



Occult Infection in Nonunion Revision Surgery: Preliminary Findings from a Brazilian Multicenter Cohort

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1. INTRODUCTION

- Established nonunion may conceal low-grade infection even when revision surgery is clinically classified as aseptic.
- Nonunion is a suggestive criterion for fracture-related infection (FRI); intraoperative microbiological sampling remains central when confirmatory signs are absent [1,2].

2. OBJECTIVE

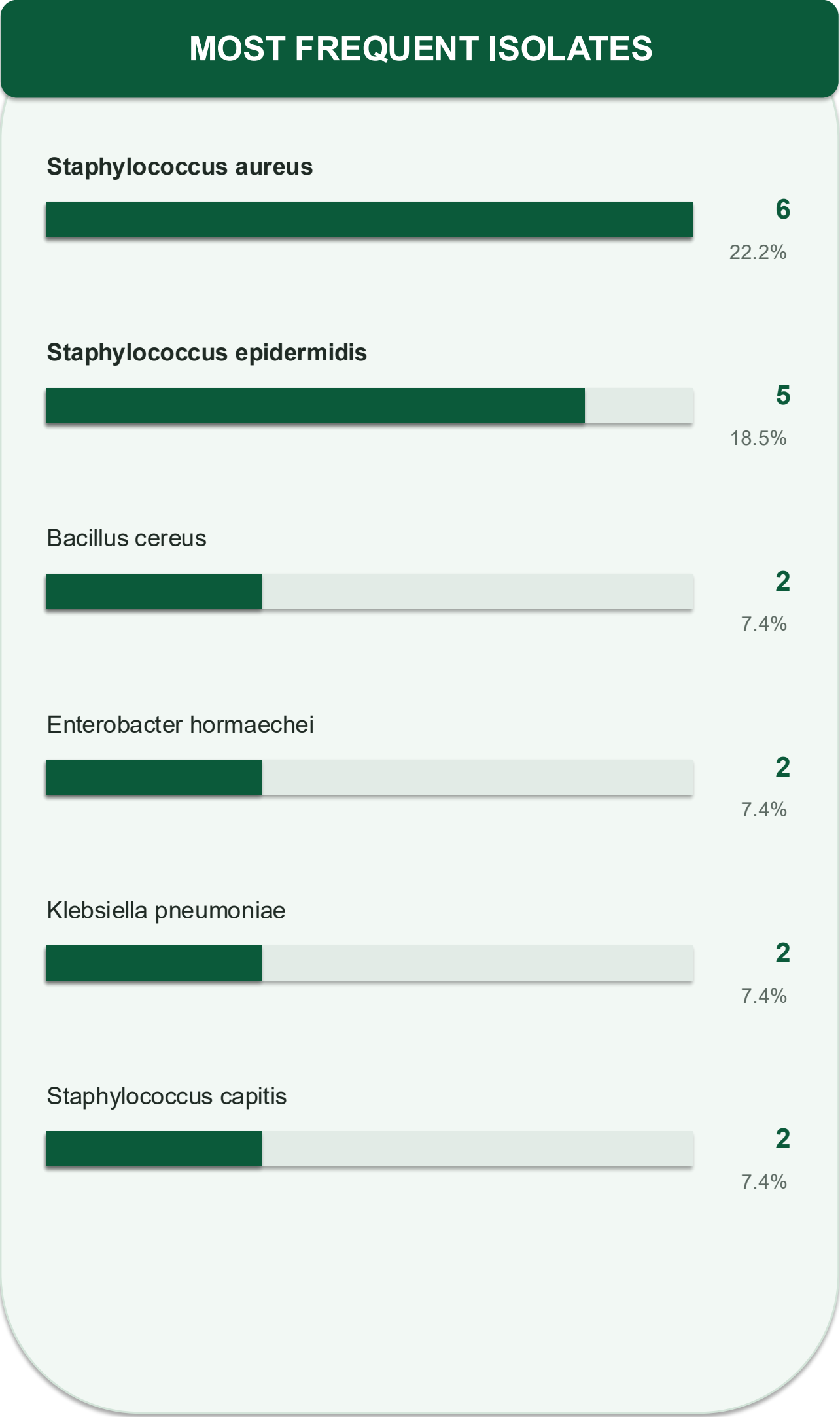
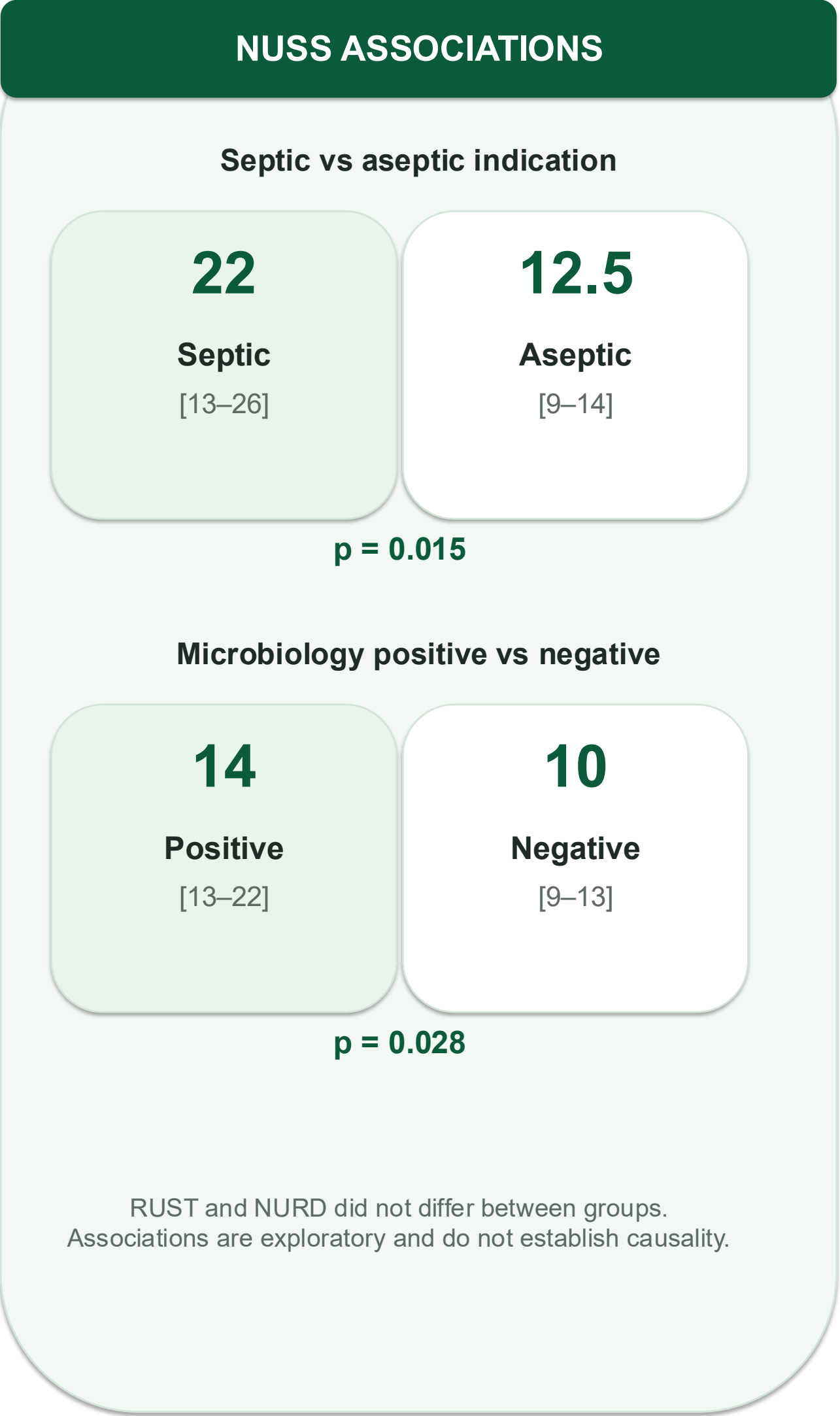
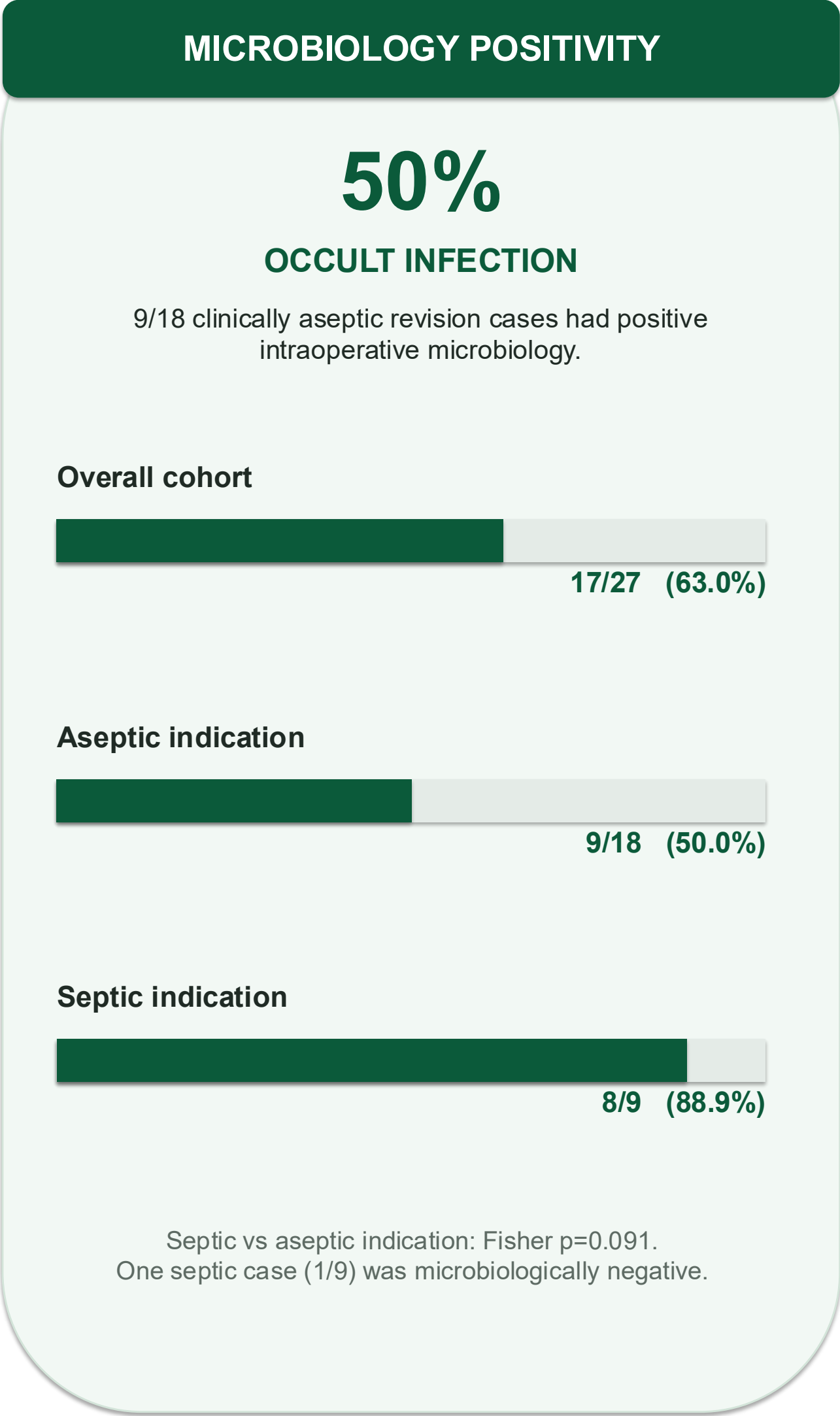
Estimate the frequency of intraoperative microbiological positivity and occult infection in revision surgery for established nonunion, and explore associations with clinical scores, fracture/nonunion classifications, and surgical risk factors.

