

Early Hypoglycaemia (First 72 hours of life)

REPUBLIC OF KENYA



MINISTRY OF HEALTH



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KENYA
PAEDIATRIC
ASSOCIATION

KEMRI | Wellcome Trust



Keprecon
Kenya Paediatric Research Consortium

Objectives

- Define hypoglycaemia
- Define high risk patients
- Discuss the prevention, early diagnosis and prompt treatment of hypoglycemia

Introduction



Why do we worry about hypoglycaemia?

- Associated with;
 - Increased mortality
 - Convulsions
 - Permanent brain injury
- The duration and number of hypoglycaemic episodes are associated with poor neurological outcomes
- Some neonates are at high risk and they need to be recognized early

Neonatal Risk factors for hypoglycaemia



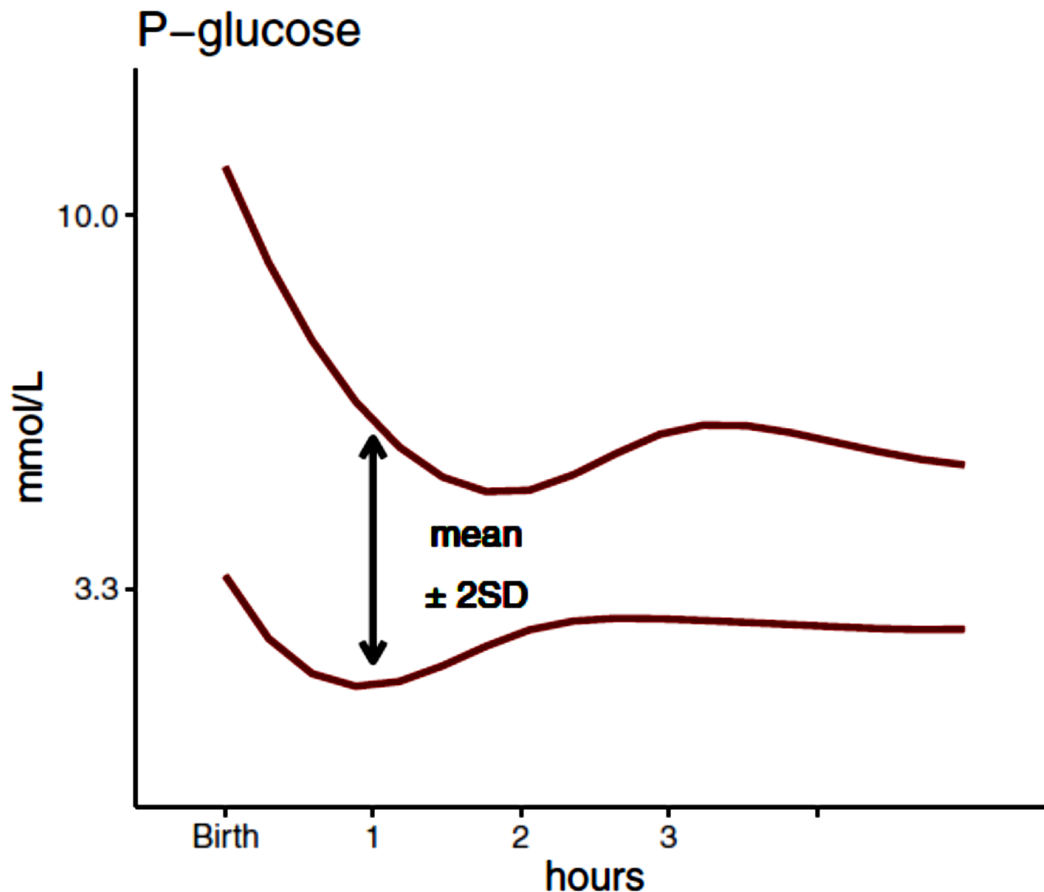
- Prematurity <37wks
- SGA & IUGR
- Perinatal asphyxia
- Infection
- Congenital heart disease
- Cesarean delivery
- Delayed start of breastfeeding
- Infant of diabetic mother

Maternal Risk factors for hypoglycaemia



- Maternal diabetes or obesity
- Iatrogenic factors e.g.
- Glucose infusions during labor/B agonists (salbutamol) used to suppress preterm labor
- Family history of early onset DM
- Sibling with history of sudden seizure/ collapse

