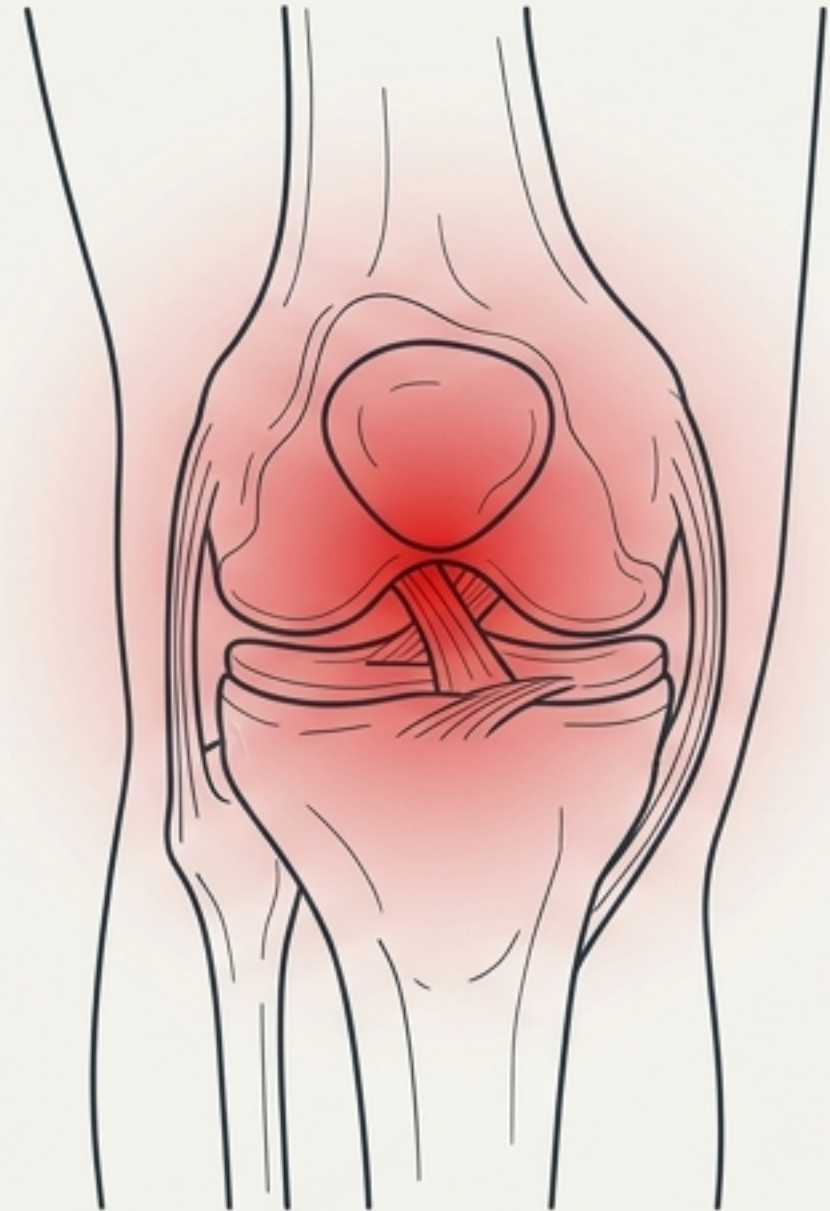


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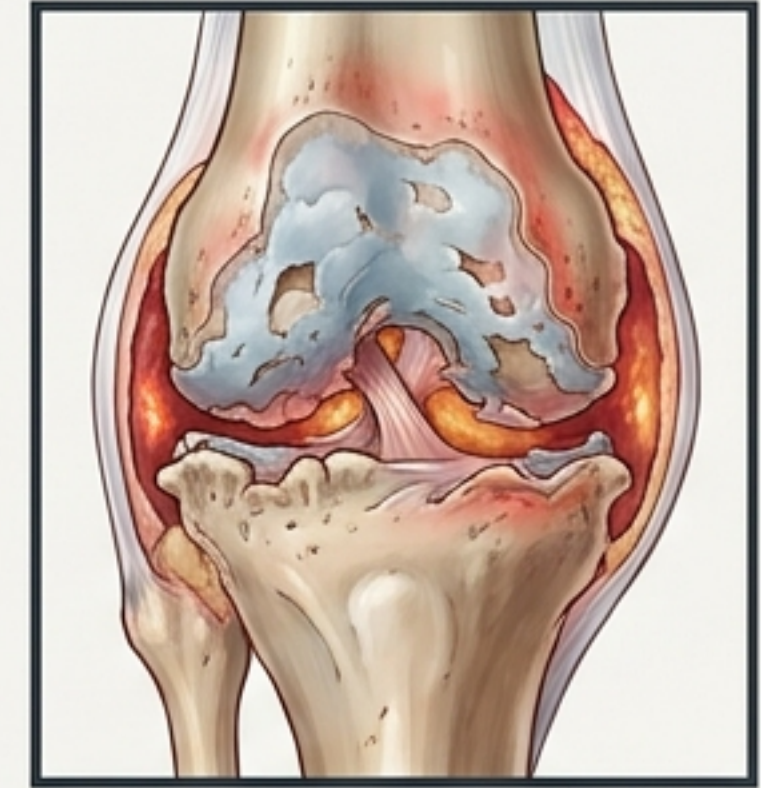
# Septic Arthritis: The 60-Minute Clinical Protocol

A rapid-reference guide to diagnosis,  
empirical treatment, and surgical  
intervention in the Australian clinical context.

