

# Newborn hypoglycaemia

Clinical Guideline Presentation v6



45 minutes

Towards CPD Hours

**References:**

Queensland Clinical Guideline: Newborn hypoglycaemia is the primary reference for this package.

**Recommended citation:**

Queensland Clinical Guidelines. Newborn hypoglycaemia clinical guideline education presentation E23.8-1-V6-R28. Queensland Health. 2023.

**Disclaimer:**

This presentation is an implementation tool and should be used in conjunction with the published guideline. This information does not supersede or replace the guideline. Consult the guideline for further information and references.

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# Learning outcomes

The participant will be able to outline:

- Risk factors for newborn hypoglycaemia
- How hypoglycaemia is defined
- Preventative care for the baby at risk
- Management of newborn hypoglycaemia
- Discharge planning

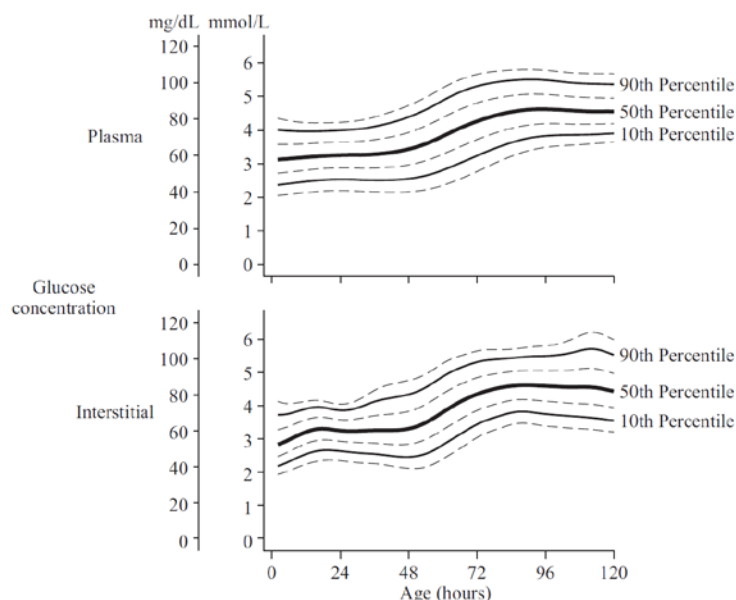


# Abbreviations

BGL	Blood glucose level
EBM	Expressed breast milk
FGR	Fetal growth restriction
IV	Intravenous
LGA	Large for gestational age
PICC	Peripherally inserted central catheter
SGA	Small for gestational age
UVC	Umbilical vein catheter
<	Less than
>	Greater than
≥	Greater than or equal to

# Physiology

- Glucose is the primary energy source for the newborn brain
- After birth there is a gradual rise in BGL



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Harris DL, Weston PJ, Gamble GD, Harding JE. Glucose profiles in healthy term infants in the first 5 days: the glucose in well babies (GLOW) study. *Journal of Pediatrics*. 2020 Aug;223:34-41.e4. doi: 10.1016/j.jpeds.2020.02.079. Epub 2020 May 4. PMID: 32381469

# Definitions and BGL targets

Hours of age	Target BGL (mmol/L)
0 - 48 hours	2.6 or more
After 48 hours to 96 hours	3.0 or more
After 96 hours	3.5 or more

Hypoglycaemia term	Definition
Hypoglycaemia	BGL less than target
Prolonged	Lasts more than 48 hours
Recurrent	More than 3 sequential episodes less than target
Severe	Less than 1.5 mmol/L or symptomatic
Critical	<ul style="list-style-type: none"><li>• Symptomatic (irrespective of BGL)</li><li>• Severe, recurrent or prolonged</li><li>• Unresponsive to other treatment</li><li>• Circumstances of concern present</li></ul>

# Maternal risk factors

- **Medications:** beta blockers and agonists, insulin, oral hypoglycaemics, betamethasone
- **Diabetes:** poorly controlled of any type
- **Family history:** genetic hypoglycaemia or congenital hyperinsulinaemia
- **Intrapartum glucose** > 20 g/hour IV
- **Maternal conditions:** (e.g. pre-eclampsia, eclampsia, hypertension)

