

Infective Endocarditis

A pediatric nurse's high-yield map to vegetations, valves, & the vital prophylaxis call.

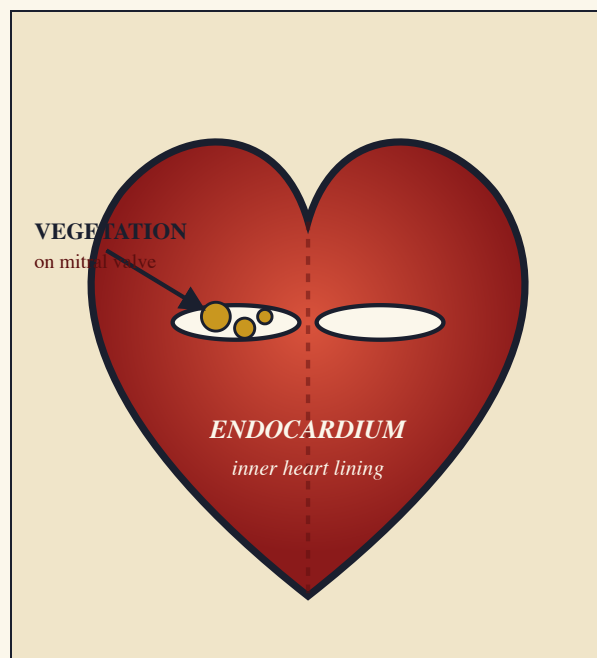
SYSTEM • CARDIAC NGN DOMAIN • RECOGNIZE CUES / TAKE ACTION RISK TIER • HIGH FILED • 04 / 2026

The *vegetation* story.

Infective endocarditis (IE) is a microbial infection of the **endocardium** — most commonly the heart valves — where bacteria adhere to damaged or abnormal endothelium and form fibrin-platelet-microbe clusters called **vegetations**.

In children, IE is rare but devastating. It almost always rides on a pre-existing setup: **congenital heart disease**, a **prosthetic valve**, or an **indwelling central line**. Vegetations destroy valves, embolize to the brain & lungs, and seed distant abscesses.

Heart of the test plan: blood cultures × 3 → echo → IV antibiotics 4–6 weeks → prophylaxis for high-risk kids.



AT-A-GLANCE • THE PEDIATRIC SETUP

Most pediatric IE rides on a pre-existing heart problem.

~75–90% of cases occur in children with **congenital heart disease**, prosthetic valves, or central venous catheters. Healthy hearts are rare hosts — except in IV drug use among adolescents (right-sided IE).

TRIPLE THREAT

Fever + new murmur + at-risk heart = IE until proven otherwise.

Persistent fever > 48 hrs in a child with CHD, prosthetic valve, or central line is a culture-and-echo emergency. **Do not delay blood cultures for antipyretics.**

01 Who's at risk — the pediatric setup

RECOGNIZE CUES



Unrepaired Cyanotic CHD

Tetralogy of Fallot, transposition, truncus — turbulent flow damages endocardium. **Highest pediatric risk.**



Prosthetic Valve

Mechanical or bioprosthetic. Risk highest in **first 6 mo** post-op. Includes valved conduits.



Central Line / PICC

Long-term access in onc, NICU, TPN kids. **Right-sided IE** — tricuspid valve target.



Prior Endocarditis

One of the strongest predictors. Damaged valve = recurrent vegetation site.



Adolescent IV Drug Use

Skin flora into bloodstream → **tricuspid (right-sided) IE**. *S. aureus* is the usual culprit.



Repaired CHD w/ Residue

Patches, conduits, or residual shunts — turbulent flow continues. Risk persists 6 mo+ post-repair.

