saving children's lives
ETAT+
Emergency Triage Assessement and Treatment plus admission

Neonatal Feeds and Fluids Management

REPUBLIC OF KENYA
MINISTRY OF HEALTH
NEST360°
University of Nairobi
KENYA PAEDIATRIC ASSOCIATION
KEMRI | Wellcome Trust
Keprecon
Kenya Paediatric Research Consortium

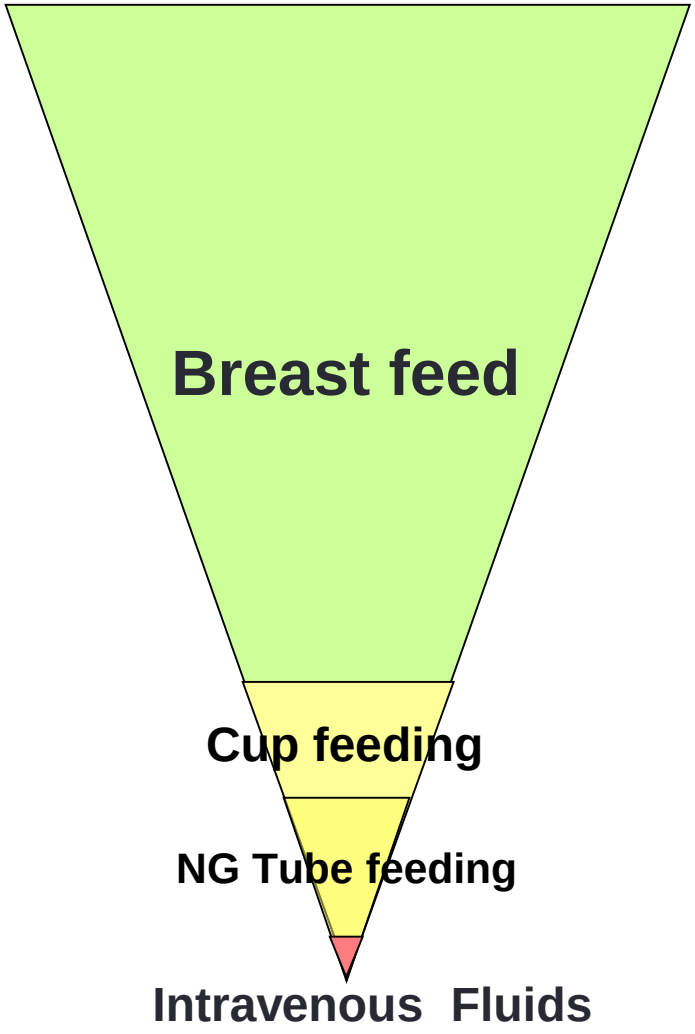
Objectives

- Describe feeding regimes for the stable and unstable newborns
- Describe the breast milk expression and use - cup feeding and nasal/oral gastric feeding
- Discuss gastric residual monitoring
- Describe monitoring of newborn feeds and fluids

Introduction

saving children's lives
ETAT+
Emergency Triage Assessement and Treatment plus admission

Modes of Feeding



Before feeding any baby determine;

1. **Safety/Risk**
2. **If the baby is stable or unstable**
3. **Measurement – Correct volume**
4. **Frequency – How often**
5. **Hunger ques**

Neonatal Feeding Recommendations

Can breastfeed? — Yes → Breastfeed

No ↓

Is newborn stable? — Yes → Expressed Breast Milk

No ↓

Day 1: 10% Dextrose

Day 2 : Start EBM(30mls/kg/day), reduce IVF

Characteristics of unstable newborns

Convulsions, Unconscious, Severe respiratory distress evidenced by severe drawing, Absent bowel sounds

EBM/Fluid volume on Day 1 of life based on weight:

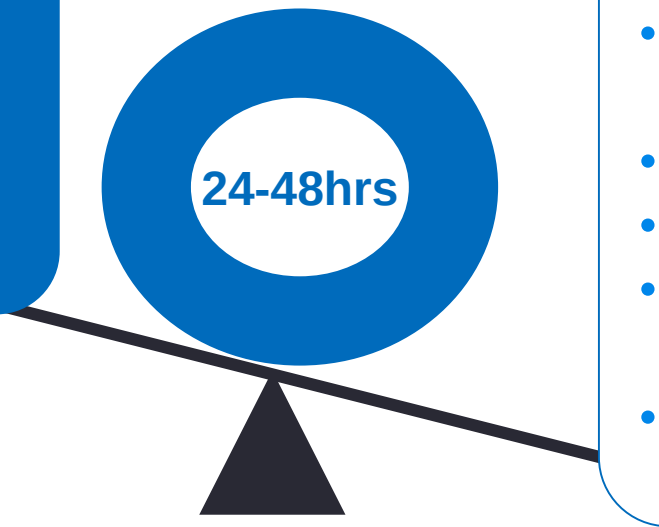
Less than 1500gms - 80mls/kg/day

More than or Equal to 1500gms – 60mls/kg/day

Effects of Early Vs Delayed feeds on GIT

Early Feeding

- Enhanced GIT absorption
- Stimulates vital processes
- Improves digestive tolerance
- Enhances Growth
- Early discharge
- Reduced risk for NEC



