

Implant Sonication Adds Diagnostic Information in Hip and Knee Revision Arthroplasty: An EBJIS-Based Cohort Study

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Sonication provides highly specific additional microbiological evidence, but a negative result cannot exclude PJI; it should complement, not replace, systematic intraoperative cultures.

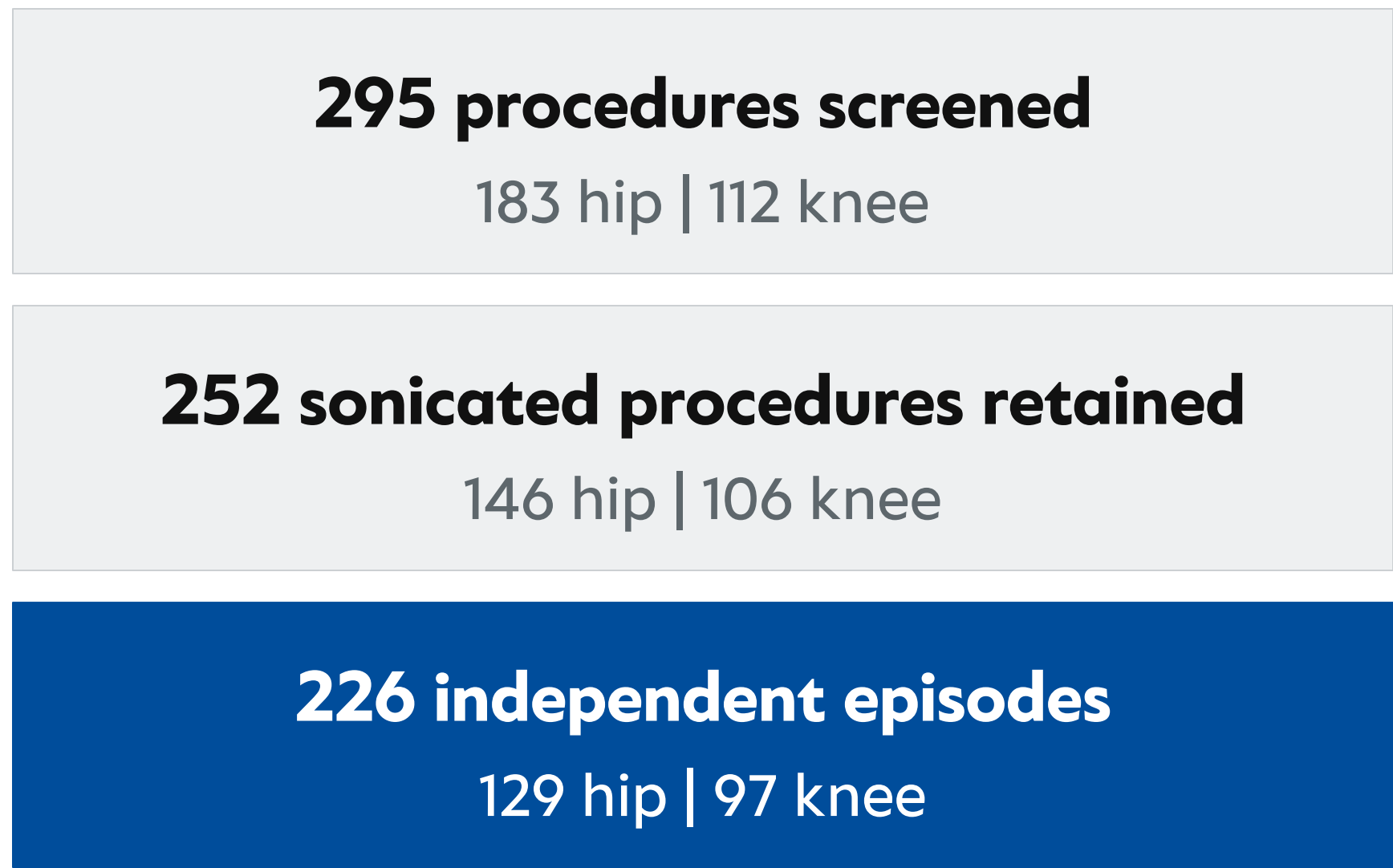
Clinical question

Does implant sonication add diagnostically meaningful, biofilm-directed evidence beyond the standard intraoperative work-up in suspected PJI?