02 Causative pathogens — know the top 4

TAKE ACTION • ABX SELECTION

#1

Staph aureusAcute IE • IVDU
Central lines • Prosthetic

#2

Strep viridansSubacute IE
Native valve • Post-dental

#3

CoNSCoagulase-negative Staph
Prosthetic valves • Lines

#4

HACEKHaemophilus, Aggregatibacter,
Cardiobacterium, Eikenella,
Kingella

03 Modified Duke Criteria — the diagnostic spine

ANALYZE CUES

MAJOR Criteria

×2 = DEFINITE

- ▶ **Positive blood cultures** for typical IE organism — 2 separate sets
- ▶ Persistent bacteremia (cultures > 12 hrs apart, all positive)
- ▶ **Echo evidence:** vegetation, abscess, valve dehiscence, new regurgitation
- ▶ New valvular regurgitation (worsening murmur)

MINOR Criteria

×5 = DEFINITE

- ▶ **Predisposition:** CHD, prosthetic valve, IVDU
- ▶ **Fever** > 38.0°C (100.4°F)
- ▶ **Vascular:** emboli, Janeway lesions, mycotic aneurysm
- ▶ **Immunologic:** Osler nodes, Roth spots, glomerulonephritis, +RF
- ▶ Microbiologic: positive culture not meeting major

DEFINITE IE: *2 Major* • OR • *1 Major + 3 Minor* • OR • *5 Minor*

04 Clinical manifestations — the FROM JANE map

MNEMONIC • RECOGNIZE CUES

MNEMONIC • THE CLASSIC IE PICTURE

F·R·O·M J·A·N·E**F**ever > 38°C — most common
sign in kids**R**oth spots — retinal
hemorrhages w/ pale center**O**sler nodes — *painful*
finger/toe pad bumps**M**urmur — new or changed
regurgitant murmur**J**aneway lesions — *painless*
palm/sole macules**A**nemia — normocytic; chronic
disease pattern**N**ail-bed splinter hemorrhages
— linear streaks**E**mboli — stroke, splenic,
pulmonary, renal**Janeway Lesions**Flat red macules on palms/soles
— septic micro-emboli.

PAINLESS

**Osler Nodes**Tender raised nodules on
fingertips/toes — immune
complex.

PAINFUL • OUCH!

**Roth Spots**Retinal hemorrhages with white
center — fundoscopy finding.

EYE EXAM

**Splinter Hemorrhages**Thin red-brown lines under nails
— micro-emboli to nail
capillaries.

PAINLESS

PEDIATRIC RED-FLAG PICTURE

What you'll actually see in the child

- **Persistent low-grade fever** (often the only sign early)
- **Malaise, weight loss, anorexia** — chronic illness picture
- **New or changing murmur** on auscultation
- **Splenomegaly** (subacute IE)
- **Petechiae** on conjunctiva, palate, extremities
- **Heart failure signs:** tachycardia, tachypnea, poor feeding (infants)
- **Embolic events:** focal neuro deficits, hematuria, flank pain

DIAGNOSTICS — THE WORKUP

What gets ordered & why

- **Blood cultures × 3** from *different sites, different times* — **BEFORE** antibiotics
- **Echocardiogram:** TTE first; **TEE** if prosthetic valve or TTE inconclusive
- **CBC:** leukocytosis, normocytic anemia
- **ESR & CRP:** elevated (track response to therapy)
- **Urinalysis:** hematuria, proteinuria (glomerulonephritis)
- **EKG:** new conduction block = perivalvular abscess
- **Procalcitonin, BMP, LFTs:** baseline organ function

05 Treatment — long, IV, and patient

TAKE ACTION

ANTIBIOTIC THERAPY

IV ABx × 4–6 weeks

- **Empiric:** Vancomycin + Gentamicin (covers MRSA + Strep)
- Narrow when culture & sensitivity returns
- **Native valve viridans:** Penicillin or Ceftriaxone
- **Staph aureus:** Nafcillin (MSSA) / Vancomycin (MRSA)
- **Prosthetic valve: 6+ weeks +** Rifampin