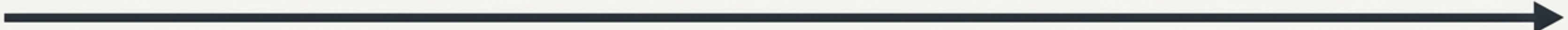




HEALTHY JOINT  
(BASELINE)



SEVERELY ERODED JOINT  
(END-STAGE)



**MORTALITY\_RATE**

10-15% (Native Joint)  
Up to 25%  
(Elderly/Immunocompromised)

**INCIDENCE\_AUS**

4-10 per 100,000  
population/year

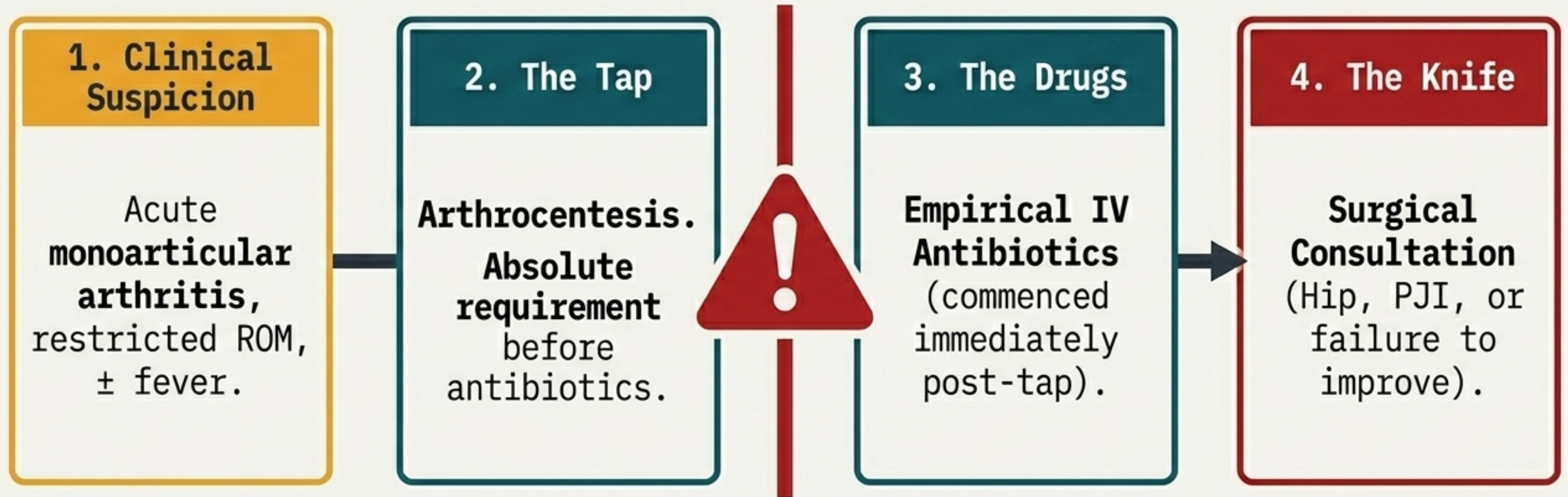
**AFFECTED\_SITES**

Knee (50-60%) > Hip (15-20%) > Shoulder > Ankle

**Every hour of delay in initiating treatment increases the risk of irreversible cartilage degradation. Arthrocentesis and empirical antibiotics MUST occur within 1 hour of clinical suspicion.**

# The Protocol Pathway

## The Golden Hour Pathway



### CRITICAL BARRIER:

Do not cross with empirical therapy  
until synovial sample is secured.

# Clinical Phenotypes & Microbiology



## The Typical Presentation

Acute monoarticular, marked effusion, fever  $>38^{\circ}\text{C}$  (60% of cases).

Pathogen:  
*S. aureus* (45-65%) /  
Streptococci (15-25%)



## Disseminated Gonococcal Infection

Sexually active  $<40$  yrs, migratory polyarthralgia, tenosynovitis, pustular skin lesions, low-grade fever.

Pathogen:  
*N. gonorrhoeae*  
(5-10%)



## The Septic Patient

Haemodynamically unstable, multi-joint, immunocompromised or prosthetic joint. High mortality.