Postnatal Plasma glucose levels



Fetal blood glucose

0.5 mmol/l lower than maternal level

At 1 hr postnatal

In a well term neonate
1.4–1.7 mmol/L

At 2 hrs

Steadily rises to 3-
3.3mmol/l and continues
to rise to maintain plasma
glucose of 3.9-5.9mmol/l

Target blood glucose levels of neonates at risk at varying postnatal age

Postnatal age

Target blood sugar

0- <3hrs

1.4mmol/l

3 – 72 hours

≥ 2.6 mmol/L

> 72 hours

≥ 3.3 mmol/L

Signs and symptoms of hypoglycemia

Mild – Moderate

- **CNS** – Jitteriness, Irritability, High pitched cry, Lethargy, Hypotonia, Tremors, Hypothermia
- **CVS** – Tachycardia, Sweating
- **Respiratory** - Tachypnoea
- **GIT** - Poor Feeding, Vomiting

Severe

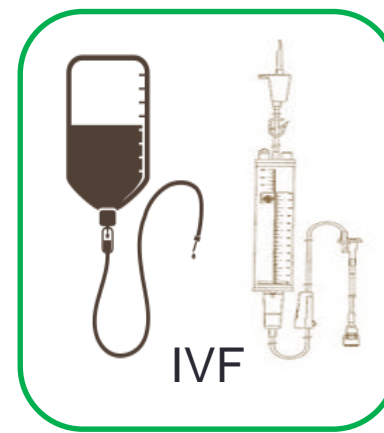
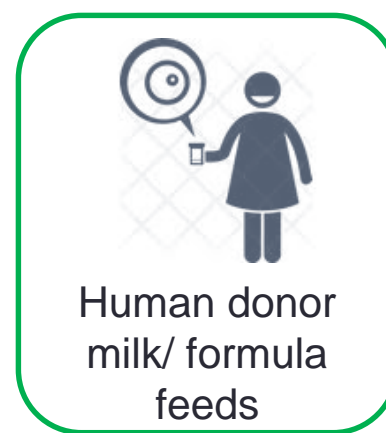
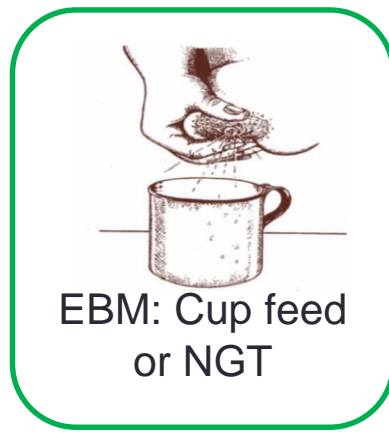
- **CNS** – Seizures, Coma, Sudden Death
- **CVS** – Pallor, Circulatory Collapse
- **Respiratory** – Apnea, Cyanosis

Prevention of hypoglycemia



Prevention of hypoglycemia

1. Breastfeeding immediately after birth
2. Neonates of mothers not available and for the unstable babies - to give breastmilk should receive supplementary feeding **NO LATER than ONE HOUR after birth**



Prevention of hypoglycemia

3. Maintain skin to skin contact
4. Keep warm – prevent hypothermia
5. Postpone the first bath by 6hrs and if acceptable up to 24 hours
6. After first feed, babies breastfed as per infants hunger cues/signal and at least every 2-3hrs

Monitor high risk infants for hypoglycaemia

- Blood glucose should be measured at **2 hrs of age in all high risk** (NOT later than 3hrs after birth)
- Measure blood sugar in all **severely ill newborns at the point which diagnosis** of 'sick neonate' is made
- Measure blood sugar **immediately in neonates with the signs/symptoms** associated with hypoglycaemia

Prevention of hypoglycemia

All well and not at risk neonates

All high risk neonates at birth

All sick neonates

BG at 2hrs of age

Immediate BG

No Hypoglycaemia
BG \geq 2.6mmol/l

1. Keep warm.
2. Skin to skin contact
3. If able to BF, feed as per the cues, if not NGT or IVF continue feeding as per guidelines