3. MATERIALS & METHODS

- Brazilian multicenter cohort; 27 patients undergoing revision surgery for established nonunion.
- Intraoperative tissue cultures in all patients; sonication fluid cultures when feasible.
- Positive microbiology: growth in tissue/sonication after clinical adjudication excluded likely single-isolate skin contamination.
- Occult infection: clinically aseptic surgical indication plus positive intraoperative microbiology.
- Variables: AO, Weber–Cech, RUST, NURD, NUSS, open fracture, smoking, comorbidities, medications, prior external fixation and laboratory markers.
- Mann–Whitney; Fisher exact/exploratory chi-square. Exploratory analyses; no adjustment for multiple comparisons.

Study definition: a positive culture does not necessarily equal formal confirmatory FRI criteria.

4. KEY FINDINGS



5. RESULTS

ANALYSIS	GROUP 1	GROUP 2	P VALUE
Microbiological positivity by surgical indication	Aseptic 9/18 (50.0%)	Septic 8/9 (88.9%)	0.091
NUSS by surgical indication	Aseptic 12.5 [9–14]	Septic 22 [13–26]	0.015
NUSS by microbiological status	Negative 10 [9–13]	Positive 14 [13–22]	0.028
Weber–Cech pattern	Avascular 5/12 (41.7%)	Vascular 12/15 (80.0%)	0.057
Fracture openness	Closed 9/18 (50.0%)	Open 8/9 (88.9%)	0.091
Previous external fixation	No 5/12 (41.7%)	Yes 12/15 (80.0%)	0.057

6. DISCUSSION

Clinical signal

A clinically aseptic presentation did not reliably exclude positive intraoperative microbiology.

NUSS

Higher NUSS scores were associated with septic clinical indication and with microbiological positivity; causality cannot be inferred.

Exploratory trends

Borderline p-values for vascular Weber–Cech pattern, open fracture and prior external fixation are hypothesis-generating, not confirmatory.

Sampling strategy

Systematic tissue cultures—with sonication when feasible—may uncover clinically occult infection and refine the biological diagnosis.

7. CONCLUSION

Intraoperative microbiology was frequently positive in nonunion revision surgery, including in half of cases clinically classified as aseptic. NUSS was associated with septic indication and microbiological positivity. Open fracture, previous external fixation and vascular Weber–Cech pattern showed exploratory trends toward higher positivity. Larger cohorts with prespecified microbiological criteria are required.

REFERENCES

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CLINICAL RELEVANCE

Routine intraoperative tissue cultures ± sonication may uncover occult infection during nonunion revision.