Pathogen:  
Gram-negatives (5-10%),  
Polymicrobial (5-10%),  
MRSA

# The Golden Rule: Tap vs. Treat

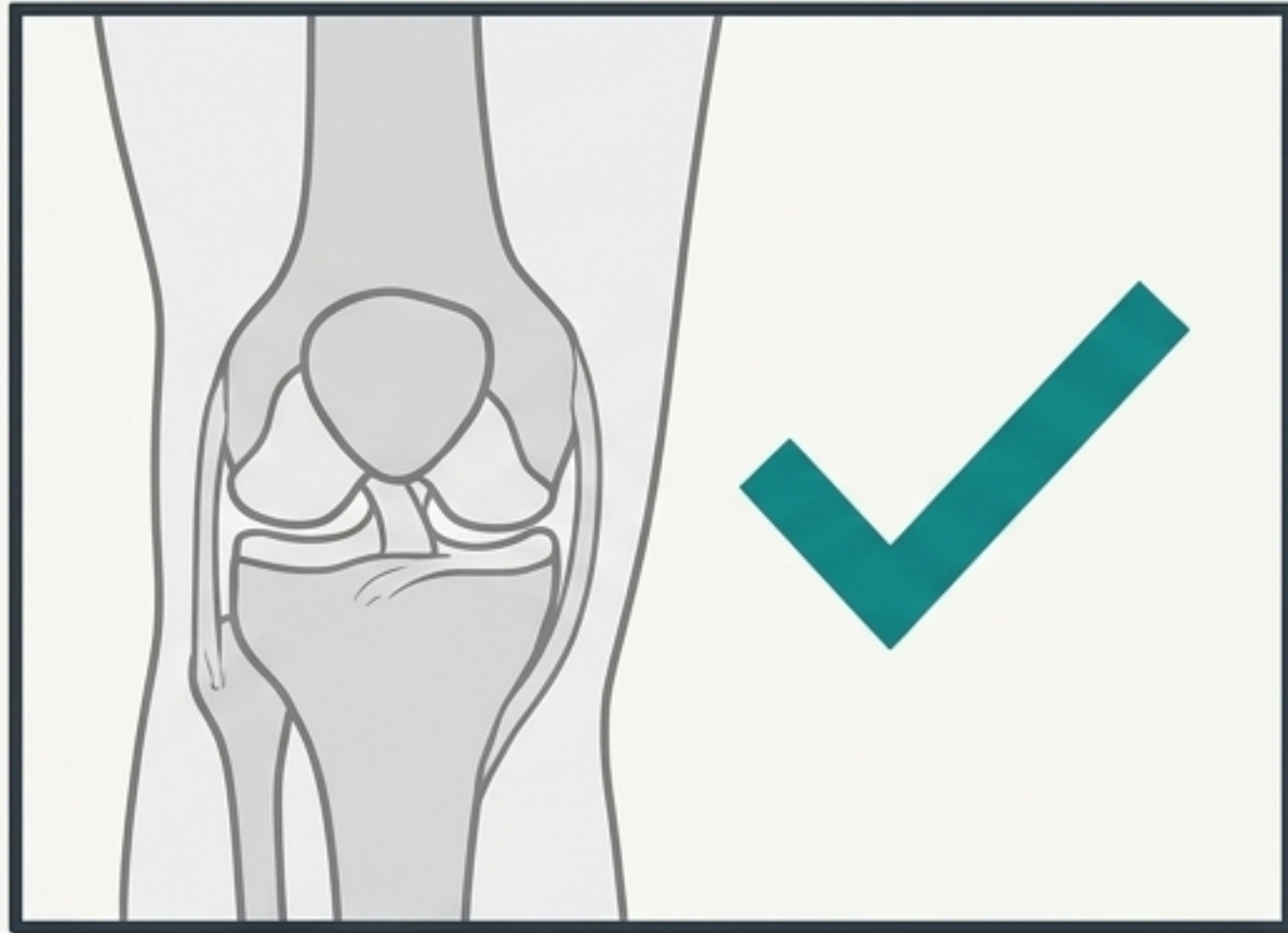


**Prior antibiotic therapy significantly reduces culture yield. Tap first.**

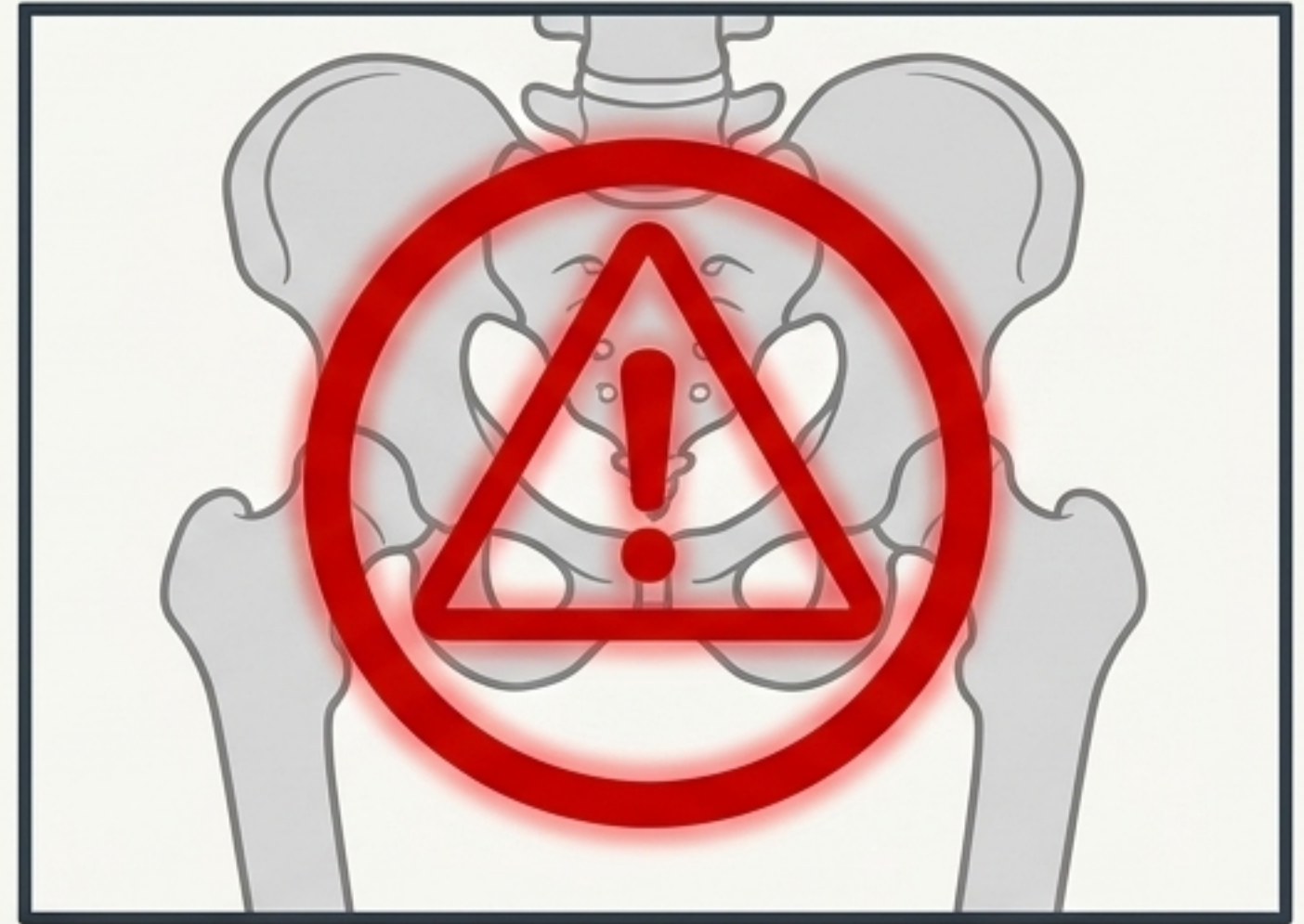
## Procedural Details

- **Prep:** Chlorhexidine 2% in 70% isopropyl alcohol.
- **Yield:** Need 1-2 mL minimum.
- **Tubes:** Sterile container (Culture) + Purple EDTA tube (Cell count) + Plain tube (Crystals).
