Good Nutrition

This module is designed to improve knowledge, skills and clinical practice of all stakeholders involved in the care of preterm neonates in good nutrition.

Learning objectives

The participants will learn:

- To understand the importance of nutrition for optimal short and long term outcome in preterm babies
- To be able to understand and use different methods/ equipment's for optimal enteral feeding of preterm infants
- To be able to understand and implement best evidence based nutrition practices for preterm infants
- To be able to monitor growth of preterm infants
- To be able to monitor and improve processes and outcomes related to nutrition using quality improvement methods relevant to local context

Module contents

This module includes following elements:

- **Script:** Easy to read format, gives quick introduction and is an essential reference material for the participants
- **Key messages:** After having read through the script, these key messages summarize the important learning points in the webinar and the script
- **Video demonstration:** The videos in this module cover the "Insertion of orogastric tube and intragastric tube feeding, expression and storage of breast milk, how to feed the baby using paladai, demonstration of breastfeeding positioning and attachment, how to prepare formula feed, counseling of a mother for breast feeding while baby is admitted in special newborn care unit, common problems in breast feeding and measuring the weight, length and head circumference of the preterm baby"
- **Webinar:** The webinar in this module shall help the participant to gain knowledge of "importance of nutrition for optimal short and long term outcome in preterm infants, how and when to initiate feeding, feeding method, how much to feed, the available sources of nutrition and finally neonatal growth charts and growth monitoring"
- **Poster demonstration:** The participant shall learn about "STP on deciding the initial feeding method, STP on deciding the increment in fluids and feeds, milk expression pictorial charts and growth charts"
- **Self-assessment:** This will be done at the end of each objective, based on what participant has already learnt. The participant is free to consult text material, if assistance is required in recapitulating
- **Skill check:** The skill check includes evaluation of the participant's skills on "weight recording, assessment of readiness to feed, insertion of intra-gastric tube and feeding, paladai feeding, abdominal girth monitoring, milk fortification, counseling for milk expression and plotting growth on chart"
- **Simulation:** After reading through the text material, viewing videos, webinars and pictorial posters with messages, the participant shall be asked to perform the case scenario on feeding of a low birth weight baby. While performing as a team; individual feedback and debriefing by team will be done

Learning Objective 1

Understanding the importance of nutrition for optimal short and long term outcome in preterm babies

This objective covers the importance of nutrition for optimal short and long term outcome in preterm babies and will be delivered as:

- Webinar
- Script
- Key messages
- Self-check MCQ's

After viewing and listening to the webinar, and reading the script along with the key messages you shall undergo a self-evaluation based on what you have already learnt.

1.1: Webinar

You will view and listen to webinar on the importance of nutrition for optimal short and long term outcome in preterm babies along with your facilitator. You are free to interrupt your facilitator anytime for any clarifications or suggestions. The power point slides of the webinar are given here.

Importance Of Nutrition For Optimal Short And Long Term Outcome In Preterm Infants

DR. JAYASHREE MONDKAR
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Professor & Head
Department of Neonatology
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Mumbai

Objectives of this webinar

In this webinar we will learn about :

- Recommended Nutritional Goal For Preterm Babies
- What is "Extra uterine growth restriction" and its long term adverse effects 9
- Short and long term effects of Extrauterine growth restriction

Recommended nutritional goal for preterm babies

- Premature infants have greater nutritional needs to achieve optimal growth in the neonatal period than at any other time in life
- AAP recommends : extra uterine growth of a preterm baby should parallel the intrauterine growth trajectory of a fetus of comparable GA without stressing the developing metabolic or excretory system

American Academy of Pediatrics Committee on Nutrition Pediatrics 1985; 75(5): 976-986.

Inherent limitations of the preterm baby

- Immaturity
  - Limited nutrient stores
  - Immature metabolic pathways
  - Immature GI tract
  - Inco-ordination of suck swallow breathe cycle.
- Catabolic effects of illness
  - Due to associated problems like RDS, sepsis apnea
- Higher metabolic needs
  - Requirement for increased nutrient intake for growth

The result

- Cumulative deficits in protein & energy resulting in slower growth
- Large proportion of VLBW babies have EUGR
- EUGR defined as : growth< 10th centile at 36 weeks PMA or at discharge

Problems associated extra uterine growth restriction

- Short Term
  - Increased risk of retinopathy of prematurity
  - Chronic Lung disease
  - Poor bone health
- Long Term
  - Blindness
  - Adverse neuro-developmental sequelae
  - Lower final weight & height at 20 years of age
  - Adult metabolic syndrome

EUGR and ROP

Increased risk of type 1 ROP In extremely low gestational age newborns if:

- Intake of total calories, lipids, and carbohydrates in the first month was in the lowest quartile and
- Growth velocity was in the lowest quartile

Improving the early nutrition in ELGAN may help prevent development of sight-threatening ROP

VanderVeen DK et al. PLoS One. 2013; 8(5): e64325

Increased risk of chronic lung disease

- Chronic lung disease is related to ventilation oxygen toxicity and infection
- Babies with poor nutritional status are at a greater risk of chronic lung disease
- Chronic lung disease further increases poor nutritional status and growth

Osteopenia of prematurity

- Suboptimal supplementaion of milk with phosphorus, calcium and vitamin D results in osteopenia or metabolic bone disease
- This can result in
  - Increased risk of fractures
  - Poor linear growth
  - Failure to wean off ventilator

Neurodevelopmental sequale

- Preterm brain is vulnerable to under - nutrition which may permanently affect later cognitive development
- Lower weight gain is associated with poor mental development index, poor psychomotor development index, higher risk of neurodevelopmental impairment and cerebral palsy

EUGR and lower final weight and height

- VLBW infants are twice likely to have a height less than the third percentile at 20 years of age than normal birth weight controls

Long term adverse effects of rapid catch up growth

Babies with low weight in neonatal period, showing rapid catch up growth in infancy:

Protective for brain, but in adulthood high incidence of

- Coronary heart disease,
- Type II diabetes mellitus,
- Hypercholesterolemia
- Hypertension & stroke

In conclusion

- Early enteral nutrition is important for VLBW babies optimal growth
- Poor nutrition associated with EUGR
- EUGR causes poor ND outcomes, increased risk of ROP, BPD

What did you learn from this webinar?

1. .....
2. .....
3. .....

What are the queries which come to your mind?

1. .....
2. .....
3. .....

1.2: Script

Importance of nutrition for optimal short and long term outcome in preterm babies

This script shall help you to understand the importance of nutrition for optimal short and long term outcome in preterm babies.

- 27 million babies are born in India each year of which 3.6 million (13%) babies are born preterm. As many as 0.76 million babies die in the neonatal period. Prematurity is the major cause of neonatal deaths. More than 80% premature babies born in our country, are born between 32 - 37 weeks, also termed as moderate/late preterm. Many of these babies die needlessly for lack of simple, essential care such as warmth and feeding support
- Premature infants have greater nutritional needs to achieve optimal growth in the neonatal period than at any other time in life
- The AAP recommends that extra uterine growth of a preterm baby should parallel the intrauterine growth trajectory of a fetus of comparable GA without stressing the developing metabolic or excretory system

Inherent limitations of the preterm baby include

- Limited nutrient stores
- High metabolic needs
- Catabolic effects of illness due to associated problems like RDS, sepsis, apnea
- Immature metabolic pathways and osmolar limitations
- Immature GI tract
- Incoordination of suck swallow breathe cycle and
- Requirement for increased nutrient intake for rapid growth

The preterm baby is very likely to develop cumulative deficits in protein and energy resulting in slower growth. Large proportion of ELBW & VLBW babies develop extra uterine growth restriction (EUGR) defined as weight < 10^{th} centile at 36 weeks PMA or at discharge

Problems Associated extra uterine growth restriction include

- Long term adverse neuro-developmental sequelae
- Increased risk of ROP, poor bone health
- Lower final weight & height at 20 years of age and increased post natal growth
- Adult metabolic syndrome

The preterm brain is very vulnerable to under-nutrition which may permanently affect later cognitive attainment. VLBW babies showed higher neuro developmental impairment, with the lowest quartile of weight gain of 12 g/kg/day compared to babies with weight gain in the highest quartile of 21.2 g/kg/day. An increased risk of type 1 (severe type) of ROP in extremely low gestational age newborns has been observed when intake of total calories, lipids, and carbohydrates as well as the growth velocity in the first month were in the lowest quartile. Improving the early nutrition in ELGAN babies may help prevent development of sight-threatening ROP

Prematurity and LBW also increase the risk of underweight, stunting and wasting. There is evidence to suggest that at 6 months of age, 28% of VLBW are stunted.

