

Application of New Consensus Definition Identifies High Numbers of Fracture Related Infections with Negative Cultures.

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Introduction

- Fracture related infection (FRI) is a severe complication in trauma surgery, but defining the full impact of these infections has been challenging with the lack of clear diagnostic criteria.
- This is particularly problematic for culture-negative FRI (CNFRI), which lack pathogen identification to guide antimicrobial therapy.
- Previous studies reported the incidence of CNFRI to be 9%.
- New consensus definition and criteria for the diagnosis of FRI (Figure) may help reduce the risk of diagnostic error.

Figure 1. Flow chart of FRI.

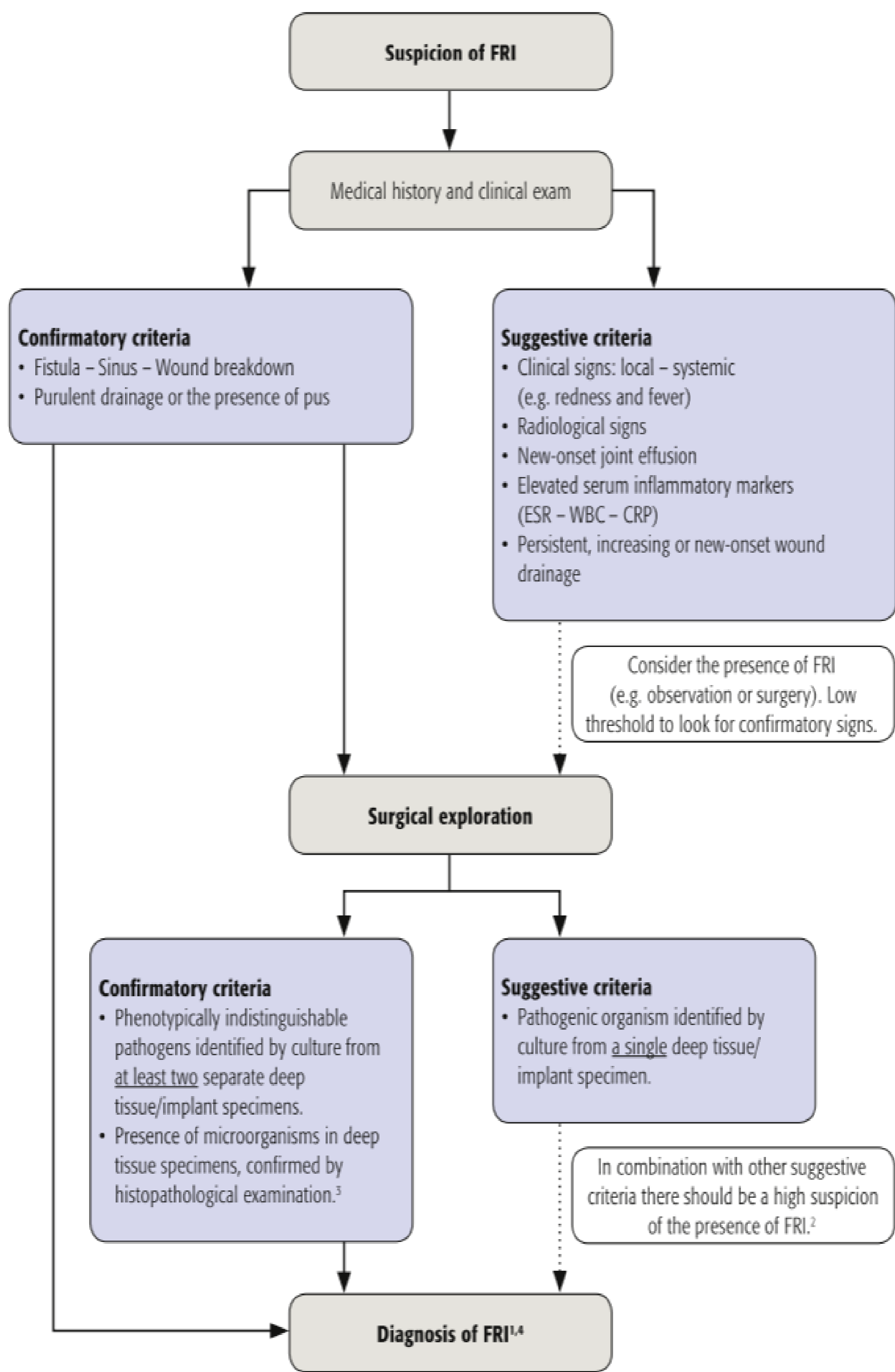
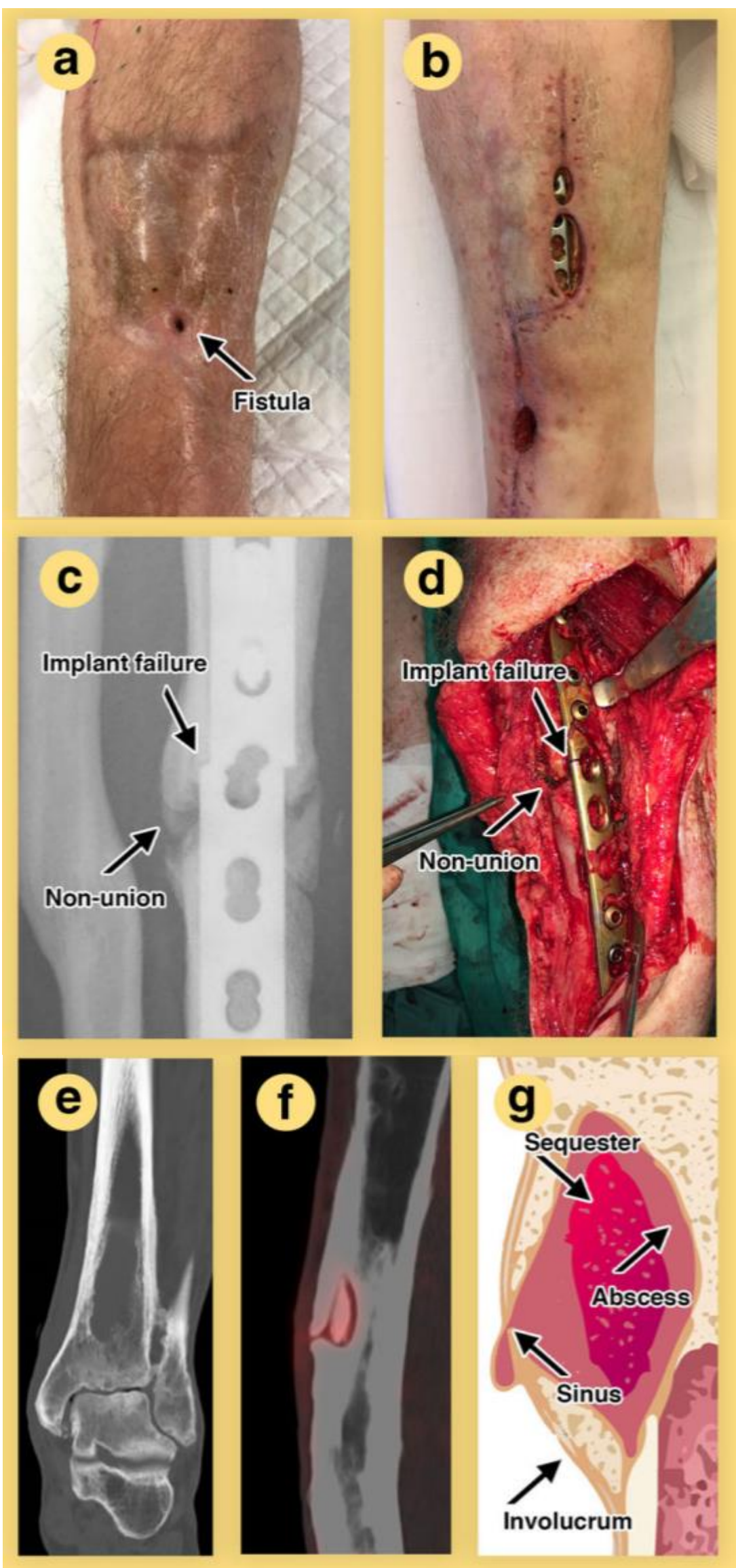


Figure 2. Clinical, radiological, and surgical features of fracture-related infections.



