

NCLEX-RN • 2026 TEST PLAN • NCJMM ALIGNED

PHARMACOLOGY • ANTI-INFECTION MODULE

HIGH ALERT • IV VESICANT

Vancomycin

Generic: *vancomycin HCl* • Brand: *Vancocin®*, *Firvanq®*

CLASS

Glycopeptide Antibiotic

SYSTEM

Anti-Infective / Immune

PREGNANCY

Category B (IV) • C (PO)

01

Drug Overview

i Indications — Why We Give It

- ▶ **MRSA infections** (methicillin-resistant *Staph aureus*) — drug of choice
- ▶ **Serious gram-positive infections** resistant to other antibiotics
- ▶ **Endocarditis, osteomyelitis, sepsis, pneumonia, meningitis** (penetrates CSF when inflamed)
- ▶ **Coagulase-negative staph** (*Staph epidermidis*) in line infections
- ▶ **PCN-allergic patients** needing gram-positive coverage
- ▶ **PO route ONLY for *C. difficile* colitis** — not absorbed systemically

★ High-Yield Clinical Use

- ▶ Reserved for **resistant gram-positive** organisms — not first-line
- ▶ Effective against: *MRSA*, *MRSE*, *Streptococcus*, *Enterococcus*
- ▶ **NO gram-negative coverage** — pair with another agent for mixed infections
- ▶ IV for systemic infection; PO for gut-only (*C. diff*)
- ▶ Often surgical prophylaxis when MRSA risk is high

CLINICAL PEARL PO vancomycin ≠ IV vancomycin. Oral vanco stays in the gut to kill *C. difficile*.

It will NOT treat pneumonia, bloodstream, or skin infections. NCLEX loves this trap.

02

Mechanism of Action

- 1 **Binds bacterial cell wall precursors** → attaches to *D-alanyl-D-alanine* on peptidoglycan
- 2 **Blocks transpeptidation** → prevents cross-linking of the cell wall
- 3 **Cell wall weakens** → osmotic pressure ruptures the bacterium
- 4 **Bactericidal effect** → bacteria lyse and die
- 5 **Gram-positive ONLY** → molecule too large to cross gram-negative outer membrane

WHY IT MATTERS Vancomycin is **not absorbed orally** — so PO doses stay in the GI tract. This is why PO works for *C. diff* (gut pathogen) but never for systemic infection.

03

Therapeutic Effects

Signs It's Working

- ▶ **Defervescence** — fever resolves within 48–72 hr
- ▶ **WBC trending down** toward normal (5–10K)
- ▶ **CRP & procalcitonin decreasing**
- ▶ **Negative blood cultures** on follow-up draws
- ▶ Wound healing, less drainage, decreased erythema
- ▶ Improved hemodynamics in sepsis (↑ BP, ↓ HR, ↑ UOP)

Expected Timeline

- ▶ **Clinical improvement:** 48–72 hours
- ▶ **Trough at steady state:** draw before 4th dose
- ▶ **MRSA bacteremia treatment:** minimum 14 days IV
- ▶ **Endocarditis:** 4–6 weeks IV
- ▶ **Osteomyelitis:** 4–8 weeks IV
- ▶ ***C. diff* (PO):** 10–14 days

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Side Effects & Adverse Reactions

Common (Manage)

- ▶ **Phlebitis at IV site** — vesicant, dilute well
- ▶ Nausea, taste disturbance (metallic)
- ▶ Headache, dizziness
- ▶ Diarrhea (PO route)
- ▶ Chills, fever (less common)
- ▶ Reversible eosinophilia

Serious

- ⚠ **Red Man / Red Person Syndrome** — flushing, pruritus, erythema of face/neck/upper torso (rate-related, NOT allergy)
- ⚠ **Nephrotoxicity** — ↑ BUN/Cr, oliguria, AKI
- ⚠ **Ototoxicity** — tinnitus, hearing loss (may be permanent)
- ⚠ **Neutropenia & thrombocytopenia** with prolonged therapy
- ⚠ **Anaphylaxis** (true IgE allergy — rare but distinct from Red Man)
- ⚠ **Stevens-Johnson Syndrome / DRESS** (rare)
- ⚠ **Superinfection** — *C. diff*, oral thrush

RED MAN VS ANAPHYLAXIS **Red Man Syndrome** = histamine release from rapid infusion. Patient has

flushing & itching but **stable BP, no wheezing, no angioedema**.