1.3: Key messages

- Early enteral nutrition is important in very low birth weight infants for optimal growth
- Poor enteral nutrition is associated with extra uterine growth restriction
- Extra uterine growth restriction is associated with poor neuro developmental outcomes

1.4:Self-check MCQ's

Facilitator checks the MCQ's given to the participants and give marks according to the answers provided below:

1. Complications associated with poor nutrition and growth restriction in the postnatal life include
   a. Adverse neurodevelopmental outcomes
   b. Increased risk of ROP
   c. Poor bone health
   d. All of the above

2. What proportion of stunting at 6 months of age is attributed to low birth weight (LBW)?
   a. 18%
   b. 28%
   c. 38%
   d. 48%

3. LBW babies showing rapid catch up growth in infancy are at risk of developing coronary heart disease and hypertension in adult life. This syndrome is called
   a. Prader Willi syndrome
   b. Fragile X syndrome
   c. Adult metabolic syndrome
   d. Soto syndrome

4. Inherent limitations of the preterm baby include all **'EXCEPT'**
   a. Limited nutrient stores
   b. High metabolic needs
   c. Immature metabolic pathways
   d. Requirement for less nutrient intake

5. State if **'true** or **false'**: Prematurity and LBW also increase the risk of underweight, stunting and wasting

Learning Objective 2

Knowing the different methods/ equipment's for optimal enteral feeding of preterm infants

This objective covers the different methods/ equipment's for optimal enteral feeding of preterm infants and is delivered as:

- Videos
- Posters
- Self-check MCQ's

After viewing and listening to the videos and posters you shall undergo a self-evaluation based on what you have already learnt.

2.1: Video

There will be video demonstration by your facilitator on:

1. Insertion of orogastric tube and intragastric tube feeding
2. Expression and storage of breast milk
3. How to feed the baby using paladai
4. Demonstration of breastfeeding positioning and attachment
5. How to prepare formula feed
6. Counselling of a mother for breast feeding while baby is admitted in special newborn care unit
7. Common problems in breast feeding

The video demonstration will be followed by discussion

1. The following aspects of the insertion of orogastric tube and intragastric tube feeding were shown:
   i. .....
   ii. .....
   iii. .....

2. The following aspects of expression and storage of breast milk were shown:
   i. .....
   ii. .....
   iii. .....

3. The following aspects of how to feed the baby using paladai were shown:
   i. .....
   ii. .....
   iii. .....

4. The following aspects of the demonstration of breastfeeding positioning and attachment were shown:
   i. .....
   ii. .....
   iii. .....

5. The following aspects of how to prepare formula feed were shown:
   i. .....
   ii. .....
   iii. .....

6. The following aspects of counseling a mother for breast feeding while baby is admitted in special newborn care unit were shown:
   i. .....
   ii. .....
   iii. .....

7. The following aspects of common problems in breast feeding were shown:
    i. .....
    ii. .....
    iii. .....

Comments on video:

Good aspect	Need improvement
.....	.....
.....	.....
.....	.....

2.2: Poster

There will be a poster demonstration on:

- Milk expression pictorial chart

MILK EXPRESSION PICTORIAL CHART

The facilitator shall conduct a demonstration session on milk expression pictorial chart

Optimal Feeding of the Low Birth Weight Infant

EXPRESSING BREAST MILK

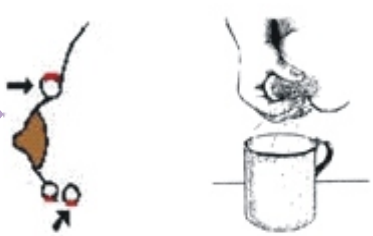
1. Wash your hands well with soap and water

2. Place a clean container below your breast to collect milk

3. Massage the breasts gently toward the nipples

4. Place your thumb and index finger opposite each other just outside the dark circle around the nipple

5. Now press back toward your chest, then gently squeeze to release milk



6. Repeat step 5 at different positions around the areola

Adapted from WHO Guidelines on "Optimal Feeding of the Low Birth Weight infant"

2.3:Self-check MCQ's

Facilitator checks the MCQ's given to the participants and give marks according to the answers provided below.

1. In case mother's milk is **NOT** available, the best possible alternative for feeding a LBW infant would be
   a. Donor human milk
   b. Cow's milk
   c. Standard term formula
   d. Preterm formula

2. What is the preferred initial mode of feeding in a baby born with birth weight of 1650 g and is hemodynamically stable?
   a. Intravenous fluids
   b. Orogastric tube feeding
   c. Spoon/paladai feeding
   d. Direct breastfeeding

3. The signs of good attachment while breastfeeding a LBW baby include all **'EXCEPT'**
   a. Baby's mouth wide open
   b. Lower lip turned inward
   c. Baby's chin touches mother's breast
   d. Majority of areola inside baby's mouth

4. State whether **'True'** or **'False'**
   a. Daily dose of iron supplements in a baby with birth weight of 1750 g is 4 mg/kg/day
   b. Encouraging mothers to express milk from day 1 of life helps in exclusive breast milk feeding of LBW neonates

Learning Objective 3

Understanding and implementing the best evidence based nutrition practices for preterm infants

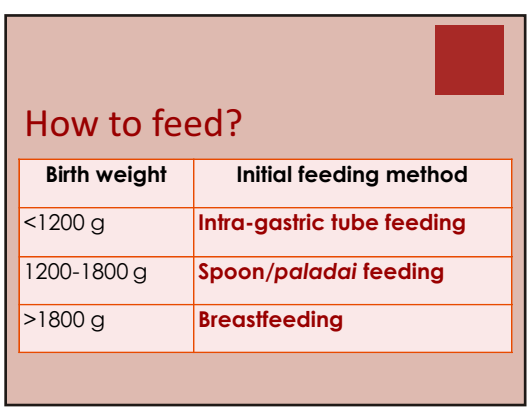
This objective covers the understanding and implementing the best evidence based nutrition practices for preterm infant's and will be delivered as:

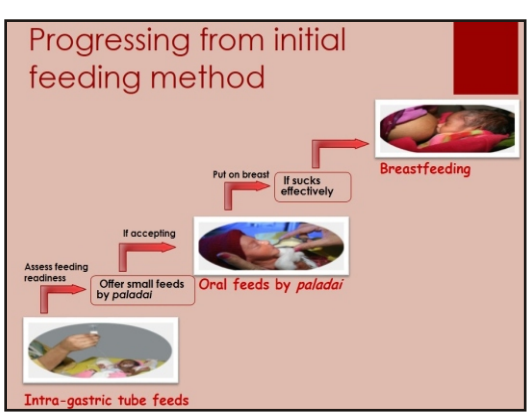
- Webinar
- Script
- Key messages
- Posters
- Self-check MCQ's

After viewing and listening to the webinar, and reading the script along with the key messages you shall undergo a self-evaluation based on what you have already learnt.

3.1:Webinar

You will view and listen to webinar on how to feed and how to monitor for feed intolerance in low birth weight infants along with your facilitator. You are free to interrupt your facilitator anytime for any clarifications or suggestions. The power point slides of the webinar are given here.





Good Nutrition

Assessing adequacy of feeding

Mode of feeding	Adequacy of feeding
Spoon/ *paladai*	• **Swallows** milk **WITHOUT coughing or spluttering** • Accepts **required amount**
Breastfeeding	• **Attaches** well and **suckles** effectively • Able to **suckle long enough** to satisfy needs

For all modes:
Adequate weight gain; Passing urine 6 times in 24 hr

Monitoring for feed intolerance

Inspect abdomen before **each feed**

Visible **distension**

Aspirate stomach contents

- **Clear but > 5 mL**
- **Bile/blood-stained aspirate**

Monitoring...

> 5 mL aspirate

Withhold 1 or 2 feeds

Reassess: Abdominal examination

No distension: **Restart feeds**

Distension

Monitoring...

Bile or blood-stained aspirate/ vomiting

Withhold feeds for 24-48 hr; Evaluate for local & systemic causes

What did you learn from this webinar?

1. .....
2. .....
3. .....

What are the queries which come to your mind?

