CARDIOVASCULAR SYSTEM

Endocarditis

Inflammation and infection of the endocardium and heart valves — high stakes for embolization, heart failure, and sepsis. A priority NCLEX topic for clinical judgment, prioritization, and pharmacology.

- Cardiac Pathology
- IV Antibiotic Therapy 4–6 wks
- High Mortality if Untreated
- NGN NCLEX 2026 High-Yield

1 Definition & Overview

What it is, who's at risk, why it matters

WHAT IT IS

Endocarditis is inflammation of the **endocardium** — the inner lining of the heart — most commonly affecting the **heart valves** (mitral > aortic in general population; **tricuspid in IV drug users**).

WHY IT MATTERS

Bacteria form **vegetations** on valves that can **embolize** → stroke, splenic/renal infarct, pulmonary embolism. Can cause **valve destruction → heart failure** (#1 cause of death in endocarditis).

MOST COMMON CAUSE

Bacterial infection — typically **Staphylococcus aureus** (acute) or **Streptococcus viridans** (subacute, often post-dental). Fungal causes are rare but lethal.

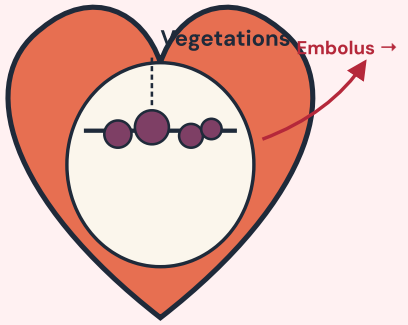
TOP RISK FACTORS

- IV drug use (right-sided/tricuspid)
- Prosthetic valves & congenital heart disease
- Recent dental, GU, or GI procedures
- Hemodialysis & long-term central lines
- Immunocompromised state

2 Pathophysiology — Step by Step

From bloodstream invasion to systemic embolic disease

1. **Portal of entry:** bacteria enter bloodstream (dental work, IVDU, central line, GU/GI procedure)
2. **Adherence:** organisms adhere to damaged endocardium or prosthetic valve surface
3. **Vegetation forms:** fibrin + platelets + microbes clump on valve leaflets
4. **Valve destruction →** regurgitation, new murmur, heart failure
5. **Embolization:** vegetations break off → stroke, splenic/renal infarct, PE (right-sided)



Vegetations on valve leaflets can break off and embolize systemically.

KEY CONCEPT

Right-sided endocarditis (tricuspid — IVDU) → emboli go to **LUNGS** (PE, septic pulmonary infarcts). **Left-sided** (mitral/aortic) → emboli go **SYSTEMIC** (brain → stroke, kidneys, spleen, extremities).

3 Signs & Symptoms

Early/general → late/peripheral classic findings

EARLY / GENERAL	LATE / SEVERE 🚨
Fever & chills (most common — often low-grade in subacute)	**New or changed heart murmur** (regurgitant — hallmark)
Fatigue, malaise, weakness	Heart failure: crackles, dyspnea, S3, edema
Anorexia, weight loss, night sweats	Embolic events: stroke (focal deficits), flank pain (renal), LUQ pain (splenic)
Arthralgia, myalgia, headache	Petechiae on palate, conjunctiva, neck, chest
Tachycardia, anemia of chronic disease	Sepsis & septic shock (acute bacterial endocarditis)

⭐ Classic Peripheral Signs (Late, Diagnostic Clues)

From immune complex deposition & microemboli — high-yield NCLEX content

Osler Nodes

Painful red/purple raised nodules on **fingertips & toe pads**. *Osler = Ouch.*

Janeway Lesions

Painless flat red/purple macules on **palms & soles**. *Janeway = Just spots.*

Roth Spots

Retinal hemorrhages with pale/white centers. Seen on funduscopic exam.

Splinter Hemorrhages

Thin red-brown **vertical streaks under nail beds** — look like splinters.

