

MANAGEMENT OF LBW BABIES IN RESOURCE LIMITED SITTING



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TOPICS OF PRESENTATION CONT.

1. * Fluid and electrolyte
2. * Feeding and Nutrition
3. * Nutritional supplement
4. * Gentle rhythmic stimulation
5. * Management of problems in preterm baby
6. * Immunization
7. * Follow up
8. * Survival & long term outcome

TOPICS OF PRESENTATION

1. * Introduction
2. * Antinatal management
3. * Optimal care in labour room
4. * Management in post natal ward
5. * Monitoring in NICU
6. * Maintenance of temperature
7. * Asepsis
8. * Oxygen therapy

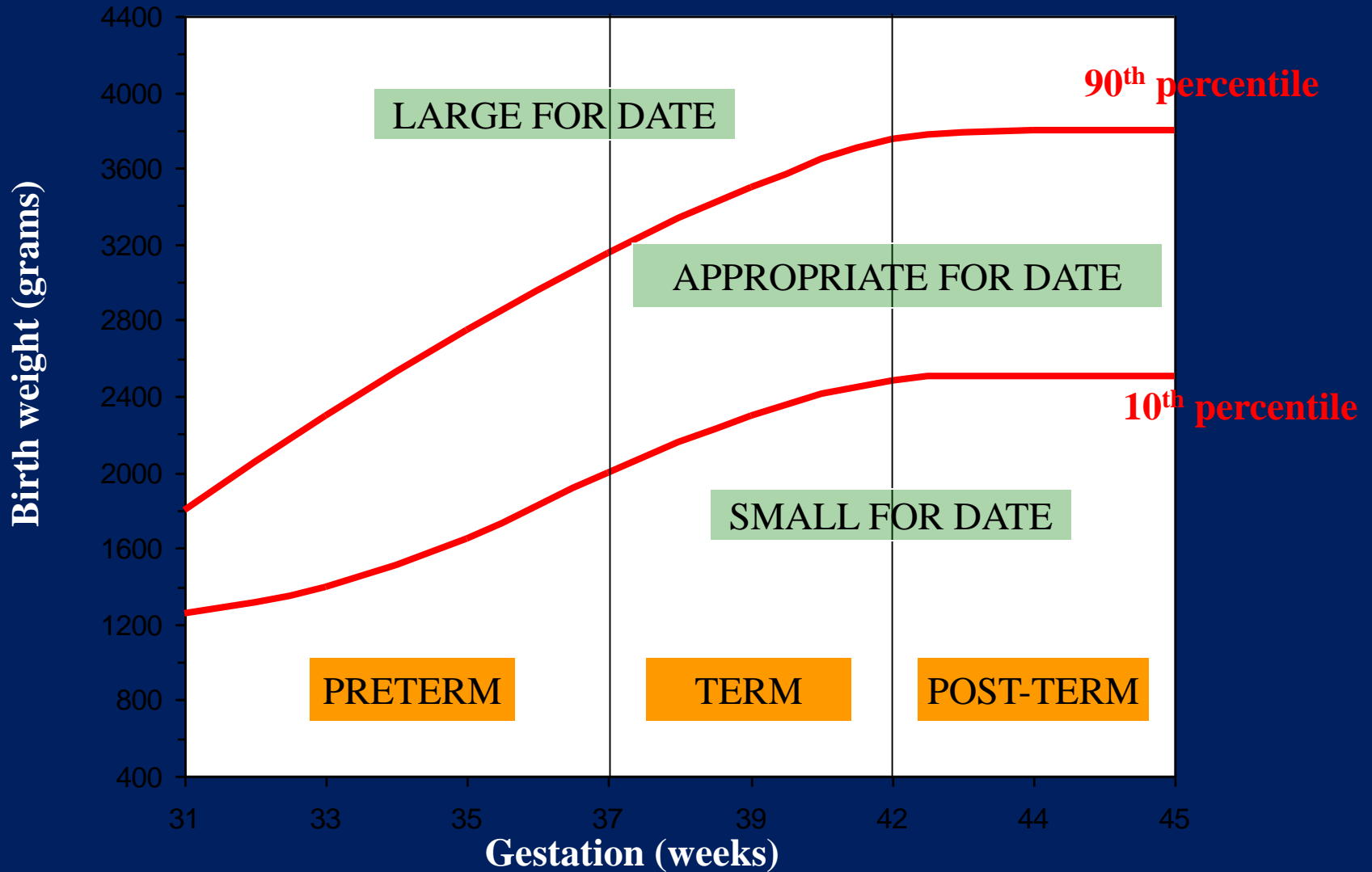
Low Birth Weight Infants in India

- 40% of total LBW infants in developing world are from India.
- Currently 21.5% of Babies born in India annually are Low Birth Weights
- 70-75% of these are born of the weight of 2000 gm to 2500 gm
- Rest 25-30% are born with birth weight <2000 gms. And are more vulnerable to various medical problems.

