virus**

Hepatitis B Virus infection during pregnancy is associated with preterm births. The transmission rate to the newborn is 90% when the mother is seropositive for both hepatitis B surface antigen (HbsAg) and hepatitis B e antigen (HbeAg). Transmission occurs transplacentally; serum to serum and by contact with contaminated blood, urine faeces, saliva, semen or vaginal secretions during birth or the first few days of birth. Transmission may also occur through breast milk. The infant may be symptom free at birth or may have evidence of acute hepatitis with changes in liver function. The mortality for full blown hepatitis is 75%. Infants who become carriers are at risk of developing chronic hepatitis cirrhosis of the liver or liver cancer. The infant whose mothers have antibodies for HbsAg or who have developed hepatitis should be treated with hepatitis B immunoglobulin, 0.5ml intramuscularly as soon as possible after birth or within the first 12 hrs of life. The hepatitis B vaccine should also be given concurrently but at a different site. The second dose is given at one month and the third dose at 6 months.



Read on Rubella, Herpes simplex and Cytomegalovirus

#### **j) Minor disorders**

##### **Sore buttocks**

This is caused by infrequent changing of the napkin, frequent loose stools, rough napkins or toweling, and chemical soap. Prevention of this includes frequent changing of napkins. The buttocks should be cleaned with soap and water. When washing the napkins soap should be rinsed carefully to avoid skin excoriation.

### **5.12. Congenital malformations**

Congenital abnormalities arise in the embryo, mostly during the first three months of pregnancy. This is the period when organs are forming and when the most severe malformations may develop. The rest of the time utero is devoted mainly to growth. The causes may be genetic-hereditary or gene mutation in which case there is something wrong with the chromosomes. The cause may be environmental or there may be an interaction of the two. The environmental causes include:

- Infections such as rubella in the first 12 weeks of pregnancy. If the mother has an attack during the first 3 months of pregnancy the baby may be born with defects
- Foetal anoxia especially in the early months of pregnancy
- Severe malnutrition
- Exposure to radiation such as X-rays early in pregnancy
- Drugs for example thalidomide.

#### **5.12.1. Down's syndrome**

This is genetic in origin and usually associated with elderly mothers. It may also affect the offspring of young mothers although rather infrequently. The infant is mentally subnormal; the head is small with a flat occiput. The eyes are slanting resembling those of the Mongolian race. The cheeks are rosy in colour, the hands are short. A palmar crease, unbroken from side to side is present. The great toe is widely separated from other toes. The whole body is soft and hypotonic. Leukemia is more common in Mongols than in normal babies. About half of these subnormal infants have cardiac lesions.

Because Mongols have an extra chromosome, 47 instead of 46, a blood sample is taken to effect diagnosis. The facial appearances of both parents are also considered. Mongol children learn to walk later than usual, between two and three years and their speech is usually poor. Some live up to old age although those with heart problems may die early.

#### **5.12.2 Microcephaly**

The microcephalic infant has a very small head. If it survives, it will be mentally deficient.



### **5.12.3. Abnormalities of the genitor-urinary system**

- Imperforate urethra- the urethra leading to from the bladder is closed. This leads to distension of the bladder
- Phimosis- a constriction of the prepuce leading to urinary retention
- Hypospadias – is a malformation in which the urethra opens on the under-surface of the penis
- Hermaphroditism – a condition in which both male and female genital organs are present.

### **5.12.4 Abnormalities of the heart and blood vessels**

The ductus arteriosus and foramen ovale which should become occluded at birth may remain patent. Congenital coarctation of the aorta and other cardiac malformations may be present at birth. General signs of heart abnormalities include:

- Dyspnoea
- Difficulty with feeding
- Choking spells or stridor
- Apex beat of over 200/min
- Recurrent respiratory infections
- Failure to gain weight and failure to thrive
- Heart murmurs
- Cyanosis and cyanotic attacks
- Cerebral haemorrhage.

### **5.12.5 Limb abnormalities**

#### **a) Webbed fingers and toes**

In this condition, the fingers and toes are held together by folds of skin.

#### **b) Extra fingers and toes**

The infant has an extra little finger or toe. This is abnormality tends to be hereditary.

#### **c) Missing or deformed limbs, fingers and toes**

This may be due to drugs taken during pregnancy.

### **5.12.6 Cleft lip and cleft palate**

Cleft lip is a congenital fissure or fissures in the upper lip. Cleft palate is a congenital fissure or fissures in the hard and soft palates or in the soft palate alone. Cleft palate may or may not be associated with cleft lip. The condition is more common on the left side than on right and more unilateral than bilateral.

Cleft lip and cleft palate result from failure of the facial processes to fuse during the seventh and 12th weeks of intra-uterine life. It may be caused by hereditary or environmental factors.

Cleft lip can be repaired at 3 months and cleft palate is repaired when the child is 18 months old.

### **5.12.7. Hydrocephalus**



Hydrocephalus is a condition characterized by an abnormal increase in the cerebrospinal fluid volume within the intracranial cavity which is accompanied by enlargement of the head and prominence of the forehead. It may be caused by:

- Excessive cerebrospinal fluid secretion
- Obstruction of the normal circulatory pathways of the cerebrospinal fluid
- Defective absorption.

Other causes include atresia, stenosis or absence of one or more of the interventricular communications, inflammatory reactions such as meningitis and neoplasms that may obstruct the cerebrospinal pathways.