Delayed Feeding

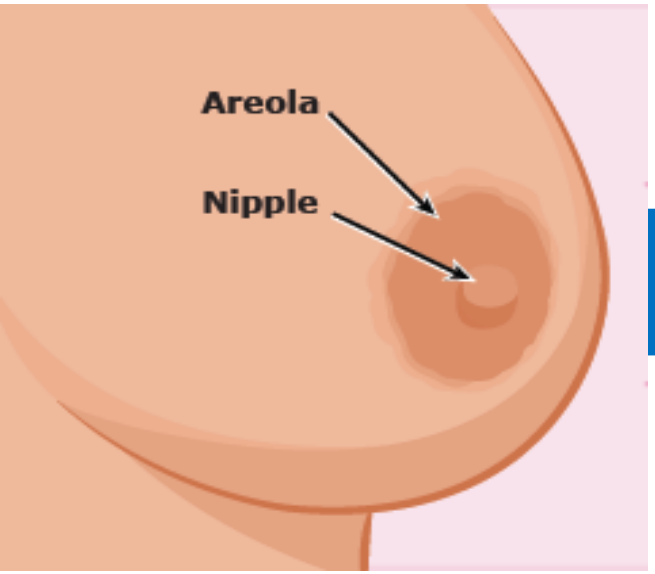
- GIT mucosal atrophy
- Reduced intestinal size
- Slow maturation of GIT enzymes
- Bacterial overgrowth
- Inadequate growth
- Risks of prolonged IV's
- Risks of long hospital stay

We do not have iv nutrition –
10% dextrose has < 50% the calories of EBM

Breastfeeding, A Guide for the Medical Profession, 8th EDITION by Ruth A. Lawrence & Robert M. Lawrence & Jochum F, et al., ESPGHAN/ESPEN/ESPR guidelines on pediatric parenteral nutrition: Fluid and electrolytes, Clinical Nutrition (2018) & Journal of Pediatric Gastroenterology and Nutrition 38:237–238 © March 2004 Lippincott Williams & Wilkins, Inc., Philadelphia

Feeding regimes for the Stable Newborn

Feeding Regimes – Stable Newborn



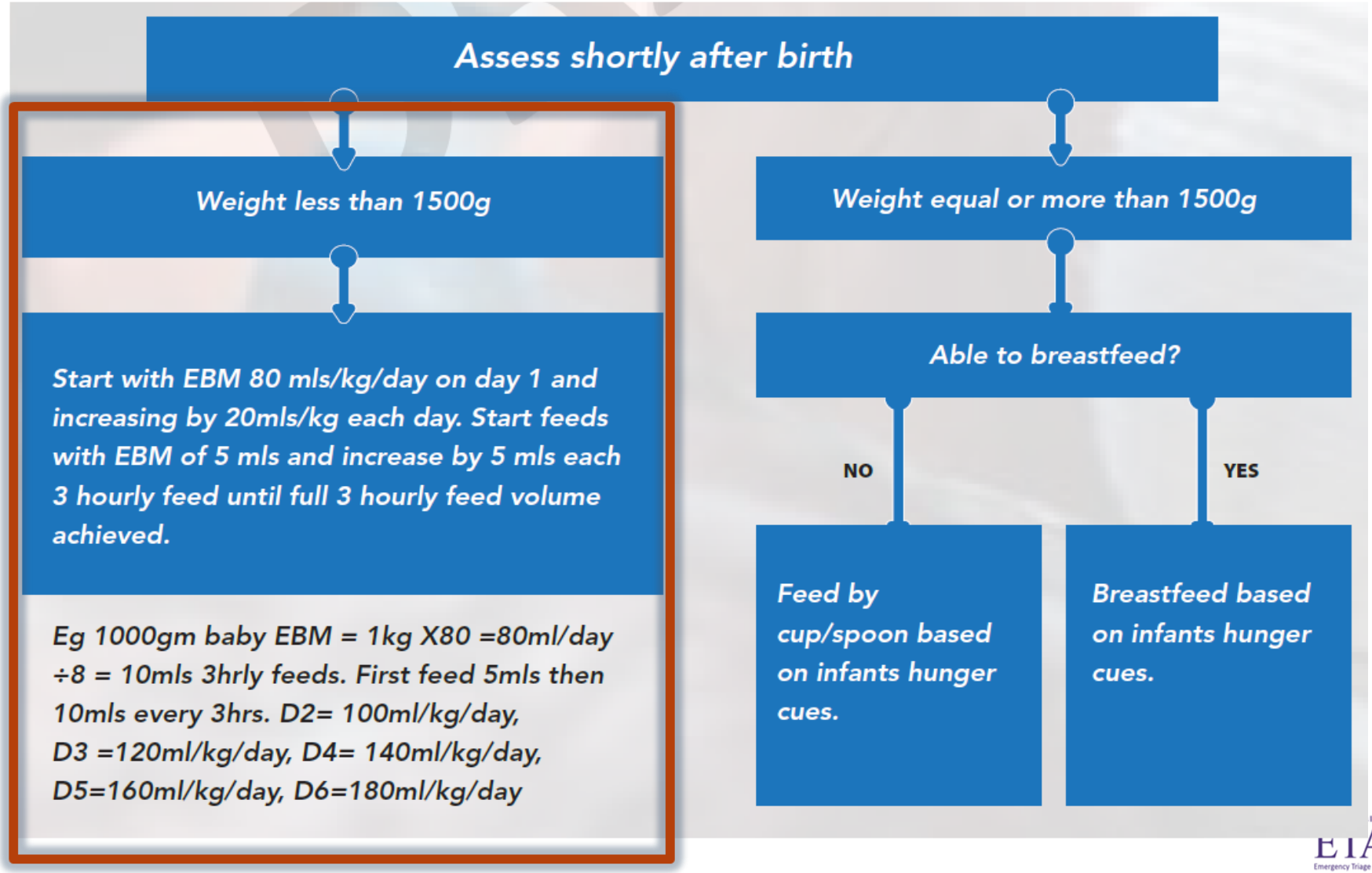
>1500 grams

<1500 grams

Which Feed?