Categories of low birth weight babies

- **LBW – Birth weight < 2.5 KG.**
- **VLBW – Birth weight < 1.5 KG.**
- **ELBW – Birth weight < 1.0 KG.**
- **Most LBW babies are premature while some are SGA.**
- **SGA: Babies are those – Whose birth weight falls below 10TH percentile of expected weight for the particular gestational age.**

Intrauterine growth chart



Antenatal Management

- **Mother is an ideal transport incubator – high risk mother should be referred for confinement to a centre equipped with good quality obstetrical & neonatal care.**
- **Arrest of labour – Rest, sedation & tocolytic agents – Isoxsuprine.**

Antenatal Management contd.

- Assessment lung maturity:

BY- L/S ratio or amniotic fluid phosphotidyl glycerol level— before induction of premature labour , when it is required in the interest of mother or fetus.

Antenatal Management Contd.

- Antenatal steroid – Less than 34 Weeks GA
 - Betamethasone – 12 MG IM 24
Hourly – 2 Doses OR
 - Dexamethasone – 6 MG IM 12
Hourly – 4 Doses
 - Optimal effect – After 24
Hours of last dose.
 - **Therapeutic effect lasts for 7 days.**

Labour Room Optimal Care

- **Attended by-**

- an experienced & competent neonatologist,
fully prepared to resuscitate.**

- **Delay clamping of cord –**

- Improves iron store & decrease incidence
& severity of HMD.**

Labour Room optimal care

- Promptly dry , cover & warm.
- Resuscitation with T-piece resuscitator
- Elective intubation & prophylactic Surfactant administration – In ELBW
 - Early CPAP –if retraction
 - Rescue surfactant –in NICU
- VIT-K – 0.5 mg IM.

Transfer Criteria

- Babies < 1.8 kg. & < 35 Weeks GA
 - Transfer to – NICU/SNCU
 - Babies > 1.8 kg. & > 35 Weeks GA
 - If stable – Transfer to mother. -
- Have close supervision in PNW

Management in postnatal ward

- Babies between 1.8 KG. & 2.5 KG.
 - High risk infants & require more care.
 - Regular feeding – 2 Hourly.
 - Blood sugar monitoring.
 - Clothed and nursed under warmer if necessary (In winter).

Management of preterm babies requiring NICU Care

Monitoring

- By specially trained nurses-Best monitors
- Frequency depends on GA & clinical status.
- Multichannel vital sign monitor-

HR, RR, SPO₂, NIBP, ECG & TEMP.

Monitoring Contd.

- **TONE, ACTIVITY, CRY & REFLEXES.**
- **COLOUR – PINK , PALE, GREY, BLUE, YELLOW.**
- **BLOOD SUGAR – 4-6 HOURLY.**

Monitoring Contd.

TISSUE PERFUSION – ADEQUATE TP IS SUGGESTED BY

- PINK COLOUR
- CRT < 2 SEC
- WARM & PINK EXTREMITIES
- NORMAL BP
- UO - > 1.5 ML/KG/HOUR
- ABSENCE OF METABOLIC ACIDOSIS
- LACK OF DISPARITY BETWEEN PaO₂ &

SaO₂.

Monitoring Contd.

- FLUIDS, ELECTROLYTES (NA,K,CA) & ABG.
- TOLERANCE OF FEEDS – VOMITING ,
GASTRIC RESIDUALS, ABDOMINAL GIRTH.
- LOOK FOR RDS, APNOEA, SEPSIS, PDA,
NEC, IVH .
- WEIGHT GAIN VELOCITY – 10-15 GM/KG/DAY

Maintenance of Temperature

- Servo controlled radiant warmer or incubator.
- Application of oil or liquid paraffin.
- ELBW – Cover with a cellophane or thin transparent plastic sheet.

