

Unexplained Paediatric Hypoglycaemia

Key Points

- Clinical hypoglycaemia is defined as blood glucose (BG) concentration low enough to cause symptoms and/or signs of impaired brain function.
- Treat **symptomatic** hypoglycaemia with BG <3.0mmol/l.
- Treat all patients with BG < 2.6mmol/l.
- **If the patient's history does not adequately explain a BG <2.6mmol/L, prompt investigation and treatment is required in all ages with ongoing referral to Paediatrics.**
 For example, 1 or 2 vomits in a normally well child does not adequately explain a symptomatic BG <2.6.
- Measuring **ketones at time of hypoglycaemia** is vital to determining underlying diagnosis and further investigations (e.g., low or absent ketones usually indicates hyperinsulinism with the exception of fatty-acid oxidation defects and defects of ketone metabolism)
- Measure BM post-treatment at 10–15-minute intervals until CBG is stable >3mmol/L

Version: 1.0
Date Issued: 12 November 2024
Review Date: August 2027
Key words: Paediatric hypoglycaemia

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ABC	Airway, Breathing, Circulation
CBG	Capillary Blood Glucose
Hx/lx	History/Investigations

Abbreviations

Purpose/Importance of Guideline

- Early identification and treatment of unexplained hypoglycaemia.
- Initiate appropriate investigations for **unexplained hypoglycaemia <2.6mmol/L in all ages** to identify potential cause e.g., undiagnosed metabolic/endocrine conditions.
- Arrange appropriate observation period and initiate steps for follow-up and future management plan.

Hypoglycaemia Flowchart

Hypoglycaemia **BG <2.6 mmol/l**



Assess and stabilise **ABC**

Establish good venous access and take bloods **at time of hypoglycaemia** for hypo screen (see box 1 or list printed in hypo screen bag in ED trolley)
Ketone levels are key to considering the underlying diagnosis.
Ensure lab glucose sent to confirm hypoglycaemia
 Attach urine bag on arrival/collect first **urine** in department (see Box 1)

***Please order using on-call Paediatric consultant name on EPIC**



TREATMENT
 (Hypo box available in ED)

No IV access

Child able to swallow	Child NOT able to swallow
<1 yr – Give 40% glucogel >1 year – Give oral hypoglycaemia treatment (fast-acting carbs, 40% glucogel, glucojuice, dextrose tablets)	<25kg - IM Glucagon 0.5mg >25kg – IM Glucagon 1.0mg (NB. Glucagon is rarely effective in metabolic patients)

IV access

IV bolus 10% glucose 3ml/kg



Recheck BG 10 minutes after IV, IM or oral treatment

Recheck capillary CBG at 10-minute interval until CBG stable >3 mmol/L.



If child unable to recommence feeds or remains unwell

Start IV glucose infusion using 10% glucose/0.9% sodium chloride solution at a rate of 3-5 ml/kg/hr

If BM remains <2.6mmol/l - Repeat bolus 10% glucose 3ml/kg.
 Increase IV fluid rate to 6ml/kg/hr 10% glucose/0.9 sodium chloride

If BMs remain low, increase concentration of glucose in IV fluids.

For suspected hyperinsulinism consider glucagon infusion.

For suspected adrenal insufficiency give 4mg/kg hydrocortisone to a max 100mg.

If improved and able to swallow:

- Give **20g** long-acting (LA) carbohydrate, e.g., 2 biscuits, 1 packet of crisps
- If glucagon used, give **40g** of LA carbohydrate to replenish glycogen stores



Cause of hypoglycaemia must be established prior to discharge.

Refer all patients with unexplained hypoglycaemia to Paediatric SPR/PAU for BM monitoring and appropriate follow-up as required.

Box 1. (please order using on-call Paediatric consultant name on EPIC)

Ix at time of hypoglycaemia:

- **CBG/VBG, blood ketones**
- **Lab glucose, lab lactate**
- **Cortisol**
- TO LAB ON ICE* = **Insulin, C-peptide** and ammonia
- Free fatty acids, non-esterified fatty acids, beta-hydroxybutyrate, amino acids
- TFTs, Growth hormone
- LFTS, U+Es
- FBC
- Acylcarnitine (blood spot)
- **Lab urine** (first urine passed for ketones, amino and organic acids)

Bottles required:

- 1 x Grey
- 1 x purple
- 5 x green paed's or yellow adult
- 1 x Guthrie card
- 1 x gas tube/syringe
- 2 x urine white tops

*If ice not available, take samples to lab immediately

If samples difficult to obtain, **bloods highlighted in red are most important

- NB. If hypoglycaemia has already been treated by pre-hospital team, then blood tests are not recommended unless further drop $<2.6\text{mmol/L}$.
- Urine dip/ketones in ED will still be useful.
- Paediatric team may consider controlled fast/Ix if clinically indicated.

Important Clinical history points

- Age
- Birth history and weight
- Feeding history
- Hx of Neonatal Jaundice
- Hx of drug ingestion/access to medications
- FH of neonatal conditions or consanguinity
- Unexpected neonatal deaths
- Length of fasting period
- Previous episodes of low BM
- Tolerance to illness/fasting

Hypoglycaemia causes

High Ketones

Metabolic: Ketotic Hypoglycaemia/accelerated starvation – fasting/illness/vomiting, Glycogen storage disease, Gluconeogenesis defects

Endocrine: GH/cortisol deficiency

Absent/low ketones

Metabolic: Fatty acid oxidation defects
Defects of ketone body metabolism

Endocrine: Hyperinsulinism
Transitional neonatal hypoglycaemia

Other causes:

Toxic: Drugs – insulin, beta-blockers, sulphonylureas, aspirin
Liver failure/Hepatic
Sepsis
Chemotherapy

References

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Full version control record

Version:	1.0
Guidelines Lead(s):	Dr Rachel Parish, Consultant in Paediatric Emergency Medicine
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Library check completed:	26 February 2024
Ratified at:	Emergency Medicine Clinical Governance, August 2024 (FPH); October 2024 (WPH) Paediatrics Clinical Governance, August 2024
Date Issued:	12 November 2024
Review Date:	August 2027
Pharmaceutical dosing advice and formulary compliance checked by:	N/A
Key words:	Paediatric hypoglycaemia

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Version History

Version	Date	Guideline Lead(s)	Status	Comment
0.1	Jan 2024	Dr R Parish, Consultant in Paediatric Emergency Medicine	Draft	
1.0	Nov 2024	Dr R Parish, Consultant in Paediatric Emergency Medicine	Final	

Related Documents

None