

ENDOCRINE • MATERNAL-NEWBORN • NCLEX 2026

Infant / Newborn Hyperinsulinemia

Excess insulin in the neonate → profound, persistent hypoglycemia. The brain runs on glucose — without rapid recognition and intervention, neurologic injury is the consequence.

GLUCOSE < 40 MG/DL = HYPOGLYCEMIA

MOST COMMON: INFANT OF DIABETIC MOTHER (IDM)

PRIORITY: CHECK GLUCOSE • FEED • D10W

SOURCE TRANSPARENCY

This topic was not present in the uploaded personal note set. Content compiled from standard NCLEX-RN references: Saunders Comprehensive Review for the NCLEX-RN Examination (10th ed., 2026); ATI Maternal Newborn Nursing (Edition 12); Lippincott Manual of Nursing Practice; AAP Clinical Report — Postnatal Glucose Homeostasis in Late-Preterm and Term Infants (Adamkin, reaffirmed); Pediatric Endocrine Society Recommendations for the Evaluation and Management of Persistent Hypoglycemia in Neonates, Infants, and Children (Thornton et al.).

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DEFINITION • OVERVIEW

What is neonatal hyperinsulinemia?

- ▶ **Excessive insulin secretion** from the newborn's pancreas → drives glucose into cells → **persistent or recurrent hypoglycemia**.
- ▶ Most common cause of **severe, persistent hypoglycemia** in newborns and infants.
- ▶ Two main forms — **Transient** (e.g., Infant of Diabetic Mother — resolves in days) and **Persistent / Congenital Hyperinsulinism** (genetic; lifelong management).
- ▶ Why it matters: insulin *also suppresses* ketone production → the brain has **no backup fuel** → high risk of seizures, brain injury, developmental delay.

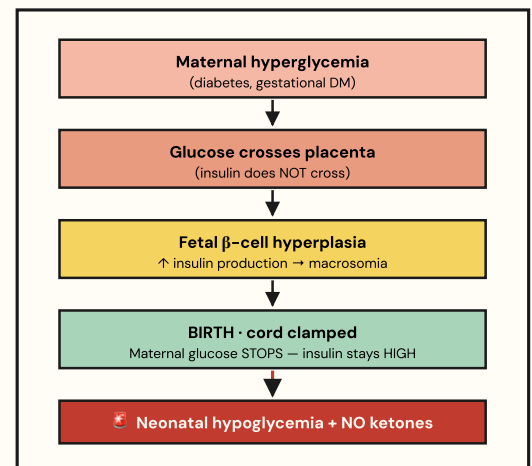
Who is at risk?

- ▶ Infant of a diabetic mother (gestational, type 1, type 2) — **#1 cause**
- ▶ Large-for-gestational-age (LGA) / macrosomia (>4000 g)
- ▶ Beckwith-Wiedemann syndrome
- ▶ Perinatal stress: birth asphyxia, IUGR, SGA, prematurity
- ▶ Genetic congenital hyperinsulinism (K_{ATP} channel mutations)

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PATHOPHYSIOLOGY

The "sweet mama, sour baby" cascade



- ▶ Insulin **blocks** glycogenolysis, gluconeogenesis, lipolysis, and ketogenesis.
- ▶ The brain is left with **no glucose AND no ketone backup** — this is what makes hyperinsulinemic hypoglycemia uniquely dangerous.

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GENS & SYMPTOMS

Recognize early — newborns hide hypoglycemia

EARLY / SUBTLE CUES

- ▶ **Jitteriness / fine tremors** (most common early sign)
- ▶ Poor feeding, weak suck
- ▶ Lethargy, low tone (hypotonia)
- ▶ Hypothermia / temperature instability
- ▶ Sweating, pallor, mottled skin
- ▶ Irritability, high-pitched cry

LATE / SEVERE FINDINGS

- ▶ **Seizures** — major red flag
- ▶ **Apnea / cyanosis**
- ▶ **Coma / unresponsiveness**
- ▶ Bradycardia, hypotension
- ▶ Respiratory distress, grunting
- ▶ Eyes rolling back, abnormal gaze

Classic appearance of the Infant of a Diabetic Mother (IDM)