SURGICAL INDICATIONS

When ABx alone won't do

- Heart failure from valve destruction
- Persistent bacteremia > 5–7 days on ABx
- **Large mobile vegetation** (> 10 mm) — embolic risk
- Perivalvular abscess or fistula
- Fungal IE — *almost always* requires surgery
- Recurrent embolic events on therapy

NURSING PRIORITIES

Daily care focus

- **VS q4h** — fever curve = response marker
- **Neuro checks** — embolic stroke risk
- Strict I&O; daily weights
- **Lung sounds, work of breathing** — HF
- Central line care — sterile dressing changes
- Watch for **Vanc trough** & nephrotoxicity
- Auscultate for **new/changed murmur** daily

**RED FLAG — embolic stroke is the silent killer**

Sudden focal neurologic deficit (slurred speech, weakness, vision change, seizure) in a child being treated for IE = **embolic CVA until proven otherwise**. Notify provider STAT, hold next dose if anticoagulated, prep for emergent imaging.

DON'T MISS THIS ON THE NCLEX

Cultures BEFORE antibiotics — always.

If you give that first dose of vancomycin before drawing 3 sets of blood cultures, you may sterilize the blood and lose the diagnosis. The **only** exception is septic shock. Even then — draw 1 set first, then push antibiotics within an hour.

VANC TROUGH MONITORING

Trough goal: 15–20 mcg/mL for IE.

Draw **30 min before the 4th dose**. Hold next dose & notify provider for trough > 20, rising creatinine, or new oliguria. Watch for **red man syndrome** — slow infusion to ≥ 60 min and pre-medicate with diphenhydramine if needed.

06 Prevention — the prophylaxis question NCLEX loves

Antibiotic prophylaxis — only for high-risk kids, only for high-risk procedures.

WHO GETS PROPHYLAXIS

- ✓ Prosthetic cardiac valve / prosthetic material used for repair
- ✓ Previous infective endocarditis
- ✓ **Unrepaired** cyanotic CHD (incl. shunts & conduits)
- ✓ CHD repaired w/ prosthetic material × **first 6 mo**
- ✓ Repaired CHD with residual defect at site of patch/device
- ✓ Cardiac transplant w/ valvulopathy

WHICH PROCEDURES

- ✓ **Dental:** manipulation of gingiva, periapical region, or oral mucosa perforation
- ✓ Respiratory tract incision/biopsy (T&A, bronchoscopy w/ biopsy)
- ✓ Procedures on infected skin/MS tissue
- ✓ **NOT routinely needed** for GI/GU procedures, routine cleanings, or simple fillings

Amoxicillin 50 mg/kg PO • 30–60 min before procedure (max 2 g)

PCN allergy: Cephalexin 50 mg/kg or Azithromycin 15 mg/kg

07 Complications — what kills, what cripples

EVALUATE OUTCOMES

1

Valve Destruction

Regurgitation → volume overload → **heart failure**

2

Septic Emboli

Brain (CVA), spleen, kidney, lung. Right-side → **pulmonary emboli**

3

Perivalvular Abscess

Conduction block on EKG → surgical emergency

4

Glomerulonephritis

Immune complex deposition → hematuria, AKI

5

Mycotic Aneurysm

Vessel-wall infection → rupture risk (cerebral arteries)

07b Prophylaxis decision drill — yes or no?

RAPID RECALL

YES — GIVE ABx

Prosthetic valve • routine dental cleaning

Cleaning involves gingival manipulation. Prosthetic valve is highest-risk category.

YES — GIVE ABx

Unrepaired TOF • tooth extraction

Unrepaired cyanotic CHD + invasive dental work = absolute indication.

YES — GIVE ABx

Prior IE • T&A surgery

Past IE = lifetime high-risk. Tonsil/adenoid surgery breaks respiratory mucosa.

NO — SKIP ABx

VSD repaired 2 yrs ago • cleaning

No residual defect & > 6 mo post-repair = no longer high risk.