# Baby risk factors

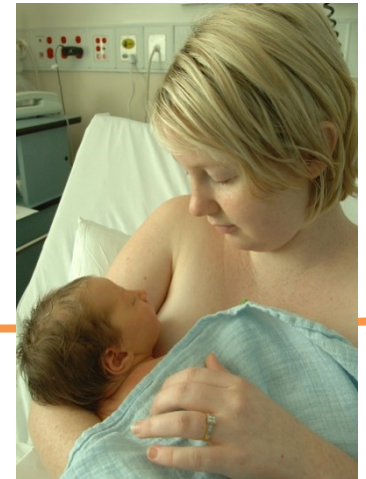
- Increased glucose requirements (e.g. cold stress, birth asphyxia, infection, congenital heart disease, respiratory disease)
  - FGR; preterm; LGA; SGA
  - Delayed/inadequate feeding
  - IV therapy—abrupt cessation or infiltration
  - Polycythaemia/hyperviscosity
- Seizures
  - Increased levels of insulin
  - Congenital anomalies
  - Inborn errors of metabolism
  - Hypothyroidism
  - Meconium aspiration syndrome
  - Endocrine disorders (e.g. congenital adrenal hyperplasia)





# Risk minimisation

- Keep baby warm
- Promote skin-to-skin contact
- Feed within one hour of birth
- If enteral feeding not possible or contra-indicated
  - IV glucose 10% at 60 mL/kg/day



# Assessment

- Review maternal history
- Perform physical assessment
  - Identify if FGR, SGA, LGA or associated signs (e.g. micropenis, syndromes)
- Maintain high level of suspicion for clinical signs of hypoglycaemia



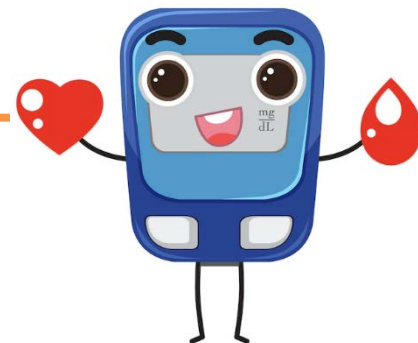
# Prophylactic glucose gel 40%

- Consider for babies with risk factors
- BGL not required prior to or after administration
- Administer at one hour of age
- Follow with feed (does not preclude breastfeeding attempts prior)
- Can give treatment doses subsequently

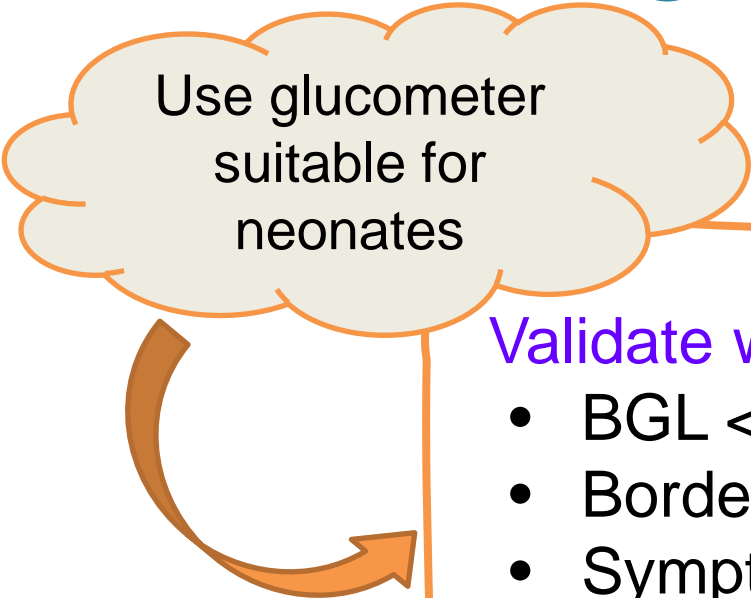
# Screening

If risk factors identified, BGL screening:

- Before second feed
  - No more than 3 hours of age
- Before third feed
  - No more than 6 hours of age
- Then if normal, every 3–6 hours



# BGL screening



Use glucometer  
suitable for  
neonates

## Validate with diagnostic test if:

- BGL < 2.6 mmol/L
- Borderline result in baby with risk factors
- Symptomatic hypoglycaemia

## Diagnostic test

- Point of care enzymatic device
- Blood gas analyser
- Laboratory specimen

# Clinical signs

## Neurogenic

- Jitteriness or persistent tremor
- Irregular or rapid breathing
- Sweating, irritability, pallor

## Neuroglycopenic

- Poor feeding, lethargy, apathy
- Abnormal cry—weak/high pitched
- Hypotonia, seizures, stupor, coma

## Other

- Apnoea
- Bradycardia
- Cyanosis
- Tachypnoea
- Hypothermia
- Cyanosis



# Glucose gel 40% treatment

Glucose gel for neonatal use is supplied as Glucose<sup>®</sup> 15 g glucose in 37.5 g tube