- **Best Option: Breast Milk**
  - Colostrum – low fat, high protein and minerals.
  - Breast milk lowers the risk of NEC – whenever possible fresh breast milk
- **2nd option:** Donor milk if available
- **3rd option:** Preterm formula milk
- If full oral feeds not possible use parenteral feeds
- Oral glucose solutions can cause diarrhea
- Cows milk is NOT recommended

Stable Neonate
Birthweight less than 1500grams



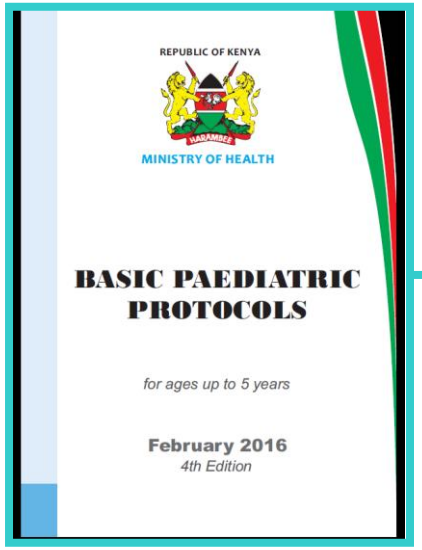
Calculating Feed Volume

Stable newborn birth weight – 1.3kg

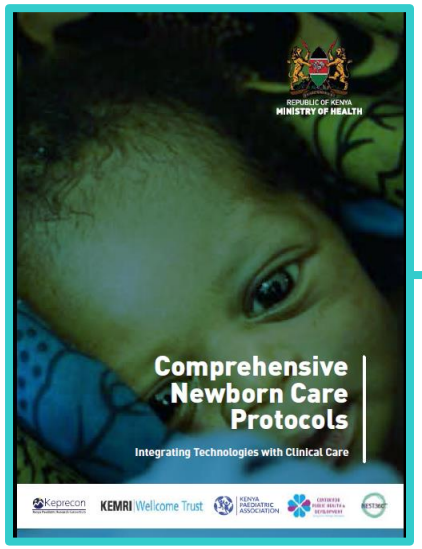
Day	Total fluid required/day	Three hourly feeds
Day 1	**80 X 1.3 = 104ml**	**13**
Day 2	**100 X 1.3 = 130ml**	**16**
Day 3	**120 X 1.3 = 156ml**	**20**
Day 4	**140 X 1.3 = 182ml**	**23**
Day 5	**160 X1.3 = 208 ml**	**26**

Start at 80ml/kg/day volume of feeds. Increase by 20ml/kg/day to full feeds (150ml/kg); maximum 180ml/kg/day

Feeding of the Stable Newborn



Weight (Kg)	1.1-1.2 NG 3 hourly feed	1.3-1.4 NG 3 hourly feed	1.4-1.5 NG 3 hourly feed	Total Daily Fluid/Milk Volume
Day 1	11	13	14	80ml/kg/day
Day 2	14	16	18	100ml/kg/day
Day 3	17	20	21	120ml/kg/day
Day 4	19	23	25	140mls/kg/day
Day 5	22	26	28	160mls/kg/day
Day 6	25	29	31	180ml/kg/day



Age	1.0kg	1.1kg	1.2kg	1.3kg	1.4kg	1.5kg
D-1	10	11	12	13	14	15
D-2	13	14	15	16	18	19
D-3	15	17	18	20	21	23
D-4	18	20	21	23	25	26
D-5	20	22	24	26	28	30
D-6	23	25	27	29	32	34

Feeding regimes for the Unstable Newborn

saving children's lives
ETAT+
Emergency Triage Assessement and Treatment plus admission

Increasing EBM - Unstable Newborns

Day	Feed/Fluid	Weight <1500grams	Weight ≥1500grams
Day 1	10% D	**80ml/kg/day**	**60ml/kg/day**
Day 2	EBM **30ml/kg/day**	30mls/kg/day (÷ into 3hrly feeds)	30mls/kg/day (÷ into 3hrly feeds)
	IVF	**100ml/kg** – **30mls/kg** = IVF volume	**80ml/kg** – **30mls/kg** = IVF volume
Day 3	EBM **60ml/kg/day**	60mls/kg/day (÷ into 3hrly feeds)	60mls/kg/day (÷ into 3hrly feeds)
	IVF	**120ml/kg** – **60mls/kg** = IVF volume	**100ml/kg** – **60mls/kg** = IVF volume

Increase daily total fluid requirement by 20mls/kg/day until maximum
On Day 2 start EBM at 30ml/kg/day then increase by 30ml/kg/day until maximum
Withhold oral feeds if abdominal obstruction or ileus is suspected