- **Billing Code:** MBS Item 55064 (Ultrasound-guided aspiration).

# The Joint Danger Zone



Accessible via percutaneous aspiration ( $\pm$  POCUS).



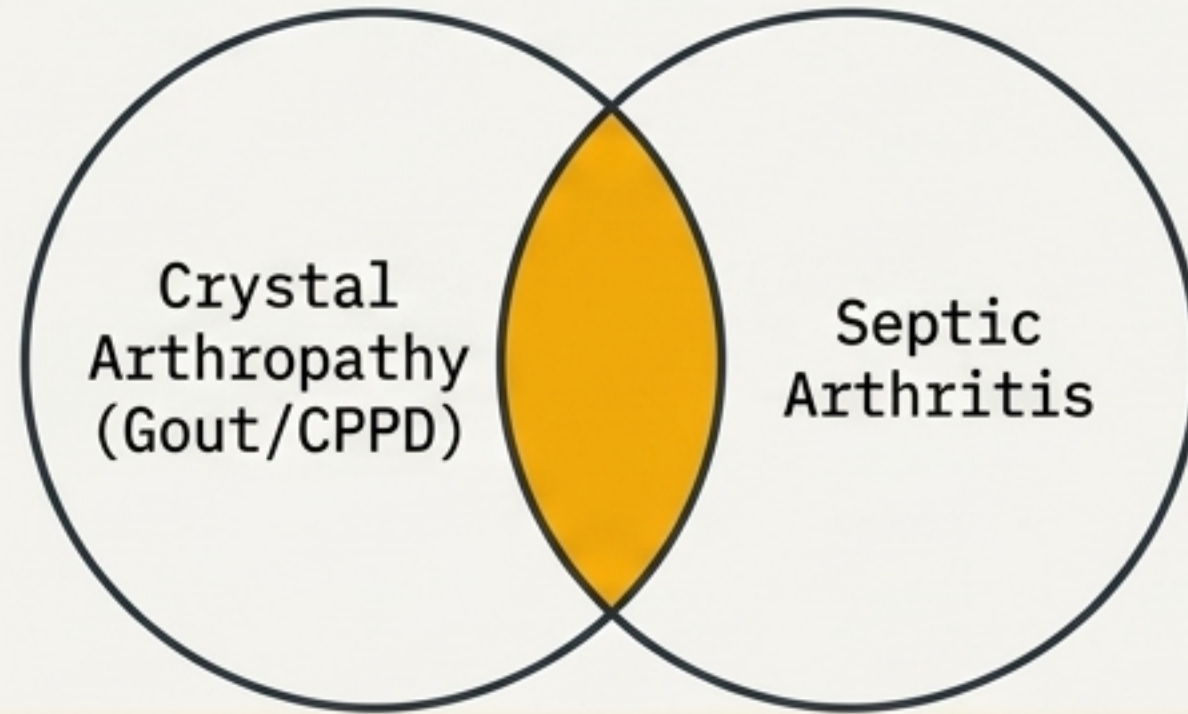
**Hip Septic Arthritis is a SURGICAL EMERGENCY.**

- Do not attempt to manage with antibiotics alone.
- Prompt surgical washout (open/arthroscopic) is mandatory to prevent avascular necrosis of the femoral head and irreversible disability.
- If aspiration isn't technically feasible, proceed directly to the OR for intra-operative cultures.