Treatment of hypoglycemia



Treating hypoglycaemia – Simplified

| | |
|---|--|
| Symptomatic hypoglycaemia | Treat with iv 10% dextrose 2mls/kg then IV 10% Dextrose infusion Change to EBM when possible |
| Blood sugar below 1.8mmol | Treat with iv 10% dextrose 2mls/kg then IV 10% Dextrose infusion Change to EBM when possible |
| Asymptomatic blood sugar 1.8 - 2.5mmol/l | Immediate NGT feed with EBM |

Give buccal 0.4ml/kg of 50% as you prepare the IV dextrose/EBM

Why don't we give IV dextrose for those asymptomatic patients glucose levels 1.8 mmol/L and 2.5 mmol/L

- Lack of evidence for adverse effects of glucose levels between 1.8 mmol/L and 2.5 mmol/L in asymptomatic infants at several hours of age
- No one form of supplementation shown to be superior over the other (breastfeeding, buccal glucose or IV dextrose).



- A staged approach to screening and intervention is reasonable



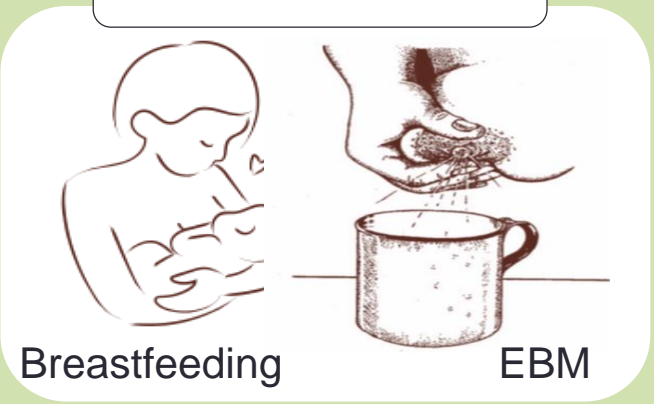
- Reasonable to continue feeding at-risk infants at regular intervals, while screening before feeds.



- Levels should be rechecked after 30 mins to identify persistent hypoglycemia

Why is breastmilk the preferred option?