NO — SKIP ABx

Healthy 8-year-old • cavity filling

No cardiac risk factors. Routine restoration is not high-risk regardless.

NO — SKIP ABx

Prosthetic valve • colonoscopy

GI/GU procedures — **not** routinely required per 2021 AHA update.

SPECIAL POPULATIONS • QUICK CALLOUTS

Neonates → non-specific signs (poor feeding, apnea, temp instability); often **central line** related in NICU.

Infants → tachypnea + sweating with feeds = early HF clue from valve damage.

IVDU teens → **tricuspid IE**, S. aureus, septic pulmonary emboli; screen privately.

One patients → long-term lines → CoNS & **fungal IE** risk; surgical course often required.

CASE STUDY • BOW-TIE ITEM

The 9-year-old with TOF and a 6-day fever

A 9-year-old with surgically repaired Tetralogy of Fallot (3 years post-op, residual VSD) presents with 6 days of fevers to 38.9°C (102°F), fatigue, and decreased appetite. On exam: HR 124, RR 26, SpO₂ 96% on RA. New holosystolic murmur at LLSB. Conjunctival petechiae present. Tender erythematous nodule on R index fingertip. Two months ago, patient had dental cleaning **without antibiotic prophylaxis**. Labs: WBC 17.2, ESR 78, CRP 6.4, U/A: 2+ blood, 1+ protein.

- ACTIONS TO TAKE (2)

Obtain 3 blood cultures from separate sites ✓

Notify provider; prepare for echocardiogram ✓

Administer scheduled acetaminophen

Encourage oral fluids and rest

CONDITION MOST LIKELY

Subacute Infective Endocarditis

Fever + new murmur + Osler node + petechiae + hematuria + post-dental + repaired CHD with residual defect → meets **1 Major + 4 Minor** Duke criteria.

PARAMETERS TO MONITOR (2)

Neurologic status (embolic CVA risk) ✓

Heart sounds & murmur trend daily ✓

Bowel sounds q shift

Skin turgor q4h

09 The quick-recall card — pre-exam scan

LAST 60 SECONDS

Top organism overall → Staph aureus. **Subacute / post-dental** → Strep viridans. **Prosthetic valve** → CoNS.

Tricuspid IE → think IV drug use or central line. Right-sided emboli → **lungs**, not brain.

Cultures BEFORE antibiotics. 3 sets, different sites, ≥ 1 hour apart in subacute IE.

TTE first. TEE is the gold standard for prosthetic valves & small vegetations.

Osler = Ouchy (painful). **Janeway = "Just there"** (painless). Memorize the pair.

Fever + new murmur + at-risk heart = blood cultures + echo. Don't pass go.

IV ABx 4–6 wks. 6+ wks for prosthetic valves. Discharge often w/ PICC + home infusion.

Prophylaxis amoxicillin 50 mg/kg PO 30–60 min before high-risk dental work in high-risk kids only.

New conduction block on EKG during IE tx = **perivalvular abscess** until proven otherwise.

Fungal IE almost always = surgery. Long, hard to clear, high mortality.

Teach families: good oral hygiene > antibiotics. Carry an "IE alert" card before procedures.

Vegetation > 10 mm + mobile on echo = high embolic risk; surgical consult on the table.

FAMILY TEACHING • DISCHARGE PRIORITIES

Before they walk out that door

- ✓ **Oral hygiene** — soft brush 2x/day, daily floss, dental cleanings q6mo
- ✓ **Carry a wallet card** listing IE risk + prophylaxis indication
- ✓ **Notify all providers** (dentist, ENT, surgeon) of cardiac history
- ✓ **Avoid piercings & tattoos** (bacteremia source)
- ✓ **Fever > 38°C lasting > 24 hrs** = call cardiology, do not self-treat
- ✓ **Complete the full ABx course** — even if feeling better
- ✓ Watch for **weakness, vision change, severe headache** = ED now
- ✓ **Follow-up echo** at end of therapy & 6 wks post