# The Synovial Fluid Diagnostic Matrix

	Normal	Non-Inflammatory	Inflammatory	Septic
Appearance	Clear/Colourless	Yellow/Clear	Yellow/Turbid	Turbid/Purulent
Viscosity	High (long string)	High	Low (short string)	Very low
WBC (cells/ $\mu$ L)	<200	200–2,000	2,000–50,000	<b>&gt;50,000</b>
Neutrophils (%)	<25%	<25%	50–70%	<b>&gt;75–90%</b>
Gram Stain	Neg	Neg	Neg	Positive in 50–75%
Culture	Neg	Neg	Neg	Positive in 60–90%

# The Diagnostic Pitfall: Crystals



**CRITICAL CAVEAT:** Crystal-positive synovial fluid does NOT exclude concurrent septic arthritis.

## Key Stats

**Up to 5%** of patients with crystal arthropathy have a coexistent infection.

**Actionable Rule:** If clinical suspicion remains high, treat empirically for septic arthritis regardless of crystal findings.

## Adjunct Biomarkers

**Synovial Lactate** >4 mmol/L (strongly suggests SA).

**Low Synovial Glucose** (<50% of serum).

# Secondary Investigations Checklist

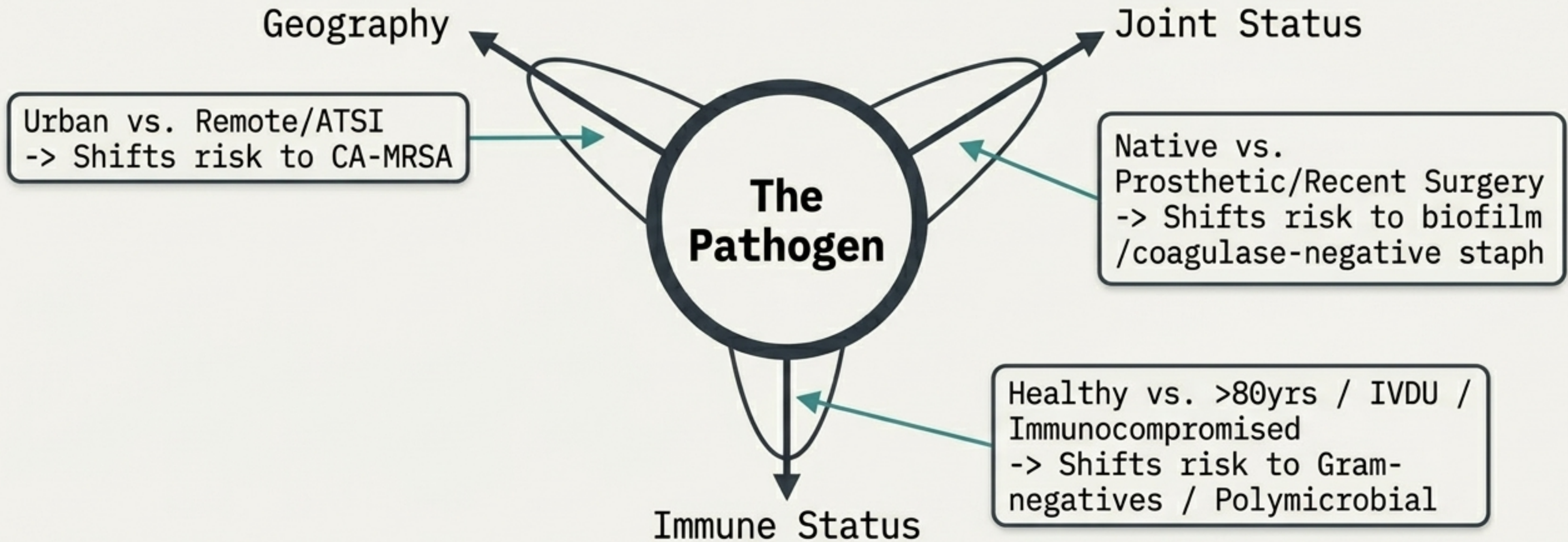
## ESSENTIAL (DO NOW)

- Blood Cultures:** 2 sets (MBS 69316). Collect before antibiotics. Positive in 30-50% of SA cases.
- Serum Markers:** CRP (best marker for tracking response), ESR, FBC, UECs (for drug dosing baseline), Lactate (sepsis).

## CONTEXT-DEPENDENT (ORDER AS NEEDED)

- Plain X-Rays:** Exclude fracture/osteomyelitis. Often normal early, may show effusion.
- MRI with Contrast (MBS 63546):** Highly sensitive for bone marrow oedema/abscess. Use if spinal/osteo suspected.
- NAAT (MBS 69380):** Synovial fluid or genital swab. More sensitive than culture for *N. gonorrhoeae*.

# The Synthesis Arc: The Host Dictates the Bug



Empirical treatment of septic arthritis is entirely an exercise in host profiling. The patient's background dictates the exact IV regimen required.

# Empirical IV Protocols (Part 1)

## Native Joint - Low MRSA Risk

**Agent:**

Flucloxacillin

**Dose:**

2 g IV every 4-6  
hours (Paediatric:  
50 mg/kg IV q6h)

**Target:**

MSSA & Streptococci.

## Native Joint - High MRSA Risk

(Remote ATSI, healthcare contact)

**Agents:**

Flucloxacillin (2 g  
IV 4-6h) +  
Vancomycin

**Vanc Dose:**

25-30 mg/kg IV load,  
then 15-20 mg/kg IV  
q8-12h.

**Note:** Requires  
therapeutic drug  
monitoring (trough  
target 15-20 mg/L).

## Penicillin Anaphylaxis

**Agents:**

Vancomycin IV +  
Ceftriaxone

**Dose:**

Ceftriaxone 1-2 g IV  
daily.

