

Prosthetic Joint Infection: The Cinematic Universe!

"The Bug Is Only the Beginning. One Diagnosis, Many Decisions"

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PJI: THE CINEMATIC UNIVERSE

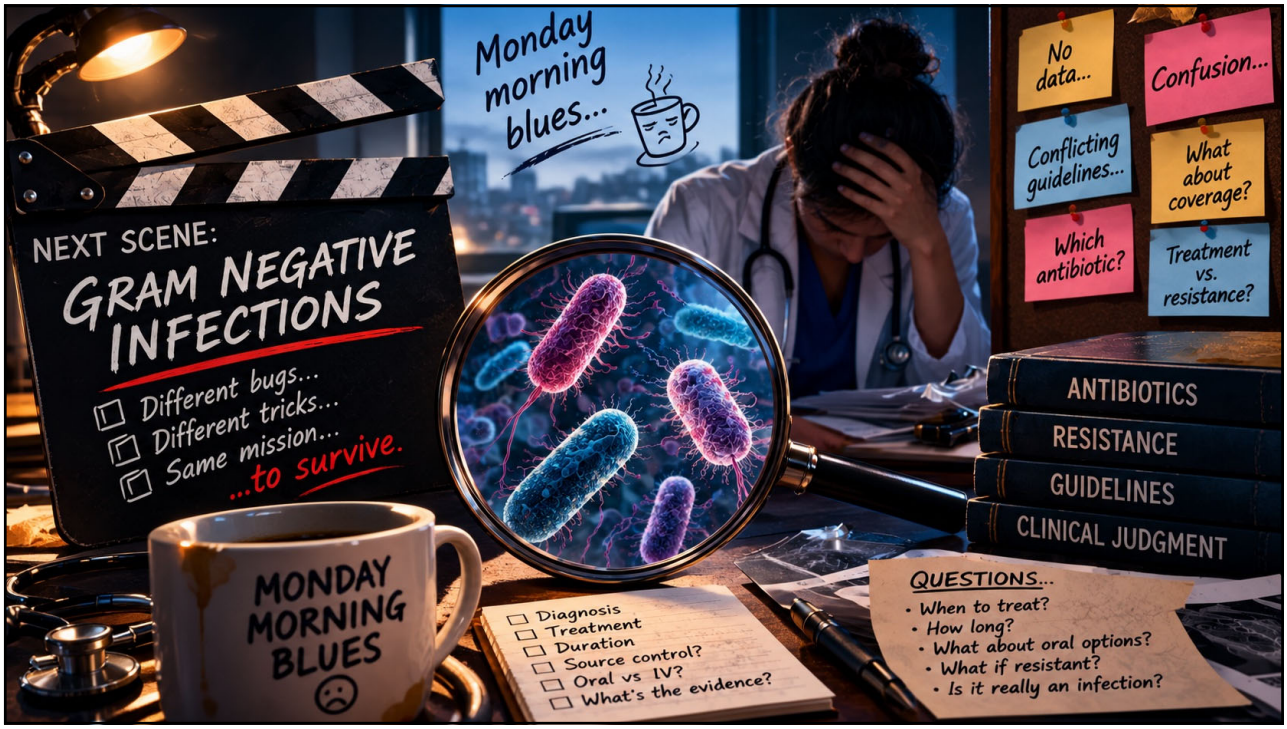
DISCLOSURES

No relevant financial relationships or conflicts of interest to disclose.