Objective

Quantify joint-specific diagnostic performance and determine how often sonication changes EBJIS classification.

Cohort



43 exclusions; 26 procedures during ongoing treatment were linked to the index episode rather than counted separately.

Methods

- Retrospective single-center cohort, 2015–2025.
- Revision episode as the unit of analysis; repeated procedures within one infection episode were linked.
- EBJIS classification reconstructed before adding sonication.
- Confirmed and unlikely episodes informed binary accuracy; likely episodes were retained for reclassification.
- Wilson 95% confidence intervals; earliest-episode sensitivity analysis.

Sonication interpretation

Clinically adjudicated positive result

- >50 CFU/mL
- Any growth of a virulent organism
- Low-level growth under antibiotics or involving anaerobes interpreted in clinical context
- All media incubated for 14 days

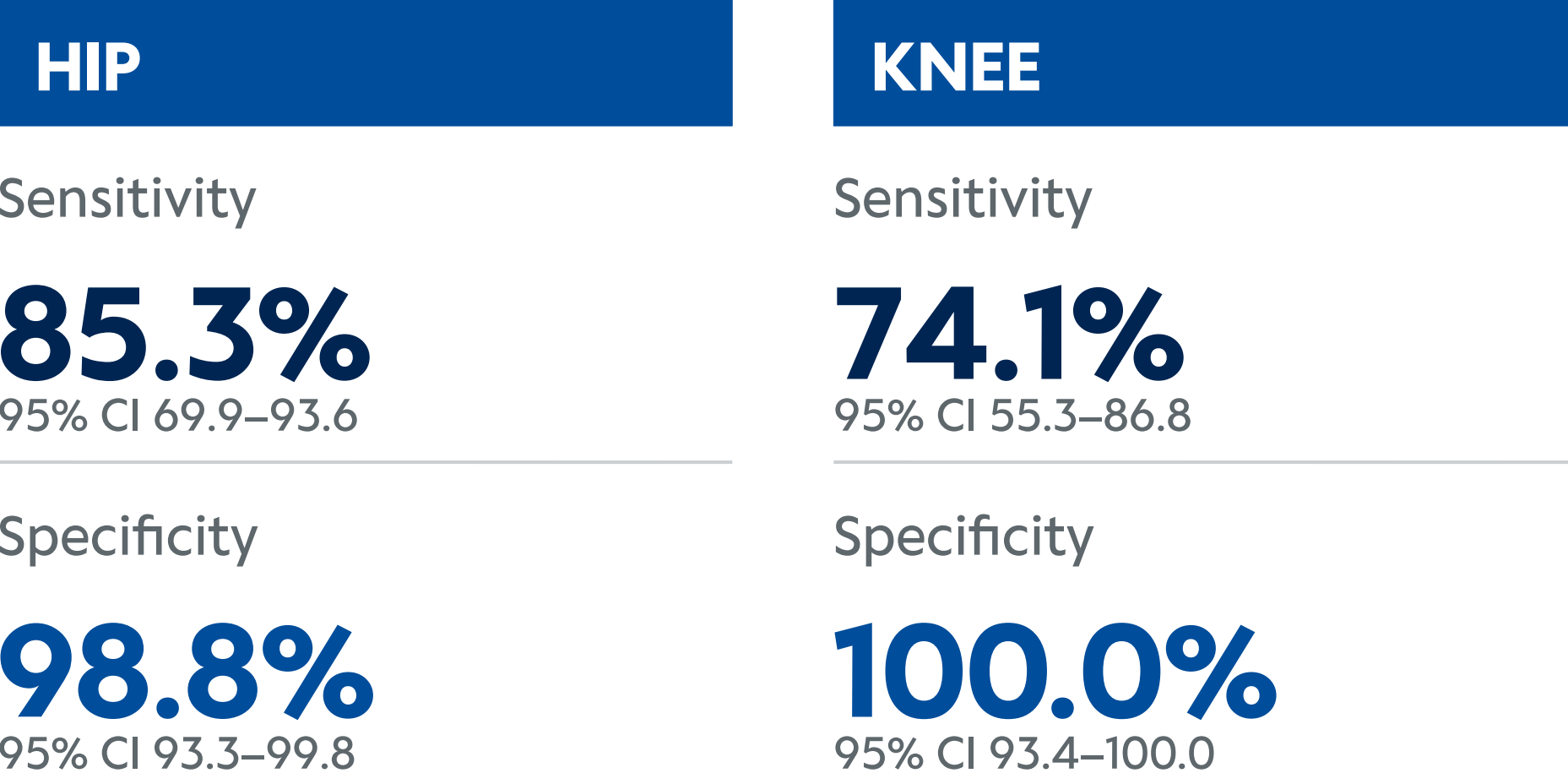
Reference frame

Diagnostic accuracy used the pre-sonication EBJIS classification. This evaluates sonication as an add-on test and avoids incorporating its own result into the primary reference standard.

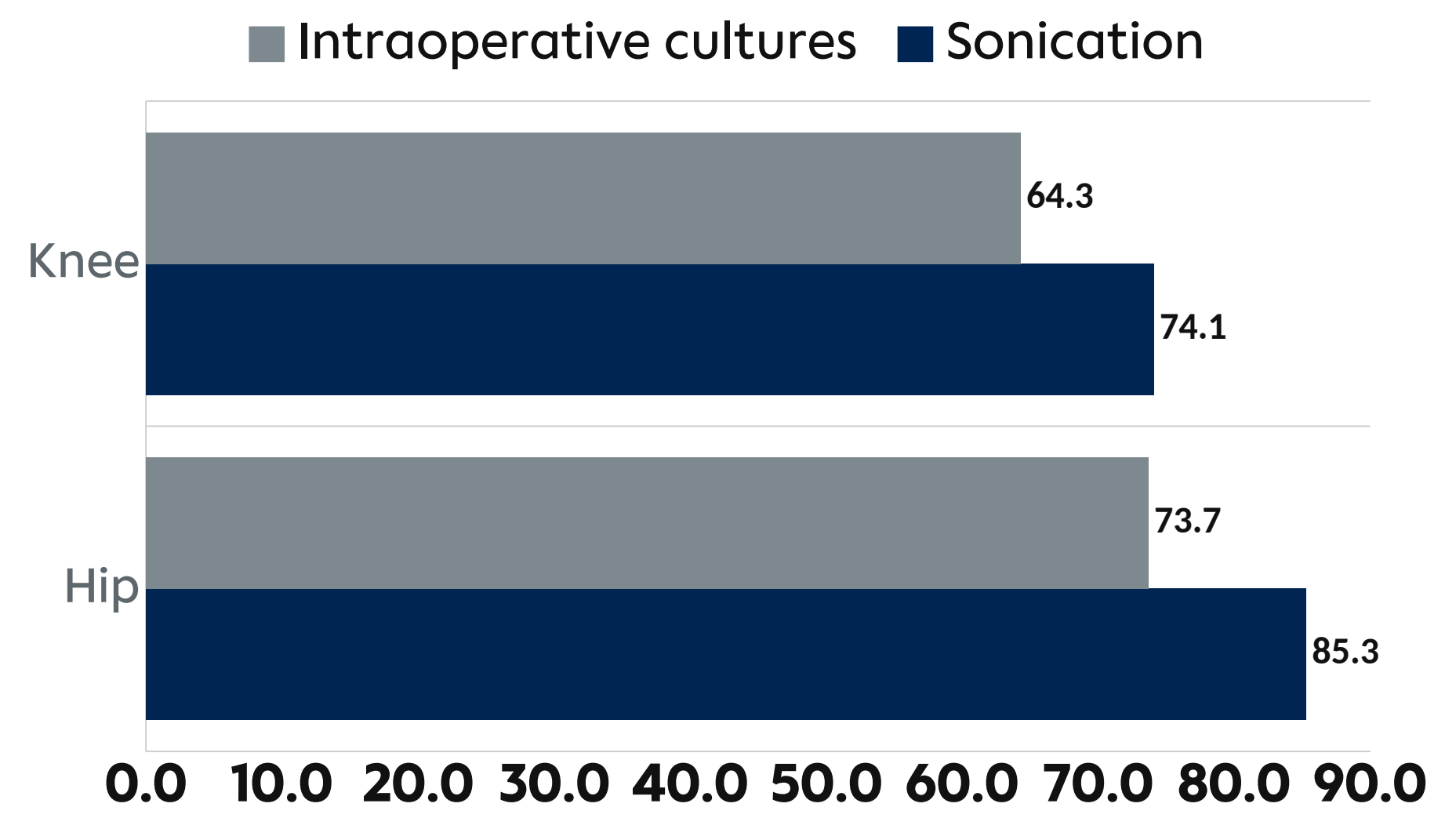
The analysis therefore addresses incremental diagnostic value rather than stand-alone replacement of the EBJIS work-up.