1. .....
2. .....
3. .....

3.2: Script

How to feed and how to monitor for feed intolerance in low birth weight infants

This script shall help you to understand how to feed and how to monitor for feed intolerance in low birth weight infants.

- The preferred initial feeding method in LBW infants is usually decided by their feeding skills. Roughly, the feeding skills correlate with gestation and birth weight
- Any baby with birth weight <1200 g is initially started on intra-gastric tube feeding. Babies weighing between 1200 and 1800 g are started on spoon or *paladai* feeds while those weighing >1800 g are given direct breastfeeding. These are only rough guidelines – a baby with birth weight of 1700 g baby may be able to feed directly from the breast – in which case, there is no need for spoon feeds
- All LBW infants should ideally be on direct breastfeeding by the time of discharge from the hospital, irrespective of the initial feeding method. They must be assessed periodically to check if they are ready to accept breastfeeding. For babies on intra-gastric tube feeds, the feeding readiness should be assessed daily. If ready, they must be offered small feeds by spoon or paladai. If they accept well, the amount by spoon can be slowly increased to reach full *paladai* feeds. Babies on full *paladai* feeds should be put to breast daily. They should be assessed for effective sucking at the breast. If they can suckle effectively for adequate time, direct breastfeeding should be initiated

If the baby is on spoon/paladai feeds, adequacy is indicated

- Baby swallowing milk **WITHOUT** coughing or spluttering and
- Baby accepting required amount of milk

Babies on breastfeeding are said to be feeding adequately if

- They can attach well and suckle effectively; and
- They can suckle long enough to satisfy needs

For all modes of feeding, other indicators of feeding adequacy include

- Adequate weight gain – 15 to 18 g/kg/day after 7-10 days of birth; and
- Passing urine at least 6 times in 24 hr

All LBW babies should be assessed for feed intolerance by careful inspection of the abdomen before EACH feed. If there is obvious abdominal distension, the stomach contents should be aspirated to check the nature and volume of aspirate

- If the aspirate is clear but is more than 5 mL, the feeds should be withheld for 1-2 feeds, after which we should reassess by abdominal examination
- If there is no distension, we can restart feeds. If there is distension, we should aspirate the contents again and then decide
- If the aspirate or vomit is bile or blood-stained, feeds should be withheld for 24-48 hours. The babies should also be evaluated for local and systemic causes like neonaetal enterocolitis (NEC). We can restart feeds after 24-48 hours depending upon the abdominal and other systemic examination findings

3.3:Key messages

- All LBW infants should ideally be on direct breastfeeding
- They must be assessed periodically
- Babies on full *paladai* feeds should be put to breast daily
- Babies on any mode of feeding– should be assessed for adequacy of feeding on a regular basis

3.4:Webinar

You will view and listen to webinar on what to feed in low birth weight infants along with your facilitator. You are free to interrupt your facilitator anytime for any clarifications or suggestions. The power point slides of the webinar are given here.

LBW infants: How to feed?

Dr. M.Jeeva Sankar
MD, DM(Neonatology)
Associate Professor
Department of Pediatrics
AIIMS, New Delhi

What to feed?

Breastmilk is the IDEAL feed for all infants

All LBW infants should be fed mother's own milk

- Direct BF or expressed milk

What to feed?

Breast milk feeding: How to improve?

- **Psychological** and **social support** of mothers **from birth**
- **Admit mother** ; encourage bedding-in or visit to SNCU
- **KMC**
- **Expression** of milk from **day 1**
- Adequate **nutrition** and rest of mother

What to feed?

Supplements

Birth weight 1500g to 2499 g			
Nutrient	**Dose**	**When to start?**	**When to stop?**
Iron	2 mg/kg/day	2 weeks of age	1 year of age
Vitamin D	400 IU/day		

What to feed?

Supplements

Birth weight <1500 g			
Nutrient	**Dose**	**When to start?**	**When to stop?**
Iron	2 mg/kg/day	2 weeks of age	1 year of age
Vitamin D	400 IU/day		
Multivitamins	0.3 mL/day		
Calcium & Phosphate	Ca: 120-140 Phos: 60-90 mg/kg/day	On reaching full feeds	Upon reaching 2 kg

What to feed?

Supplements in <1500 g

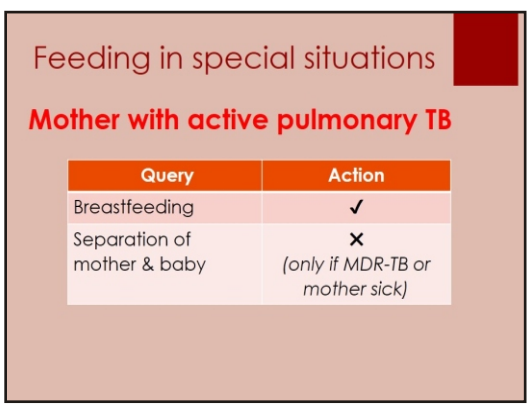
Fortification with HMF

In whom?	• **Inadequate weight gain** despite adequate breastmilk intake
How much?	• 1 g per 25 mL
How long?	• Till baby weighs 2-2.5 kg

Feeding in special situations

If **mother's milk** is **NOT** available, the choices in **order of preference**:

1. Expressed donor milk (if milk banking available)
2. Infant formula (standard/pre-term formula)
3. Animal milk - *Avoid in preterm babies*



What did you learn from this webinar?

1. .....
2. .....
3. .....

What are the queries which come to your mind?

1. .....
2. .....
3. .....

3.5:Script

What to feed in low birth weight infants

This script shall help you to understand what to feed in low birth weight infants

Breast milk is the IDEAL feed for all infants until 6 months of age

This applies to even LBW infants – so All LBW infants should be fed only mother's milk – either by direct breastfeeding or as expressed breast milk

The important strategies to improve breast milk feeding include

- Psychological and social support of mothers right from birth or admission
- Admitting mothers in the same hospital, which is particularly important for outborn babies
- Encouraging bedding-in or visit to nursery
- Promoting KMC once the baby is stable
- Facilitating mother to express breast milk from day 1 itself
- Ensuring adequate nutrition and rest of mother
- There is no role for drugs like metoclopramide in promoting breastfeeding
- While breast milk is the ideal feed, it alone cannot meet the daily requirements of some nutrients, like iron, in LBW infants. Therefore, all LBW infants weighing 1500g to 2499 g should be given daily supplements of iron and vitamin D
- Iron has to be given in the dose of 2 mg/kg/day while vitamin D is to be given 400 IU/day. Both should be started at 2 weeks of age and stopped at 1 year. In very low birth weight infants, in addition to iron and vitamin D, we must supplement multivitamins and calcium & Phosphate also
- Multivitamins are given in the dose of 0.3 mL/day from 2 weeks to 1 year of age; it is preferable to use multivitamin drops containing zinc. Calcium and phosphate should be given in the dose of 120-140 mg/kg of calcium and 60-90 mg/kg/day of phosphate. They should be started when the baby reaches full enteral feeds and stopped when the baby reaches 2 kg
- Some VLBW babies may not gain weight adequately i.e. 15 to 18 g/kg/day, even after taking optimal amount of breast milk. These babies should be given fortified milk – by adding human milk fortifiers to expressed breast milk
- The fortifier is available in powder form – it should be mixed in the concentration of 1 g per 25 mL of breast milk. It has to be continued till the baby reaches 2 to 2.5 kg weight

Feeding in special circumstances

- Rarely, the mother's milk may not be available for a LBW baby – for example the mother has died or is very sick. In that case, the alternatives, in order of preference, are expressed donor milk; infant formula; and animal milk
- While the preferred option is donor milk from healthy donors, it requires the services of human milk banking, which are not available in many parts of the country

- Formula milk can be either in the form of standard term formula or special preterm formula
- Animal milk is the least preferred option, particularly in preterm LBW infants
- Babies born to HIV positive mothers should be given exclusive breastfeeds till 6 months of age
- Top feeds – formula or cow's milk – should be given ONLY if mother has died/has terminal illness or decides not to breastfeed despite adequate counseling
- Even in them, the AFASS criteria – i.e. Acceptable, Feasible, Affordable, Sustainable and Safe - should be met before starting the formula feeds. Remember these babies should be either on exclusive breastfeeding or on exclusive top feeds – there is no role of mixed feeding
- Babies born to mothers with active pulmonary tuberculosis should be started on exclusive breastfeeding
- There is no need to separate the mother and the baby, unless the mother has multi-drug resistant -TB or is very sick

3.6: Key messages

- Breast milk is the IDEAL feed for all infants until 6 months of age
- KMC should be promoted once the baby is stable
- Psychological and social support of mother is important right from birth
- No need to separate the mother and the baby, unless the mother has multi-drug resistant - TB or is very sick
- Iron has to be given in the dose of 2-3 mg/kg/day
- Vitamin D is to be given 400 IU/day
- Multivitamins are given in the dose of 0.3 mL/day from 2 weeks to 1 year of age

3.7:Webinar

You will view and listen to webinar onwhen to initiate feeds and how much to feed in low birth weight infants along with your facilitator. You are free to interrupt your facilitator anytime for any clarifications or suggestions. The power point slides of the webinar are given here.