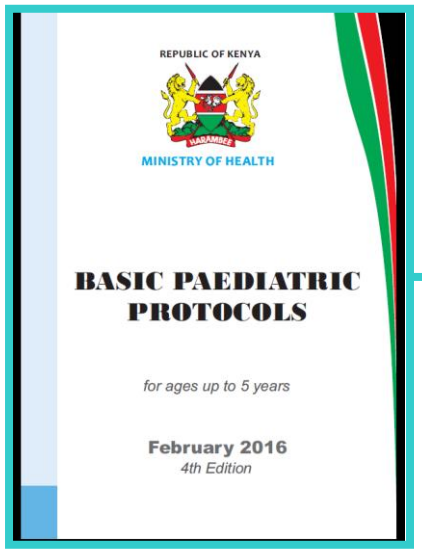
Calculating Feed Volume

Unstable newborn birth weight – 1.3kg

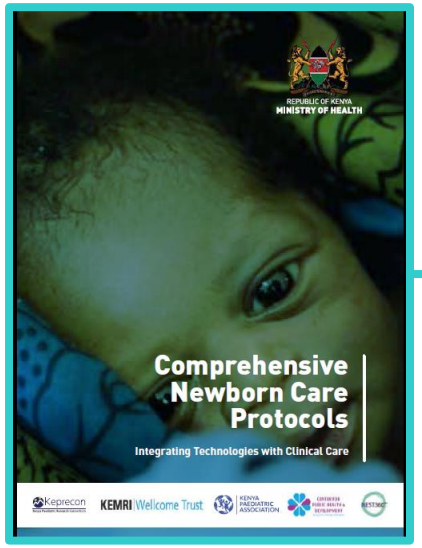
Day	Total fluid required/day	3 Hourly EBM Feeds	1 Hourly IVF
Day 1	**80 X 1.3 = 104mls**		**4.3mls**
Day 2	**100 X 1.3 = 130mls**	**4.9mls**	**3.7mls**
Day 3	**120 X 1.3 = 156mls**	**10mls**	**3.3mls**
Day 4	**140 X 1.3 = 182mls**	**14.6mls**	**2.7mls**
Day 5	**160 X1.3 = 208 mls**	**19.5mls**	**2.2mls**

Start at 80ml/kg/day volume of feeds. Increase by 20ml/kg/day to full feeds (180ml/kg/day if on enteral feeds and 150mls/kg/day if on IVF)

Feeding the Unstable Newborn



Weight (kg)	0.8 - 0.9 IVF mls per hr	0.8 - 0.9 NGT 3hrly feed	0.9 - 1.0 IVF mls per hr	0.9 - 1.0 NGT 3hrly feed	1.1 - 1.2 IVF mls per hr	1.1 - 1.2 NGT 3hrly feed	1.3 - 1.4 IVF mls per hr	1.3 - 1.4 NGT 3hrly feed	1.4 - 1.5 IVF mls per hr	1.4 - 1.5 NGT 3hrly feed
Day 1	3	0	3	0	4	0	3	0	4	0
Day 2	2	5	3	5	3	5	4	5	5	5
Day 3	1	10	2	10	2	10	3	10	4	10
Day 4	0	15	1	15	1	15	3	15	4	15
Day 5	0	16	0	18	0	22	2	26	3	28
Day 6	0	18	0	20	0	25	1	29	3	30
Day 7+	0	21	0	22	0	27	0	32	0	35



Three hourly NGT EBM feeds and ONE hourly IVF for UNSTABLE NEWBORNS with birth weight less than 1500grams

	0.6kg		0.7kg		0.8kg		0.9kg		1.0 -1.1kg		1.2—1.3kg		1.4-1.5kg	
	EBM 3hrly	IVF mls/hr	EBM 3hrly	IVF mls/hr	EBM 3hrly	IVF mls/hr	EBM 3hrly	IVF mls/hr	EBM 3hrly	IVF mls/hr	EBM 3hrly	IVF mls/hr	EBM 3hrly	IVF mls/hr
D-1		2		2		3		3		4		4		5
D-2	2	2	3	2	3	2	3	3	4	3	5	4	5	4
D-3	5	2	5	2	6	2	7	2	8	3	9	3	11	4
D-4	7	1	8	1	9	2	10	2	12	2	14	3	16	3
D-5	9	1	11	1	12	1	14	1	16	1	19	5	22	2
D-6	11	0	13	0	15	0	17	0	20	0	23	0	27	0
D-7	14	0	16	0	18	0	20	0	24	0	28	0	33	0

Class Exercise

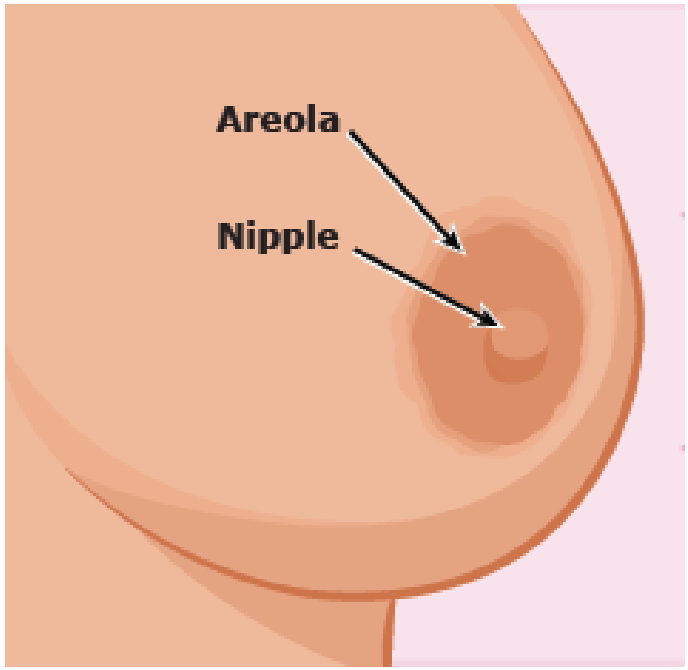
Outline the one week feeding plan for a;