# Empirical IV Protocols (Part 2: Atypical Risk)

## Suspected Gonococcal SA (DGI)

**Agent:** Ceftriaxone

**Dose:** 1–2 g IV once daily.

**Duration:** 7–14 days (IV then PO).

**Note:** Treat chlamydia co-infection (Azithromycin 1 g PO stat).

## Gram-Negative Risk (Elderly, IVDU, UTI source)

**Agents:** Flucloxacillin + Gentamicin (or Pip-Taz 4.5g IV q8h).

**Gentamicin Dose:** 4–7 mg/kg IV once daily (Extended interval).

**Note:** Short course only ( $\leq 5$  days) to minimize nephrotoxicity. Dose per nomogram.

# The Surgical Triggers Checklist

## Indications for Washout

- **[ABSOLUTE]** Hip Septic Arthritis.
- **[ABSOLUTE]** Prosthetic Joint Infection (PJI).
- **[CONDITIONAL]** No clinical improvement after 48—72h of IV antibiotics.
- **[CONDITIONAL]** Loculated effusion on ultrasound/CT.

## Surgical Approach Matrix

<b>Arthroscopic</b>	First-line for Knee/Shoulder. Minimally invasive, shorter recovery. May fail for heavy loculations.
<b>Open Arthrotomy</b>	Gold standard for Hip, complex late presentations, or failed arthroscopy. Higher surgical morbidity.

