

CLINICALJUDGE™ • NGN NCLEX PREP LIBRARY

FETAL HEART RATE VARIABILITY

The single most important predictor of fetal oxygenation. Master the four categories, what they mean, and how to act on them — in plain language with annotated monitor strips.

MATERNAL-NEWBORN

INTRAPARTUM CARE

2026 NGN NCLEX

PRIORITY ACTION

CLINICAL JUDGMENT

- Critical / Emergency
- Pathophysiology
- Safe / Expected
- Complication
- NCLEX Trap
- Medication
- Patient Education

01 / FOUNDATION

WHAT IS VARIABILITY (IN PLAIN ENGLISH)?

Imagine the baby's heart rate as a heartbeat song. A healthy fetal brain conducts the song with little ups and downs — never a flat hum. Those tiny squiggles on the monitor strip are **variability**, and they tell you the baby's brain and oxygen supply are working.

PATHOPHYSIOLOGY IN 3 SENTENCES

The fetal autonomic nervous system pulls the heart rate up (sympathetic) and down (parasympathetic/vagal) in a constant tug-of-war. That tug-of-war creates fluctuations around the baseline. **If the brain is well-oxygenated, the tug-of-war is strong → you see nice squiggles. If the brain is starving for oxygen, the tug-of-war fades → the line flattens out.**

WHY THIS MATTERS MORE THAN ANYTHING ELSE ON THE STRIP

Moderate variability = a reassuring strip, even if you see some decelerations. It's the gold-standard indicator that the fetal brain is getting enough oxygen *right now*. On NGN questions, variability is almost always the deciding factor between "monitor" and "intervene."

HOW IT'S MEASURED

Look at the **peak-to-trough amplitude** of the squiggles over a 10-minute window (excluding accelerations and decelerations). Measure in **bpm** — beats per minute of fluctuation around the baseline.

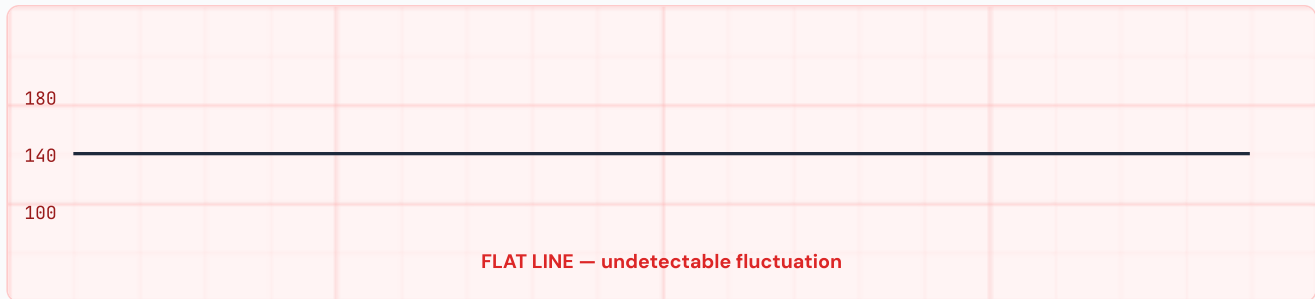
02 / THE FOUR CATEGORIES

SEE IT, NAME IT, ACT ON IT

NICHHD defines exactly four categories. Memorize these strip pictures — NCLEX shows them as images you have to identify.

ABSENT VARIABILITY

⚠ CRITICAL • 0 BPM



AMPLITUDE

Undetectable (0 bpm)

CATEGORY

Category III if with decels or bradycardia

MEANING

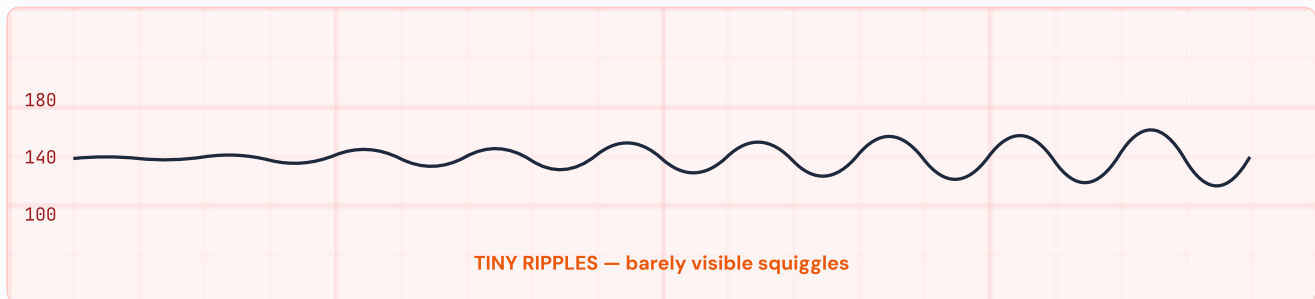
Severe hypoxia / acidosis until proven otherwise