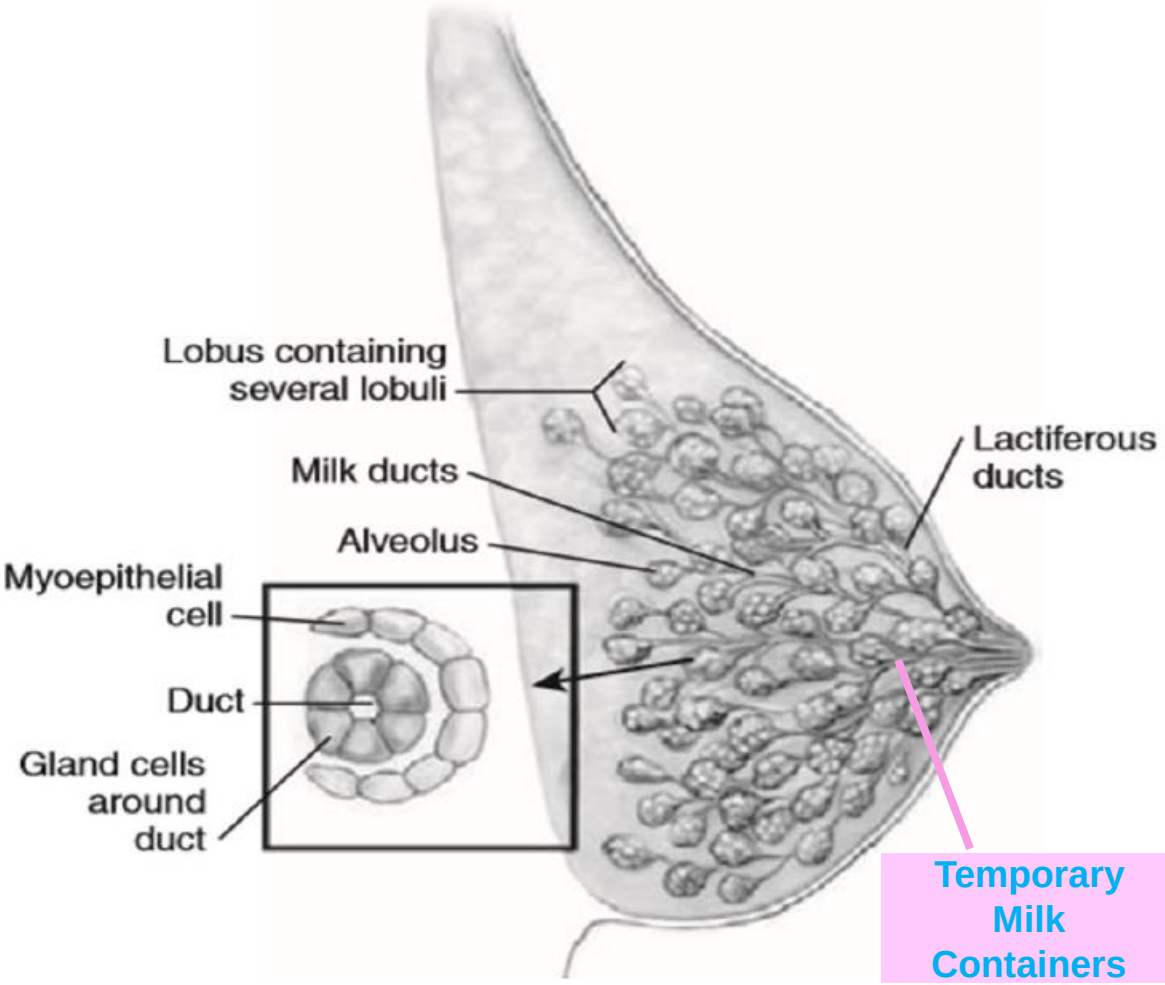
1. Stable newly born whose birth weight is 1.4kg
2. Newly born with severe birth asphyxia. Birth weight 1.8kg
3. Newly born with severe chest wall indrawing. Birth weight 1.2kg
4. Stable newly born whose birth weight is 1.6kg and not able to breastfeed