Learning Objectives

- Recognize how organism, timing, surgical strategy, and patient factors influence PJI management
- Evaluate IV versus Oral therapy and treatment duration using evidence rather than habit
- Develop and Integrate an individualized, patient centered approach to the management of PJI
- Describe the role, evidence and practical consideration of suppressive antimicrobial therapy in PJI

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Case 1 — A painful prosthetic knee

Feature	Presentation
Age	72 years
Hardware	Right TKA, 2 years ago
Symptoms	3 days of increasing pain and swelling
Vitals	38.3°C; hemodynamically stable
Exam	Effusion, warmth, pain with ROM; healed incision
Risk factors	Diabetes; CKD stage 3

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Diagnostic work-up

Test	Result
WBC	13.8 × 10^9/L
CRP	18.6 mg/dL
ESR	72 mm/h
Creatinine	1.6 mg/dL
Blood cultures	Pending
Synovial WBC	45,000/µL
Synovial PMN	92%
Gram stain	No organisms

The Microbiology data

Synovial fluid: Escherichia coli

Blood cultures: E. coli in 2/2 sets

Antibiotic	Interpretation
Ceftriaxone	S
Cefepime	S
Ciprofloxacin	S
TMP-SMX	S
Amoxicillin-clavulanate	S
ESBL	Negative

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Panel: “Keep it or Yeet it”

What surgical procedure would you recommend—and why?

1) DAIR + polyethylene liner exchange
2) 1-stage revision
3) 2-stage revision
4) Other

What factors are driving your decision?

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Surgical strategy: DAIR or exchange?

- Well-fixed implant
- No sinus tract
- Symptoms 3 days

→ **DAIR**

- Extensive synovectomy and debridement
- Irrigation and debridement of accessible infected tissue
- Polyethylene liner exchange
- Retention of well-fixed components
- Five separate intraoperative tissue specimens obtained
- Blood cultures cleared after source control

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Panel: Pick your poison

What would your antimicrobial strategy look like? And Why?

Antibiotic	Interpretation
Ceftriaxone	S
Cefepime	S
Ciprofloxacin	S
TMP-SMX	S
Amoxicillin-clavulanate	S
ESBL	Negative

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IDSA 2013: The starting point

Question	2013 IDSA framework
Non-staphylococcal PJI after DAIR	4–6 weeks pathogen-specific IV or highly bioavailable oral therapy
GN oral option	Fluoroquinolones are prominent options when susceptible
Suppression	Indefinite suppression may be considered in selected cases

The guideline is the baseline — but it predates OVIVA, DATIPO, and newer GN-PJI data.

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OVIVA: the route-of-therapy conversation changed - 2019

1,054 patients with complex bone/joint infection

Oral vs IV for the first 6 weeks

Outcome at 1 year	IV	Oral
Treatment failure	14.6%	13.2%
Catheter complications	9.4%	1.0%

Oral therapy was noninferior.

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The modern question is not 'IV or PO?'

Do I have a drug that is:

- Active against the isolate
- Reliably absorbed orally
- Pharmacologically appropriate
- Tolerable for this patient
- Compatible with renal/hepatic function and interactions
- Supported by adequate source control

If yes → early oral therapy can be reasonable.

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Gram-negative PJI: which oral agent?

Option	Why consider it	Key cautions
Fluoroquinolone	Excellent bioavailability; established experience	Resistance; tendinopathy; CNS effects; QT; dysglycemia; C. difficile
TMP-SMX	High bioavailability; potential alternative to FQ	Hyperkalemia; renal effects; cytopenias; interactions
Oral β-lactam	May be an option for selected susceptible isolates	PK/PD and bioavailability concerns; less PJI evidence

Susceptibility + patient factors + evidence quality should drive the choice.

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2024 multicenter GN-PJI study

74 GN-PJI patients • 72 DAIR • 1-stage revision in 2

Targeted strategy	n	Success / failure-free
Fluoroquinolone	47	72%
Cotrimoxazole (TMP-SMX)	13	92%
β-lactam	14	36%

FQ vs TMP-SMX: P=0.13 → hypothesis-generating, not definitive.

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Bonus Round: What if the E. coli is fluoroquinolone-resistant?

Ciprofloxacin: R

TMP-SMX: S

Ceftriaxone: S

What would you feed the bug??

a) IV Ceftriaxone

b) Bactrim PO

c) Half and Half (IV Ceftriaxone and PO Bactrim)

d) Wish the patient was Bactrim Allergic to make it easier

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Because Pseudomonas is feeling left out !!!