4 Priority Nursing Interventions

ABC framework + safety + NCLEX prioritization

A — AIRWAY / B — BREATHING

- **Assess** lung sounds for crackles → HF complication
- **Monitor** SpO_2 & respiratory rate; watch for sudden dyspnea (PE risk in right-sided)
- Position semi-Fowler's if HF develops

C — CIRCULATION

- **Auscultate heart sounds q shift** — listen for new/changed murmur 🚨
- **Monitor** VS, peripheral pulses, capillary refill
- **Assess** for embolic signs: neuro changes, flank/abdominal pain, cool/mottled extremities
- Strict I&O; daily weights

INFECTION CONTROL — PRIORITY

- **Obtain blood cultures × 3** from different sites **BEFORE** first antibiotic dose ⚠️
- Administer **IV antibiotics** on schedule — typically 4–6 weeks
- Monitor temperature q4h; antipyretics as ordered
- Maintain long-term IV access (PICC line)

SAFETY & ACTIVITY

- **Bed rest** during acute phase to reduce embolization risk
- Soft toothbrush; avoid flossing during acute phase
- Frequent neuro checks (stroke risk)
- Prepare for **echocardiogram** (TEE more sensitive than TTE)
- Prepare for possible **valve replacement surgery**

🚨 TOP PRIORITY ACTION

If a client with endocarditis develops **sudden focal weakness, slurred speech, or vision changes → suspect embolic stroke**. Notify provider immediately and prepare for emergency neuro assessment & imaging. ABC + Neuro takes priority over scheduled cares.

5 Pharmacology

Long-course IV antibiotics — backbone of treatment

Penicillins / Beta-lactams

Penicillin G • Nafcillin • Oxacillin • Ceftriaxone

MOA: Inhibit bacterial cell wall synthesis → bactericidal

USE: Strep viridans, MSSA endocarditis (gold standard)

SIDE EFFECTS: Allergy/anaphylaxis, GI upset, rash

NURSING: Assess PCN allergy **before** first dose; monitor for rash, dyspnea

Glycopeptide

Vancomycin (IV)

MOA: Inhibits cell wall synthesis

USE: MRSA, PCN allergy, prosthetic valve infection

SIDE EFFECTS: **Nephrotoxicity, ototoxicity, "Red Man syndrome"** (flushing if infused too fast)

NURSING: Infuse over **at least 60 min**; monitor **trough levels** (10–20 mcg/mL); check BUN/Cr; assess hearing

Aminoglycoside

Gentamicin (IV)

MOA: Inhibits protein synthesis; **synergy** with cell-wall agents

USE: Combined with PCN/Vanc for synergistic killing of enterococci/strep

SIDE EFFECTS: **Nephrotoxicity & ototoxicity** (irreversible hearing loss)

NURSING: Monitor **peak & trough** levels, BUN/Cr, urine output, daily hearing assessment

Prophylaxis

Amoxicillin (PO) • Clindamycin (PCN allergy)

MOA: Single-dose prophylaxis 30–60 min **before** high-risk procedures

USE: Dental, GU, respiratory procedures in high-risk patients (prosthetic valve, prior endocarditis, certain congenital heart disease)

NURSING: Educate patient to **always inform dentist & providers**; carry MedicAlert

⚠ WHY NOT ANTICOAGULANTS?

Anticoagulants are **NOT routinely given** for endocarditis — risk of **hemorrhagic conversion** of septic cerebral emboli. Only continued if there's a separate indication (e.g., mechanical valve already on warfarin).

6 NCLEX Test Traps

Common wrong-answer patterns & what to choose instead

✕ Trap #1: Antibiotics first, cultures later

Tempting because the patient is septic and you want to "act fast."

✓ **Correct:** Always draw **blood cultures × 3 BEFORE** starting antibiotics. Once antibiotics are in, cultures may falsely return negative.

✕ Trap #2: Confusing Osler & Janeway

Both are peripheral skin findings — easy to mix up.

✓ **Remember: Osler = Ouch** (painful, fingertips). **Janeway = Just spots** (painless, palms/soles).

✕ Trap #3: Giving anticoagulants for emboli

Sounds logical because patient is throwing emboli.

✓ **Correct:** Anticoagulants are **contraindicated** in most cases — they can convert a septic embolic stroke into a **hemorrhagic** one.

✕ Trap #4: Stopping antibiotics when fever resolves

Patient feels better at week 2 — must be cured, right?