YOUR MOVE

**INTRAUTERINE RESUSCITATION
• NOTIFY PROVIDER NOW**

MINIMAL VARIABILITY

⚠ CONCERNING • ≤ 5 BPM



AMPLITUDE

Detectable but ≤ 5 bpm

CATEGORY

Category II (indeterminate)

MEANING

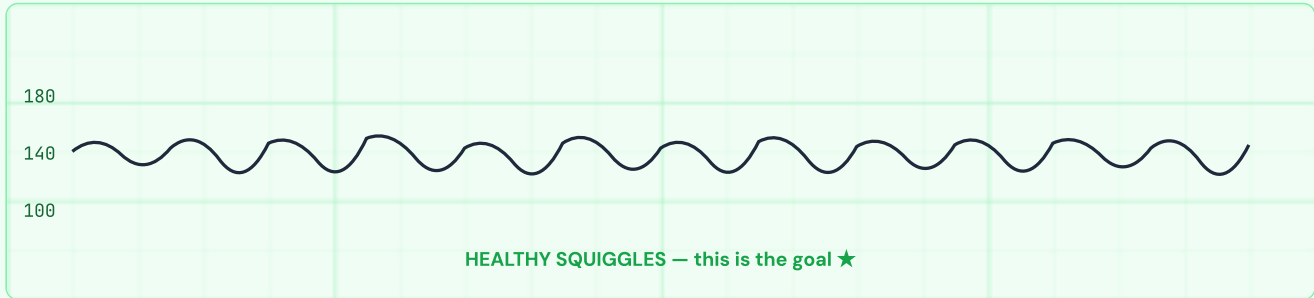
Could be sleep, meds, OR developing hypoxia

YOUR MOVE

Investigate → reposition, fluids, O₂, scalp stim

MODERATE VARIABILITY ✓

★ REASSURING • 6-25 BPM



AMPLITUDE

6 – 25 bpm

CATEGORY

Category I (normal)

MEANING

Adequate fetal oxygenation,
intact CNS

YOUR MOVE

CONTINUE MONITORING — no
intervention needed

MARKED VARIABILITY

! INDETERMINATE • > 25 BPM



AMPLITUDE

> 25 bpm

CATEGORY

Category II (indeterminate)

MEANING

Often early/mild hypoxia;
sometimes maternal
stimulants

YOUR MOVE

Evaluate context, intrauterine
resuscitation if persistent

⚠ DON'T CONFUSE THIS: SINUSOIDAL PATTERN

Sinusoidal ≠ marked variability. Sinusoidal is a smooth, even, undulating wave (looks like a perfect sine wave) at 3–5 cycles/minute. It's a **Category III emergency** — think severe fetal anemia (e.g., Rh isoimmunization, fetal-maternal hemorrhage). Marked variability is jagged and irregular; sinusoidal is smooth and rhythmic.

MEMORY ANCHOR

"ABSENT MINIMAL MODERATE MARKED" → 0, ≤5, 6-25, >25

Quick numeric anchor — memorize the cutoffs in order:

0 **Absent** — flat line, undetectable

≤5 **Minimal** — tiny ripples

6-25 **Moderate** ★ — the goal

>25 **Marked** — wild swings

CAUSES YOU MUST RECOGNIZE

CAUSES OF DECREASED / ABSENT VARIABILITY

CAUSE	MECHANISM IN SIMPLE TERMS	REVERSIBLE?
Fetal sleep cycle	Baby's brain quiets down for 20–40 minutes — normal physiology	Yes, resolves spontaneously
Fetal hypoxia / acidosis ★	Brain not getting enough oxygen → autonomic tug-of-war weakens	Emergency — act now
CNS depressants	Opioids, magnesium sulfate, general anesthesia cross placenta and dampen fetal CNS	Often, as drug wears off
Prematurity	Immature fetal autonomic nervous system can't produce big fluctuations yet	Gestational
Fetal tachycardia	Fast heart rate compresses the room for fluctuation	Treat underlying cause
Congenital anomalies	Anencephaly, cardiac defects, prior CNS injury	Structural
Fetal arrhythmia	Disorganized rhythm masks variability	Depends