→ *Slow the rate*, give diphenhydramine (Benadryl), may resume at slower rate.

Anaphylaxis = IgE-mediated. Hypotension, wheezing, airway swelling. → *STOP the drug*, epinephrine, never re-give.

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Priority Nursing Considerations

⚙️ Assess / Monitor

- ▶ **Baseline & ongoing BUN, creatinine, GFR**
- ▶ **Trough level** — drawn 30 min BEFORE the 4th dose
- ▶ **Strict I & O** — UOP > 0.5 mL/kg/hr
- ▶ **Hearing & tinnitus** at baseline, then weekly
- ▶ **IV site hourly** — vesicant, watch for phlebitis/infiltration
- ▶ **VS during infusion** — esp. BP & HR for first hour
- ▶ **CBC weekly** with prolonged therapy
- ▶ Cultures & sensitivities, clinical response

⚠️ Contraindications / Cautions

- ▶ Hypersensitivity to vancomycin or corn (some formulations)
- ▶ **Renal impairment** — dose adjust by CrCl
- ▶ **Hearing impairment** — risk of further loss
- ▶ Elderly — ↑ ototoxicity & nephrotoxicity risk
- ▶ Pregnancy/lactation — use only if clearly needed
- ▶ Concurrent nephrotoxic or ototoxic drugs

HOLD / NOTIFY

- ✗ **HOLD & NOTIFY:** trough > 20 mcg/mL (toxic range)
- ✗ **NOTIFY:** rising creatinine > 0.5 mg/dL above baseline OR creatinine > 1.5
- ✗ **NOTIFY:** UOP < 30 mL/hr or < 0.5 mL/kg/hr
- ✗ **NOTIFY:** new tinnitus, vertigo, or hearing changes
- ✗ **STOP infusion:** wheezing, hypotension, angioedema (anaphylaxis)
- ✗ **SLOW infusion:** flushing, itching, red rash on upper body (Red Man)

⚡ Critical Drug Interactions

- ▶ **Aminoglycosides** (gentamicin, tobramycin) — ↑↑ nephro/ototoxicity
- ▶ **Loop diuretics** (furosemide) — ↑ ototoxicity
- ▶ **NSAIDs, contrast dye, ACE inhibitors** — ↑ nephrotoxicity
- ▶ **Amphotericin B, cyclosporine, tacrolimus** — additive renal damage
- ▶ **Neuromuscular blockers** — prolonged paralysis
- ▶ **Anesthetics** — ↑ risk of erythema & histamine-like reactions

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Labs & Diagnostics

LAB	NORMAL RANGE	THERAPEUTIC / CRITICAL	MEANING
Vancomycin Trough	—	10-20 mcg/mL (15-20 for serious infx)	>20 = TOXIC, hold & notify. Draw 30 min BEFORE 4th dose.
AUC/MIC ratio	—	400-600 mg·hr/L	Preferred modern monitoring for MRSA (2020 guidelines).
Creatinine	0.6-1.2 mg/dL	↑ > 0.5 from baseline	Signals nephrotoxicity. Recheck q24-48h.
BUN	7-20 mg/dL	↑ trending up	Renal function decline; correlate with creatinine & UOP.
GFR / CrCl	> 90 mL/min	< 60 mL/min	Dose adjustment required.
WBC	5-10 × 10 ⁹ /L	Should ↓ toward normal	Therapeutic response indicator.
Platelets	150-400 × 10 ⁹ /L	< 100 = caution	Watch for drug-induced thrombocytopenia.
ANC	> 1,500	< 1,000 = neutropenia	Prolonged use → bone marrow suppression.
Blood cultures	Negative	Negative at 48-72 hr	Confirms clearance of bacteremia.

TROUGH TIMING - HIGH-YIELD Trough is drawn **30 minutes BEFORE the next (4th) dose**. Do NOT draw peaks routinely for vanco (no longer standard). Many institutions now use **AUC-based dosing** for MRSA per 2020 IDSA guidelines.