## Criteria for administration

- 35+0 weeks or more
- < 48 hours of age
- Feeding orally
- Asymptomatic and well
- History of glucose gel is:
  - $\leq 2$  doses in last 24 hours
  - $\leq 5$  total doses given
  - $\leq 2$  consecutive doses

## Dose

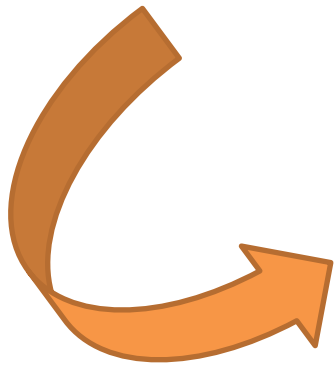
- 0.5 mL/kg (200 mg/kg)

## Administration

- Dry buccal mucosa with gauze
- Rub gel into buccal mucosa
- Feed baby immediately

# Well, hypoglycaemic baby

If BGL 1.5–2.5 mmol/L and  
Baby meets criteria for glucose gel 40%



- Give glucose gel 40% 0.5 mL/kg
- Follow with feed
- Repeat BGL 30 minutes after glucose gel 40%



# Critical hypoglycaemia

**Urgent**—do not delay treatment

- Validate screening BGL with diagnostic test
- Collect diagnostic blood and urine samples
- 10% glucose IV (+/- bolus dose 1–2 mL/kg)
- Glucagon if IV glucose delayed more than 15 minutes
- Continue feeds if able—include formula in total fluid volume

# Escalation (first 48 hours)

- Criteria to escalate:
  - BGL remains less than 2.6 mmol/L
  - Baby unwell or feeding poorly
- Admit to neonatal unit if :
  - BGL less than 2.6 mmol/L after 2 doses of glucose gel and EBM or formula feed
  - BGL less than 1.5 mmol/L at any time
  - Baby becomes unwell or feeds poorly

# Diagnostic samples

Take blood samples immediately **before** treatment **during** hypoglycaemic episode

## Blood

- Insulin, cortisol, growth hormone, adrenocorticotrophic hormone
- Ketones (beta hydroxybutyric acid)
- Free fatty acids
- Acyl-carnitine profile
- Blood gas, electrolytes, glucose, haemoglobin, haematocrit, lactate



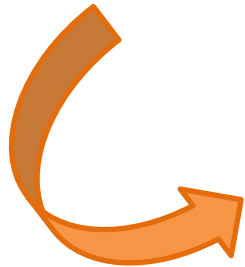
## Urine (metabolic screen)

- First sample after hypoglycaemic episode
- Treatment may be started



# IV therapy

- Indicated if BGL < 1.5 mmol/L (or unrecordable)
- Use UVC/PICC if > than 12% glucose



- Increase volume, THEN concentration for immediate effect
- Commence glucose 10% at 60 mL/kg (4.2 mg/kg/minute)
- Give bolus 1–2 mL/kg and increase infusion rate

# Weaning glucose infusion

General principles (in order):

- Reduce glucose infusion to 8 mg/kg/minute
- Wean glucose infusion and increase feeds
- Wean glucagon (if used)
- Wean hydrocortisone (if used)

# Medications

## Indication

- BGL not normalised after 40% glucose gel or IV glucose

## Short term

- Glucagon—effective for babies of mother with diabetes or other hyperinsulinaemic condition
- Hydrocortisone—increases glucogenesis

## Long term

- Diazoxide (with hydrochlorothiazide)—for persistent hypoglycaemia
- Octreotide—inhibits insulin

# Discharge

## Criteria

Pre-prandial BGL for 3 feed-fast cycles

- Baby < 48 hours of age: > 2.6 mmol/L
- Baby >48 hours of age: > 4 mmol/L



## Follow up

- GP and child health nurse
- If severe, symptomatic, recurrent, atypical—specialist follow up

**Consider  
6 hour fast test**

## Educate parents about

- Causes, risks, potential sequelae, management
- Escalation signs and plans

**Offer parent information**


## Reduce risk in next pregnancies

- Maternal lifestyle
- Genetic counselling
- Diabetes management

# Six hour fast test

- Identifies baby requiring additional investigations or management
- Consider history of hypoglycaemia (onset, duration, treatment required)
- Refer to guideline for full list of indications

Check BGL at 4, 5 and 6 hours post feed (skip one feed)—omit further feeds during test



- If BGL < 3 mmol/L or baby symptomatic:
  - Perform investigations and then feed
- If BGL ≥ 3 mmol/L:
  - Finish test and feed