# Native Joint vs. Prosthetic Joint Infection

## Native Joint Infection

**Primary Driver:** Medically-driven (Rheumatology/ED).

**Duration:** 2-4 weeks total.

**Surgical Role:** Adjunct (washout if needed).

**Hardware:** None.

## Prosthetic Joint Infection (PJI)

**Primary Driver:** Surgically-driven (Ortho/Infectious Diseases).

**Duration:** 3-6 months to indefinite.

**Surgical Role:** Mandatory (DAIR or Revision).

**Hardware:** Biofilm formation complicates eradication.

# The PJI Chronology: DAIR vs. Revision

**0-3 Weeks**

0-3 WEEKS

**MANDATORY CUT-OFF**

3 WEEKS

Time Since Symptom Onset

**The DAIR Window (Debridement, Antibiotics, Implant Retention)**

**Condition:** Well-fixed implant, acute onset.

**Action:** Exchange modular parts, copious lavage, 6-12 WEEKS antibiotics.

**>3 Weeks: Two-Stage Revision**

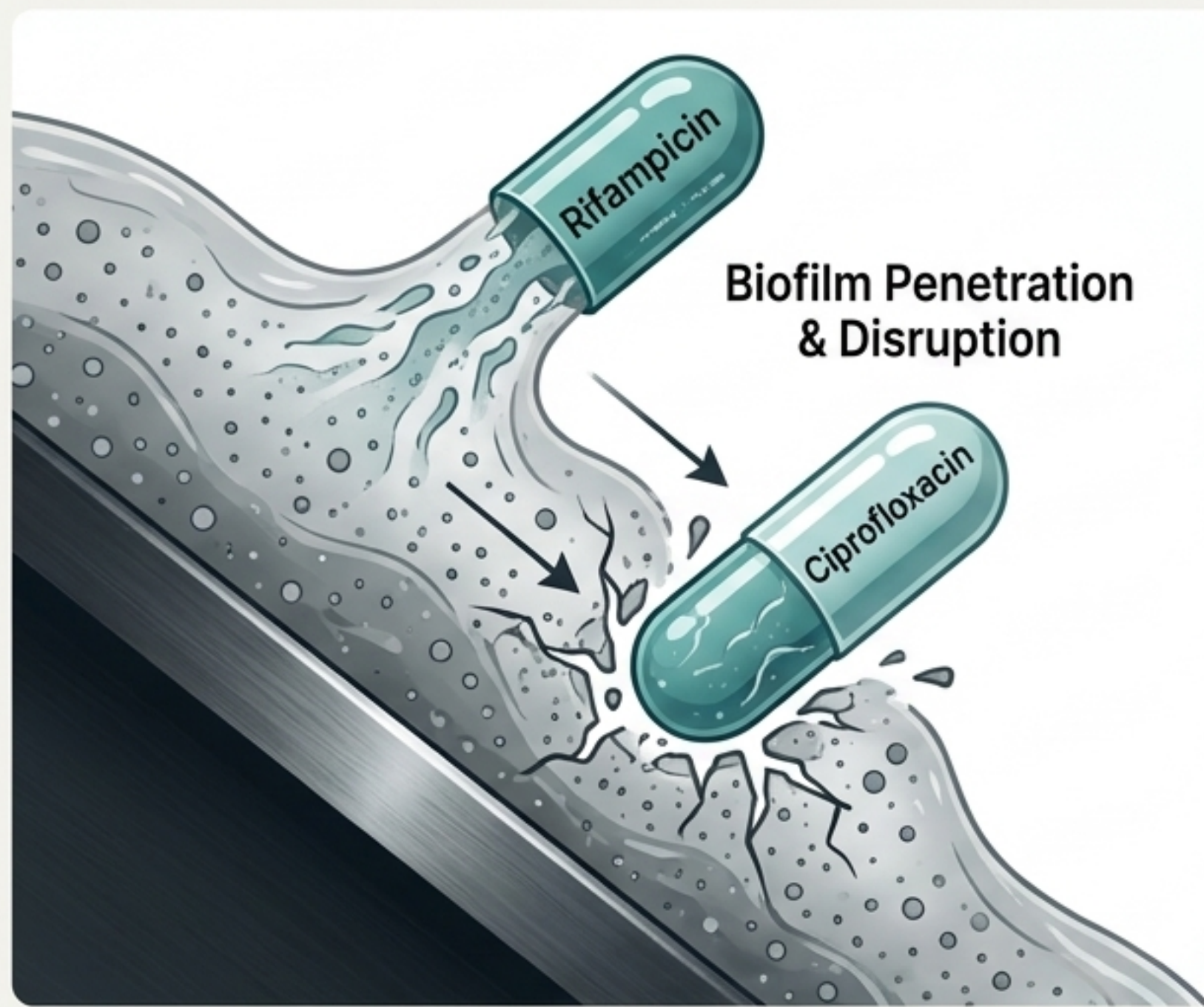
>3 WEEKS

**Condition:** Chronic PJI, biofilm established.

**Stage 1:** Remove all material, insert antibiotic cement spacer.

**Stage 2:** Re-implant new joint after 6-12 WEEKS of targeted IV antibiotics and normal CRP.

# PJI Pharmacotherapy: Biofilm Busters



Biofilm requires specialized oral combinations following initial IV DAIR phase.

## Rifampicin

Rifampicin (300-450 mg PO q12h)

The primary biofilm-active agent against Staphylococci.  
⚠ **Rule:** NEVER use as monotherapy (rapid resistance).

## Ciprofloxacin

Ciprofloxacin (500-750 mg PO q12h)

Companion drug. Excellent bone/biofilm penetration.  
⚠ **Warning:** Tendon toxicity risk.

⚠ **Mandatory Action:** ID Specialist referral and OPAT for all PJI cases.

# Special Populations Adjustments



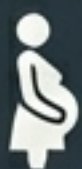
## Paediatrics

- *K. kingae* common <4 yrs (needs specific PCR).
- Empirical Flucloxacillin 50 mg/kg q6h.
- Hip SA is high risk for avascular necrosis of epiphysis.



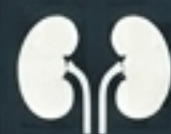
## Elderly (>65) & Immunocompromised

- May lack fever or present with delirium only.
- Polymicrobial risk is high; broaden empirical cover (add Vanc + Pip-Taz).
- Hold biologic DMARDs (TNF inhibitors).



## Pregnancy

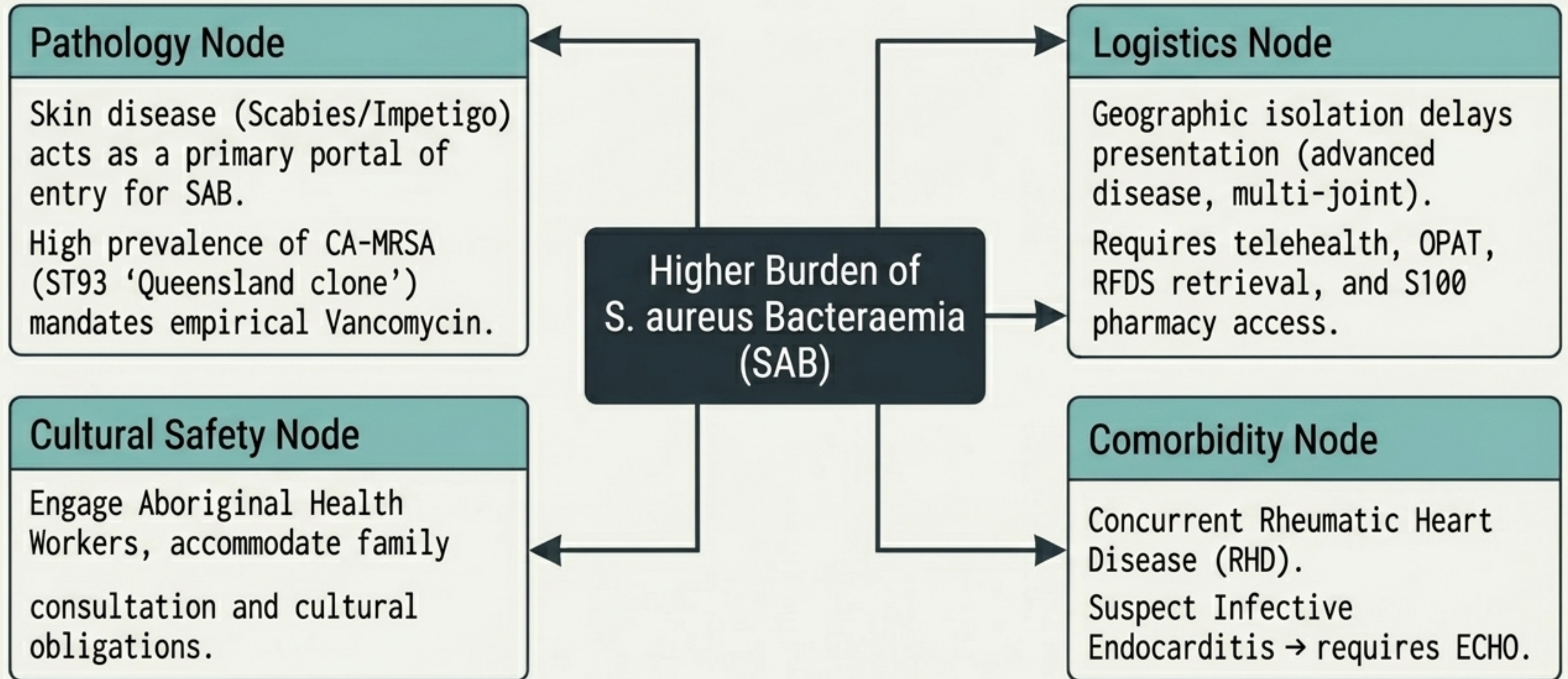
- Flucloxacillin (Category A).
- Ceftriaxone (Category B1 - preferred for DGI).
- **AVOID** fluoroquinolones (cartilage damage).



