

Rheumatic Fever

NGN-ALIGNED
CLINICAL JUDGMENT
SIX-STEP MODEL

A delayed, autoimmune, inflammatory sequela of untreated Group A β -hemolytic Streptococcus (GAS) pharyngitis — striking heart, joints, brain, skin, and subcutaneous tissue 2–4 weeks after the initial infection.

ONSET WINDOW

2–4 weeks post-strep

PEAK AGE

5–15 years

TRIGGER

GAS strep throat / scarlet fever

WORST SEQUELA

RHD mitral valve damage

AT-A-GLANCE • WHY IT MATTERS

The "child with sore throat" who didn't finish antibiotics

- Antibodies cross-react with self (**molecular mimicry**) → multi-organ inflammation.
- **Carditis** is the only manifestation that causes permanent damage — primarily the **mitral valve**.
- Diagnosis is **clinical** (Jones criteria) + lab evidence of recent GAS.
- Long-term **penicillin prophylaxis** prevents recurrence — the central teaching point.

01

Pathophysiology & Timeline

MECHANISM • MOLECULAR MIMICRY

Antibodies confuse strep for self

The **M-protein** on the surface of Group A *Streptococcus* shares structural epitopes with cardiac myosin, joint synovium, neuronal tissue (basal ganglia), and skin. Antibodies generated to fight the infection **cross-react with the child's own tissues**, producing a Type II hypersensitivity inflammatory response in genetically susceptible hosts.

The result is a **pancarditis** (endo-, myo-, peri-cardium), migratory arthritis, chorea, rash, and nodules — appearing weeks *after* the strep infection has resolved.



CLINICAL TIMELINE

From sore throat to chorea

DAY 0 • TRIGGER

GAS pharyngitis

Strep throat or scarlet fever; often **untreated or undertreated** with antibiotics.

WEEK 2–4 • ONSET

Acute rheumatic fever

Sudden fever, migratory polyarthritis, new murmur — child appears “suddenly sick” weeks after recovery.

WEEK 6–12 • LATE

Sydenham chorea

Involuntary purposeless movements + emotional lability — may appear in isolation, months later.

MONTHS → YEARS

Rheumatic heart disease

Mitral valve scarring → regurgitation → stenosis. Lifelong consequence if recurrent.

02

The Jones Criteria • Major Manifestations

MNEMONIC • HEART WALKS LIKE A J•O•N•E•S

JONES

Each letter is a major manifestation. The O is drawn as a heart — a reminder that **carditis is the only manifestation that causes permanent damage.**

J

Joints

Migratory polyarthritis of large joints (knees, elbows, ankles, wrists). Hot, red, swollen — moves joint to joint over hours/days. Resolves without deformity.



Carditis

Pancarditis — endocarditis (new murmur, mitral regurg), myocarditis (tachycardia, CHF), pericarditis (friction rub, chest pain). **Most serious — permanent damage.**



N

Nodules

Subcutaneous, painless, firm nodules (0.5–2 cm) over **extensor surfaces & bony prominences** — elbows, knees, scalp, spine. Often signal severe carditis.



E

Erythema marginatum

Pink, macular, evanescent rash with **clear center & serpiginous borders** on the **trunk & proximal limbs** (never the face). Comes & goes; non-pruritic.



S

Sydenham chorea

Involuntary, purposeless, jerky movements + **emotional lability**, muscle weakness, deteriorating handwriting. May appear in isolation months later. Self-limiting.



MINOR CRITERIA

► Fever $\geq 38.5^{\circ}\text{C}$

► Arthralgia (no swelling)

► $\uparrow$ ESR / $\uparrow$ CRP

► Prolonged PR interval (ECG)

► Prior rheumatic fever

Dx Rule

2 MAJOR —or— 1 MAJOR + 2 MINOR PLUS evidence of recent GAS infection ($\uparrow$ ASO titer, $\uparrow$ anti-DNase B, + throat culture, or rapid antigen test) = **Acute Rheumatic Fever.**

03

Diagnostics • What to Order & Why

LAB WORKUP

Confirming recent strep + active inflammation

-  **ASO Titer (Anti-streptolysin O)**
 Confirms recent GAS infection. **Peaks 3–6 weeks** after strep. Most useful in early ARF. ↑ ELEVATED
-  **Anti-DNase B**
 Backup serology — **peaks later (6–8 wk)**; useful when ASO is normal but suspicion remains. ↑ ELEVATED
-  **ESR & CRP**
 Non-specific inflammation markers. Used to **monitor disease activity** & response to therapy. ↑ ↑
-  **Throat culture / Rapid antigen**
 May be **negative by the time ARF appears** (infection has cleared) — ASO titer is more reliable. +/-
-  **CBC**
Leukocytosis + mild normocytic anemia of chronic inflammation. ↑ WBC

CARDIAC WORKUP

Don't miss carditis — order these on every suspected case

-  **12-Lead ECG**
Prolonged PR interval (1° AV block) = classic minor criterion. Also: tachycardia disproportionate to fever. PR > 0.20s
-  **Echocardiogram**
 The **gold standard** for diagnosing carditis. Detects valve regurgitation (esp. mitral), pericardial effusion, ventricular dysfunction. GOLD STD
-  **Chest X-ray**
 Look for **cardiomegaly** & pulmonary congestion (heart failure from acute carditis). CARDIOMEG.
-  **Auscultation**
New holosystolic murmur at apex (mitral regurg) is the *hallmark physical finding*. Listen for friction rub. NEW MURMUR

04

Treatment • Three Pillars

01

ERADICATE

Eliminate residual streptococcus

- **Penicillin G benzathine** — single IM dose (drug of choice)
- **Penicillin V PO** × 10 days (alternative)
- **Erythromycin / azithromycin** if PCN-allergic

Teach: Even a negative throat culture warrants treatment — eliminates carrier state & protects others.