- ▶ LGA / macrosomic (>4000 g) — but functionally **immature**
- ▶ Plump, plethoric ("cherubic") face; ruddy red color
- ▶ Increased risk of: hypocalcemia, hyperbilirubinemia, polycythemia, respiratory distress syndrome (RDS), birth trauma (shoulder dystocia)

Diagnostic glucose threshold

TIME AFTER BIRTH	TREAT IF BLOOD GLUCOSE <	SOURCE
First 4 hours	40 mg/dL	AAP
4–24 hours	45 mg/dL	AAP
> 48 hours (persistent)	60 mg/dL	Pediatric Endocrine Society

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PRIORITY NURSING INTERVENTIONS (ABC + SAFETY)

What the nurse does — in order

A Airway · B Breathing · C Circulation

- ▶ Position to maintain airway; suction if needed.
- ▶ Monitor RR, SpO₂; provide blow-by O₂ if respiratory distress.
- ▶ HR, perfusion, capillary refill q15–30 min during acute episode.

🔴 Glucose Management — the priority

- ▶ **Check blood glucose (heel-stick) immediately** — within 30–60 min of birth for at-risk infants, then per protocol.
- ▶ **Asymptomatic + glucose 35–45 mg/dL**: early feeding (breast or formula) *or* 40% buccal glucose gel + recheck in 30 min.
- ▶ **Symptomatic OR glucose < 40 mg/dL**: IV **D10W** — minibolus 2 mL/kg, then continuous infusion at glucose infusion rate (GIR) **4–8 mg/kg/min**.
- ▶ Recheck glucose **30 min after every intervention**, then q1h until stable × 3, then q3h.
- ▶ **Never give D50W to a newborn** — too hyperosmolar; causes rebound hypoglycemia and vein damage.

🔥 Thermoregulation & Safety

- ▶ Place skin-to-skin or under radiant warmer — *cold stress worsens hypoglycemia*.
- ▶ Seizure precautions: pad rails, side-lying, suction available.
- ▶ Feed every 2–3 hours; do not skip feedings.

📋 Continuous monitoring

- ▶ Strict I&O; daily weights.
- ▶ Trend serum glucose, calcium, magnesium, bilirubin.
- ▶ Notify provider if glucose remains <45 mg/dL despite feeding × 2 — escalate to IV dextrose.

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PHARMACOLOGY

Drugs the nurse must know

DRUG	ACTION	WATCH FOR
D10W (IV dextrose 10%)	First-line; raises serum glucose rapidly	Patent IV; never bolus high-conc dextrose; check glucose 30 min after start
40% Glucose gel (buccal)	Asymptomatic mild hypoglycemia + feeding	Massage into buccal mucosa; recheck in 30 min
Glucagon (emergency)	Mobilizes liver glycogen → ↑ glucose	Less effective in neonates (low glycogen stores); short-acting bridge to IV access
Diazoxide (PO)	Opens K _{ATP} channels → suppresses insulin release (first-line for congenital hyperinsulinism)	Fluid retention, hypertrichosis, pulmonary HTN (black-box) — monitor weight, lungs
Octreotide (somatostatin analog, SC/IV)	Inhibits insulin release; for diazoxide-refractory cases	NEC risk, GI side effects, gallstones; monitor tolerance of feeds
Hydrocortisone	Stress dose if adrenal insufficiency suspected	Hyperglycemia, infection masking

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LEX TEST TRAPS ⚠️

What students confuse — and how to choose right

TRAP "Big healthy baby" — full-term, 4.2 kg, sleepy and not feeding well."

RIGHT Macrosomia = think IDM. Check glucose FIRST, before assuming "tired newborn."

TRAP Give D50W IV push for severe hypoglycemia.

RIGHT Newborns get D10W (or D12.5%) — D50 is too hyperosmolar; causes rebound hypoglycemia + vein injury.

TRAP Jittery newborn — wrap warmly and observe.

RIGHT Jitteriness = early hypoglycemia until proven otherwise. Heel-stick glucose is the priority action.

TRAP "Looks like DKA — check ketones."

RIGHT Hyperinsulinemia suppresses ketogenesis → *no ketones*. Absent ketones during hypoglycemia is a HALLMARK clue.