## Renal Impairment

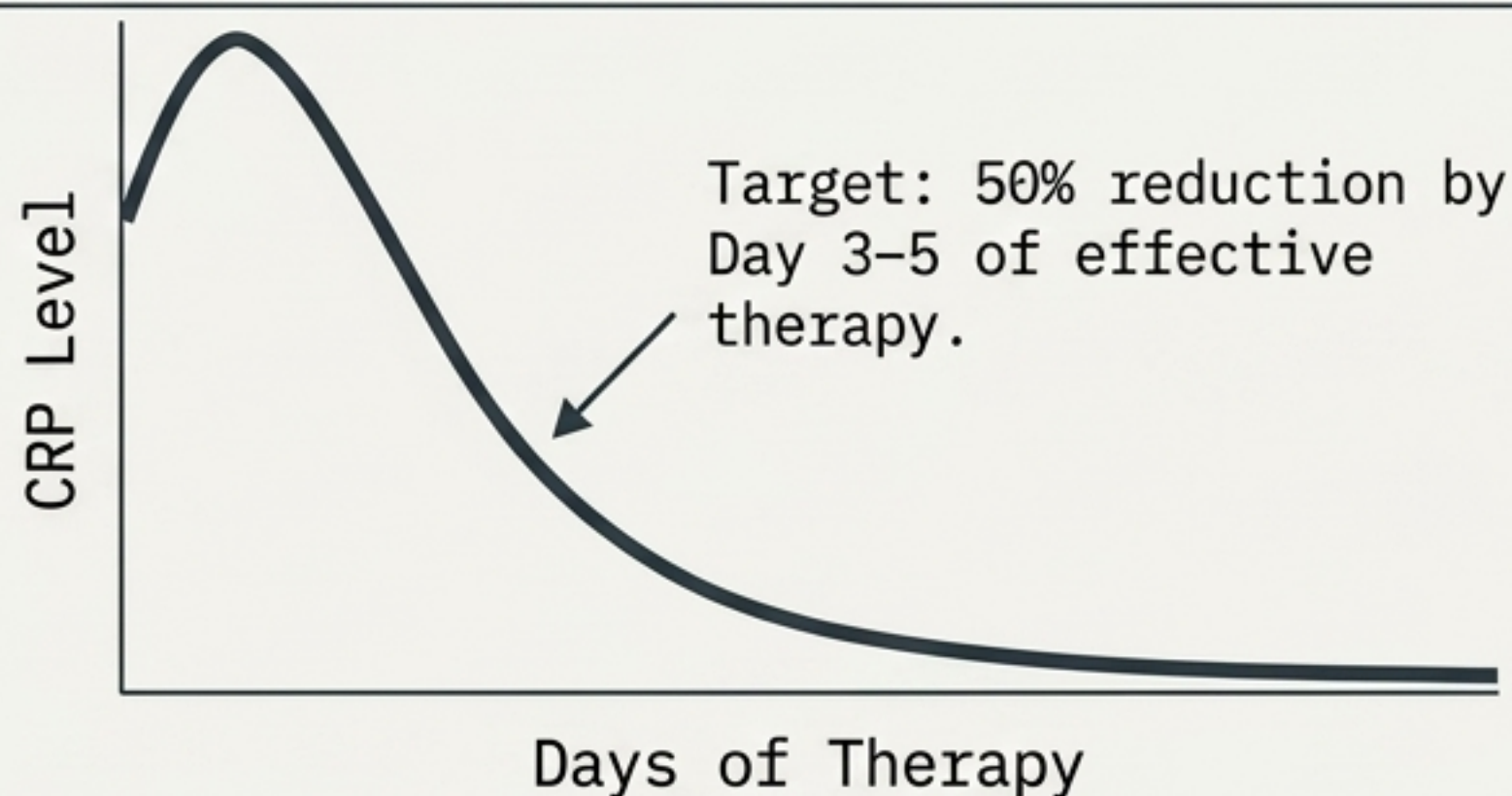
- Extend Vancomycin/Gentamicin intervals.
- TDM is mandatory.
- Flucloxacillin requires no adjustment but monitor for accumulation.

# The Australian Context: ATSI Health Considerations



# The Recovery Dashboard: Step-Down Therapy

## The CRP Trajectory



Rising/plateauing CRP = surgical review/re-tap

## IV-to-Oral Switch Criteria

- Clinical improvement (reduced pain/fever for  $\geq 48$ h).
- Falling CRP trajectory.
- Organism identified and susceptible to oral agent.
- Patient systemically well and tolerating PO.

Total Duration: Native joint SA usually requires 2-4 weeks total therapy.  
Post-discharge physio/rehab essential.