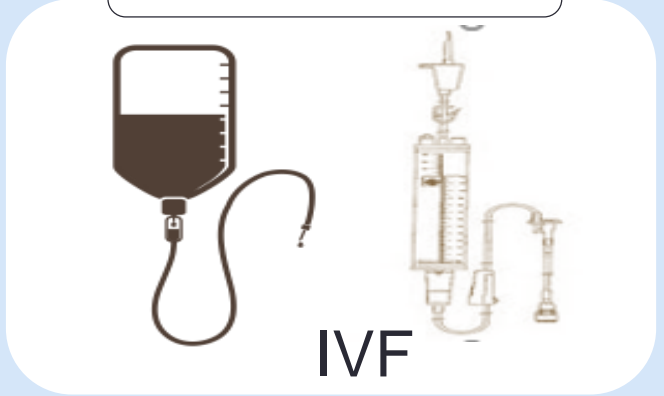
Breastmilk



- Breastmilk contains 67 kcal / 100ml

Contains almost X2 energy as compared to 10% dextrose

10% Dextrose



- Dextrose 10% (10g of glucose/100mls) contains 34kcal/100mls

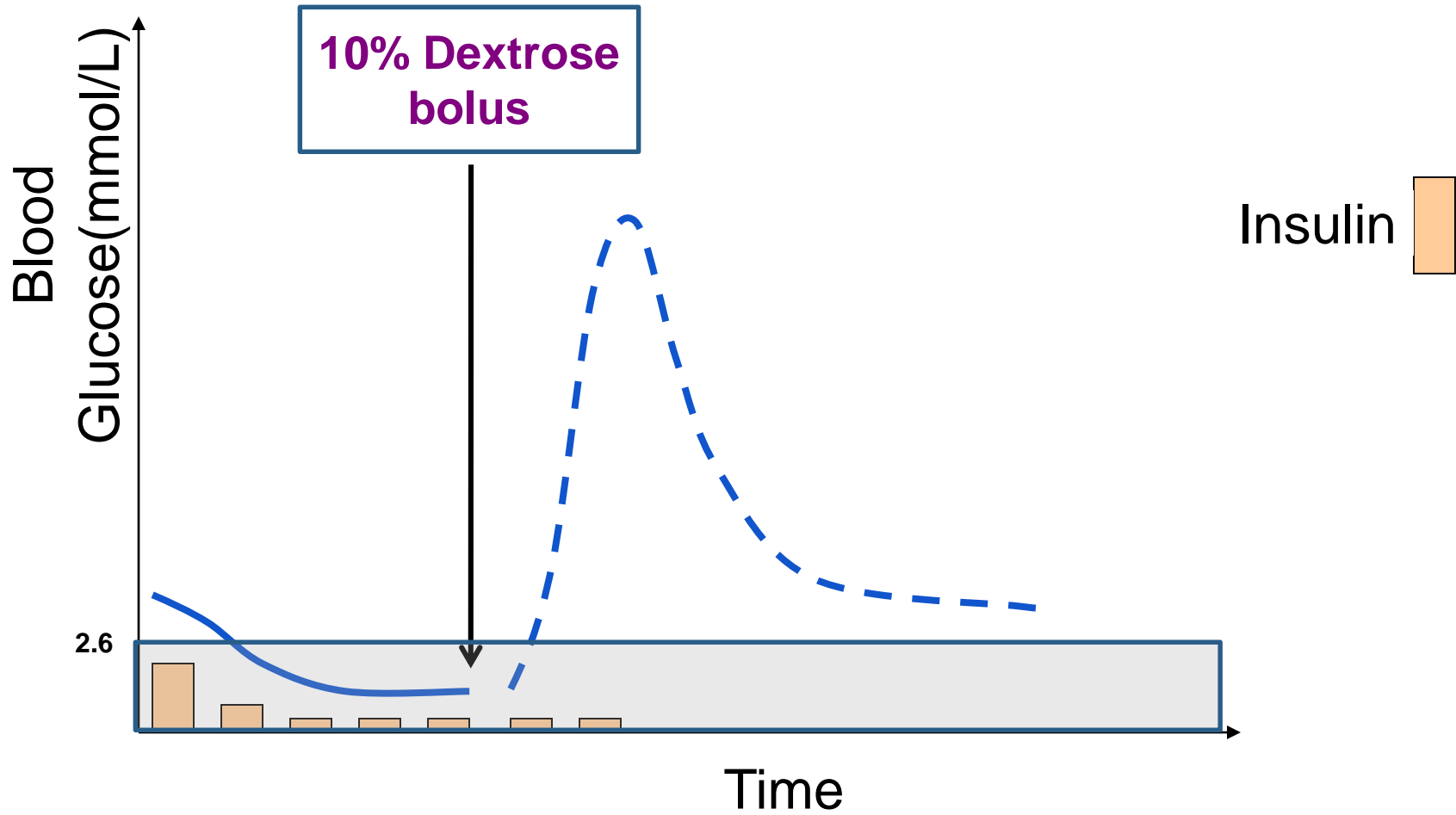
Correction of symptomatic hypoglycemia or blood sugar <1.8mmol/l

- Give 'mini-bolus' of 10% dextrose 2mls/kg given over 3 mins. *Use 0.4ml/kg of 50% glucose solution if available as you prepare to fix the IV line*
- Then immediately continue with the daily maintenance fluid (*Day 1 – 10% Dextrose, Day 2 onwards – Neonatal IV Fluid i.e. Dextrose with electrolytes*)
- If baby is able to take EBM via cup or NGT/OGT, wean off the IVF as you increase the EBM
- Repeat blood sugar after 30minutes (after the bolus) then 3hourly. **Target blood sugar $\geq 2.6\text{mmol/l}$**