LBW infants: How to feed?

Dr. M.Jeeva Sankar
MD, DM(Neonatology)
Associate Professor
Department of Pediatrics
AIIMS, New Delhi

When to initiate feeds?

All LBW infants

- **Start full** enteral **feeds** at **admission** or **birth**
  - Except in some infants*

In which infant/ clinical condition can feeds not be started?

Exceptions:

1. Weight **<1000 g** or gestation **<29 weeks**
2. Shock requiring inotropes
3. Respiratory failure requiring mechanical ventilation
4. Severe asphyxia (no cry by 5 min; chest compressions)
5. Active seizures
6. Obvious abdominal distension/blood/ bilious vomit or aspirate
7. Surgical conditions of GI tract

If any of these present: **Keep NPO; reassess after 12-24 hr**

When to initiate feeds?

Exceptions

	When to start?	How much to start?
<1000 g or gestational <29 weeks	Once **stable**	Start trophic feeds (MEN); Gradually increase by 20 mL/kg/day
Shock on inotropes	Inotropes **weaned** (dopa <10 mcg/kg/min) or **stopped**;	***<1500 g:*** Start MEN (10 TO 20 mL/kg); Increase by 20 mL/kg/day ***≥1500 g :*** Start 25-50% of required intake; Full feeds by 24-48 hr
Respiratory failure requiring ventilation	SpO_2 90-95% on **FiO_2 <40%** or off ventilator	
Severe asphyxia	Once **stable**	
Active seizures	**No** ongoing **seizures**	

When to initiate feeds?

Exceptions

	When to start?	How much to start?
Abdominal distension or blood/bilious vomit	**No distension** or vomit in last 24 hr	Start 10-20 mL/kg; Gradually increase by 20-30 mL/kg/day
Surgical conditions of GI tract	Until surgical condition **resolves**	

If feeds increased gradually, **stop IV fluids** upon **reaching 100 ml/kg/day**

How much to feed?

Day of life	Fluid requirements (mL/kg/day)	
	≥ 1500 g	< 1500 g
Day 1	60	80
Day 2	80	95
Day 3	100	110
Day 4	120	120
Day 5	140	130
Day 6	150	140
Day 7 onwards	160	150

Feed every 2-3 hours

What did you learn from this webinar?

1. .....
2. .....
3. .....

What are the queries which come to your mind?

1. .....
2. .....
3. .....

3.8: Script

When and how much to feed in low birth weight infants

This script shall help you to understand when and how much to feed in low birth weight infants.

All LBW infants should be started on full enteral feeds immediately after birth. For outborn neonates, full feeds should be started at admission. Enteral feeds may be in the form of direct breastfeeding, expressed breast milk, or formula (in rare cases). There are only a few exceptions in whom full oral feeds are NOT started at birth or admission. They include weight **<1000 g** or gestation **<29 weeks;** shock requiring inotropes; respiratory failure requiring invasive mechanical ventilation; severe asphyxia defined as no cry by 5 min or need for chest compressions; active and ongoing seizures; obvious abdominal distension with or without blood/bile-stained aspirate or vomiting; and finally, surgical conditions of GI tract like intestinal atresia

- If any of these conditions are present, we have to keep the baby nil per oral, and reassess after 12-24 hours. Upon reassessment, we should check if the baby is stable, i.e. maintaining normal temperature, normal heart rate, respiratory rate, saturations and capillary refill time with or without support. If stable, we can start oral feeds
- For babies <1000 g, we usually start with MEN - minimal enteral nutrition or trophic feeds; This means giving expressed breast milk at 10 to 20 mL/kg/day for 1-2 days and then gradually increasing by 20 mL/kg/day
- In other conditions such as respiratory failure, shock, asphyxia, or seizures, we can be little more aggressive in starting feeds maybe we can start at 25% to 50% of required daily intake; if the baby accepts this well, gradually increase to full feeds in the next 24-48 hours
- If the baby is <1500 g, start MEN and then gradually increase feeds by 20 mL/kg/day
- In babies with abdominal distension or surgical conditions of gastrointestinal tract, we can start feeds if there is no abdominal distension or vomiting in the last 24 hours and the abdomen is soft
- In these babies, we usually start feeds at 10-20 mL/kg/day and increase gradually by 20 to 30 mL/kg/day
- In all the babies in whom feeds are started slowly, we have to assess if the baby is tolerating feeds by careful inspection of the abdomen before each feed. We shall learn about monitoring of feed intolerance in a separate webinar
- If feeds are increased gradually, the baby has to be kept on IV fluids till the baby reaches 100 mL/kg/day of feeds after which we can stop IV fluids

The daily requirement of fluids in LBW babies

- For babies with birth weight of 1500 g or more, we start at 60 mL/kg on day 1 of life. We increase the amount by 20 mL/kg every day till the baby reaches 160 mL/kg by day 7
- In VLBW babies, we usually start at 80 mL/kg on day 1 of life. The amount is increased by 15 mL/kg every day till the baby reaches 150 mL/kg by day 7
- Feeds should be given every 2-3 hours in all LBW babies

3.9: Key messages

- All LBW infants should be started on full enteral feeds immediately after birth
- For babies <1000 g, we usually start with MEN
- Start feeds at 10-20 mL/kg/day and increase gradually by 20 to 30 mL/kg/day

3.10:Poster

There will be a poster demonstration on

- STP on deciding the initial feeding method
- STP on deciding the increment in fluids and feeds

STP ON DECIDING THE INITIAL FEEDING METHOD

The facilitator shall conduct a demonstration session on deciding the initial feeding method

Standard Treatment Protocol for Management of Common Newborn Conditions in Small Hospitals (Adapted from WHO Guideline)

Feeding of low birth weight and sick newborns

Babies on IV Fluids: Progression to oral feeds

Infants on IV fluids

⇩ **If hemodynamically stable**

Start MEN* / trophic feeds 10-15 mL/kg/day by oro/naso-gastic tube, **&**
Monitor for feed intolerance*

⇩ **If tolerating well**

Gradually **Increase** the **feed by 10-15 mL/kg/day**
Taper and **Stop IV** fluids once feeds reach 2/3rd of total daily requirement

 # Possible signs of feed intolerance:
- **Vomiting soon after feed**
- **Abdominal distension**
- **Gastric residue>25% of previous feed**

Revert to IV fluids if feed intolerance

Baby on oro-/naso-gastric feeding

⇩ **If tolerating feed well***

Try to spoon-feed once or twice a day
Also, put onto mother's breast

⇩ **If accepting feed well**

Gradually **Increase** the **frequency and amount of** spoon/paladai feed
Reduce tube feeds accordingly

Baby on Spoon/paladai feed

⇩

Put baby on mother's breast before each feed
Observe for good attachment & effective sucking

⇩ **If able to breastfeed effectively**

Direct breastfeeding
Taper and **stop** spoon/paladai feed once the mother is confident

***Minimal Enteral Nutrition**

For additional / next level management please refer to WHO Guidelines (Managing Newborn Problems and Pocket Book of Hospital Care of Children), http://www.ontop-in.org/sick-newborn/, http://www.newbornwhocc.org/

STP ON DECIDING THE INCREMENT IN FLUIDS AND FEEDS

The facilitator shall conduct a demonstration session on deciding the increment in fluids and feeds

Standard Treatment Protocol for Management of Common Newborn Conditions in Small Hospitals (Adapted from WHO Guideline)

IV Fluid Therapy for Newborns

Indications to start IV fluids:

- ✓ Birth weight < 1200 grams OR
- ✓ Birth weight > 1200 grams and sick; or Sick Newborn of any birth weight

Indications of sickness: Presence of one of the following

- Fast breathing (RR >60/min) with distress
- Unconscious or Lethergic (no spontaneous movements)
- No feeding or feeding poor after having fed well; or intolerance to gastric feeds
- Abdominal distension and/or vomiting (bilious/bloody)
- Uncontrolled seizures

Less than 1500 grams

Fluids based on day of life*

Day of Life	Fluid amount (mL/kg/day)	Nature of fluid
1	80	10% dextrose
2	95	10% dextrose
3	110	10% dextrose with
4	125	sodium 3mmol/kg,
5	140	potassium
6	150	2mmol/kg**
7	150	

Reassess after 24-48 hours

YES Stable and able to accept oral feeds NO

- ✓ START on enteral feeds 10-15mL/kg/day, 2 hourly
- ✓ Measure abdominal girth before feeding
- ✓ Increase 20- 30mL/kg/day
- ✓ STOP feeding (bilious/blood-stained gastric aspirate, GRV>25%/ >3mL)***

- ✓ Continue i.v. fluids
- ✓ Deduct the same amount from daily IV fluid requirement

More than 1500 grams AND/OR Sick Newborn

Fluids based on day of life*

Day of Life	Fluid amount (mL/kg/day)	Nature of fluid
1	60	
2	80	10% dextrose
3	100	10% dextrose with
4	120	sodium 3mmol/kg,
5	140	potassium 2mmol/kg**
6	150	
7	150	

Reassess after 24-48 hours

YES Stable and able to accept oral feeds NO

- ✓ START on enteral feeds 10-15mL/kg/day, 3 hourly
- ✓ Measure abdominal girth before feeding
- ✓ Increase to full feeds over 12-24 hours
- ✓ STOP feeding (bilious/ blood- stained gastric aspirate, GRV>25%/ >3mL)***

- ✓ Continue i.v. fluids

* DO NOT INCREASE fluid on the next day, if weight gain, tachycardia, oedema feet, puffy eyes, urine output < 1mL/kg/hr
** If the premixed solutions are not available, add normal saline 20 mL/kg to the required volume of 10% dextrose, but infuse only the required daily volume
***Measure gastric residual volume (GRV) only if there is increase in abdominal girth by 2 cm, above baseline.

For additional / next level management please refer to WHO Guidelines (Managing Newborn Problems and Pocket Book of Hospital Care of Children), http://www.ontop-in-org/sick-newborn/.http://www.newbornwhocc.org/

3.11:Self-check MCQs

1. What is the daily fluid requirement on Day 1 for a LBW infant with birth weight of 1600 g?
    a. 160 mL
    b. 128 mL
    c. 240 mL
    d. 96 mL

2. State whether **'True'** or **'False'**
    a. Term baby with severe birth asphyxia can be started on feeds at 24 hours if he is hemodynamically stable
    b. Maximum fluid requirement on day 7 of life in a LBW infant is 180 mL/kg/day
    c. LBW baby born to a HIV +ve mother should be breastfed unless the mother decides not to breastfeed despite counseling

3. A preterm baby is on oro-gastric tube feeding with mother's milk. Each feed is 15 mL 2hrly. You observe visible abdominal distension before giving the next feed. You aspirate the stomach contents and find it to be clear; the aspirated volume is 6 mL. What action will you take?
    a. Withhold 1 or 2 feeds
    b. Keep nil per oral (NPO)
    c. Continue with same feed volume
    d. Order abdominal X-ray

4. All of the following features indicate adequate breastfeeding in a LBW baby **'EXCEPT'**
    a. Passes urine 6-8 times in 24 hours
    b. Sleeps for 2-3 hrs after each feed
    c. Passes stool 3-4 times in 24 hours
    d. Gains weight @25-30 g/day

5. A preterm baby is born to a mother with active sputum-positive pulmonary tuberculosis. She is being treated with the first line anti-tubercular drugs. Which of the following is the correct statement regarding enteral feeding of this baby?
    a. Baby should be isolated from mother; can be fed mother's expressed milk
    b. Baby should be isolated; mother's milk NOT to be given
    c. Baby to stay with mother; mother's milk NOT to be given
    d. Baby to stay with mother; should be directly breastfed

Learning Objective 4

Monitoring the growth of preterm infants

This objective covers the monitoring the growth of preterm infants and will be delivered as:

- Webinar
- Script
- Key messages
- Video
- Poster
- Self-check MCQ's

After viewing and listening to the webinar, videos, poster and reading the script along with the key messages you shall undergo a self-evaluation based on what you have already learnt.

4.1: Webinar

You will view and listen to webinar on neonatal growth charts and growth monitoring along with your facilitator. You are free to interrupt your facilitator anytime for any clarifications or suggestions. The power point slides of the webinar are given here.

NEONATAL GROWTH CHARTS & GROWTH MONITORING

DR. JAYASHREE MONDKAR
MD, DM (Neonatology)
Professor & Head
Department of Neonatology
LTMMC and Sion Hospital
Mumbai

OBJECTIVES OF THIS WEBINAR

In this webinar we shall learn about

- The objectives of growth monitoring of preterm babies
- Growth parameters to be measured, how to measure and how frequently to measure
- Which growth charts can be used
- How to plot growth charts
- Identification of growth impairment & it's management

INTRODUCTION

- Premature infants have greater nutritional needs to achieve optimal growth in the neonatal period than at any other time in life
- The American Academy of Pediatrics recommends that extra uterine growth should parallel the intrauterine growth trajectory of the fetus at a comparable GA
- American Academy of Pediatrics Committee on Nutrition Pediatrics 1985; 75(5): 976 -986.

POST NATAL GROWTH TARGETS FOR PRETERM BABIES

- Expected as per intrauterine growth :
- Weight – 15 to 18 g/kg per day
- Length – 1 cm/week
- Head circumference – 0.7 cm/week

EXTRA UTERINE GROWTH RESTRICTION

- Due to inherent limitations, large number of ELBW & VLBW babies will have cumulative deficits in protein and energy
- Show slower growth than intrauterine counterparts? EUGR
- EUGR: Defined as weight < 10th centile at 36 weeks PMA or at discharge
- Provision of adequate nutrition from birth and growth monitoring essential

NEED FOR GROWTH MONITORING

Extra Uterine growth restriction associated with

- Long term adverse neuro-developmental sequelae
- Increased risk of ROP
- Poor bone health
- Lower final weight & height at 18 years of age
- Increased Post Natal Growth: Adult metabolic syndrome

OBJECTIVES OF GROWTH MONITORING

- To ensure that post natal growth is as optimal as is possible
- Baby growing along birth trajectory
- Early identification & management of growth impairment
- Assess response to interventions

GROWTH PARAMETERS TO BE TRACKED

Growth parameters routinely tracked are

- Weight,
- Length &
- Head circumference of the baby
- Weight record daily until discharge, then twice a week or weekly until term GA, and then monthly until 12 months of chronological age

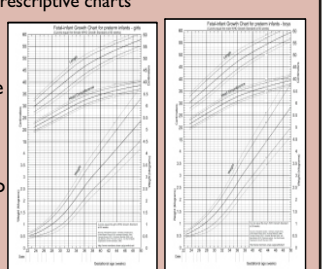
(Video format of how all 3 measurements are done to be included after this, text is in the word format, not included here)

GROWTH CHARTS COMMONLY USED

- Intrauterine growth curves
- Anthropometric data at birth from preterm babies delivered at various gestations
- Fenton's charts
- Post Natal Growth curves
- Based on longitudinal post natal weights of preterm at various gestations
- Ehrenkranz charts

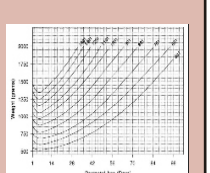
GENDER SPECIFIC FENTON CHARTS 2013

- Based on the recommended growth goal for preterm infants called standard or prescriptive charts
- Gender Specific
- Equivalent to the WHO growth charts at 50 weeks gestational, so no change in centile when transitioning

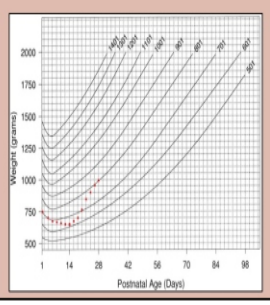


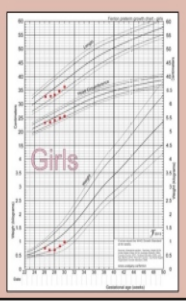
EHRENKRANZ POST NATAL GROWTH CHARTS

- Longitudinal curves
- represent postnatal growth
- Portray how babies grow after birth
- Allow for the initial postnatal weight loss seen in newborn
- Also called Reference (descriptive) curve



PLOTTING GROWTH OF 26 WEEKS 750 GRAMS, FOR FIRST 28 DAYS





REASONS FOR POOR GROWTH & MANAGEMENT

Reasons For Poor Growth	Management
Inadequate protein &/ or caloric intake	Fortification of human milk to provide 120 Kcal / kg /day & 3.5 - 4g/kg/ day protein
Cold stress	KMC
Anemia	Correction of symptomatic anemia
Occult Infection Hyponatremia	Investigate & treat appropriately

KEY MESSAGES

- VLBWs are prone to EUGR
- Growth monitoring is essential for all preterm babies.
- Monitor on Fenton's (prescriptive) for classification of nutritive status at birth
- Monitor on Ehrenkranz (descriptive) charts for postnatal growth
- Growth charts help you to monitor effectiveness of interventions

What did you learn from this webinar?