Expressing Breast Milk

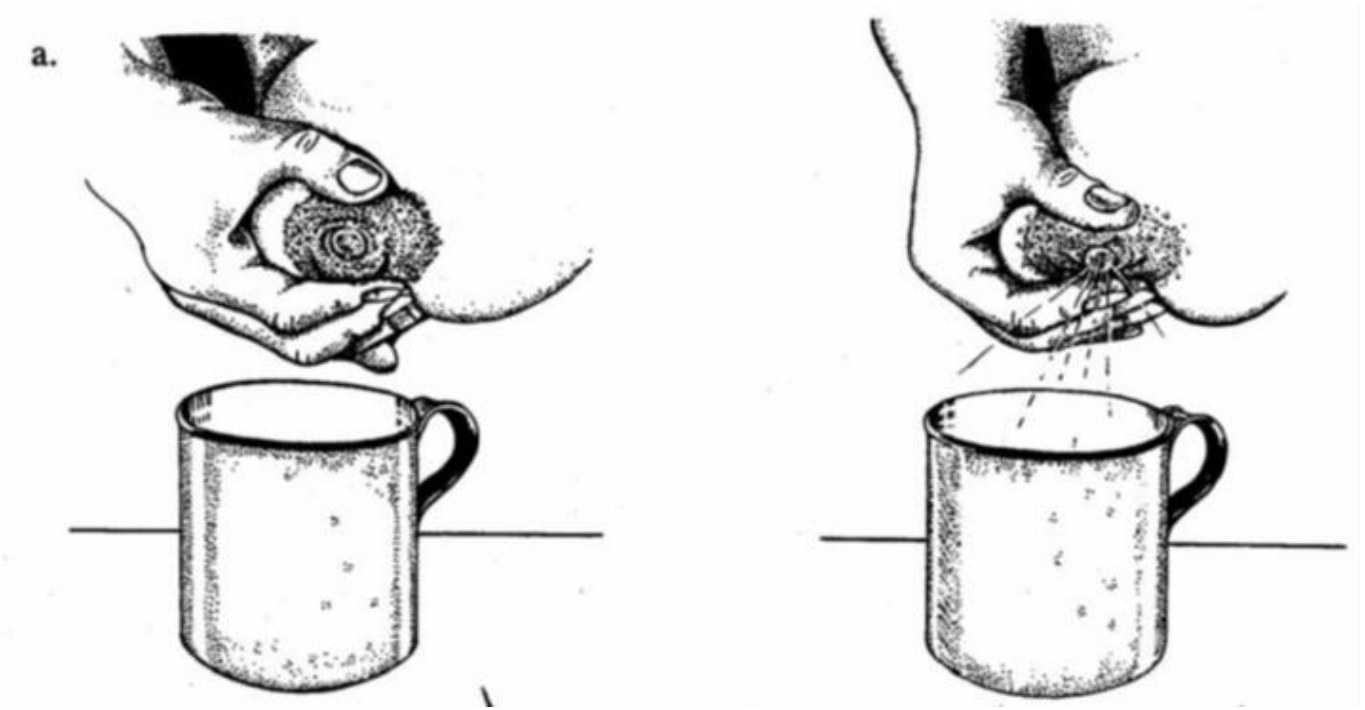
saving children's lives
ETAT+
Emergency Triage Assessment and Treatment plus admission

Structure of the Lactating Breast





Hand expression of breastmilk



- Hold the breast using ‘C grip’
- Push breast back towards the chest wall
- Press the thumb and the supporting fingers together and then release.
- Repeat this step until breast is empty

Expression Demonstration

Using Expressed Breast Milk (EBM) - Cup & NG/OG Tube Feeding

Hunger Cues

Early stage of readiness to feed	Mid stage of readiness to feed	Late stage of readiness to feed
• Wiggling • Moving arms or legs • Rooting • Fingers to mouth	• Fussing • Squeaky noises • Restless • Crying intermittently	• Full cry • Aversive screaming pitch • Color turns red

Do Not wait for crying to feed!

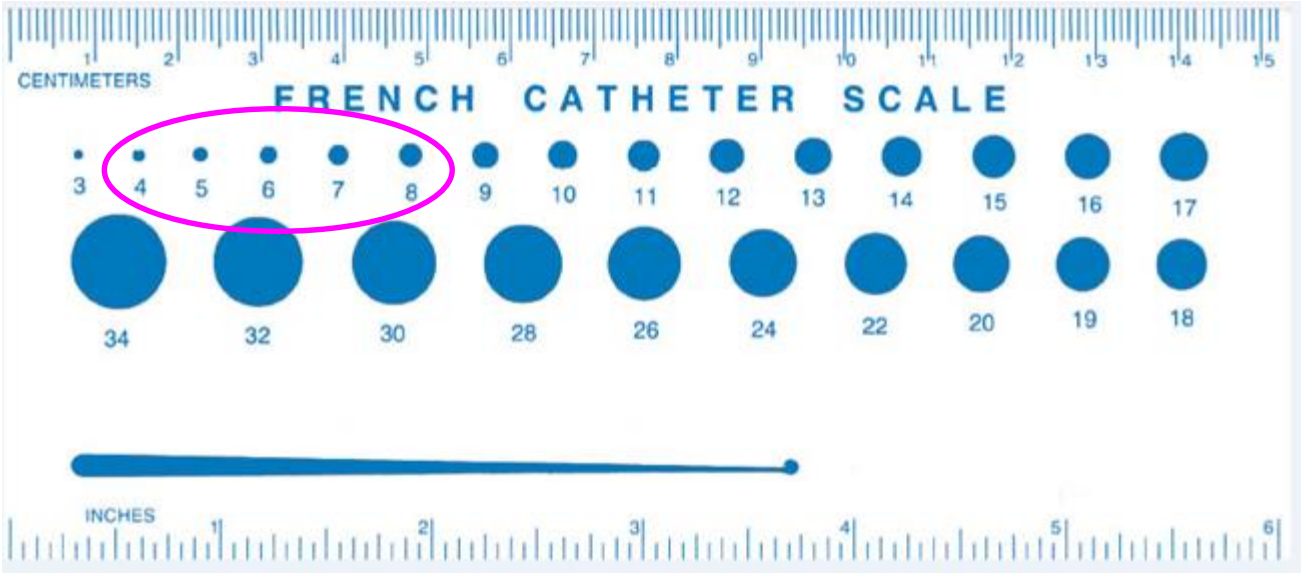
Feed as soon as early cues are present!