Maintenance of Temperature

- Stable baby – Cover with perspex shield or effectively clothed with a frock, cap, socks & mittens.
- After 1 week , stable babies of < 1200 gm – Incubator care .
- Encourage mother for kangaroo mother care (KMC).

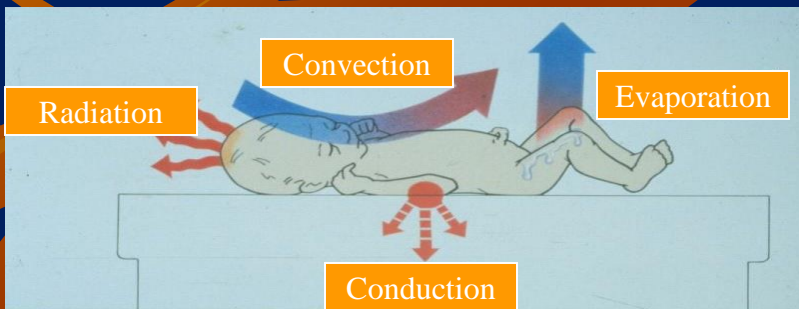
LBW: Keeping warm at home



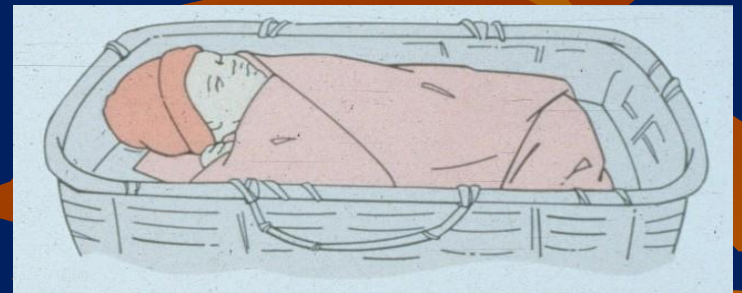
Skin-to-skin contact

| Birth weight (Kg) | Room temperature (°C) |
|-------------------|-----------------------|
| 1.0 – 1.5 | 34 – 35 |
| 1.5 – 2.0 | 32 – 34 |
| 2.0 – 2.5 | 30 – 32 |
| > 2.5 | 28 - 30 |