Diagnostic performance

Clinically adjudicated sonication versus pre-sonication EBJIS-confirmed and EBJIS-unlikely episodes



Sensitivity by diagnostic modality



Values are percentages. Cross-modality estimates are descriptive, not a formal paired comparison.

Specificity

98.8–100%

joint-specific specificity

Hip: 1/81 positive among pre-sonication EBJIS-unlikely episodes

Knee: 0/54 positive among pre-sonication EBJIS-unlikely episodes

PPV: 96.7% in hip and 100.0% in knee episodes

Interpretation of the result

Result	Clinical interpretation
Positive sonication	Strongly supports PJI and may confirm infection when conventional sampling is equivocal.
Negative sonication	Does not exclude PJI: sensitivity remained 74.1–85.3%; the full EBJIS work-up remains necessary.

Threshold matters

A strict >50 CFU/mL threshold preserved specificity but reduced sensitivity to 55.9% in hip and 63.0% in knee episodes. Contextual interpretation recovered clinically meaningful low-level growth.

A laboratory threshold alone cannot replace organism- and context-specific adjudication.

EBJIS reclassification

17/226 episodes changed EBJIS category (7.5%)

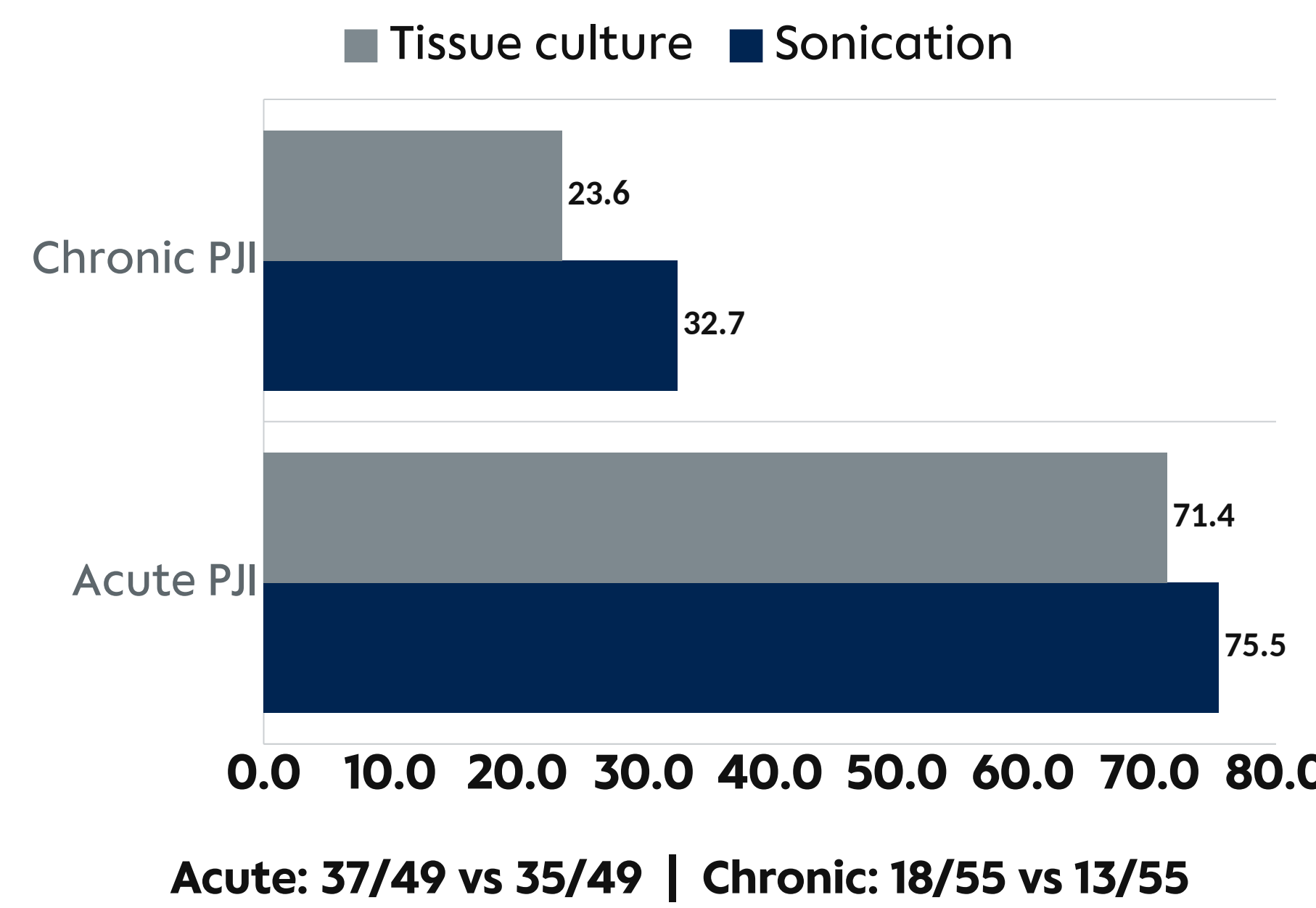
9 newly confirmed infections 8/36 likely → confirmed (22.2%)

Observed category transitions

Transition	n	%
Likely → confirmed	8	22.2%
Unlikely → confirmed	1	0.8%
Unlikely → likely	8	6.2%

Percentages use the relevant pre-sonication classification denominator.

Culture yield by infection timing



Descriptive analysis; polymicrobial episodes could contribute more than one organism category.

Clinical implications

- Add sonication when components are removed, particularly in EBJIS-likely or chronic cases.
- Continue systematic synovial-fluid and intraoperative fluid/tissue cultures.
- Interpret low-level growth with organism virulence, antibiotic exposure, histology, and concordant findings.

Limitations

- Retrospective, single-center selection of sonicated revisions.
- Criterion-dependent cross-modality comparison with differing denominators.
- Likely episodes excluded from binary accuracy; reclassification does not prove treatment benefit.

Conclusion

Routine integration, not substitution: sonication adds high-specificity, biofilm-directed evidence alongside the full EBJIS work-up and systematic intraoperative cultures.