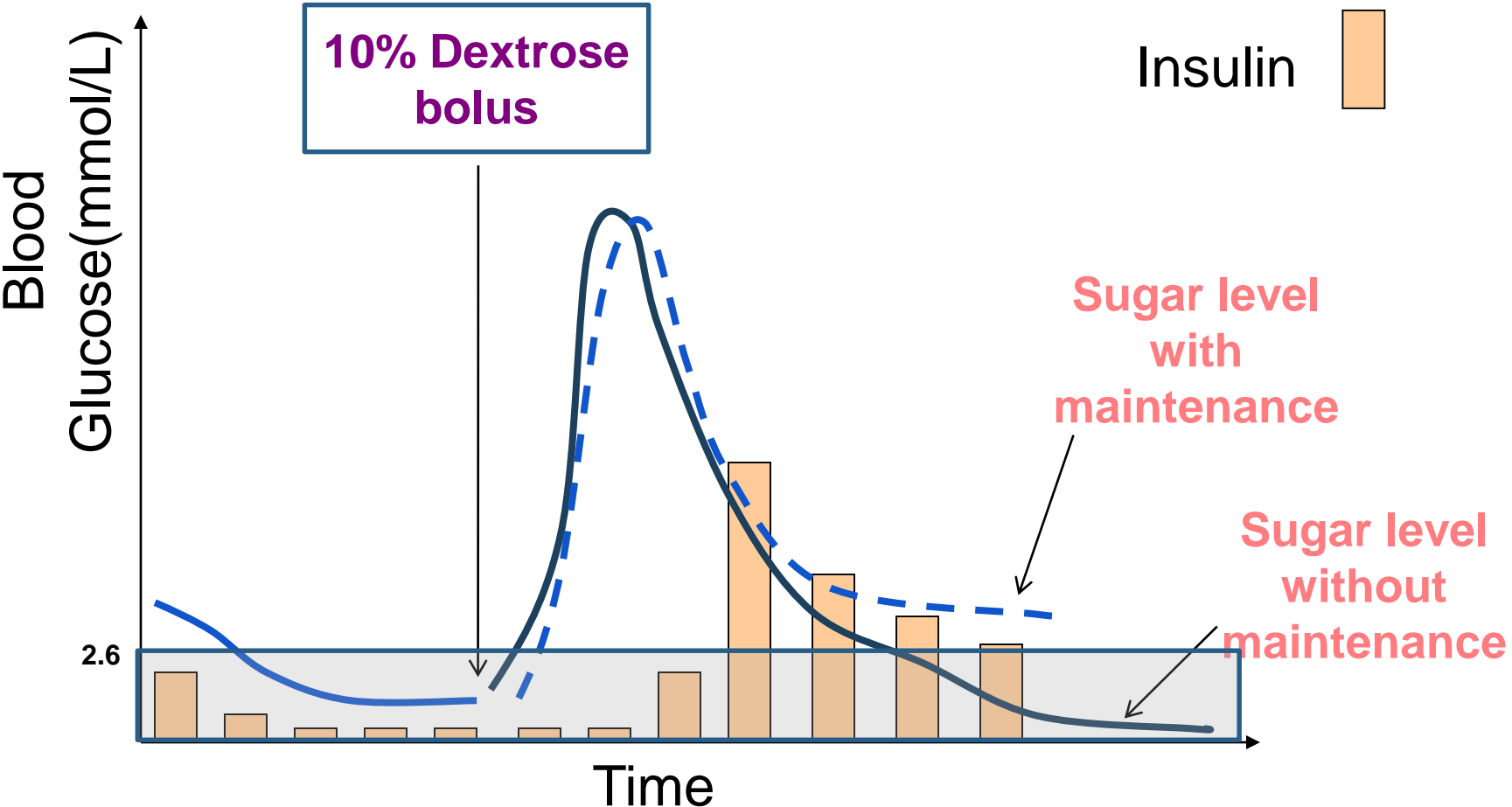
Treatment of asymptomatic

- Use 0.4ml/kg of 50% glucose solution as you prepare to obtain EBM and to fix the NGT
- Give EBM the required 3 hourly feed immediately
- Do blood sugar 1-2hrs.
- If still below 2.6mmol/l repeat the 0.4ml/kg of 50% glucose
- Ensure 3 hourly EBM (correct volume should be given). Do a blood sugar prior to each feed until **3 NORMAL readings** are obtained.
- Ensure neonate is kept warm.
- If blood sugar remains low despite adequate feeds then use IVF as for the symptomatic neonate

What happens after a dextrose bolus?



