

NCLEX-RN 2026 • MATERNAL-NEWBORN / NEONATAL

# Newborn Cold Stress

When a baby loses heat faster than it can make it — the cascade every nurse must stop.

SYSTEM: NEONATAL  
TEST PLAN: PHYSIOLOGICAL ADAPTATION  
JUDGMENT: RECOGNIZE • ANALYZE • PRIORITIZE  
EDITION: 2026

## 1 Definition & Overview

WHAT IT IS • WHY IT MATTERS

**Cold stress** = the metabolic and physiologic response when a newborn's **heat loss exceeds heat production**, dropping core temperature below the thermoneutral zone.

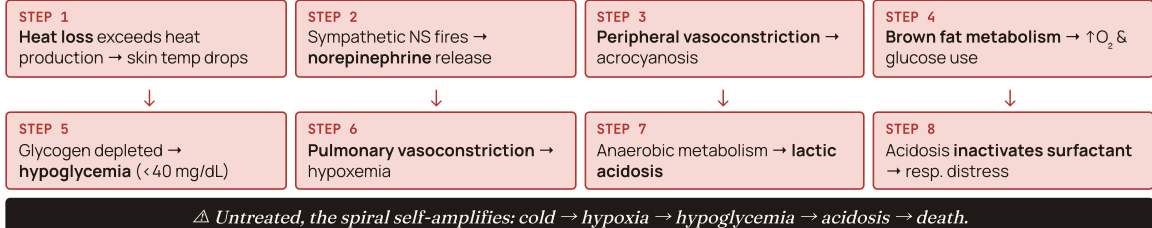
Why it matters: cold stress triggers a deadly downward spiral — **hypoxia** → **hypoglycemia** → **metabolic acidosis** → **surfactant breakdown** → **respiratory failure**.

Newborns are uniquely vulnerable: large surface-area-to-body-mass ratio, thin skin, minimal fat, and they **cannot shiver** — they rely on non-shivering thermogenesis (brown fat).

THERMONEUTRAL ZONE  
**36.5–37.5°C**  
97.7–99.5°F • axillary

## 2 Pathophysiology — The Cold Stress Spiral

STEP-BY-STEP MECHANISM



► THE 4 MECHANISMS OF HEAT LOSS — RECOGNIZE THEM IN EVERY TEST QUESTION



## 3 Signs & Symptoms

EARLY VS. LATE • RED FLAGS

### Early / Compensating SUBTLE

- Cool skin to touch (esp. trunk)
- Persistent **acrocyanosis** beyond 24 h
- Restlessness, irritability, jitteriness
- Weak suck / poor feeding
- Tachypnea (early compensatory)
- Mild hypoglycemia (40–47 mg/dL)
- ↑ O<sub>2</sub> & glucose demand

### Late / Decompensating EMERGENCY

- ❗ **Central cyanosis** (lips, trunk, mucosa)
- ❗ Bradycardia (HR < 110)
- ❗ Lethargy, hypotonia, floppy infant
- ❗ Apnea / periodic breathing
- ❗ Grunting · flaring · retractions
- ❗ Hypoglycemia < 40 mg/dL
- ❗ Mottled skin · cap refill > 3 s
- ❗ Axillary temp < 36.5°C (97.7°F)

## 4 Priority Nursing Interventions

ABCS • SAFETY • PRIORITIZATION

### A Airway

- ▶ **Maintain** patent airway — sniffing position
- ▶ **Suction** mouth > nose PRN
- ▶ **Position** supine, neutral neck

### B Breathing

- ▶ **Monitor** RR (30–60), effort, retractions
- ▶ **Assess** SpO<sub>2</sub> — target ≥ 90 %
- ▶ **Administer** *warmed, humidified* O<sub>2</sub> PRN
- ▶ **Watch** for grunting, flaring

### C Circulation

- ▶ **Monitor** HR (110–160), perfusion
- ▶ **Assess** color, cap refill ≤ 3 s
- ▶ **Establish** IV access if unstable

### 🔥 Rewarm — Gradual, ~0.5°C / hour

- ✓ **Dry** the baby immediately, remove wet linens
- ✓ **Skin-to-skin** with mother (kangaroo care)
- ✓ **Pre-warm** radiant warmer/incubator *before* use
- ✓ Apply **cap** — head = largest heat-loss surface
- ✓ Use **warmed blankets, scale, stethoscope, hands**
- ✓ **Delay first bath** until temp stable (AAP: ≥ 24 h)
- ✓ Move away from windows, AC vents, drafts
- ✗ **Avoid rapid rewarming** → apnea, hypotension

### 📊 Monitor & Reassess

- ▶ **Temp** q 15–30 min during rewarming until stable
- ▶ **Blood glucose** heel stick; treat < 40 mg/dL
- ▶ Assess for **respiratory distress**, sepsis (cold stress can mask infection)
- ▶ Daily weights, I&O; feeding tolerance
- ▶ Provide **calories** — breastfeed/formula early & often
- ▶ Document interventions & infant response
- ▶ Notify provider if temp doesn't rise or distress worsens

## 5 Pharmacology

SUPPORTIVE • TARGETED

### D10W — Dextrose 10 % in Water

GLUCOSE / IV HYPERTONIC

#### MECHANISM

Immediate IV glucose for documented hypoglycemia (< 40 mg/dL).

#### SIDE EFFECTS

Rebound hypoglycemia if stopped abruptly; fluid overload; hyperglycemia.

#### NURSING

Bolus 2 mL/kg, then infusion. Recheck glucose q 30 min; **taper slowly**.