Cup Feeding Technique

1. Observe for hunger cues
2. Prepare and put appropriate volume of milk in a cup
3. Sit the baby at 90^0 supporting the baby's head, neck and back.
4. Place the cup on the lower lip and tilt the cup so the milk reaches the baby lips
5. Let the baby lick the milk using the tongue
6. Continue tilting the cup as the baby continues to lick the milk.
7. When baby has taken enough, he will start closing his mouth and even fall asleep

- Do not feed baby when lying down
- Do not pour milk into the mouth
- Do not feed a sleeping baby

Nasal/Oral Gastric Tube Sizes



Baby's Weight	Recommended Size
Less than 1500gm	Fr Gauge 5 - 6
More than or equal to 1500gm	Fr Gauge 6 - 8

SUH 2007 and NICCU Clinical Guidelines 2006

Nasal vs Oral Gastric Tube

- Nasal gastric tubes (NGT) preferred over Oral gastric tubes (OGT)

Use Oral gastric tubes when the baby has;

- Nasal prongs on for CPAP or conventional oxygen therapy
- Nasal trauma
- Choanal atresia
- Cranio-facial anomalies

Nasal/Oral Gastric Tube Insertion

Sizing the NGT

- Measure the distance from the nose to the ear lobe, then to the midpoint between xiphisternum (epigastrium) and umbilicus.
- Mark the tube at this point

Inserting

- Lubricate the tip of the NGT with breast milk
- Insert until the measured distance is reached. Ensure the mark is visible
- Secure the tube on the cheek using a clear medical adhesive

Nasal/Oral Gastric Tube Insertion

Confirming and Securing position

- Aspirate using a 1-2ml syringe and check that the aspirate turns blue litmus paper pink.
- If no aspirate is obtained, inject air down the tube and listen for a ‘whoosh’ over the abdomen with a stethoscope
- Before feeding always confirm correct tube placement

Nasal/Oral Gastric Tube Feeding

a)

Three hourly NGT EBM feeds and ONE hourly IVF for UNSTABLE NEWBORNS with birth weight less than 1500grams

	0.6kg		0.7kg		0.8kg		0.9kg		1.0 -1.1kg		1.2—1.3kg		1.4-1.5kg	
	EBM 3hrly	IVF mls/hr	EBM 3hrly	IVF mls/hr	EBM 3hrly	IVF mls/hr	EBM 3hrly	IVF mls/hr	EBM 3hrly	IVF mls/hr	EBM 3hrly	IVF mls/hr	EBM 3hrly	IVF mls/hr
D-1		2		2		3		3		4		4		5
D-2	2	2	3	2	3	2	3	3	4	3	5	4	5	4
D-3	5	2	5	2	6	2	7	2	8	3	9	3	11	4
D-4	7	1	8	1	9	2	10	2	12	2	14	3	16	3
D-5	9	1	11	1	12	1	14	1	16	1	19	5	22	2
D-6	11	0	13	0	15	0	17	0	20	0	23	0	27	0
D-7	14	0	16	0	18	0	20	0	24	0	28	0	33	0

Give 2mls/kg of colostrum every 3hours as trophic feeds on Day 1 after A, B and C are stabilized – DO NOT SUBTRACT THIS FROM THE IVF, thus IVF REMAINS AS SHOWN IN THE CHART – 80ml/kg/day

Confirm the correct volume to feed

b)

Hand hygiene

c)

Check correct tube placement

d)

Pour volume of EBM needed in a cup

e)

Remove the syringe burrel

Nasal/Oral Gastric Tube Feeding

a)

Pinch the tube

b)

Open the end of the tube

c)

Attach the empty syringe

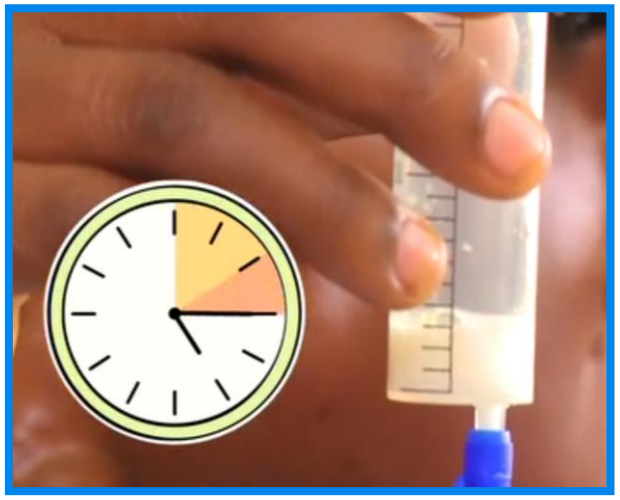
d)

Pour milk into the syringe

e)

