

PHARMACOLOGY

GI SYSTEM

NCLEX-RN 2026

NGN / NCJMM

Histamine-2 (H₂) Receptor Antagonists

A high-yield, color-coded study infographic built for the 2026 NCLEX-RN Test Plan — designed for rapid review in under 60 seconds and clinical judgment mastery.

DRUG CLASS

H₂ Antagonists

SYSTEM

Gastrointestinal

SUFFIX

–TIDINE

HIGH-ALERT?

IV → Cardiac

01

Drug Overview

Key Indications — WHY we give it

- **GERD:** Gastroesophageal reflux disease
- **PUD:** Peptic ulcer disease (gastric + duodenal ulcers)
- **Stress ulcers:** ICU / critically ill prophylaxis (burns, trauma, mechanical ventilation)
- **ZES:** Zollinger-Ellison syndrome (acid hypersecretion)
- **Heartburn:** Erosive esophagitis, dyspepsia, indigestion
- **Pre-op:** Prevention of aspiration pneumonitis before anesthesia

💡 **High-yield:** H₂ blockers ↓ *acid production* but DO NOT neutralize existing acid (that's antacids). Slower onset than antacids (~1 hr) but LONGER duration (6–12 hrs).

02

Mechanism of Action

Block H₂ receptors on parietal cells of the stomach



↓ Histamine-stimulated acid secretion



↓ Hydrochloric acid (HCl) production



↑ Gastric pH (less acidic)



🛡️ Ulcer healing + symptom relief

💡 **Pathway pearl:** H₂ blockers inhibit ONLY the histamine pathway. Acetylcholine and gastrin pathways still drive acid secretion — which is why PPIs (which block the final common proton pump) are stronger acid suppressors.

03

Therapeutic Effects

✅ Signs the drug is working

- ↓ Epigastric pain, heartburn, burning sensation
- ↓ Acid reflux symptoms and regurgitation
- Ulcer healing on endoscopy (duodenal 4–8 wks · gastric 6–8 wks)
- Stable or rising hemoglobin/hematocrit (if GI bleed resolving)
- Normalized gastric pH > 4
- ↓ Need for antacid rescue doses
- Improved sleep (less nocturnal reflux when dosed at bedtime)

04

Side Effects & Adverse Reactions

● Common (mild)

- Headache (most common)
- Dizziness, drowsiness, fatigue
- Diarrhea OR constipation
- Nausea, abdominal discomfort
- Dry mouth

🚨 Serious / Life-threatening

- 🧠 **CNS confusion, hallucinations** — esp. elderly & renal impairment
- 🩸 **Thrombocytopenia / leukopenia / agranulocytosis**
- ❤️ **Bradycardia & hypotension** with rapid IV push
- 🟡 Hepatotoxicity (↑ LFTs, jaundice)
- 🩺 Acute interstitial nephritis (↑ creatinine)
- 🖋️ Vitamin B₁₂ deficiency (long-term use)
- ⚠️ Masks symptoms of gastric cancer

⚠️ Cimetidine-Specific (highest side-effect profile)

- **Gynecomastia** — breast enlargement in men (antiandrogen effect)
- **Impotence, ↓ libido**
- **Galactorrhea** in women
- **CYP450 inhibition** → many drug interactions (see Section 5)

05

Priority Nursing Considerations

Assess / Monitor

- Abdominal pain, bowel patterns, stool color (black/tarry = bleed)
- Vitals — especially HR & BP with IV administration (bradycardia risk)
- Mental status in elderly and renal impairment (confusion)
- CBC (platelets, WBC) & renal function (BUN/Cr)
- LFTs with long-term therapy
- Signs of GI bleed: melena, hematemesis (coffee-ground emesis), ↓ H&H

HOLD / Notify Provider If:

- Platelets < **100,000** or sudden drop
- New confusion, agitation, or hallucinations (esp. elderly)
- HR < **60** or SBP < **90** after IV dose
- ↑ Creatinine > **1.5×** baseline or oliguria
- Black tarry stools / hematemesis → possible active bleed
- Jaundice or LFTs > **3×** upper limit of normal