Warm room, fire or heater



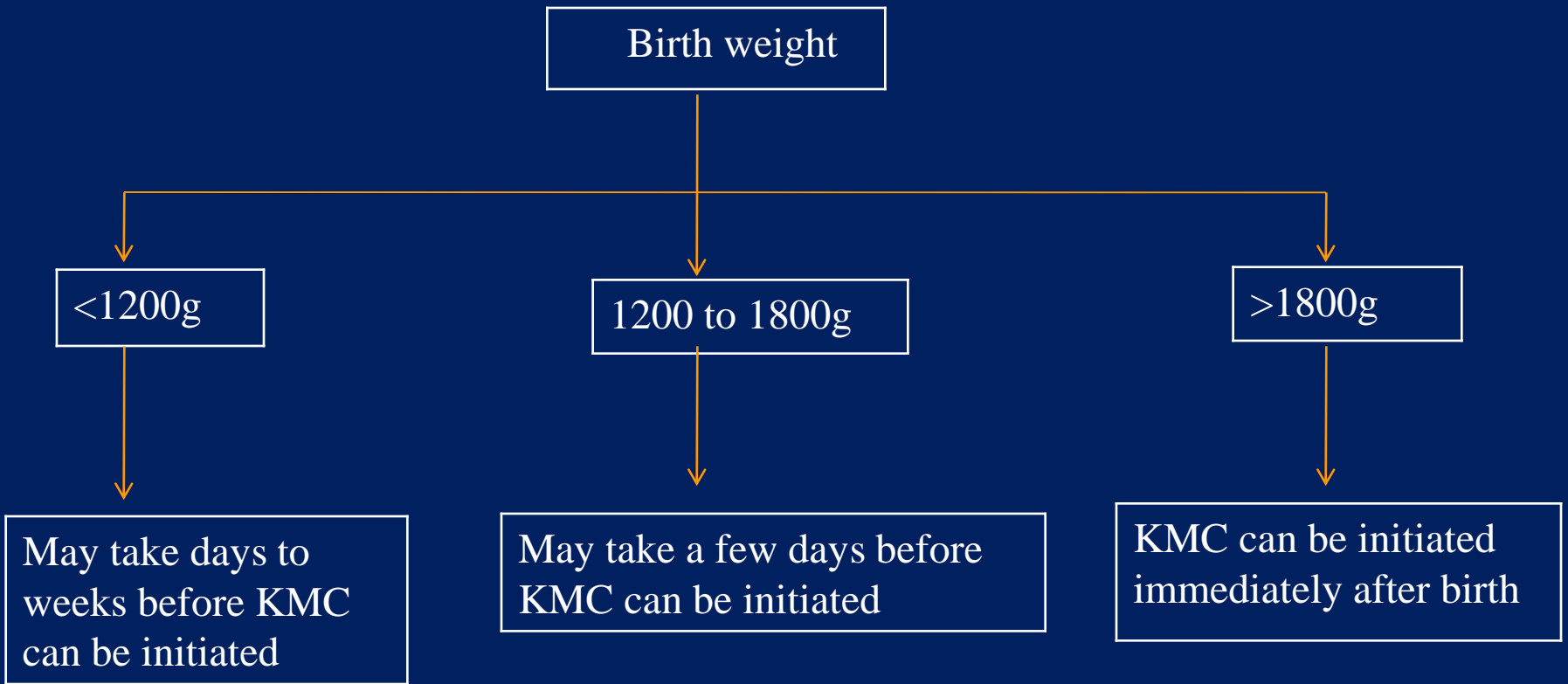
Prevent heat losses



Baby warmly wrapped



Kangaroo Care



LBW: Keeping warm at home

Well covered newborn







LBW: Keeping warm in hospital

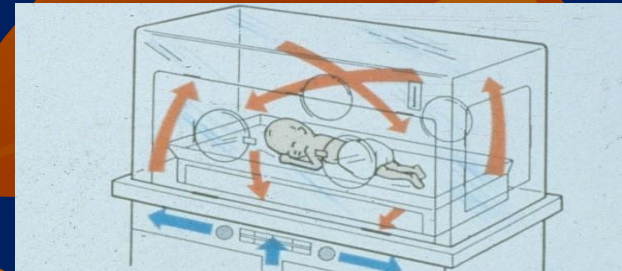
- Skin-to skin method
- Warm room, fire or electric heater
- Warmly wrapped



Radiant warmer



Heated water-filled mattress



Air-heated Incubator

Provide in – Uteromileus in NICU

- Create uterus like baby – Friendly ecology in nursery –
- Soft , comfortable , nested & cushioned bed.
- Avoid excessive light , sounds , handling & painful procedures.

- Provide warmth
- Ensure asepsis.
- Prevent evaporative skin losses
- Safe oxygenation.
- Early partial PN & trophic feeds with EBM.
 - Provide tactile & kinesthetic stimulation, interaction, music, caressing & cuddling.

Oxygen therapy

- With head box – When SpO_2 falls below 90%
- Lowest Fio_2 & flow rate used to maintain
– SpO_2 –90 to 94% & PaO_2 between 60-80 mm Hg.

Fluid requirement of neonates (ml / kg body weight)

Day of Life

Birth Weight

> 1500 gm

< 1500 gm

1

60

80

2

75

95

3

90

110

4

105

125

5

120

140

6

135

150

7

150

150

Fluid & Electrolyte

- All babies $>1000\text{gm}$ – 10% dextrose IV.
- ELBW($< 1000\text{ gm}$) – 5% dextrose IV.
80-100 ml/kg/day from day 1.

Achieving appropriate glucose infusion rates using a mixture of D10 & D25 (Babies > 1500 gm)

Glucose infusion Rate

| Volume (ml/kg/d) | 6 mg / kg / min | | 8 mg / kg / min | | 10 mg / kg / min | |
|------------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|---------------------------|
| | D 10 (ml/kg/d) | D 25 (ml/kg/d) | D 10 (ml/kg/d) | D 25 (ml/kg/d) | D 10 (ml/kg/d) | D 25 (ml/kg/d) |
| 60 | 42 | 18 | 24 | 36 | 5 | 55 |
| 75 | 68 | 7 | 49 | 26 | 30 | 45 |
| 90 | 90 | - | 74 | 16 | 55 | 35 |
| 105 | 85 | - | 99 | 6 | 80 | 25 |
| 120 | 100 | - | 120 | - | 97 | 18 |

GIR in MG/KG/MIN =

% Dextrose x ml/kg/day

144

Breast Feeding.....

- Is the best choice for LBW infants.