1. .....
2. .....
3. .....

What are the queries which come to your mind?

1. .....
2. .....
3. .....

4.2: Script

Neonatal growth charts and growth monitoring

This script shall help you to understand the neonatal growth charts and growth monitoring of preterm babies.

Premature infants have greater nutritional needs to achieve optimal growth in the neonatal period than at any other time in life. The American Academy of Pediatrics recommends that extra uterine growth of a preterm baby should parallel the intrauterine growth trajectory of a fetus of comparable gestational age with out stressing the developing metabolic or excretory system

Post natal growth targets for preterm babies

The ideal growth targets of preterm babies based on intra uterine growth rates is

- Weight 15 to 18 g/kg per day
- Length 1 cm/week
- Head circumference 0.7 cm/week

Weight monitoring

- The Weight of VLBW babies is preferably monitored on an electronic weighing scale with a minimum accuracy of 5 gm
- For ELBW babies an accuracy of 1 g is preferred
- The weighing scale should have a re-zero weight adjustment facility and a clear digital read out
- It should be calibrated with standard weights at least on a monthly basis
- The pan / baby tray of the weighing scale should be of non-heat conducting material
- It should be cleaned with spirit before use
- Ensure that the baby is quiet & not moving and that the digital readout is steady, before recording the weight of the baby in grams

Length monitoring

- Length of the baby is measured using an infantometer
- It has a firm, flat horizontal surface with a measuring tape in 1 mm (0.1 cm) or 1/8 inch increments
- At one end of the infantometer is an immovable headpiece at a right angle to the horizontal board and tape, and at the other end is a smoothly moveable foot-piece, perpendicular to the tape
- Clean the infantometer with spirit before use
- Read the length to the nearest 0.1 cm

Head circumference monitoring

- Head circumference is measured using a non-stretchable measuring tape
- The tape should be 1/4 - 1/2 inch wide. Ideally an 'insertion tape' is used, since it provides a more accurate 'view' of the circumference measure than that obtained by overlapping the edges of a tape measure
- The tape should have 0.1 cm increments
- The tape is placed to cover the head at the maximum circumference over the supra orbital ridges anteriorly, behind the ears & at the external occipital protuberance posteriorly
- The measurement is done on the lateral surface of the head by the cross tape technique

How frequently should the anthropometric measurements be taken?

- The standard practice is to weigh the VLBW infant daily until discharge from hospital, then twice a week or weekly until term, and then monthly until 12 months of chronological age
- Babies who are unwell are weighed more frequently

Growth charts commonly used

- Two growth charts are commonly used for monitoring preterm babies
- Intrauterine growth curves from that are generated from anthropometric data at birth from preterm babies delivered at various gestations. Examples are the Fenton's charts & the Intergrowth 21st charts
- The other are the post natal growth curves based on longitudinal postnatal weights of preterm babiesat various gestations. The Ehrenkranz charts are postnatal growth charts

Gender specific fenton charts 2013

- Most neonatal units plot early growth the Fenton intrauterine growth reference chart which are based on the recommended growth goal for preterm infants and are called standard or prescriptive charts. They have separate charts for boys and girls for all the three parameters of weight, length & head circumference on the same chart. The same charts are used at birth to characterize babies as adequate, large or small for gestational age. As these charts are based on IU growth standards of apparently normal babies of different gestational ages, taken at birth, they do not account for the normal postnatal weight loss that occurs in babies in the early days after birth
- Weights plotted on these charts are equivalent to the WHO growth charts at 50 weeks gestational, so no change in centile when transitioning

Ehrenkranz post natal growth charts

- Many centers also use the Ehrenkranz postnatal growth charts to assess the adequacy of postnatal growth, weights. These longitudinal curves represent postnatal growth & portray how the baby is growing after birth. These charts allow for the initial postnatal weight loss seen in newborn infants. They are also known as reference / (descriptive) curves

The intergrowth 21st charts

- The INTERGROWTH-21st consortium have recently been published for babies between 33 weeks to 64 weeks, in 2013 & from gestational age of 23 weeks onwards in 2016, and may also be considered for use

Reasons for poor growth & management

- The commonest reason for poor postnatal growth in the convalescent period is inadequate protein & caloric intake, which needs to be addressed by optimizing feeding volumes to 160 to 180 cc/kg/day of EBM as well as by fortifying milk to provide 120 Kcal/kg/day & 3.5-4 g/kg / day of proteins
- Occult cold stress may also impair growth & maximizing KMC duration per day may help better growth. Other problems like anemia of prematurity, hyponatremia and occult infections like urinary infections, fungal sepsis may also cause growth faltering & need to be investigated and treated appropriately
- If poor growth, or growth faltering is identified, the likely cause needs to be identified and addressed appropriately

4.3: Key messages

- Very low birth weight (VLBW) & Extremely low birth weight (ELBWs) are prone to EUGR
- Growth Monitoring of weight, length and head circumference is essential for all preterm infants
- Monitor on Fenton's (prescriptive) for classification of nutritive status at birth and Fenton's /Ehrenkranz (descriptive) charts after birth
- Use growth charts to monitor faltering and to monitor effectiveness of corrective intervention
- Fortification of mothers milk and kangraoo mother care (KMC) are important for improved growth velocity

4.4:Video

There will be a video demonstration by your facilitator on measuring the head circumference, length and weight of the preterm baby

The video demonstration will be followed by discussion

1. The following aspects of measuring the head circumference of the preterm baby were shown
   i. .....
   ii. .....
   iii. .....

2. The following aspects of measuring the length of the preterm baby were shown
   i. .....
   ii. .....
   iii. .....

3. The following aspects of measuring the weight of the preterm baby were shown
   i. .....
   ii. .....
   iii. .....

Comments on video:

Good aspect	Good aspect
.....	.....
.....	.....
.....	.....