Rebound hypoglycaemia



A plan must be made for continuous glucose supply after a bolus

Management of hypoglycemia

Do blood glucose for all high risk neonates and all sick neonates

Hypoglycemia Blood Sugar $\leq 2.5\text{mmol/l}$

Asymptomatic

Symptomatic OR BG $< 1.8\text{mmol/l}$



0.4ml/kg 50% oral glucose & NGT

0.4ml/kg 50% oral glucose & IV line

Immediate EBM via NGT at 3hrly feed volume and CT regular 3hrly feeds

10% Dextrose 2ml/kg mini-bolus over 3mins & immediate maintenance IVF. Start EBM as tolerated



BG after 1-2hrs then prior to the 3hrly feed

BG after 30minutes after the mini-bolus then 3hrly



If BG remains low



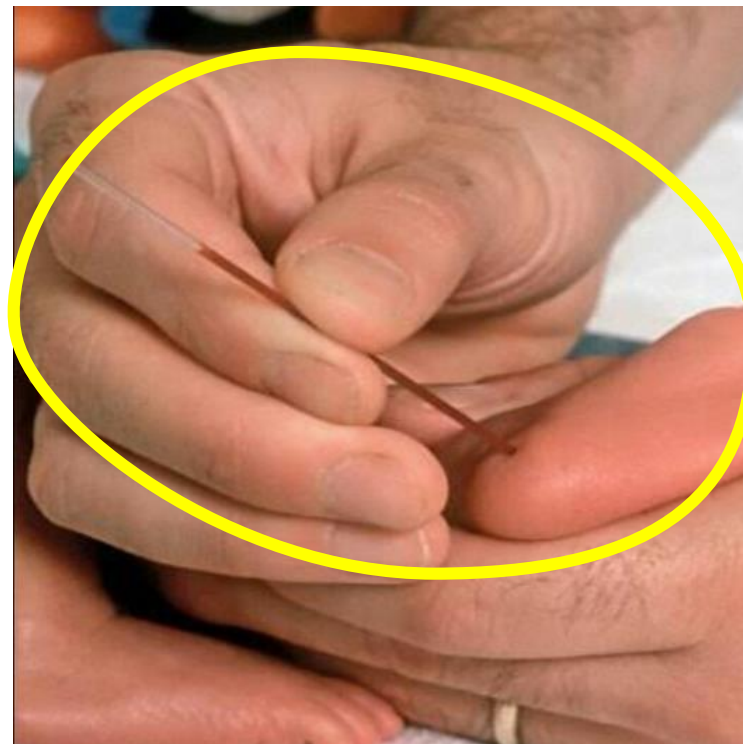
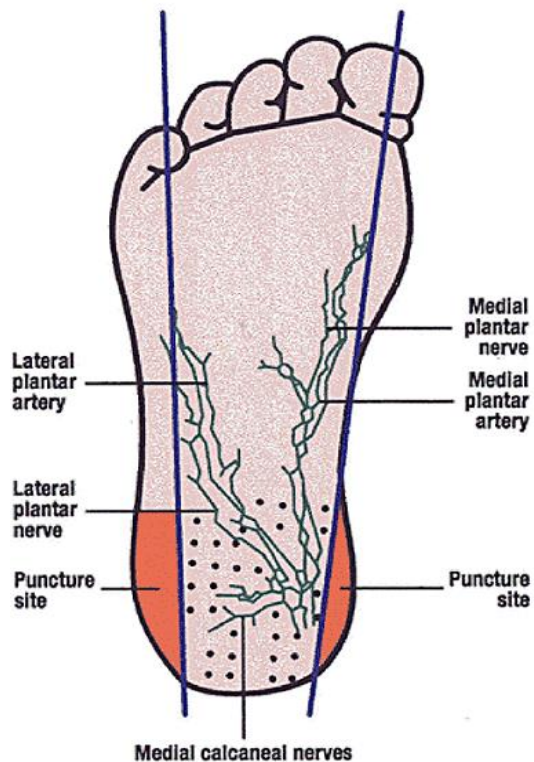
Administering Buccal glucose & Performing a heel prick

The Heel Prick

Goal: To obtain blood for random blood sugar analysis

1. Observe hand hygiene
2. Manage pain – breastfeeding 2min before, during and after
3. Clean site with 70% alcohol; allow to dry for 30sec
4. Prick the heel with a disposable lancet to a depth of not more than 1mm
5. Wipe off the first drop and allow a large drop to collect.
6. Collect large drop using a capillary tube and place on point of diagnostic strip
7. Apply pressure on the site pricked to stop the bleeding.