A. fistula. B. wound breakdown with exposed implant. C. plain radiograph demonstrating a nonunion with implant failure. D. intraoperative view of infected nonunion with plate breakage. E. CT image of subacute intraosseous FRI. F. FDG PET/CT image of an encapsulated sequestrum. G. schematic representation. Adapted from Glaudemans, Andor et al. "Diagnosing fracture-related infections: can we optimize our nuclear imaging techniques?". Eur J Nucl Med Mol Imaging, 2019, 1583-1587.

Purpose

- To determine the proportion and clinical characteristics of CNFRI cases at a level I trauma hospital using the new diagnostic criteria.

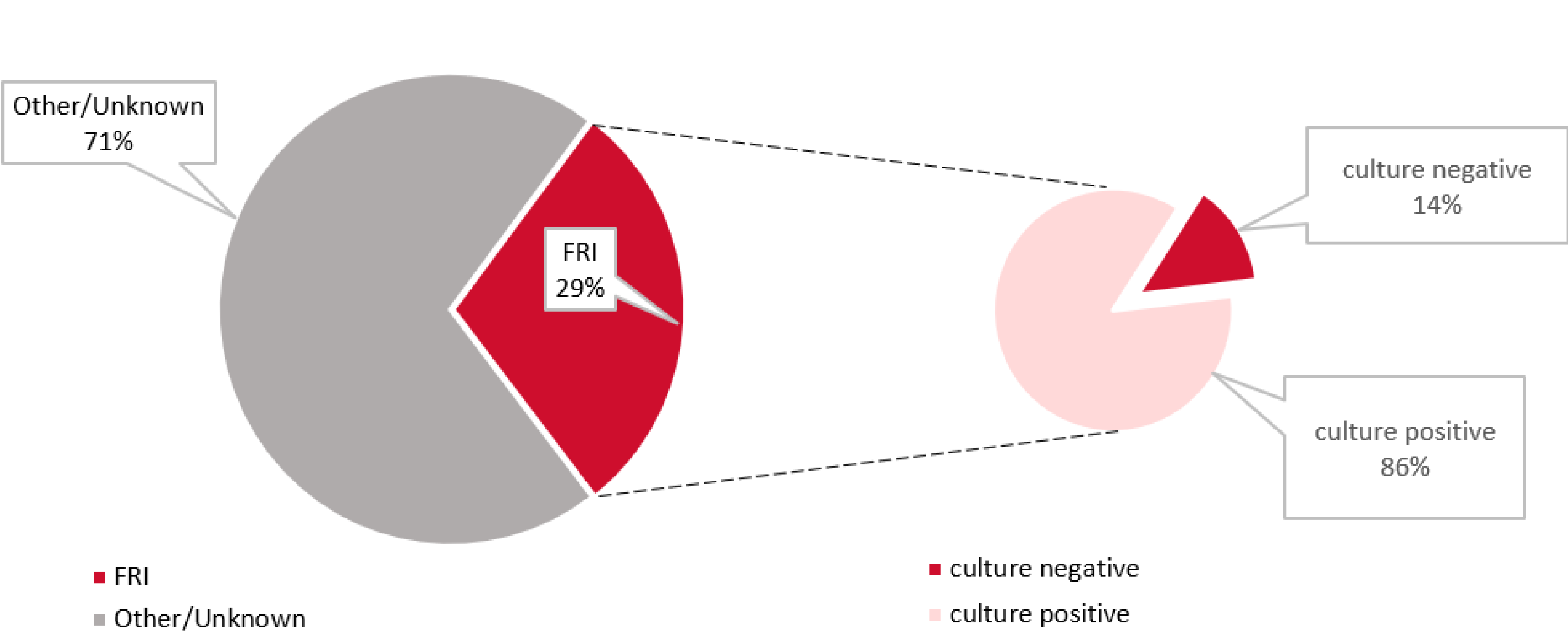
Methods

- Design: Retrospective chart review.
- Subjects: Patients that were managed by orthopedic surgeons at our trauma I level hospital in Cincinnati, Ohio during a three-year study period and during this time had at least one specimen submitted for microbiology culture.
- Data collected: Fracture characteristics, initial surgical antibiotics, confirmatory and suggestive criteria of infection, antibiotic utilization prior to FRI intervention, and culture specimens were obtained from electronic medical records.