At birth the head may be of normal size or large. Later, by the second and third month, it enlarges at an abnormally rapid rate. The sutures are widened and Fontanelles are tense. The forehead becomes prominent and the eyebrows and upper eyelids are drawn upwards exposing the sclerotic coat above the iris. In severe cases it becomes impossible to close the eyelids completely. Depression of the eyeballs occurs causing them to be pushed forwards and downwards giving the characteristic appearance of the eyes referred to as the “sunset sign”. The infant finds it difficult or impossible to hold its head up because of its large size and increased weight. Eventually, cranial pressure sores develop which sometimes lead to necrosis of the skull bones.

The condition becomes worse if no intervention is taken as physical and mental growth becomes slow. With increased enlargement of head, the body fails to grow at the normal rate presenting a striking disproportion. With gradual mental deterioration the child becomes dull, lethargic and incontinent. Later strabismus, nystagmus and optic atrophy develop. The infant’s cry becomes high pitched, there is restlessness and irritability. Rigidity of extremities is seen and the reflexes are exaggerated. Convulsions sometimes occur. Vomiting when present is projectile. In older children where the intracranial pressure is more pronounced, headache, stupor or coma, diplopia, vomiting, papilloedema, convulsions increased blood pressure, decreasing pulse and irregular respiration occur.

The condition is confirmed by inspection, x-ray and lumbar puncture. Treatment involves surgery. The prognosis is poor after surgery. The operations are directed towards reducing the volume of cerebrospinal fluid within the ventricles.

#### **5.12.8. Abnormalities of the alimentary system**

##### **a) Oesophageal atresia**

This is malformation of the upper end of the oesophagus which ends blindly in a pouch, instead of being a normal continuous passage to the stomach. There are four major anatomical types:

- i. The upper and lower segments of the oesophagus are blind; neither of the segments connects to the air passages.
- ii. The upper segment opens into the trachea and the lower end is blind. In this type, food may be introduced into the air passages and the infant may drown

- iii. The upper segment of the oesophagus ends in a blind pouch near the level of the bifurcation of the trachea; the lower segment from the stomach is connected to the trachea.
- iv. Both upper and lower segments are connected by a common tract to the trachea.

#### **b) Imperforate anus**

This is a congenital abnormality in which there is no opening through the anus. The rectum ends blindly or communicates with the perineum in front of the closed anal orifice or with the urethra or the bladder or with the vagina in the female infant.

#### **5.12.9. Spina bifida**

Spina bifida is an abnormality in the development of the spinal column characterized by incomplete fusion of one or more of the vertebral laminae.

##### **Classification**

- i. Spina bifida occulta is a result of incomplete fusion of the spinal column without external protrusion of the spinal cord or meninges. The exact cause is not known.
- ii. Meningocele is the external protrusion of the meninges through a spina bifida to form a visible sac along the spinal column
- iii. Meningomyelocele is the external protrusion of the meninges and spinal cord through a spina bifida to form a visible sac along the spinal column.
- iv. Myelocele is an extreme spina bifida in which the spinal column has failed to close. The spinal cord and meninges are represented by a granular red mass in the midline of the surface of the back. Treatment involves surgery.

#### **5.12.10. Talipes (Club foot)**

All congenital abnormalities of the foot are grouped under the term talipes. The cause may be abnormal intra-uterine positions of the foetus combined sometimes with the additional factor of increased mechanical or hydrostatic pressure or it may be hereditary

There are four primary deformities

- i. Equinus: plantar flexion (the toes point downwards)
- ii. Calcaneous: Dorsiflexion (the heel is downwards)
- iii. Varus: Inversion and adduction (the heel is turned inwards)
- iv. Valgus: Eversion and abduction (the heel is turned outwards)

The commonest combinations of deformities are:

- Talipes equino-varus (plantar flexion, inversion and adduction), which accounts for three quarters of all cases
- Talipes calcaneo-valgus (dorsiflexion, eversion and abduction), which accounts for most of the remainder.

The deformities may be bilateral or unilateral and sometimes the deformities may be different on the two sides. Surgery is required to correct the deformities



#### **Summary**

Early identification of the high-risk newborn is the first step in detecting and managing complications to reduce morbidity and mortality. In this unit, selected complications that may occur in newborn have been discussed.

### Activity

1. How will you recognize a neonate with hypothermia
2. List five characteristics of a Large for dates baby
3. Compare and contrast the appearance, and other characteristics of the premature and full term infant.
4. List five ways to protect a new born from infections
5. List six signs of increasing intracranial pressure.
6. Describe the spinal congenital malformations.

### Module summary

In this module you have learnt that the baby, who had been in the enclosed and protected world of the uterus, has to adapt very quickly to the new environment outside the uterus. You have also learnt that the majority of the babies do adapt quickly however, some babies do have problems. An understanding of the physiological changes that occur in a baby will help you to anticipate and prevent problems. You have looked at the some of the problems that a newborn may experience and what to do if the occurred.

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### Assignment and case study



#### Assignment

Compare and contrast physiological and pathological jaundice. Since many newborns are discharged before 24 hours, how would you teach parents to monitor their baby for evidence of physiological jaundice?



### **Case study**

Go to a labour ward at the Hospital where you are working, identify a newborn for follow up care. Conduct a head to toe examination of a newborn.