Contraindications / Caution

- Hypersensitivity to H₂ blockers
- Severe renal impairment (reduce dose ~50%)
- Hepatic impairment (especially cimetidine)
- Pregnancy Category B — use only if clearly needed
- Elderly — ↑ risk of delirium / falls

Key Drug Interactions (esp. Cimetidine — CYP450 inhibitor)

- **Warfarin** → ↑ INR, bleeding risk
- **Phenytoin** → phenytoin toxicity
- **Theophylline** → theophylline toxicity
- **Lidocaine, metoprolol, propranolol** → ↑ levels
- **Antacids** → ↓ absorption of H₂ blocker (separate by 1–2 hrs)
- **Ketoconazole, itraconazole, atazanavir** → ↓ absorption (need acid)
- **Alcohol** → ↑ serum ethanol (cimetidine)

06

Labs & Diagnostics



Labs to Monitor

- **CBC:** with platelets — watch for thrombocytopenia & leukopenia
- **Renal function:** BUN 7–20 mg/dL · Creatinine 0.6–1.2 mg/dL → renal dosing required
- **LFTs:** AST/ALT — hepatotoxicity screen (long-term)
- **Critical platelets:** 150,000–400,000/mm³ — HOLD if < 100,000 or dropping rapidly
- **H&H:** Hgb 12–17 g/dL · Hct 36–51% — trend for GI bleed
- **Vit B₁₂:** 200–900 pg/mL — check with long-term use
- **Magnesium:** 1.5–2.5 mEq/L — hypomagnesemia possible



Diagnostics

- Upper endoscopy (EGD) — confirm ulcer healing, rule out malignancy
- H. pylori testing (urea breath test, stool antigen) — treat if positive
- Gastric pH monitoring — goal > 4 for ulcer healing

07

Administration & Safety



Route + Timing

- Routes: **PO, IV push, IV intermittent infusion, IM**
- Best time: **at BEDTIME** (controls nocturnal acid surge) OR 30 min before meals
- With or without food — food does not significantly affect absorption
- Separate from antacids by **1–2 hours** (antacids ↓ H₂ blocker absorption)



HIGH-ALERT IV Precautions

- IV push: administer **SLOWLY over AT LEAST 2 minutes** (famotidine)
- Rapid IV push → **bradycardia, hypotension, cardiac arrhythmias**
- Prefer intermittent IV infusion over 15–30 min when possible
- Check IV compatibility — do not mix with incompatible solutions



Dose Adjustments

- **Renal impairment** (CrCl < 50): reduce dose ~50% or extend interval
- **Hepatic impairment:** reduce cimetidine; famotidine preferred
- **Elderly:** start low, go slow — higher confusion risk



Safety Pearls

- NOT a PRN rescue drug — onset ~1 hour (antacids for immediate relief)
- Tolerance can develop after 2 weeks of daily use
- Do NOT stop abruptly if on chronic therapy → **rebound acid hypersecretion**

08

Patient Education

Must-Teach Points

- Take exactly as prescribed — even when feeling better
- Take at **BEDTIME** for best overnight acid control
- Full effect takes several days — NOT immediate like antacids
- If using antacid for breakthrough, SPACE 1–2 hours apart
- **AVOID:** alcohol, smoking, NSAIDs, aspirin, caffeine, spicy/fatty foods
- Smoking delays ulcer healing — biggest modifiable risk factor
- Report: confusion, mood changes, easy bruising, unusual bleeding
- Long-term use may require B₁₂ supplementation — ask provider

Seek Help Immediately If:

- Black tarry stools (melena) or bright red blood in stool
- Vomiting blood or coffee-ground-looking emesis
- Severe abdominal pain, fainting, dizziness
- Yellow skin/eyes (jaundice), dark urine
- Signs of infection — fever, sore throat (agranulocytosis)
- Persistent symptoms > 2 weeks despite therapy — rule out cancer

09

NCLEX Test Traps ⚠️

❌ **"-TIDINE" = H₂ blocker; "-PRAZOLE" = PPI** — don't mix them up!