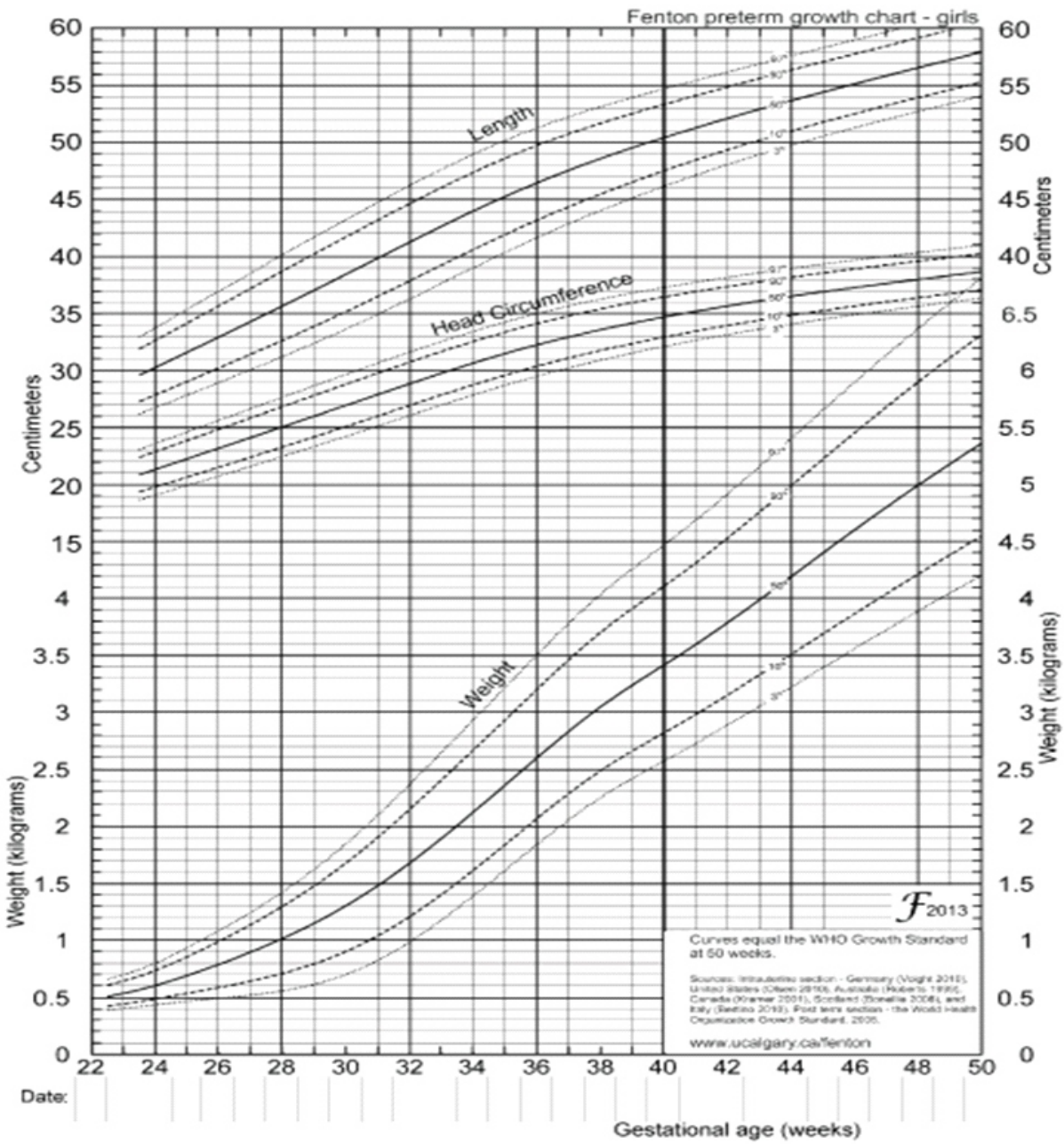
4.5:Poster

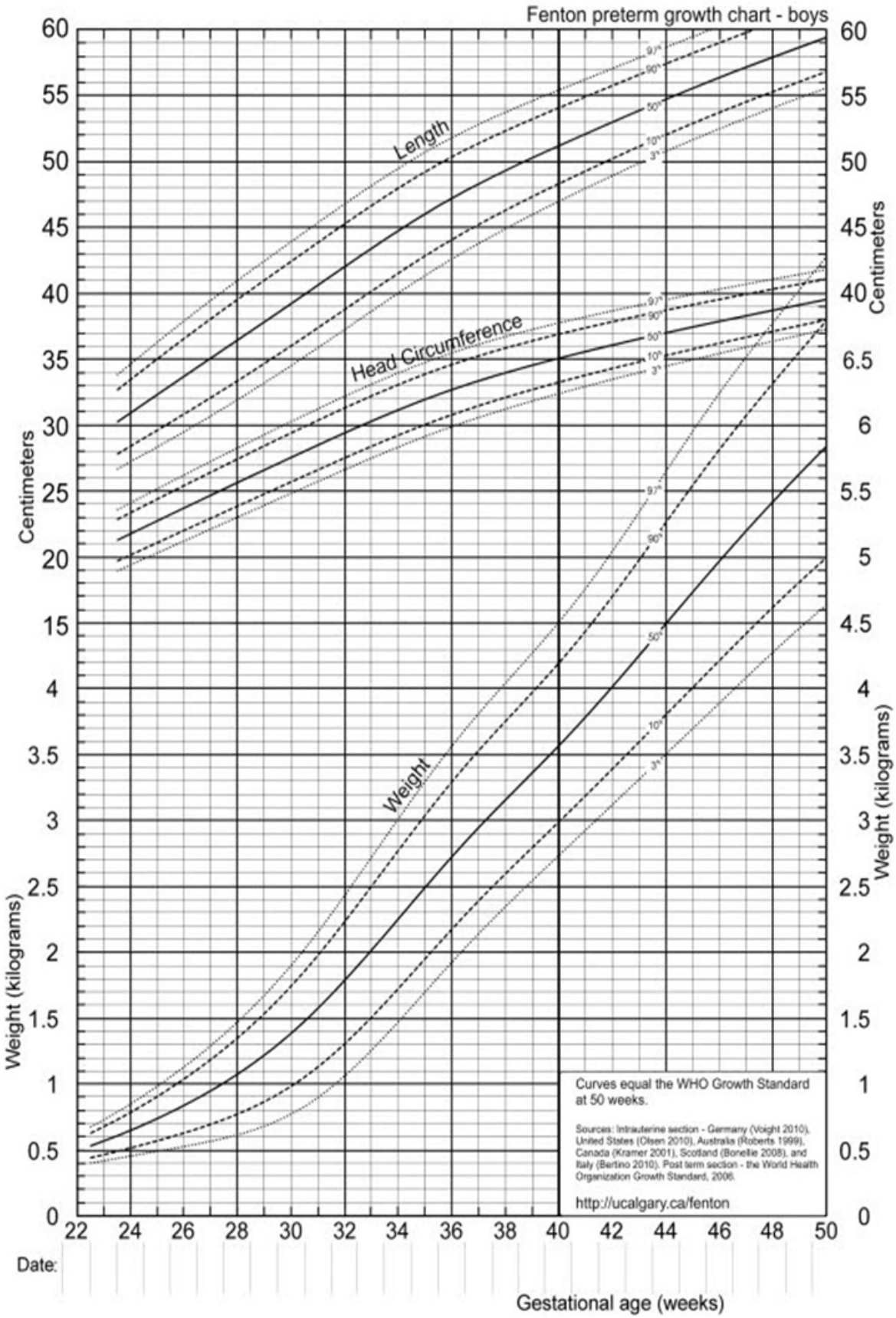
GROWTH CHARTS

There will be a poster demonstration on:

- Fenton preterm growth chart for girls
- Fenton preterm growth chart for boys

The facilitator shall conduct a demonstration session on growth charts




Fenton preterm growth chart - boys
Length
Head Circumference
Weight
97th
90th
50th
10th
3rd
Centimeters
Weight (kilograms)
Curves equal the WHO Growth Standard at 50 weeks.
Sources: Intrauterine section - Germany (Voigt 2010), United States (Olsen 2010), Australia (Roberts 1999), Canada (Kramer 2001), Scotland (Bonellie 2008), and Italy (Bertino 2010). Post term section - the World Health Organization Growth Standard, 2006.
http://ucalgary.ca/fenton
Date:
Gestational age (weeks)

4.6:Self-check MCQ's

1. Which growth chart should be used for monitoring the postnatal weight gain of a LBW infant after 40 weeks of postmenstrual age?
    a. IAP chart
    b. Lubchenco chart
    c. WHO MGRS chart
    d. Ehrenkranz chart

2. State whether **'True'** or **'False'**,
    - The weight of a preterm baby in the neonatal unit should be recorded weekly

3. Which growth chart should be used to classify a baby as appropriate, large or small for gestational age at birth?
    a. IAP chart
    b. Fenton's chart
    c. WHO MGRS chart
    d. Ehrenkranz chart

4. The major causes of poor growth in the postnatal period include all of the following **'EXCEPT'**
    a. Inadequate protein intake
    b. Chronic hypothermia
    c. Regurgitation of feeds
    d. Anemia

5. Which growth chart should be used for monitoring the postnatal growth of a very low birth weight infant during the initial hospital stay?
    a. IAP chart
    b. Lubchenco chart
    c. WHO MGRS chart
    d. Ehrenkranz chart

Skill Check

After you have read through the script, seen the videos and the webinars, you shall be asked to undergo a skill check on task trainers. The facilitator shall assess you and provide feedback. This shall include assessment of skills:

S. No.	OSCE
1.	Weight recording
2.	Assessment of readiness to feed
3.	Insertion of intragastric tube and feeding
4.	Paladai feeding
5.	Abdominal girth monitoring
6.	Milk fortification
7.	Counseling for milk expression
8.	Plotting growth on a chart

Common requirements for OSCE (to be arranged at each point)

1. Soap and water
2. Orogastric tubes
3. Gloves
4. Syringes 10 mL, 20 mL, 5 mL
5. Normal Saline
6. Milk
7. Mannequin
8. Water
9. Wide mouthed container
10. Measuring tape
11. Soap and water
12. Breast model
13. Boiling utensil
14. Premie Natalie
15. Mama breast
16. Electronic weighing scale
17. Draw sheets

1. Weight recording

You have just received a stable newborn infant in the SNCU. You have to weigh the baby. Demonstrate the necessary steps to weigh the baby

S. No	Correct Action	YES	NO
1.	Performs hand hygiene		
2.	Places the weighing scale on a flat and stable surface		
3.	Brings the weighing scale near the baby		
4.	Cleans the weighing scale with soap and water		
5.	Checks whether pan is centrally placed		
6.	Switches on the weighing scale and zero the scale		
7.	Places a sterile towel on the pan		
8.	Adjusts the scale to "0"		
9.	Detaches as many tubes and equipment as possible		
10.	Undresses the baby and places the naked baby on the weighing scale		
11.	Places baby centrally on the pan, record weight while the baby is not moving; If using pre-weighted splint, reduces the weight of the splint from the baby's weight		
12.	Records the reading in the case record		
13.	Cleans the weighing scale with soap and water		
	Total Score:		

Score: (Maximum score 13): _____

2. Assessment of readiness to feed

You have just received a 2.0 kg LBW baby in the SNCU. Assess the readiness of the baby to feed

S. No	Correct Action	YES	NO
1.	Washes hands		
2.	Mentions the gestation on the current day (should be > 32weeks)		
3.	Comments that 'the baby is hemodynamic stable'		
4.	Mentions the baby's ability to maintain temperature outside incubator/in skin to skin contact		
5.	Comments that 'the baby has stable, comfortable breathing'		
6.	Checks the rooting and sucking reflex		
7.	Puts the baby on mother's breast and assesses if the baby is able to breastfeed		
8.	If baby starts sucking, assesses if the baby is able to suck effectively		
9.	If sucking effectively, comments that 'the baby is ready to be breastfed'		
	Total Score:		

Score: (Maximum score 9): _____

3. Insertion of intra gastric tube and feeding

An infant is born at 30 weeks of gestation and not able to take paladai feeds. Demonstrate the steps of orogastric tube feeding to the baby

S. No	Correct Action	YES	NO
1.	Washes hands		
2.	Selects appropriate size orogastric tube		
3.	Positions the baby supine with head elevated		
4.	Measures the length of tube to be inserted from the bridge of the nose to the tip of ear lobe down to the xiphoid process		
5.	Marks the tube with tape or maintain the measurement with thumb and finger		
6.	Inserts the tube into the mouth until it reaches the premeasured mark on the tube; uses EBM or baby's saliva as lubricant		
7.	Checks the position of the tube by gently aspirating the stomach contents or by injecting 0.5 auscultating 1 mL of air into the stomach while		
8.	Brings the tube at the corner of the mouth & fixes the tube in 'C shape' manner		
9.	Measures the amount of feed to be given		
10.	Removes the plunger of the syringe and connects the barrel to the gastric tube		
11.	Fills the barrel of the syringe with required amount of milk		
12.	Allows the milk to run down the tube by gravity		
13.	Observes the baby during the entire gastric feed; Stops the feed if the infant vomits, becomes floppy, develops breathing difficulty or cyanosis		
14.	Caps the end o f the tube after feeding		
15.	Documents on nurses' chart		
	Total Score:		

Score: (Maximum score 15): _____

4. Paladai feeding

A 32 weeks old baby, weighing 1700 gm, is admitted in SNCU. Demonstrate the steps of palade feeding to the baby

S.NO	Correct Action	YES	NO
1.	Washes hands		
2.	Takes the required amount of expressed milk in the bowl		
3.	Ensures that the baby is awake; *If the baby is not alert, tries to stimulate the baby with gentle stimulation*		
4.	Holds the baby in upright posture (to avoid aspiration)		
5.	Fills the *paladai* spoon with the milk		
6.	Holds the *paladai* so that the pointed tip rests lightly on the baby's lower lip		
7.	Tilts the *paladai* to pour a small amount of milk into infant's mouth; feeds the infant slowly		
8.	Ensures the infant has swallowed the milk already taken before giving more milk		
9.	Burps the baby gently by holding upright		
10.	After use, washes the utensils thoroughly with soap and water and places the *paladai* in boiling water for disinfection		
	Total Score:		

Score: (Maximum score 13): _____

5. Abdominal girth monitoring

A 28 weeks baby is admitted in NICU. You need to measure the abdominal girth before giving the next feed. Demonstrate the steps of taking abdominal girth for the baby

S. No	Correct Action	YES	NO
1.	Washes hands		
2.	Ensures the baby has separate measuring tape in the bedside belongings		
3.	Places the tape gently around the abdomen		
4.	Measures the girth just above the umbilicus (in cm)		
5.	Checks the previous measurement of the abdominal girth		
6.	Informs the doctor on duty		
	Total Score:		

Score: (Maximum score 6): _____

6. Milk fortification

A 31 weeks old premature baby is now on full feeding 13mL/2hrly. it was decided to add HMF to the expressed breast milk

S. No	Correct Action	YES	NO
1.	Washes hands		
2.	Takes the measured volume of feed in a bowl		
3.	Calculates the right amount of fortifier to be added to EBM: *1 gm sachet to be added to 25 mL*		
4.	Ensures that there is no moisture or clumps in the HMF powder		
5.	Adds the required amount of fortifier to the EBM		
6.	Feeds the baby as per prescription (orogastric tube/*paladai*)		
7.	Monitors for any feed regurgitation /vomiting or abdominal distension		
	Total Score:		

Score: (Maximum score 7): _____

7. Counseling for milk expression

A 29 weeks baby, currently day 2 of life, is admitted in SNCU. Baby is on orogastric feeds and needs expressed breast milk for 2-hourly feeding. Demonstrate the steps of expression of breast milk

S. No	Correct Action	YES	NO
1.	Washes hands		
2.	Ensures that the container is clean and disinfected; if not, places the container in boiling water and leaves it there for at least 10 minutes		
3.	Demonstrates how to gently massage the breast		
4.	Asks the mother to place her thumb on the top of the breast away from the nipple and the other fingers on the underside of the breast opposite to the thumb		
5.	Asks her to push the fingers straight into the chest wall and roll the thumb and fingers forward at the same time		
6.	Asks her to compress and release the breast tissue between the thumb and the fingers for a few times		
7.	Tells her to compress and release all the way around the breast keeping the fingers at the same distance from the nipples		
8.	Instructs her to stop expressing when the milk no longer flows or drips from the breast		
	Total Score:		

Score: (Maximum score 8): _____

8. Plotting growth on chart

A 28 weeks baby, birth weight 990 gm was admitted to SNCU and is currently 14 days old. We need to monitor the growth of the baby. Demonstrate the steps, how would you monitor the growth of the baby

S. No	Correct Action	YES	NO
1.	Washes hands		
2.	Weighs the baby as per procedure		
3.	Knows how to select the appropriate postnatal growth chart • Birth weight < 1500 g: Modified Dancis/Ehrenkranz chart • Birth weight > 1500 g: Fenton's chart Postmenstrual age/gestation > 40 weeks: WHO growth chart		
4.	Marks the correct weight on the chart		
5.	Marks the correct day of life		
6.	Mentions the centiles on the chart		
7.	Notes the findings in the nursing chart		
	Total Score:		

Score: (Maximum score 7): _____

Simulation

An essential pre-requisite before reaching this stage in each module is that the learner should have undergone the entire module, seen the videos and webinars facilitated by the facilitator, attempted the evaluation questionnaire, and demonstrated the skill check.
This session brings out learning and practice in a realistic environment for good nutrition The emphasis is on working together as a team and not on individual skills.

You shall be asked by the facilitator to participate as a team for the management of the following conditions:

- Feeding of a low birth weight baby

This shall be followed by feedback and debriefing.