- Different from Breast Milk of a Term Infant in following areas :

 - # Breast milk of Pre-Term Infant has more Protein and less carbohydrate than that of a term infant.

 - # Proportion of MCT (medium chain triglyceride) is more in milk of Pre-term infant.

However, breast milk needs to be fortified, as it results in better catch up growth.

NNF Clinical Practice Guidelines For LBW Infant

Summary of Recommendations

- • **Mother's milk is the best feeding option for LBW infants. In case breastmilk feeding is not possible, it may be preferable to use pre-term infant formula for pre-term infants (< 2000 grams).**
- • **Routine use of the multicomponent fortification of the breastmilk should be avoided. This option is best reserved for preterms infants <32 weeks gestation or <1500 g birth weight who fail to gain weight despite adequate breastmilk feeding.**
- • **Enteral feeding should be initiated as early as clinically appropriate and minimal enteral nutrition should be provided, if volumes cannot be advanced.**

NNF Clinical Practice Guidelines , 2010

- • **LBW neonates can be successfully fed with intragastric tubes or a variety of other traditional/culturally accepted devices.**
- • **Non Nutritive Sucking and Kangaroo mother care are useful adjuncts to maintain and enhance breast feeding and nutrition.**
- • **All LBW infants who are exclusively breastfed should receive supplements of vitamin D, calcium and phosphorous. Iron supplementation at 2-3 mg/kg/day at 6-8 wks , and as early as 2 wks in <1500 gms is effective in preventing anemia of prematurity.**
- • **All LBW infants should be checked for weight (daily), head circumference (weekly) and length (weekly or fort-nightly) during their NICU stay.**

ESPGHAN Recommendation for Preterm Infants

| Min - Max | Per Kg / day | Per 100 Kcal |
|----------------------------------|---------------------------|--------------|
| Fluid mL | 135 - 200 | |
| Energy , Kcal | 110 - 135 | |
| Protein, g < 1 kg body weight | 4.0 – 4.5 | 3.6 – 4.1 |
| Protein, g 1- 1.8 kg body weight | 3.5 – 4.0 | 3.2 – 3.6 |
| Lipids ,g (of which MCT< 40 %) | 4.8 – 6.6 | 4.4 – 6.0 |
| Linolenic acid , mg | 385 - 1540 | 350 - 1400 |
| Alpha–linolenic acid ,mg | > 55 (0.9%of fatty acids) | > 50 |
| DHA ,mg | 12 - 30 | 11 - 27 |
| AA , mg | 18 - 42 | 16 - 39 |
| Carbohydrate , g | 11.6 – 13.2 | 10.5 - 12 |
| Sodium , mg | 69 - 115 | 63 - 105 |

ESPGHAN Recommendation for Preterm Infants

| Min - Max | Per Kg / day | Per 100 Kcal |
|----------------------|--------------|--------------|
| Potassium , mg | 66 - 132 | 60 - 120 |
| Chloride , mg | 105 - 177 | 95 - 161 |
| Calcium , mg | 120 -140 | 110 - 130 |
| Phosphate , mg | 60 - 90 | 55 - 80 |
| Magnesium , mg | 8 - 15 | 7.5 – 13.6 |
| Iron , mg | 2 - 3 | 1.8 – 2.7 |
| Zinc , mg | 1.1 – 2.0 | 1.0 – 1.8 |
| Copper , micro gm | 100 - 132 | 90 - 120 |
| Selenium , micro gm | 5 - 10 | 4.5 - 9 |
| Manganese , micro gm | < 27.5 | 6.3 - 25 |
| Fluoride , micro gm | 1.5 – 60 | 1.4 - 55 |

ESPGHAN Recommendation for Preterm Infants

| Min - Max | Per Kg / day | Per 100 Kcal |
|------------------------|--------------|--------------|
| Iodine , micro gm | 11 - 55 | 10 - 50 |
| Chromium , ng | 30 - 1230 | 27 - 1120 |
| Molybdenum , micro gm | 0.3 - 5 | 0.27 – 4.5 |
| Thiamin , micro gm | 140 - 300 | 125 - 275 |
| Riboflavin , micro gm | 200 - 400 | 180 - 365 |
| Niacin , micro gm | 380 - 5500 | 345 - 5000 |
| Pantothenic acid ,mg | 0.33 – 2.1 | 0.3 – 1.9 |
| Pyridoxine , micro gm | 45 - 300 | 41 - 273 |
| Cobalamin , micro gm | 0.1 – 0.77 | .08 – 0.7 |
| Folic acid , micro gm | 35 - 100 | 32 - 90 |
| L – ascorbic acid , mg | 11 - 46 | 10 - 42 |