🕒 H₂ blocker ≠ immediate relief — if patient wants FAST relief, give an **ANTACID**

🚫 **RANITIDINE (Zantac) was WITHDRAWN in 2020** (NDMA contamination) — never pick it as a current med

🕒 Antacids + H₂ blocker at SAME time = wrong — must separate by **1–2 hrs**

🧠 Confusion in elderly is THE HALLMARK adverse effect — *not* "normal aging"

🩸 **Cimetidine + warfarin = BLEEDING risk** (classic priority question)

♂ Gynecomastia is **cimetidine**, NOT famotidine

💉 Rapid IV push = bradycardia & hypotension — always give SLOWLY (≥2 min)

🚑 GI bleed symptoms = PRIORITY assessment (ABCs / circulation)

🔄 Don't stop abruptly → **rebound hyperacidity**

💊 H₂ blockers ↓ absorption of drugs needing acid (ketoconazole, atazanavir)

📄 Long-term use → B₁₂ deficiency, fractures, C. diff risk

10

Memory Boosters

The 4 C's of CIMETIDINE

- **C**onfusion (elderly)
- **C**YP450 inhibition → drug interactions
- **C**ardiac effects (bradycardia with IV)
- **C**osmetic → gynecomastia, impotence

"TIDINE = TIDE the acid away"

- Famotidine, Cimetidine, Nizatidine → all block H₂

HAPPY Stomach

- **H** — Heartburn relief
- **A** — Acid reduction
- **P** — Peptic ulcer healing
- **P** — Prophylaxis for stress ulcers
- **Y** — Yields higher gastric pH

"BEST at BEDtime"

- H₂ blockers suppress nocturnal acid surge best — dose at bedtime

Class Pattern — 3 GI acid drug classes

- **Antacids** (aluminum/magnesium/calcium): neutralize acid — FASTEST, shortest duration
- **H₂ blockers** (–tidine): ↓ acid production — MODERATE speed, 6–12 hrs
- **PPIs** (–prazole): irreversibly block proton pump — STRONGEST, 24+ hrs



Most-Tested Drugs in This Class

Drug	Key Pearl	Watch Out For	NCLEX Status
Famotidine Pepcid	PREFERRED H ₂ blocker — fewest interactions, safest profile, available OTC + IV	Headache, rare confusion in renal impairment	★ MOST TESTED CURRENT H ₂ BLOCKER
Cimetidine Tagamet	Oldest, weakest acid suppression, MANY drug interactions (CYP450 inhibitor)	Gynecomastia, impotence, confusion, CYP450 inhibition, Beers Criteria drug	⚠ HIGH-YIELD FOR SE & INTERACTIONS
Nizatidine Axid	Similar to famotidine; 100% oral bioavailability	Headache, dizziness; rare hepatotoxicity	LESS COMMONLY TESTED
Ranitidine Zantac	WITHDRAWN from U.S. market April 2020 (NDMA contamination — probable carcinogen)	Do NOT select as current medication on the NCLEX	🚫 WITHDRAWN 2020



"New" Zantac 360 on shelves today contains **FAMOTIDINE** — same brand name, different drug. A classic NCLEX patient-teaching scenario.



Clinical Judgment Snapshot (NCJMM)

? What is the #1 priority risk with H₂ antagonists?

- **GI bleeding** from underlying ulcer/GERD — ALWAYS assess for melena, hematemesis, ↓ H&H, hemodynamic instability first
- In elderly or renal impairment: **acute confusion/delirium** is a life-safety concern (falls, aspiration)

? What will harm the patient FIRST?

- **RAPID IV PUSH** → bradycardia, hypotension, cardiac arrhythmia within minutes
- **Missed GI bleed** → hypovolemic shock
- **Drug interaction** with warfarin/phenytoin (cimetidine) → toxicity or hemorrhage

? What is the FIRST nursing action in a priority scenario?

- **Suspected GI bleed** → Assess ABCs, VS, H&H; establish large-bore IV access; notify provider
- **Post-IV bradycardia/hypotension** → STOP the infusion, place patient supine, assess VS, notify provider
- **New confusion in elderly on cimetidine** → HOLD the drug, assess neuro, fall precautions, notify provider, request switch to famotidine
- **Coffee-ground emesis** → NPO, suction setup, IV access, type & crossmatch, notify provider STAT



Recognize cues → Analyze → Prioritize → Take action → Evaluate outcomes

For educational use as part of NCLEX-RN preparation. Always verify clinical practice against current institutional protocols and pharmacology references.