### Oxygen — warmed & humidified

MEDICAL GAS

#### MECHANISM

Corrects hypoxemia from pulmonary vasoconstriction & surfactant inactivation.

#### SIDE EFFECTS

Retinopathy of prematurity (ROP) with high FiO<sub>2</sub> in preterm; dry mucosa if not humidified.

#### NURSING

Titrate to SpO<sub>2</sub> goal. **Never cold/dry O<sub>2</sub>** — worsens cold stress.

### Surfactant — beractant • calfactant • poractant

PULMONARY SURFACTANT

#### MECHANISM

Replaces surfactant inactivated by acidosis; reduces alveolar surface tension.

#### SIDE EFFECTS

Transient bradycardia, desaturation, airway obstruction during instillation.

#### NURSING

Verify ETT placement; monitor HR/SpO<sub>2</sub>; **do not suction** for 1–2 h post-dose.

## 6 NCLEX Test Traps

⚠ WHAT STUDENTS GET WRONG

|   |                                                                   |                                                                                                                |
|---|-------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| 1 | ✗ THE TRAP<br>"Rapidly rewarm the cold infant — fastest is best." | ✓ CORRECT<br>Rewarm <b>gradually</b> (~0.5°C/h). Rapid rewarming → apnea, hypotension, ↑O <sub>2</sub> demand. |
| 2 | ✗ THE TRAP<br>"Acrocyanosis is always normal in a newborn."       | ✓ CORRECT<br>Normal only in first 24 h. <b>Central cyanosis</b> (lips/trunk) is always an emergency.           |
| 3 | ✗ THE TRAP<br>"Give glucose first to a cold, jittery infant."     | ✓ CORRECT<br><b>Warm first</b> — hypoglycemia often resolves with warming (root cause).                        |
| 4 | ✗ THE TRAP<br>"Bathe the newborn immediately after birth."        | ✓ CORRECT<br><b>Dry first</b> ; delay bath until thermally stable (AAP: ≥ 24 h).                               |
| 5 | ✗ THE TRAP<br>"Quiet, sleepy newborn = peaceful baby."            | ✓ CORRECT<br><b>Lethargy is a red flag</b> — cold stress, sepsis, or hypoglycemia until proven otherwise.      |
| 6 | ✗ THE TRAP<br>"Place infant directly on scale or exam table."     | ✓ CORRECT<br>Cover with <b>warmed blanket</b> — prevents conductive heat loss.                                 |

## 7 Patient & Family Education

DISCHARGE TEACHING • HOME CARE

### ✓ DO

- ✓ Dress baby in **one more layer** than adult comfort
- ✓ Keep a **cap on** in the first weeks, especially after bath
- ✓ Practice **skin-to-skin** — best thermoregulation for stable infants
- ✓ Bathe 2–3×/week in **warm room, warm water**, dry immediately
- ✓ **Breastfeed frequently** — provides calories for heat production
- ✓ Take **axillary temp**; report < 36.5°C (97.7°F) or > 38°C (100.4°F)
- ✓ For car seats: thin layers + **blanket OVER straps**, not under

### ✗ DON'T

- ✗ Place baby near **cold windows, AC vents, fans**
- ✗ Use **heating pads, hot water bottles, microwaved items** — burn risk
- ✗ Overbundle to the point of overheating — links to SIDS
- ✗ Place infant directly on a **cold surface** — line it first
- ✗ Bathe a baby whose temp is **not yet stable**
- ✗ Ignore **poor feeding or lethargy** — call provider
- ✗ Co-sleep on couches/recliners or with loose blankets

## 8 Memory Boosters

MNEMONICS • PATTERN RECOGNITION

### W•A•R•M — Stop cold stress fast

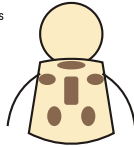
- W** Wrap & dry — remove all wet linens immediately
- A** Apply a cap — head is the biggest heat-loss zone
- R** Radiant warmer / skin-to-skin — pre-warmed before use
- M** Monitor temp, glucose, respiratory status

### C•C•E•R — 4 ways heat is lost

- C** Conduction — cold scale, table (direct contact)
- C** Convection — drafts, AC vents (moving air)
- E** Evaporation — wet skin (after birth or bath)
- R** Radiation — cold walls/windows (no contact)

#### BROWN FAT DEPOSITS

- Neck
- Scapulae
- Mediastinum
- Kidneys & adrenals



#### NEWBORNS

- cannot shiver
- rely on non-shivering thermogenesis
- = BROWN FAT

BROWN ADIPOSE TISSUE • NEWBORN'S HEAT FACTORY

### Pattern Recognition

- ▶ "I Can't Shiver" — newborns rely on brown fat, not shivering
- ▶ "H•H•S" cascade — Hypoxia → Hypoglycemia → Surfactant failure
- ▶ Cold + jittery + poor feeder → check glucose, warm baby, assess sepsis
- ▶ Temp instability in any newborn → think *sepsis* until ruled out
- ▶ Heart hot, baby happy — keep core trunk warm (cap + skin-to-skin)
- ▶ 0.5°C / hour = the safe rewarming pace — memorize it

### Quick-Recall Vitals Strip

TEMP (AXILLARY)

**36.5 – 37.5°C**  
97.7 – 99.5°F

HR

**110 – 160**  
bpm

RR

**30 – 60**  
breaths/min

SP0<sub>2</sub>

**≥ 90 %**  
target

GLUCOSE

**≥ 40 mg/dL**  
first 24 h