TRAP Stop IV dextrose as soon as glucose normalizes.

RIGHT Wean dextrose gradually; abrupt stop = rebound hypoglycemia. Maintain enteral feeds during weaning.

TRAP Skip the 0400 feeding so baby can sleep.

RIGHT Feed every 2–3 hours — never skip. Missed feedings = next hypoglycemic episode.

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TIENT / FAMILY EDUCATION

What to teach the parents

- ▶ **Feed on a schedule** — every 2–3 hours, day and night. Never skip a feeding.
- ▶ Wake the baby to feed if needed during the first weeks.
- ▶ Watch for warning signs at home: poor feeding, unusual sleepiness, jitteriness, sweating, color change, twitching.
- ▶ Skin-to-skin contact stabilizes glucose and temperature.
- ▶ For IDM: explain this is usually **transient** — most resolve in 2–4 days as the baby's insulin levels normalize.
- ▶ For congenital hyperinsulinism: lifelong monitoring; teach blood glucose checks, diazoxide administration, emergency glucagon use, and when to go to the ER.
- ▶ Follow up for neurodevelopmental screening — recurrent severe hypoglycemia can affect learning.
- ▶ Encourage maternal glycemic control in future pregnancies.

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MORY BOOSTERS

Mnemonics & pattern cues

JITTERS

1. Jitteriness / tremors
2. Irritability + high-pitched cry
3. Temperature low (hypothermia)
4. Tachypnea / apnea
5. Eyes rolling, seizures
6. Refuses to feed (weak suck)
7. Sweating + lethargy

Sweet Mama → Sour Baby

High maternal sugar → fetal pancreas pumps out insulin → cord cut → mom's sugar gone → **baby's insulin still high** → crash.

Rule of 40s

< 40 mg/dL = treat.

D10W → bolus 2 mL/kg → GIR 4–8

mg/kg/min.

Never D50 in a newborn.

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JMM • SIX-STEP CLINICAL JUDGMENT SCENARIO

Apply it: the LGA newborn at 1 hour of life

SCENARIO

A term newborn (39 wk, 4,250 g) is delivered to a mother with poorly controlled gestational diabetes (last HbA1c 8.1%). At 60 minutes of life, the nursery nurse notes the baby is plethoric, sleepy, latching poorly, with fine tremors of the hands. Axillary temp 36.4°C (97.5°F), HR 168, RR 68, SpO₂ 96% on room air. Initial heel-stick glucose:

32 MG/DL

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RECOGNIZE CUES

Macrosomia, IDM history, jitteriness, poor feeding, tachypnea, tachycardia, hypothermia, **glucose 32 mg/dL (low)**.

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ANALYZE CUES

Maternal hyperglycemia → fetal hyperinsulinemia → after cord clamp, persistent high insulin causes neonatal hypoglycemia. Tachypnea and tremors are *symptomatic* hypoglycemia — this is NOT an asymptomatic baby who can be managed by feeding alone.

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PRIORITIZE HYPOTHESES

#1 Symptomatic neonatal hypoglycemia secondary to hyperinsulinemia (IDM) — life-threatening if not corrected (seizure, brain injury). Rule-outs: sepsis, hypocalcemia, polycythemia — but glucose comes first.

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GENERATE SOLUTIONS

Place under radiant warmer · obtain IV access · start **D10W** mini-bolus 2 mL/kg then continuous infusion at GIR 4–8 mg/kg/min · continue enteral feeds when tolerated · seizure precautions · notify provider · draw confirmatory serum glucose.

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TAKE ACTION

Initiate D10W per protocol. Warm baby. Recheck heel-stick glucose **30 minutes after** bolus. Document interventions. Anticipate orders for serum calcium, magnesium, CBC, and bilirubin.

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EVALUATE OUTCOMES

Target: glucose > 45 mg/dL × 3 consecutive checks, resolution of tremors and tachypnea, temp 36.5–37.5°C, tolerating feeds. If glucose remains < 45 mg/dL despite D10W → **escalate GIR, consider glucagon, evaluate for persistent congenital hyperinsulinism (diazoxide candidate)**.