CAUSES OF MARKED VARIABILITY

CAUSE	MECHANISM IN SIMPLE TERMS
Early fetal hypoxia	The baby's autonomic system over-corrects in the early phase of stress
Fetal stimulation	Vibroacoustic stimulation, scalp stim, fetal movement
Maternal stimulants	Cocaine, methamphetamine, ephedrine, terbutaline
Umbilical cord compression (mild)	Intermittent vagal swings produce big fluctuations

INTRAUTERINE RESUSCITATION LADDER

When variability drops or you see Category II/III tracing, run this sequence **in this order**. NGN bow-tie questions love this exact ranking.

1**REPOSITION the mother**

Left lateral first → if no improvement, right lateral or knee-chest. Removes vena cava compression and improves uteroplacental perfusion.

2**STOP oxytocin (Pitocin)**

If infusing — turn it off immediately. Tachysystole or hyperstimulation reduces placental blood flow.

3**IV FLUID bolus**

500–1000 mL Lactated Ringer's (or NS) wide-open. Boosts maternal blood volume → improves placental perfusion.

4**OXYGEN per mask**

10 L/min via non-rebreather. Increases maternal — and therefore fetal — oxygen saturation. *Note: recent evidence is mixed; still tested as a standard intervention on NCLEX.*

5**NOTIFY the provider**

SBAR report. Anticipate orders: tocolytic (terbutaline) for tachysystole, amnioinfusion for cord compression, or operative delivery.

6**DOCUMENT and prepare**

Time-stamped tracing review, interventions, fetal/maternal response. Prepare for possible C-section if no improvement.

MNEMONIC — "LIONS"

Left side · IV fluids · Oxygen · Notify provider · Stop Pitocin. Pair it with "turn, tank, oxygen, off, call" as a backup phrase.

IF YOU SEE THIS → DO THIS

IF

Moderate variability + accelerations + no decels



THEN

Category I · Continue routine monitoring. Reassuring strip.

IF

Minimal variability lasting > 40 minutes



THEN

No longer fetal sleep — investigate. Reposition, fluids, O₂, scalp stim. Notify provider.

IF

Absent variability + recurrent late or variable decels



THEN

Category III · EMERGENCY. Full intrauterine resuscitation + prepare for C-section.

IF

Mother received morphine/fentanyl 1 hr ago, now minimal variability



THEN

Likely med-related. Document, continue monitoring, expect resolution as drug clears.

IF

Sinusoidal pattern (smooth wave, 3–5 cyc/min)



THEN

Category III · Suspect severe fetal anemia. Notify provider STAT, prepare for emergency delivery / fetal transfusion.

IF

On magnesium sulfate for preeclampsia, see minimal variability



THEN

Often expected from mag. Don't panic — assess other strip features (decels, baseline). Document.

8 TRAPS THAT COST POINTS

TRAP 01

Calling marked variability "good"

It's NOT reassuring. Marked = Category II.
Only moderate (6–25 bpm) is reassuring.

TRAP 02

Confusing minimal with absent

Minimal = detectable but ≤ 5 bpm.
Absent = undetectable, flat. They have different categories.

TRAP 03

Picking O₂ as the FIRST action

Reposition first. Oxygen is step 4 of the ladder, not step 1.

TRAP 04

Mistaking sinusoidal for marked

Sinusoidal = smooth sine wave +
Category III emergency (think anemia).
Marked = jagged irregular oscillations.

TRAP 05

Forgetting the fetal sleep cycle

Up to 40 minutes of minimal variability
can be normal sleep. Wait, stimulate,
then escalate.

TRAP 06

Ignoring maternal meds

Opioids, magnesium, general anesthesia
→ expected minimal variability. Always
check the MAR.

TRAP 07

Keeping Pitocin running

In ANY non-reassuring tracing, STOP the
oxytocin before adding more
interventions.