02

SUPPRESS INFLAMMATION

Cool the autoimmune response

- **Aspirin (high-dose)** — joints & mild carditis
- **Corticosteroids (prednisone)** — moderate-severe carditis or CHF
- **Phenobarbital / haloperidol / valproate** — chorea (if severe)

Reye warning: ASA in children needs careful screening — but in ARF the benefit outweighs risk; coordinate with provider, monitor for viral illness.

03

SUPPORT & REST

Protect the inflamed heart

- **Bed rest** during acute phase, then gradual activity
- **Quiet, calm environment** for chorea (↓ stimulation, padded rails)
- **Heart failure care** if carditis is severe — diuretics, ACE-I, fluid balance

Activity rule: Resume activity only when ESR/CRP normalize & cardiac exam stable.

05

Secondary Prophylaxis • The Long-Term Plan

Once a child has had ARF, they are **highly susceptible to recurrence**. Each episode worsens cardiac damage. Continuous antibiotic prophylaxis prevents new GAS infections from triggering another attack. **This is the highest-yield teaching point on NGN exams.**

SEVERITY	DURATION OF PROPHYLAXIS	REGIMEN
ARF without carditis	5 years <i>or</i> until age 21 — whichever is longer	Penicillin G benzathine 1.2 million U IM every 4 weeks (preferred) — <i>or</i> — Penicillin V 250 mg PO BID daily — <i>or (if PCN-allergic)</i> — Sulfadiazine 1 g PO daily / Erythromycin 250 mg PO BID
ARF with carditis (no residual valve disease)	10 years <i>or</i> until age 21 — whichever is longer	
ARF with carditis & residual valve disease	10 years <i>or</i> until age 40 — sometimes lifelong	

+ ADD SBE PROPHYLAXIS (AMOXICILLIN PRE-PROCEDURE) FOR DENTAL WORK IN CLIENTS WITH VALVE DAMAGE.

06

Nursing Priorities • Acute Care

CARDIAC

Monitor for carditis

- ✓ Apical pulse for full 1 min — watch for new tachycardia
- ✓ Listen for new/changing murmurs & pericardial friction rub
- ✓ Daily weight & I/O — early CHF
- ✓ Report sudden SOB, chest pain, JVD

COMFORT & MOBILITY

Manage joints & chorea

- ✓ Position joints in functional alignment; avoid weight-bearing
- ✓ Warm compresses & scheduled ASA — never PRN
- ✓ For chorea: padded side rails, quiet room, soft utensils
- ✓ Assist with self-care during severe movements

EDUCATION & ADHERENCE

Prevent recurrence

- ✓ Teach the **full prophylaxis schedule** & rationale
- ✓ Stress: even minor sore throats need evaluation
- ✓ Family must finish *full course* of antibiotics
- ✓ Carry a **medical alert** ID; notify dentists

07

NGN Clinical Judgment Application

CASE VIGNETTE • BOW-TIE STYLE

Ava, 9 years old

“Ava is brought to the clinic with a 4-day history of fever, knee pain that ‘moved to her elbows yesterday,’ and a faint pink rash on her trunk. Mom reports Ava had a sore throat 3 weeks ago — antibiotics were prescribed but ‘we stopped after she felt better.’ On exam: T 38.6 °C, HR 128 (afebrile baseline 88), new 2/6 holosystolic murmur at the apex. ESR 68, CRP 4.2, ASO titer markedly elevated.”

STEP 1

Recognize Cues

Recent untreated strep • migratory polyarthrititis • new murmur • rash • elevated ASO/ESR/CRP • disproportionate tachycardia.

STEP 2

Analyze Cues

Pattern fits Jones criteria: ≥ 1 major (carditis, polyarthrititis, erythema marginatum) + minors (fever, ↑ESR/CRP) + recent GAS evidence.

STEP 3

Prioritize Hypothesis

Acute Rheumatic Fever with carditis — most life-threatening manifestation; rule out CHF.

STEP 4

Generate Solutions

IM Pen G • benzathine • high-dose ASA • bed rest • echo + ECG • daily weight • parent education on long-term prophylaxis.

STEP 5

Take Action

Auscultate q4h • monitor I/O & daily weight • administer ASA on schedule • implement bed rest • teach prophylaxis plan.

STEP 6

Evaluate Outcomes

Resolving murmur intensity • ESR/CRP normalizing • afebrile • joints painless • family verbalizes prophylaxis schedule.

08

Red Flags • Call the Provider Now



URGENT FINDINGS

- ! New or worsening murmur
- ! Chest pain or pericardial friction rub
- ! Sudden weight gain > 1 kg/24 h
- ! Recurrent sore throat in child on prophylaxis
- ! Sudden SOB, orthopnea, or pulmonary crackles
- ! Resting tachycardia > 130 in school-age child
- ! Severe chorea — fall & injury risk
- ! Missed prophylaxis injection > 4 weeks

MEMORY ANCHOR

JONES

“The heart walks like a J•O•N•E•S.”

• Joints (migratory) • ♥ Carditis • • Nodules (subQ) • Erythema marginatum • Sydenham chorea — diagnose with 2 major or 1 major + 2 minor + recent GAS.