ESPGHAN Recommendation for Preterm Infants

| Min - Max | Per Kg / day | Per 100 Kcal |
|-------------------------|--------------|--------------|
| Biotin , micro gm | 1.7 – 16.5 | 1.5 - 15 |
| Vitamin A , micro gm RE | 400 - 1000 | 360 - 740 |
| Vitamin D , IU / day | 800 - 1000 | |
| Vitamin E , mg | 2.2 - 11 | 2 - 10 |
| Vitamin K , micro gm | 4.4 – 28 | 4 - 25 |
| Nucleotides , mg | | < 5 |
| Choline , mg | 8 - 55 | 7 - 50 |
| Inositol , mg | 4.4 – 53 | 4 - 48 |

Guidelines for the modes of providing fluids and feeding

Age

Categories of neonates

| | < 1200 | 1200 – 1800 | >1800 |
|----------------------------------|---|-------------------|--|
| Birth weight (gm) | < 1200 | 1200 – 1800 | >1800 |
| Gestation (weeks) | < 30 | 30 - 34 | >34 |
| Initial | -IV fluids -Triage -Gavage feeds if not sick | Gavage feeds | -Breast feeds -If unsatisfactory , give cup – spoon feeds |
| After 1- 3 days | Gavage feeds | Cup – spoon feeds | Breast feeds |
| Later (1 – 3 wks) | Cup – spoon feeds | Breast feeds | Breast feeds |
| After some time (4 – 6 wks) | Breast feeds | Breast feeds | Breast feeds |

Feeding & Nutrition

- Trophic feeds with EBM – 1-2 ML 6 Hourly – Through OG Tube – To all babies irrespective of BWT & clinical condition.
- GA > 34 Weeks who are stable at birth – directly feed enterally ,initially through OG tube & then orally.
- TPN or partial parenteral nutrition in all ELBW-through UVC

Feeding & nutrition Contd.

GA < 32 Weeks & BWT < 1.5 KG :

- Preferably start on IVF
- Once CR status stable – assess for abdominal distension , bowel sounds , GI aspirates & bowel movement.

Feeding & nutrition Contd.

- If Abd soft , minimal aspirates , stool passed – start EBM 20 ml/kg/day and increase by 20-30 ml/kg/day.
- Depending on tolerance , reduce IV fluid accordingly.
- Remove feeding tube – once baby ready to feed orally.

Nutritional Supplement

- Babies < 1.5 kg. on full enteral feed – give HMF with EBM.
- HMF – Provides – Excess calories , some protein for catch up growth , calcium & phosphate to prevent osteopenia of prematurity & vitamins.

Nutritional Supplement Contd.

- **Babies > 1.5 kg. – Who do not receive HMF –**

Ca – 150-200 mg/kg/day.

Phosphate - 80-100 mg/kg/day, till term GA or 2.5 kg weight.

Nutritional Supplement Contd.

- **Multivitamins drops – containing folate , water soluble & fat soluble vitamins – start at 2 weeks age .**
- **Iron supplementation – 2-3mg/kg elemental iron should be started after 2 weeks once steady weight gain in baby.**
- **Vitamin -E - 15 IU/day.**

Gentle Rhythmic Stimulation

1. **Useful tactile stimuli** : Gentle touch , massage , cuddling , strocking & flexing – by nurse/mother.
2. **Vestibulo kinesthetic stimuli** : Rocking bed or placing preterm baby on inflated gloves rocked by a ventilator – prevents apnea.

Gentle Rhythmic Stimulation Contd.

- 3. Soothing auditory stimuli :** By taped heart beats , family voice or music – enhances weight gain .
- 4. Visual inputs:** Colored objects , diffuse light and Eye –to –Eye contact.

Prevention , Early Diagnosis & Prompt Management of Various Problems Anticipated in Preterm babies

- 1. Nosocomial Infections** – Hand Washing & High Index of Suspicion.
- 2. Hypothermia** – Thermoneutral environment.

3. RDS – Antenatal Steroids
- Surfactant

4. Aspiration – Trained Nurses.

5. PDA – Avoid Overinfusion.

Problems Anticipated in Premies

Contd.