TRAP 08

Looking at variability alone

Always interpret variability in the
context of baseline, accelerations, and
decelerations. NGN questions test the
whole picture.

WHERE VARIABILITY FITS IN THE BIG PICTURE

NGN questions almost always ask you to classify a full tracing — not just variability in isolation. Here's how variability drives the category.

CATEGORY	WHAT YOU SEE	ACTION
Category I NORMAL	Baseline 110–160 · Moderate variability · Accelerations present or absent · No late or variable decels · Early decels OK	Routine monitoring
Category II INDETERMINATE	Anything that isn't Cat I or Cat III. Includes: minimal variability, marked variability, absent variability <i>without</i> decels, tachycardia, bradycardia with moderate variability, recurrent variable decels with moderate variability	Surveillance + interventions as indicated
Category III ABNORMAL	Absent variability WITH any of: recurrent late decels, recurrent variable decels, or bradycardia · OR sinusoidal pattern	EMERGENCY — full resuscitation, prepare delivery

CRITICAL CONCEPT

The phrase to memorize: "**Absent variability + recurrent decels OR bradycardia = Category III.**" This combo is the only thing (besides sinusoidal) that automatically puts a strip in Category III.

THINK LIKE THE EXAM

Scenario: A 28-year-old G2P1 at 39 weeks is in active labor, receiving oxytocin at 8 mU/min. Cervix 6 cm, 100% effaced. Latest tracing: baseline 145 bpm, **absent variability**, recurrent late decelerations over the last 20 minutes. BP 118/74, contractions every 2 min lasting 80 sec.

ACTIONS TO TAKE

- ✓ Reposition to left lateral
- ✓ Stop oxytocin infusion
- ✓ IV bolus 500 mL LR
- ✓ Oxygen 10 L via non-rebreather
- ✓ Notify provider STAT

CATEGORY III TRACING

PARAMETERS TO MONITOR

- FHR baseline & variability
- Contraction frequency/duration
- Maternal vital signs
- Response to interventions
- Prep for possible C-section

Scenario 2: G1P0 at 38 weeks, induction in progress. Received IV morphine 4 mg for pain 30 min ago. Tracing shows baseline 140 bpm, **minimal variability** over the last 25 min, no decels, occasional accelerations. Contractions q3 min x 60 sec, moderate intensity.

MOST LIKELY CAUSE

- Maternal opioid administration
- Possible fetal sleep cycle

CATEGORY II

NURSING RESPONSE

- Continue monitoring closely
- Reposition, scalp stim if persists
- Expect resolution as opioid clears
- Document timing & response

WHAT TO TELL THE FAMILY

- ☐ "The monitor shows your baby's heartbeat — the little ups and downs we see on the screen are actually a **good sign** that your baby's brain is healthy and getting enough oxygen."
- ☐ "If we ask you to roll onto your left side, it's because that position helps blood flow to your baby — it's not because something is wrong."
- ☐ "Sometimes babies have quiet rest cycles where the squiggles get smaller for 20–40 minutes. That's normal. We watch carefully so we can act if it lasts longer."
- ☐ "Some pain medications can make the baby's heart rate look quieter for a while. That's expected and goes away as the medicine wears off."
- ☐ "The oxygen mask and the IV fluids are simple tools we use to give your baby extra support. Most of the time the tracing improves quickly."
- ☐ "You'll see us repositioning you, adjusting the IV, or stopping certain medications — that's a normal part of how we care for both of you in labor."

ONE-PAGE SUMMARY

GOAL STATE

Moderate variability (6–25 bpm) + baseline 110–160 + accelerations + no late/variable decels = Category I, reassuring

RED FLAG COMBO

Absent variability + recurrent decels or bradycardia = Category III emergency. Sinusoidal = Category III emergency.

FIRST ACTION ALWAYS

Reposition (left lateral) → Stop Pit → IV fluids → O₂ → Notify provider

MEDICATION WATCHLIST

Opioids, magnesium sulfate, general anesthesia → expected minimal variability. Check the MAR before panicking.

TOP NCLEX TRAP

Marked variability is NOT good. Only moderate is reassuring. Don't reward big swings.

TEST-TAKING TIP

When the strip shows moderate variability, the answer is rarely "intervene." When variability is absent or minimal with decels, the answer is rarely "continue monitoring."

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