How does Pseudomonas change your:

🔪 Surgical recommendation?
💊 Antimicrobial strategy?
“New Bug. New Rules?”
“Pseudomonas: Game Changer or Just Another Bug?” 🎲

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“ Duration: The ID Dating Game”

When is it time to break up with the antibiotics?

- What would you recommend for initial duration of Rx?
- What would make you do shorter or longer course?

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"When the guidelines meets the Trials"
IDSA to DATIPO (2021): the 6 vs 12 week question

410 patients • Randomized, hips and knees
Compared 6 vs 12 weeks
DAIR – 41%
1 stage exchange 37%
2 stage exchange 22%

Persistent infection	6 weeks	12 weeks
At 2 years	18.1%	9.4%
Risk difference		+8.7 percentage points 95% CI 1.8-15.6

Hmmm – Does Surgical strategy matter when deciding duration??

6 weeks was not shown to be noninferior to 12 weeks
Largest difference in the DAIR group (failure rate **38.2% in the 6-week vs 13.5% in the 12-week** for knee infections)

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IDSA 2013 vs 2026 practice

Question	IDSA 2013	2026 practice lens
Route	IV OR highly bioavailable PO	OVIVA supports PO when a good oral option exists
GN oral therapy	FQ prominent	FQ remains important; TMP-SMX increasingly considered
Duration	4–6 weeks for non-staph PJI	DATIPO makes 6 wk less comfortable, especially with retained hardware
DAIR	Early, well-fixed, no sinus tract	Same core selection principles; source control remains decisive

2026 = guideline + trials + organism-specific evidence + patient factors

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Back to our patient: On the crisp Monday morning, What's your drug and duration ??

Option	Assessment
6 weeks IV ceftriaxone	Active, but IV exposure may be unnecessary if an appropriate oral agent exists
IV → oral ciprofloxacin, 12 weeks	Strong option if susceptible and tolerated
IV → oral TMP-SMX, 12 weeks	Reasonable alternative if susceptible; evidence remains observational
6 weeks oral ciprofloxacin	Shorter than I would generally favor after DAIR/retention

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"Till Death Do Us Part- To Suppress or Not to Suppress !!!"

- **After successful treatment of this GN PJI with retained hardware…**

  Would you put this patient on chronic suppressive antibiotics?

✓ Why or why not?
✓ How Long ?

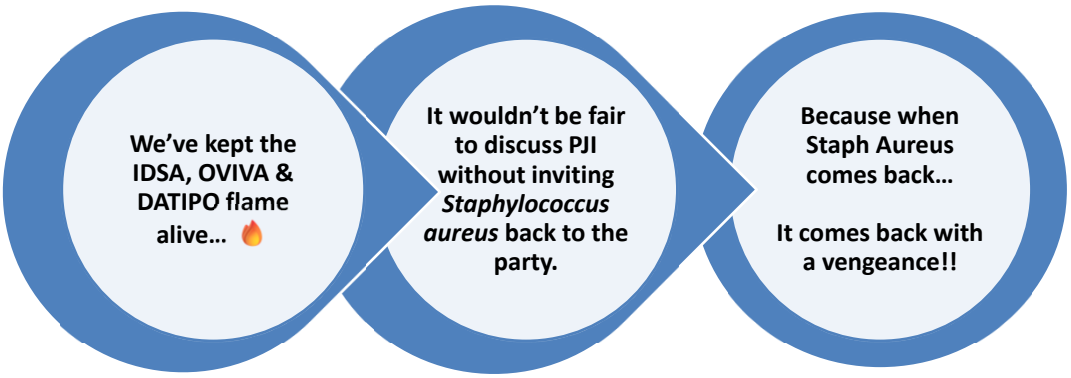
- **What would make you change your mind?**

✓ Organism / resistance pattern?
✓ DAIR vs 1 Stage Revision?
✓ Immunocompromised / host factors?
✓ Recurrent infection?
✓ Surgical options exhausted?
✓ Antibiotic toxicity / stewardship?