6. Chronic Lung Disease

- Minimum air pressure at assisted ventilation .
- ELBW – Inj Vitamin -A – 5000 U IM 3 Inj in a week for 4 weeks reduce CLD by 10%.
- Corticosteroid – Avoided – Risk of Causing neuromuscular disability.

Problems Anticipated in Premies Contd.

7. NEC –

EBM,

Avoid Hyperosmolar feed ,

Trophic feeds ,

Avoid overinfusion.

Problems Anticipated in Premies

Contd.

8. Intraventricular haemorrhage

- Antenatal Steroid
- Avoid Rough Handling
- Avoid Excessive CPAP.
- Avoid Bolus adm. of SBC.
- Screening for IVH by USG on day 3 & day 7.

Problems Anticipated in Premies

Contd.

9. ROP :- Screen babies <1750gm & <34 wks GA

- Maintain PaO₂ below 90 mm Hg.
- Avoid Excessive Light & BT.
- Feeding Human Milk.

10. PVL :-

- Less than 1.5 kg. – Screen by USG on day 28 & again before DT for PVL.

Problems Anticipated in Premies Contd.

11. NHB :-

- Is Common
- Peaks on day 5, Rises above 15 mg/dl without any specific cause.
- Monitor--- SB, T/T with phototherapy / ET.

Guidelines for phototherapy and Exchange transfusion in Low birth weight infants

| Birth Weight (Gm) | Total Serum bilirubin (mg / dl) | |
|--------------------|----------------------------------|----------------------|
| | Phototherapy | Exchange Transfusion |
| 500 - 750 | 5 -8 | 12 - 15 |
| 750 - 1000 | 6 - 10 | >15 |
| 1000 – 1250 | 8 - 10 | 15 - 18 |
| 1250 - 1500 | 10 -12 | 17 - 20 |
| 1500 - 2500 | 15 - 18 | 20 - 25 |

Problems Anticipated in Premies

Contd.

12. Apnoea of Prematurity

- NB < 34 Weeks GA – CR Monitoring for at least 1 Week.
- TT with Aminophylline / Caffeine
- Give Aminophylline/Caffeine Till Corrected GA 34 Weeks or if Apnoea free for 1 week.
- CR Monitoring is stopped – Once NB is off Amminophylline/Caffeine & is Apnea free for at least 5 days.

Problems Anticipated in Premies

Contd.

13. Renal Dysfunction :-

- PTNB < 34 weeks GA – Have Tubular Dysfunction.

- Presents with ↓ Na or/& Metabolic Acidosis due to Excessive Loss of Na or/& HCO_3 .

- Monitor & Correct Deficiency if any.

Problems Anticipated in Premies

Contd.

14. Late Metabolic Acidosis

- Restrict Protein intake to
3 gm/day
- Avoid Formula Feeds.

Problems Anticipated in Premies

Contd.

15. Anemia of Prematurity

- Monitor HB.
- Prophylactic Iron & Oral Vitamin-E –
Once on Full Enteral Feed.
- Packed Cell Transfusion – If Indicated.

Immunization

- All Vaccines BCG, OPV & HB should be given at discharge.
 - HB at 2kg weight ?
 - BCG-at 1month of age
 - If mother is HBV carrier HB vaccination & HBIG within 72 hrs of age.
- DPT & HIB – At appropriate CA¬ Postconceptional age.

Follow Up Of LBW Babies

- Babies < 32 Weeks & < 1.5 kg.
 - R/O ROP- By indirect Ophthalmoscopy.
 - R/O PVL – By USG of Brain.
 - Hearing Test – At Corrected GA of Term by AOE & BERA

Follow Up Of LBW Babies Contd.

■ Babies > 34 Weeks & > 1.75 kg-

* If Ventilated/Oxygen therapy R/O
ROP,IVH/PVL

* Hearing Test – If NB Very sick &
Required Ototoxic Drug adm.

Survival

- Depends on
 - GA
 - Weight at Birth &
- Varies from one Centre to another depending on the Level of skill & care offered to the baby at NICU stay.

Long Term Outcome Of Premature Babies

- Cerebral Palsy, Seizure.
- Eyes – ROP, Visual Impairment, Strabismus.
- Hearing Loss.

Long Term Outcome Of Premies Contd.

- Minimal Brain Dysfunction, Language Disorders, Learning Disability & Behaviour Disorders.
- Poor Physical Growth.
- Chronic Lung Disease.
- Increased Postnatal Illness & Re-Hospitalization.



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