Remove the pinch & hold the tube above the baby

f)



Let the milk flow slowly by gravity

Nasal/Oral Gastric Tube Feeding

Caution

- If the milk doesn't flow using gravity, **DO NOT** push the milk using a syringe
- Always observe the baby for spitting, vomiting and choking
- Before NGT feeds, always check if the baby is able to cup feed or breast feed
- All containers used for NGT feeding should always be cleaned and air dried after use
- Replace the NG tube after 72 hours

Gastric Aspirates Monitoring

Effects of Gastric Aspiration

Disadvantages:

1. Delays time to establish full enteral feeds
2. Delays time to regain birth weight
3. Significant increase in the episodes of feed interruption
4. Significant increase in the number of TPN and its complications
5. Damages gastric mucosa by negative pressure

NO EFFECTS in incidence of:

- NEC
- Invasive infection

1. Kaur A, et. al. Journal of Paediatric Gastroenterology and Nutrition 2015; 60(2):259-63..
2. Li YF, et. al. Pediatrics and Neonatology 2014;55(5):335-40

Recommendations for gastric residual monitoring in preterms

- Do not check for gastric residuals routinely
- Only monitor if signs are suggestive of NEC or feeding intolerance
- Withhold feeds in case of haemorrhagic residuals, as haemorrhagic residuals are significant.
- Vomiting bile may indicate an intestinal obstruction or ileus
- Isolated green or yellow residuals are unimportant.

Dutta S, et al. Guidelines for feeding very low birth weight infants. Nutrients. 2015 Jan 8;7(1):423-42

Feeds & Fluids Monitoring

saving children's lives
ETAT+
Emergency Triage Assessement and Treatment plus admission

Is the baby getting enough feeds?

- Weight monitoring

  1. **Percentage weight loss**

     (less than 1 – 2% up to 5 days of life)

  2. **Weight gain in grams/kg/day**

     (10 -15gms/kg/day)

- Number of wet diapers (4 per day after 72 hours)

Is the baby getting enough feeds?

Weight Loss Calculation (%)

- **Day 1** - 1.3kg
- **Day 3** - 1.2kg

= (Day 1 – Day 3)/Day 1 × 100
= (1.3kg – 1.2kg)/1.3kg × 100
= 0.1/1.3 × 100
= 7.7%

Weight Gain Calculation (gms/kg/day)

- **Day 8** – 1.25kg
- **Day 10** – 1.3kg

= {Day 10(grams) – Day 8(grams)} ÷ Day 10(Kg)
= (1300gms – 1250gm) ÷ 1.3kg
= 38.5gms/kg in 2 days
= 19.2gms/kg/day

[HOSPITAL NAME]

COMPREHENSIVE NEWBORN MONITORING CHART

Version 2.6

Name	IP NO	Sex M ☐ F ☐	D.O.A	D.O.B
Date today	Diagnosis			
Birth Wt gm	*Interventions:* *CPAP* ☐ *Oxygen* ☐ *Phototherapy* ☐ *Blood tranfusion* ☐ *Exchange transfusion* ☐ *KMC* ☐			

Daily Clinician Feed and Fluid prescription

Day of Life	Current Wt = gm
Total input(feed and fluid) 24hrs = ml	

Feed: BF ☐ EBM ☐ Term Formula ☐ Pre-Term Formula ☐

Route: Cup☐ NGT☐ OGT☐

Volume & Frequency = _____ml 3hrly ☐ 2hrly ☐

Total 24hr Volume = _____ml

IV Fluid & Additives	Vol (ml)	Duration

Other prescribing instructions

Clinician's name Time:

Daily IV Fluid Nursing plan

Start time:

Hourly rate= _____ ml (____ drops/min)

Planned vol = ml in hrs

	Monitoring Freq ___ hrs | Time												
Vitals	Temp (^{0}C)												
	Pulse (b/min)												
	Resp Rate (b/min)												
	Oxy Sat (%) or Cy^0 Cy$^+$												
Assessment	Resp Distress 0,+,+++												
	CPAP Pressure (cm H_2O)												
	FiO_2 (%)												
	Jaundice 0,+,+++												
	Apnoea Y/N												
	Blood Sugar (mmol/l)												
	Completed by (name)												
Feed	Breastfeeding sufficient Y/N												
	EBM vol given (ml)												
	Formula vol given (ml)												
Fluid	IV volume given												
	IV Line working Y/N												
Output	Vomit Y/N												
	Urine(diapers changed)												
	Stool Y/N												
	Completed by (name)												

Morning shift notes
Category: A☐ B☐ C☐

Total feed+fluid in this shift_____ ml
Deficit_____ m
Completed by (name)

Afternoon shift notes
Category: A☐ B☐ C☐

Total feed+fluid in this shift_____ ml
Deficit_____ m
Completed by (name)

Night shift notes
Category: A☐ B☐ C☐

Total feed+fluid in this shift_____ ml
Total feed+fluid in 24hrs_____ ml
Deficit_____ ml
Completed by (name)

Jaundice 0 none, +mild(face),+++severe(feet)

Tick the category of baby after assessment

Alerts : circle readings outside normal range with red pen and action

Questions

Summary

- Breastfeeding is the best option
- Use the correct volumes of feeds and fluids
- Gastric residual monitoring is not recommended
- Use the comprehensive newborn monitoring chart to monitor newborn feeds and fluids