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Administration & Safety

IV Route — Systemic Infection

- ▶ Infuse over **AT LEAST 60 minutes** per 1 gram
- ▶ ≥ 1.5 g dose → infuse over 90–120 min minimum
- ▶ **Dilute** to ≤ 5 mg/mL in NS or D5W
- ▶ **Use a large vein** or central line — vesicant, causes phlebitis
- ▶ Flush line before & after; rotate IV sites
- ▶ Never IV push — fatal cardiac arrest possible
- ▶ Check IV site hourly for redness, swelling, pain

PO Route — *C. diff* ONLY

- ▶ **Not absorbed** — stays in gut to kill *C. difficile*
- ▶ Capsules or oral solution (Firvanq)
- ▶ Take with full glass of water, can give with food
- ▶ Do NOT use IV solution PO interchangeably without provider order
- ▶ Continue full 10–14 day course even if symptoms resolve
- ▶ Will NOT treat pneumonia, bacteremia, cellulitis

HIGH-ALERT MEDICATION Vancomycin is on the **ISMP High-Alert list**. Always: **two-RN verification** for dose at many institutions, infusion pump required, correct rate, correct dilution. Document trough timing, infusion duration, and any adverse reactions precisely.

! If Red Man Syndrome Occurs

- ▶ **1st:** Slow or stop the infusion
- ▶ **2nd:** Give diphenhydramine 25–50 mg IV per order
- ▶ **3rd:** Monitor VS, especially BP
- ▶ **4th:** Resume at half the previous rate once symptoms resolve
- ▶ **Prevention:** infuse slower next time; pre-medicate if recurrent

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Patient Education

Must Teach

- ▶ **Complete full course** — even when feeling better
- ▶ Drink adequate fluids — protect kidneys
- ▶ Report any change in **urine output** (less, darker)
- ▶ Report **ringing in ears, hearing changes, dizziness** IMMEDIATELY
- ▶ Report fever, sore throat, easy bruising (blood dyscrasias)
- ▶ Avoid NSAIDs, OTC pain meds unless approved
- ▶ Report new watery diarrhea (possible *C. diff*)

Seek Help Immediately If

- ⚠ Difficulty breathing, throat swelling, wheezing
- ⚠ Sudden hearing changes or severe tinnitus
- ⚠ No urine output for 8+ hours
- ⚠ Severe rash, peeling skin, blisters
- ⚠ Severe abdominal pain, bloody diarrhea
- ⚠ Confusion, severe weakness, high fever

TEACHING PEARL Tell patients on **oral vancomycin**: this medication treats your gut infection but doesn't enter your bloodstream — that's why it's safe in pregnancy at lower risk and doesn't need trough monitoring like IV.

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NCLEX Test Traps ⚠️

TRAP 01 — RED MAN ≠ ALLERGY

Stop the drug and never give again — it's an allergic reaction.

Red Man Syndrome is a **rate-related histamine reaction**. *Slow the infusion*, give Benadryl, resume at half-rate. True anaphylaxis (hypotension, wheezing, airway swelling) requires permanent discontinuation.

TRAP 02 — TROUGH TIMING

Draw the trough right after the dose finishes.

Trough is drawn **30 min BEFORE the next dose** (typically the 4th dose for steady state). Peaks are no longer standard for vanco.

TRAP 03 — ROUTE CONFUSION

Give oral vancomycin for MRSA pneumonia.

Oral vanco is **NOT absorbed** — it only works in the gut for *C. difficile*. Systemic infections REQUIRE IV.

TRAP 04 — INFUSION RATE

Infuse 1g over 30 minutes to get the level up quickly.

Infuse **at least 60 minutes per gram**. Faster rates cause Red Man Syndrome and can precipitate hypotension.

TRAP 05 — RENAL PRIORITY

Hold the drug only if creatinine is > 2.0 .

Hold/notify for an **increase of 0.5 mg/dL from baseline** or trough > 20 . Trends matter more than absolute numbers.

TRAP 06 — DRUG STACKING

Give vancomycin + gentamicin + furosemide as ordered — no concern.

