Clinical Practice Guideline: Hypoglycemia

† For the purpose of this guideline, hypoglycemia is defined as plasma glucose value < 60 mg/dL (if symptomatic*) or < 50 mg/dL at any time.

*Symptoms of hypoglycemia include (but are not limited to): sweating, weakness, tachycardia, tremor, lethargy, irritability, confusion, and hypothermia.

Initial evaluation:

- Thorough history & physical exam
- Hypoglycemia as defined†

Seizure or Apnea

Yes

IV Dextrose (per PALS guidelines):

- 0.5 – 1 g/kg IV/IO
  - $D_{25}W$ 2-4 mL/kg
  - $D_{10}W$ 5-10 mL/kg

No

Obtain "critical sample" **PRIOR** to treatment:
BMP, beta hydroxybutyrate, lactate, free fatty acids, insulin, cortisol, growth hormone, c-peptide, acetoacetic acid, free carnitine, acylcarnitine profile, IGFBP-1, serum amino acids, pyruvate

Urine organic acids, reducing substances, toxicology

Diagnostic Evaluation:

- History should include timing of episode, specific diet history, recent illness, thorough assessment for possible toxic ingestion, birth history, family history, growth & development
- Physical exam should focus on growth, midline defects, ambiguous genitalia, hepatomegaly, hyperpigmentation, macrosomia, hemihypertrophy, mental status, jaundice
- Laboratory tests need to be obtained prior to correction of hypoglycemia. Imaging is not required.

Priority levels in cases where volume of blood is insufficient:

Tier 1 (high): BMP, beta hydroxybutyrate (BHOB), lactate

Tier 2 (moderate): Ammonia, C-peptide, Cortisol, Free fatty acids, Growth hormone, Insulin

Tier 3 (low): Acetoacetic acid, Acylcarnitine, Amino Acids, Total + free Carnitine, IGFBP-1, Pyruvate

Consider excluding the following types of patients:
Known diabetes mellitus
Previously diagnosed metabolic / hormonal disorder known to cause hypoglycemia

Developed by: J. Fakhoury, MD

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Emergency Department Observation vs. Hospital Admit to Pediatrics

Critical labs obtained in ED?

Yes

Tolerating PO?

Yes

- Provide sugary beverages and complex carbohydrate snacks
- POC glucose q30 min until > 70 mg/dL
- Consult Pediatric Endocrinology to arrange outpatient follow-up
- Consider discharge home with close PCP follow-up if able to maintain blood glucose > 70 mg/dL for ≥ 2 hours without need for IVF

No

- Start age appropriate IVF containing dextrose and consider admission to Pediatric Hospitalist

No

If no etiology of hypoglycemic event suggested by H&P, discuss possible admission for consideration of fasting challenge with PRS

- Consider supervised fast[#] with POC glucose checks q2h until below 70 mg/dL, then q30-60 minutes. Obtain critical labs at threshold as outlined above.
- Consultation with Pediatric Endocrinology

[#]Age appropriate fasting:
- 18-24 hours for patients < 4 yr
- 24-36 hours for patients > 4 yr

Patients with true endocrinopathies tend to present themselves earlier than recommended max duration

Critical labs obtained & follow-up arranged with Peds Endo?

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Laboratory Test	Special Instructions	Acceptable Tube	Minimum Amount (mL)
Tier 1 (High priority labs)			
BMP		GOLD	0.5
BHOB		RED / GOLD	0.5
Lactic Acid	AVOID TOURNIQUET	MINT	0.5

Laboratory Test	Special Instructions	Acceptable Tube	Minimum Amount (mL)
Tier 2 (Moderate priority labs)			
Ammonia		LAVENDER (4mL)	Full Microtainer
C-peptide	FROZEN	GOLD / RED	1.0
Cortisol		GOLD	1.0
Free Fatty Acids	FROZEN	RED	0.5
Growth Hormone		GOLD	1.0
Insulin		GOLD	0.5

Laboratory Test	Special Instructions	Acceptable Tube	Minimum Volume (mL)
Tier 3 (Low priority labs)			
Acetoacetic Acid		LAVENDER	3.0
Acylcarnitine		RED	0.04
Amino Acids	FROZEN	GREEN	0.3
Carnitine, free + total		RED	0.2
IGFBP-1		RED	0.5
Pyruvate	CALL LAB FOR SPECIAL TUBE		1.0

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References

- Dell Children's Medical Center of Texas Hypoglycemia Guideline.
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- Sperling M. Pediatric Endocrinology 4th Ed. Chapter 21, 920-921. 2014.
- Thornton PS, et al. Recommendations from the pediatric Endocrine Society for Evaluation and Management of Persistent Hypoglycemia in Neonates, Infants and Children. J Pediatr. 2016 Aug;167(2):238-45

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