For GN-PJI, suppression is individualized; IDSA noted lack of unanimous support after FQ treatment.

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" But Wait….We Can't Let S.aureus Off that Easily"



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Case 2 —Ouch, yet another knee!!
"The Sequel Nobody Asked for"

And this time… She's 96 ……

Feature	Presentation
Hardware	Left TKA, 24 yrs ago
Symptoms	36 hrs, knee pain and inability to bear weight, VSS, HDS
Arthrocentesis	GPC on gram stain
Exam	Effusion, warmth, pain with ROM; healed incision
Orthopedic plan	DAIR without modular component exchanges, Original implant components no longer available and high risk for revision

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The Microbiology data

Operative cultures	MSSA
Blood cultures	Negative

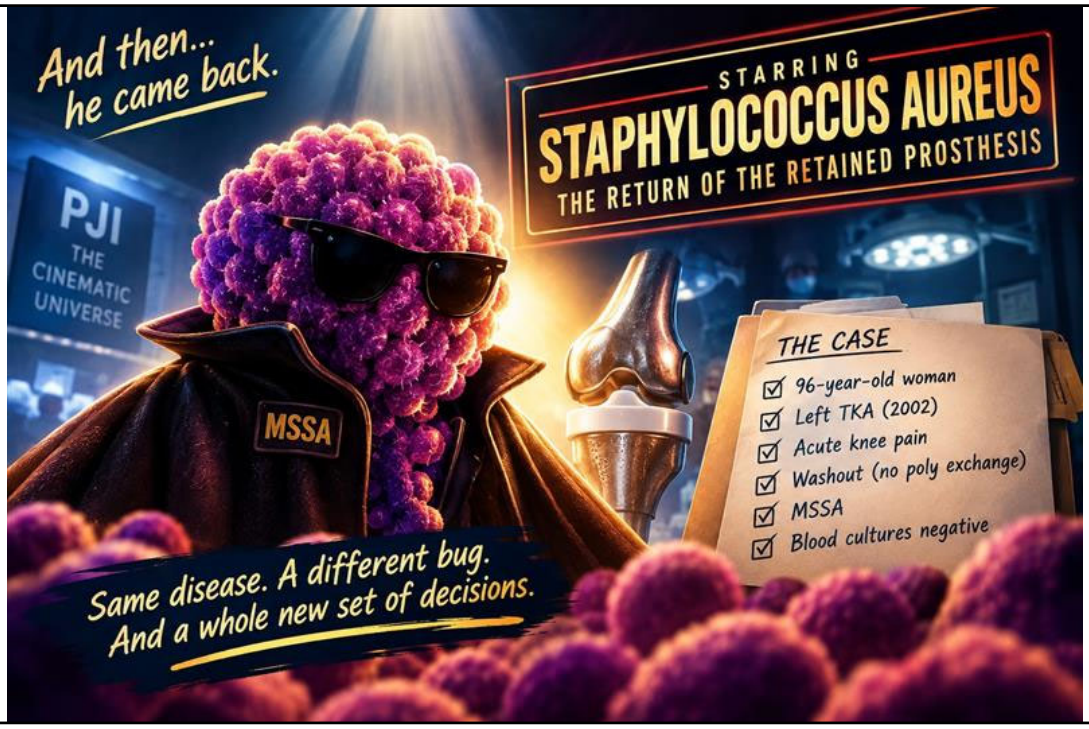
Pertinent Data

Creatinine	1.11
Potassium	3.7
EKG	QTc 481 ms
Allergy	None
Meds	Coreg, ASA

The Susceptibility data

Antibiotic	Interpretation
Cefazolin	S
Oxacillin	S
Penicillin	S
Clindamycin	S
TMP-SMX	S
Levofloxacin	S
Tetracycline	S
Daptomycin	S
Rifampin	S
Linezolid	S
Vancomycin	S