This is a **nephro & ototoxic trio**. Question the order or at minimum monitor BUN/Cr and hearing extra closely. NCLEX wants you to recognize the danger.

TRAP 07 — SUB-THERAPEUTIC TROUGH

A low trough means "not working" — increase the dose.

Low trough may mean dose too small OR drawn too early. Check timing first; collaborate with pharmacy for dose adjustment. Don't change the order independently.

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Memory Boosters

VANCO

- V** – Vesicant (large vein / central line)
- A** – Always over ≥ 60 min per gram
- N** – Nephrotoxic + Neutropenic
- C** – Cochlea (ototoxic, tinnitus)
- O** – Oral = *C. diff* ONLY

"10-20"

- 10-20 mcg/mL** = therapeutic trough
- > 20** = TOXIC – hold & notify
- 15-20** = serious MRSA infections
- 30 min** before 4th dose = draw time
- 60 min** = minimum infusion per gram

RED MAN

- R** – Rate too fast
- E** – Erythema upper body
- D** – Diphenhydramine (Benadryl)
- M** – Mild – not anaphylaxis
- A** – Antihistamine + slow rate
- N** – Never stop permanently

PATTERNS

- ↑ BUN/Cr** = nephrotoxicity
- Tinnitus** = ototoxicity → may be permanent
- Flushing** = Red Man → slow rate
- Wheezing** = anaphylaxis → stop forever
- Diarrhea** on therapy = check for *C. diff*

Clinical Judgment Snapshot

RECOGNIZE → ANALYZE → PRIORITIZE → ACT → EVALUATE

① What is the #1 priority risk with this drug?

Nephrotoxicity & ototoxicity, especially when combined with other nephro/ototoxic agents (aminoglycosides, loop diuretics, contrast dye). **Red Man Syndrome** is the most commonly tested infusion reaction but is rate-related and reversible — the lasting damage risk is to kidneys and hearing.

② What will harm the patient FIRST?

During the first dose, **Red Man Syndrome from too-fast infusion** — flushing, pruritus, possible hypotension within minutes. Across the therapy course, **acute kidney injury** from sustained high troughs or drug stacking — recognizable by rising creatinine, decreasing UOP, often before patient symptoms appear.

③ What is the FIRST nursing action in a scenario?

Patient flushing & itching during infusion: *Stop or slow the infusion FIRST*, then assess VS, then notify provider, then give Benadryl per order.

Trough reported as 24 mcg/mL: *Hold the next dose*, notify provider, check renal function.

Creatinine ↑ from 0.9 to 1.6: *Notify provider before next dose*, anticipate dose adjustment or discontinuation.

New tinnitus reported: *Hold dose, notify provider* — ototoxicity may be permanent.

Most-Tested Glycopeptides

DRUG CLASS COMPARISON

Vancomycin is the cornerstone glycopeptide and the only one NCLEX heavily tests, but newer lipoglycopeptides appear on advanced questions. Know vanco cold; recognize the others.

DRUG	KEY USE	ROUTE & DOSING	UNIQUE CONCERNS	NCLEX FOCUS
Vancomycin VANCOCIN • FIRVANQ	MRSA, serious gram + infections, <i>C. diff</i> (PO)	IV q8-12h with trough monitoring; PO QID for <i>C. diff</i>	Red Man Syndrome, nephrotoxicity, ototoxicity	★★★★★ — HIGHEST yield
Telavancin VIBATIV	Complicated skin/soft tissue infections, HABP/VABP	IV once daily	QT prolongation, nephrotoxicity, teratogenic (Pregnancy X)	★★ — Recognize the name
Dalbavancin DALVANCE	Acute bacterial skin infections (MRSA)	IV — single dose OR two-dose regimen one week apart	Long half-life (~14 days); ↑ ALT/AST	★ — Unique single-dose schedule
Oritavancin ORBACTIV	Acute bacterial skin infections (MRSA)	IV — single dose over 3 hours	Interferes with coagulation labs for up to 48 hr (falsely ↑ aPTT/PT)	★ — Lab interference pearl

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COMPARE WITH: AMINOGLYCOSIDES • LINEZOLID • DAPTOMYCIN • CARBAPENEMS