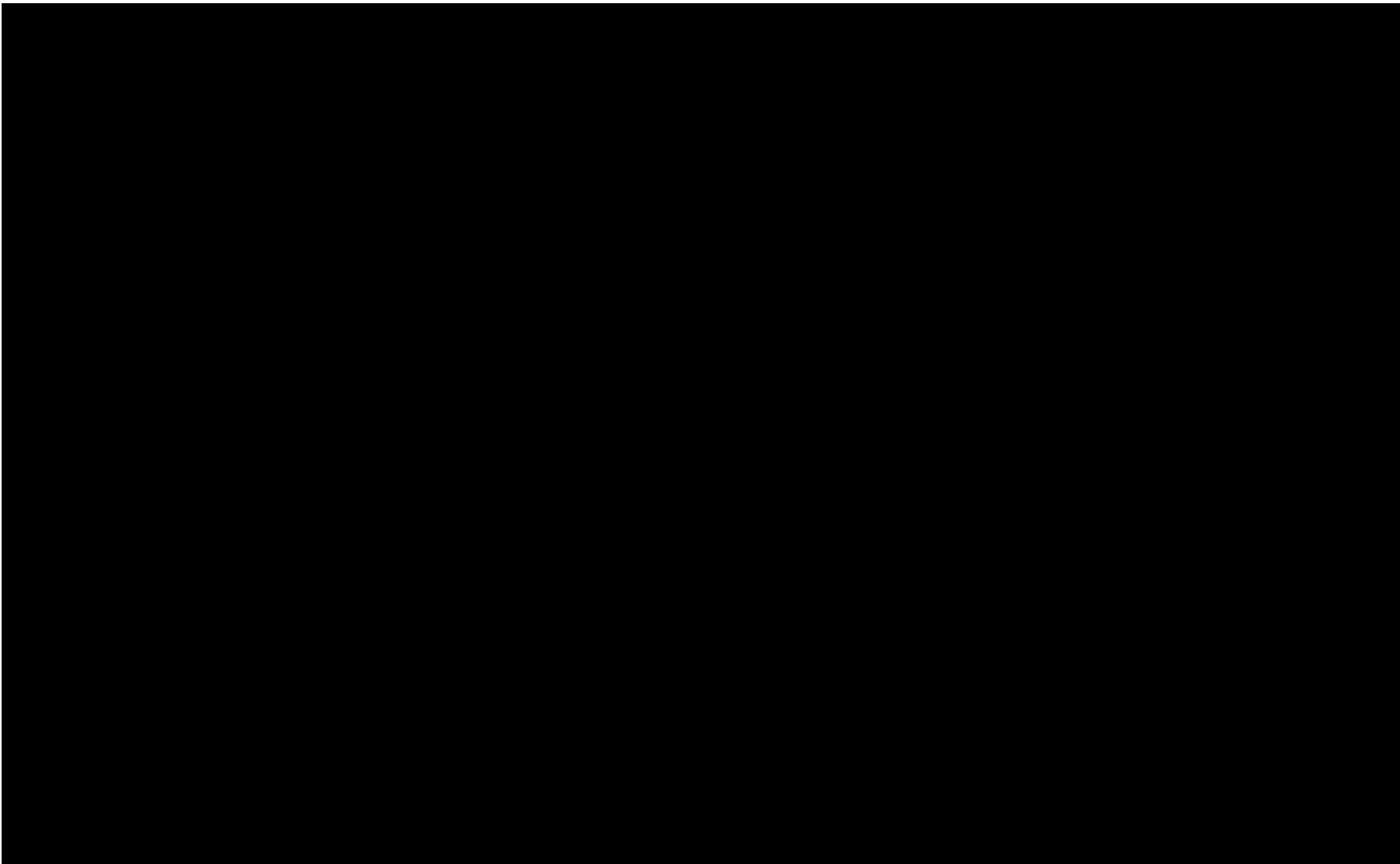
The Heel Prick



Preferred site for heel prick

- The lateral or medial side of the heel.
- At these point the bone is further away from the outer surface compared to the toe or posterior heel.
- Do not use toes or fingers