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- She was started on IV cefazolin
- Did really well post op with great recovery and able to move around without much pain

➢ Panel: When IDSA, OVIVA & DATIPO meet MSSA, retained hardware, and a 96-year-old knee

What would you recommend for initial therapy and why ?

a) Plan for IV cefazolin +/- Rifampin 6 weeks
b) Plan for PO Levaquin and Rifampin 6 weeks
c) Plan for Linezolid +/- Rifampin 6 weeks
d) Plan for 2 weeks of cefazolin then 4 weeks of linezolid +/- Rifampin
e) Plan for PO Bactrim +/- Rifampin 6 weeks

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"DATIPO is still in the Audience" –Thoughts on 12 vs 6 weeks

What is the panel's take on suppression duration post completion of the initial 6 weeks

What is the panel's view on adjunctive rifampin for biofilm formation in retained hardware?

Would Suppression Duration differ with a Poly Exchange or One-Stage Procedure?

Would Suppression Duration differ with age of the patient ?

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Suppression: The PJI After-Credits Scene

Evidence, outcomes, uncertainty & best practices

What the evidence says

- 2026 systematic review: **42 studies / 2,524 patients**
- **No randomized trials**
- Pooled reported success: **~74%**
- But studies use inconsistent definitions of "suppression" and "success"
- Evidence quality: generally **low–moderate**

The problem

- High-risk patients are preferentially placed on SAT
- No reliable untreated comparator
- DAIR, chronic PJI, retained hardware, and failed surgery are often mixed
- Therefore: **we can describe outcomes, but cannot confidently quantify the treatment effect**

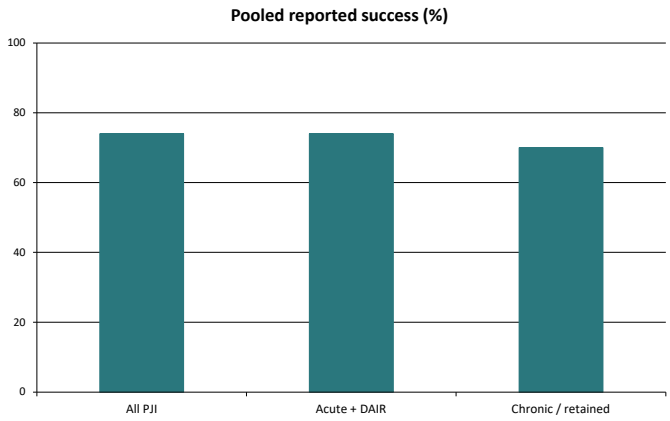
74% success ≠ 74% benefit from suppression

SAT is a strategy supported by observational experience—not high-quality comparative evidence

SAT - suppression antimicrobial therapy

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Reported SAT success: ~74%—but do not read this as treatment efficacy



74% overall
40 studies; 2,467 patients; 95% CI 70–79%

74% acute PJI + DAIR
95% CI 63–85%; 11 studies, 711 patients

70% chronic PJI with implant retention
95% CI 63–78%; 13 studies, 732 patients

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PIANO: Does Chronic Suppression Work?

720 patients with prosthetic joint infection (PJI) - Prospective observational cohort

NO SUPPRESSION	SUPPRESSION
19%	40%
Treatment failure	Treatment failure

Adjusted odds of failure with suppression: 2.48 (95% CI 1.66–3.72)

Why the caution? Patients selected for suppression often had more complex infections and a higher baseline risk of failure.

What we can conclude: This observational study cannot show that suppression causes failure—or prove that it prevents failure.

TAKE-HOME: Association ≠ causation. Select suppression thoughtfully.

Suppression is not benign

Adverse effects
In a 302-patient multicenter cohort, 5.6% stopped SAT because of adverse effects.