✓ **Correct:** Treatment is **4–6 weeks of IV antibiotics**. Stopping early = relapse, resistance, valve destruction.

✕ Trap #5: New murmur dismissed as baseline

Murmur is on the chart — assumed it's not new.

✓ **Correct:** A **new or changed murmur in a febrile patient** is endocarditis until proven otherwise. Always notify provider.

✕ Trap #6: Skipping prophylaxis education

Forgetting that high-risk patients need lifelong dental prophylaxis.

✓ **Correct:** Patients with prosthetic valves, prior endocarditis, or certain congenital heart disease need **antibiotic prophylaxis before dental, GU, and respiratory procedures**.

7

NCJMM Clinical Judgment Framework

Six-step model applied to a client with endocarditis

1 Recognize Cues

Fever, fatigue, new murmur, petechiae, splinter hemorrhages, recent dental work or IVDU history, positive blood cultures.

2 Analyze Cues

Connect: bloodstream invasion → vegetations on valve → embolic risk + valve damage + sepsis. Identify left- vs right-sided pattern.

3 Prioritize Hypotheses

Top concerns: (1) Embolic stroke, (2) Heart failure from valve regurgitation, (3) Sepsis/septic shock.

4 Generate Solutions

Blood cultures × 3 before ABX; long-course IV antibiotics; echo (TEE); strict bed rest; prepare for possible valve surgery.

5 Take Action

Draw cultures, hang IV antibiotics on schedule, neuro checks, monitor VS, auscultate heart/lungs, educate on adherence & prophylaxis.

6 Evaluate Outcomes

Resolution of fever, negative repeat cultures, stable hemodynamics, no new neuro deficits, completion of full ABX course.

8 Patient & Family Education

Recurrence prevention & long-term self-management

- **Complete the full IV antibiotic course** (4–6 weeks) even if feeling better — relapse is common
- **Notify ALL providers** (especially dentist & surgeon) of your endocarditis history — for life
- Take **prophylactic antibiotics 30–60 min before** dental cleanings, extractions, GU procedures (if high-risk)
- Wear a **MedicAlert bracelet**
- Practice **excellent oral hygiene** — soft toothbrush, regular dental visits
- **Avoid IV drug use** — refer to recovery resources if needed
- Recognize early signs of recurrence: **fever, fatigue, night sweats, weight loss, new aches**
- Care for PICC line: keep dry, monitor for redness/swelling, never miss flushes
- Keep **cardiology follow-up** appointments & echocardiograms
- Report immediately: **focal weakness, slurred speech, sudden vision changes** (stroke signs)

9 Memory Boosters & Mnemonics

Pattern recognition for the test

📌 "FROM JANE" — Classic Findings of Endocarditis

A complete map of the diagnostic clues — used in modified Duke Criteria.

- **F** — **Fever** — most common & earliest sign
- **R** — **Roth spots** — retinal hemorrhages with white centers
- **O** — **Osler nodes** — painful nodules on fingers/toes (Osler = Ouch)
- **M** — **Murmur** — new or changed (regurgitant)
- **J** — **Janeway lesions** — painless macules on palms/soles (Janeway = Just spots)
- **A** — **Anemia** — anemia of chronic disease
- **N** — **Nail-bed hemorrhages** — splinter hemorrhages
- **E** — **Emboli** — stroke, splenic/renal infarct, PE (right-sided)

🎯 QUICK PATTERN TIP

"Right side, lungs hide; Left side, brain dies."

🎯 QUICK PATTERN TIP

"Cultures before cures."

Right-sided (tricuspid, IVDU) → **pulmonary emboli**. Left-sided (mitral/aortic) → **systemic emboli → stroke**.

Always draw **3 sets of blood cultures** from different sites **before** the first antibiotic dose. Antibiotic-then-culture = false negatives.

🎯 QUICK PATTERN TIP

"VAN-CO = Slow GO."

Vancomycin must infuse over **at least 60 min** to prevent **Red Man Syndrome**. Monitor trough & renal function.

🎯 QUICK PATTERN TIP

"4–6 weeks, no peeks."

Endocarditis = long-haul IV antibiotics. Don't stop early no matter how good the patient feels. PICC line + home health is standard.