Taking a heel blood sample



Administering the buccal glucose

1. Perform hand hygiene
2. Wear clean gloves
3. Prepare the 0.4mls/kg of 50% glucose in a syringe
4. Dry the baby's gums and buccal surface using a gauze.
5. Apply a small amount of the prepared 50% glucose on one of your gloved finger
6. Gently apply and massage the 50% glucose into the baby's left gum and buccal mucosa. Avoid squeezing the dextrose into the mouth
7. Repeat the same procedure on the right gum and buccal mucosa and vice versa until all the dextrose prepared is over.
8. Continue exploring other available means of correcting hypoglycemia.



Monitoring newborns at risk of hypoglycemia



Monitoring

[HOSPITAL NAME]

NEONATAL MONITORING CHART + CPAP

Version 2.5

| | | | | | | | | | |
|--|-------------------------------------|---|--|---|--|-------|--|---------------------|--|
| Name | | IP NO | | Sex M <input type="checkbox"/> F <input type="checkbox"/> | | D.O.A | | D.O.B | |
| Date today | | Diagnosis | | | | | | | |
| Birth Wt gm | | Interventions: CPAP <input type="checkbox"/> Oxygen <input type="checkbox"/> Phototherapy <input type="checkbox"/> Blood tranfusion <input type="checkbox"/> Exchange transfusion <input type="checkbox"/> KMC <input type="checkbox"/> | | | | | | | |
| Daily Clinician Feed and Fluid prescription | | Monitoring Freq ___ hrs Time | | | | | | | |
| Day of Life | Current Wt = gm | Vitals | Temp (°C) | | | | | | |
| Total input(feed and fluid) 24hrs = ml | | | Pulse (b/min) | | | | | | |
| Feed: BF <input type="checkbox"/> EBM <input type="checkbox"/> Term Formula <input type="checkbox"/> Pre-Term Formula <input type="checkbox"/> | | | Resp Rate (b/min) | | | | | | |
| Route: Cup <input type="checkbox"/> NGT <input type="checkbox"/> OGT <input type="checkbox"/> | | | Oxy Sat (%) or Cy ⁰ Cy ⁺ | | | | | | |
| Volume & Frequency = ___ ml 3hrly <input type="checkbox"/> 2hrly <input type="checkbox"/> | | Assessment | Resp Distress 0,+,+++ | | | | | | |
| Total 24hr Volume = ___ ml | | | CPAP Pressure (cm H ₂ O) | | | | | | |
| IV Fluid & Additives | | | FiO ₂ (%) | | | | | | |
| Vol (ml) | Duration | | Jaundice 0,+,+++ | | | | | | |
| Other prescribing instructions | | Feed | Apnoea Y/N | | | | | | |
| Clinician's name | | | Time: | Blood Sugar (mmol/l) | | | | | |
| Daily IV Fluid Nursing plan | | | Breastfeeding sufficient Y/N | Completed by (name) | | | | | |
| Start time: | Hourly rate= ___ ml (___ drops/min) | | EBM vol given (ml) | | | | | | |
| Planned vol = ___ ml in ___ hrs | | 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 | | Total feed+fluid in this shift ___ ml | | | | | | Completed by (name) | |
| Category: A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> | | | | | | | | | |
| Afternoon shift notes | | Total feed+fluid in this shift ___ ml | | | | | | Completed by (name) | |
| Category: A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> | | | | | | | | | |
| Night shift notes | | Total feed+fluid in this shift ___ ml | | | | | | Completed by (name) | |
| Category: A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> | | Total feed+fluid in 24hrs ___ ml | | | | | | | |
| | | Deficit ___ ml | | | | | | | |

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

1. Apply measures to prevent hypoglycemia
2. Recognize the neonates at risk of hypoglycemia
3. Check glucose - heel prick at the correct site
 - Immediate BG in all seriously ill neonates
 - All neonates at risk at 2hrs of age
 - Regularly during treatment
4. Use 10% dextrose/EBM for treatment depending on severity. Show mums how to express breastmilk
5. Provide maintenance IVF with glucose or feed