PJI-related hospitalization
30.5% required hospitalization after SAT initiation for a PJI-related cause in that cohort.

Resistance
Among microbiologically documented cases with susceptibility data, resistance developed in 23.1%.

- Drug–drug interactions, organ toxicity, C. difficile and selection of antimicrobial resistance all matter.
- Long-term adherence, pill burden, cost and monitoring are part of the treatment burden.
- The risk–benefit equation is patient-specific and changes over time.

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Who is SAT actually for?

Classic noncurative scenario
Curative surgery is not feasible, is declined, or would carry unacceptable burden; infection remains clinically controllable.

High relapse-consequence scenario
Potentially curative management was performed, but relapse would have major consequences and patient/surgical factors make suppression reasonable.

Factors commonly prompting consideration:

- ✓ retained prosthesis
- ✓ inability/unwillingness to undergo exchange
- ✓ prior failed DAIR
- ✓ sinus tract or persistent infection,
- ✓ frailty/comorbidity
- ✓ high surgical risk
- ✓ relapse where further surgery is undesirable.

Importantly, these are indications for consideration—not validated predictors of SAT benefit.

SAT should follow a shared decision about goals: cure is not being achieved by the antimicrobial alone.

“Indefinite” should describe the planned duration—not the absence of reassessment.

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Monitoring: treat SAT like a long-term therapy program

At initiation

Baseline CBC/CMP as agent-appropriate; medication interaction review; confirm susceptibility; document symptoms and joint function.

Early follow-up

Assess adherence, tolerance, GI effects, rash, new pain/drainage, fever, wound changes; repeat labs based on agent.

Long-term

Periodic toxicity labs; medication reconciliation; antimicrobial resistance/relapse assessment; functional status.

Trigger points

New drainage, increasing pain, fever, rising inflammatory markers, intolerance, breakthrough infection, or new surgical opportunity.

Monitoring frequency should be individualized to the drug, comorbidities and clinical trajectory; no single evidence-based SAT monitoring schedule exists.

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Take-home points

- Source control drives outcome — DAIR is time-sensitive and selection-dependent.
- Oral therapy is not inferior simply because it is oral; OVIVA changed the route conversation.
- Fluoroquinolones remain important for susceptible GN-PJI, but toxicity and resistance create a need for alternatives.
- TMP-SMX is promising, supported by observational GN-PJI data — not yet randomized equivalence evidence.
- After DAIR with retained hardware, a longer course (~12 weeks) is a reasonable contemporary default for many patients.

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Take-home points

- Cefazolin backbone + adjunctive rifampin, with an early IV-to-oral switch reasonable given clinical improvement (OVIVA)
- Rifampin is guideline-endorsed for staphylococcal DAIR but watch timing, resistance, interactions, and hepatotoxicity
- Retained, non-exchanged hardware + staphylococcal knee PJI = high relapse risk → chronic, possibly indefinite, suppression is a defensible strategy in older patients
- A poly-exchange or one-stage revision would strengthen the case for a finite course rather than lifelong suppression

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Take-home points

- **SAT is common - but its definition has historically been inconsistent**
- **The best current synthesis finds ~74% reported success, but no randomized trials and substantial heterogeneity**
- **Observational comparisons do not establish that SAT improves outcomes after DAIR.**
- **SAT may be reasonable when cure is not feasible or relapse consequences are high—but patient selection is not yet evidence-based**
- **Best practice is explicit goals + narrow active therapy + toxicity/interaction monitoring + planned reassessment.**

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🙏 Acknowledgments

A HUGE THANK YOU TO OUR PANELISTS

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And especially…

Thank you for addressing the questions we're all quietly debating in the hallway. 😉

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- **Because no ID talk happens alone…**

We appreciate our:

Incredible ID colleagues — for the help in consults, debates, and “one more question” calls
Orthopedic Surgery — our partners in source control 🦴🔪
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Our patients & families — for trusting us through complicated decisions

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