Results

- 246 patients were identified with at least one culture specimen during the study time period.

Figure 3. Classification of cases based on consensus criteria.



- Distribution of fracture location: 25% ankle, 15% tibia/fibula, 13% tibial plateau.

Figure 4. Number of intraoperative cultures obtained.

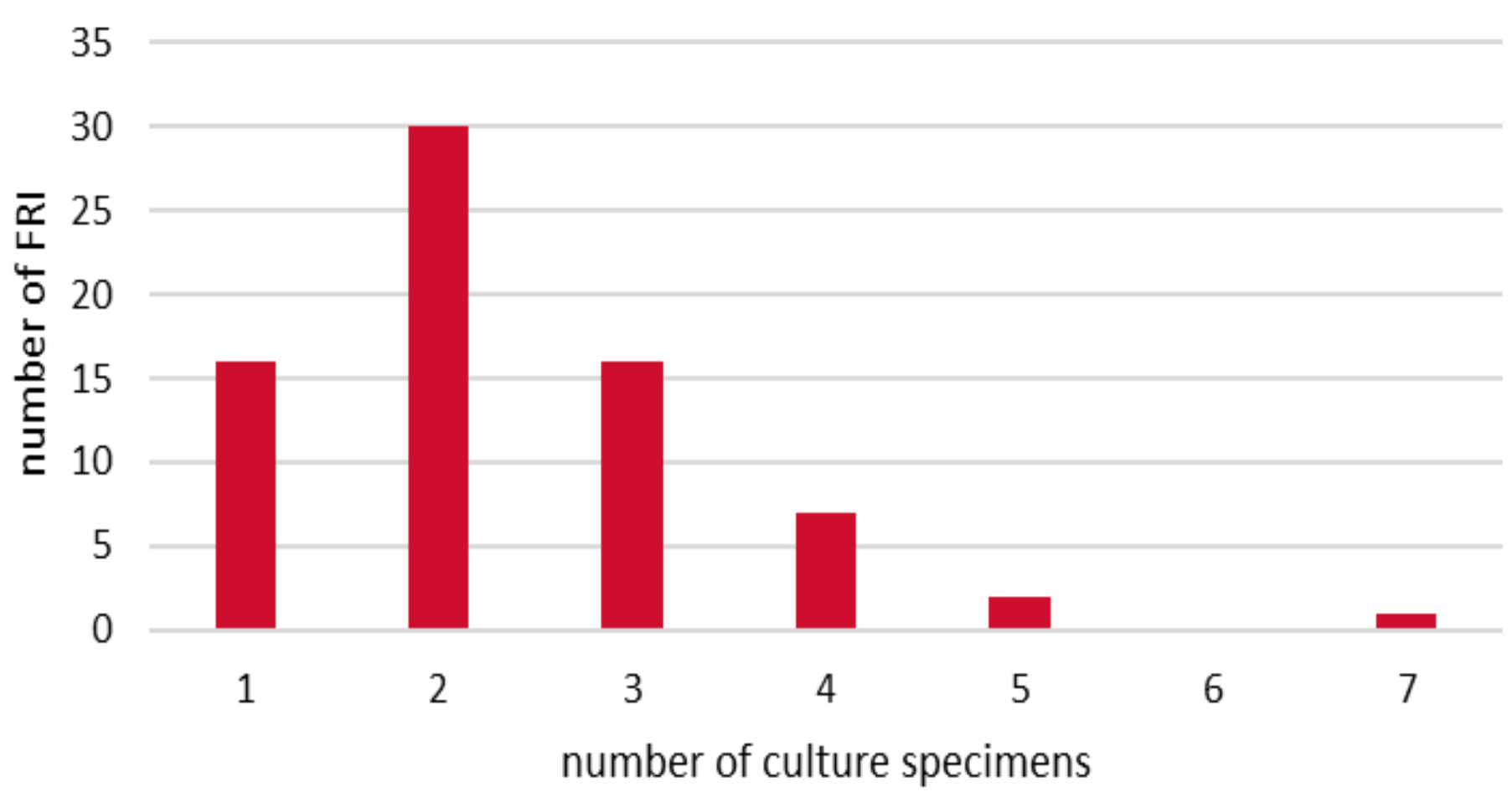


Figure 5. Rate of pathology submission in FRI cases.

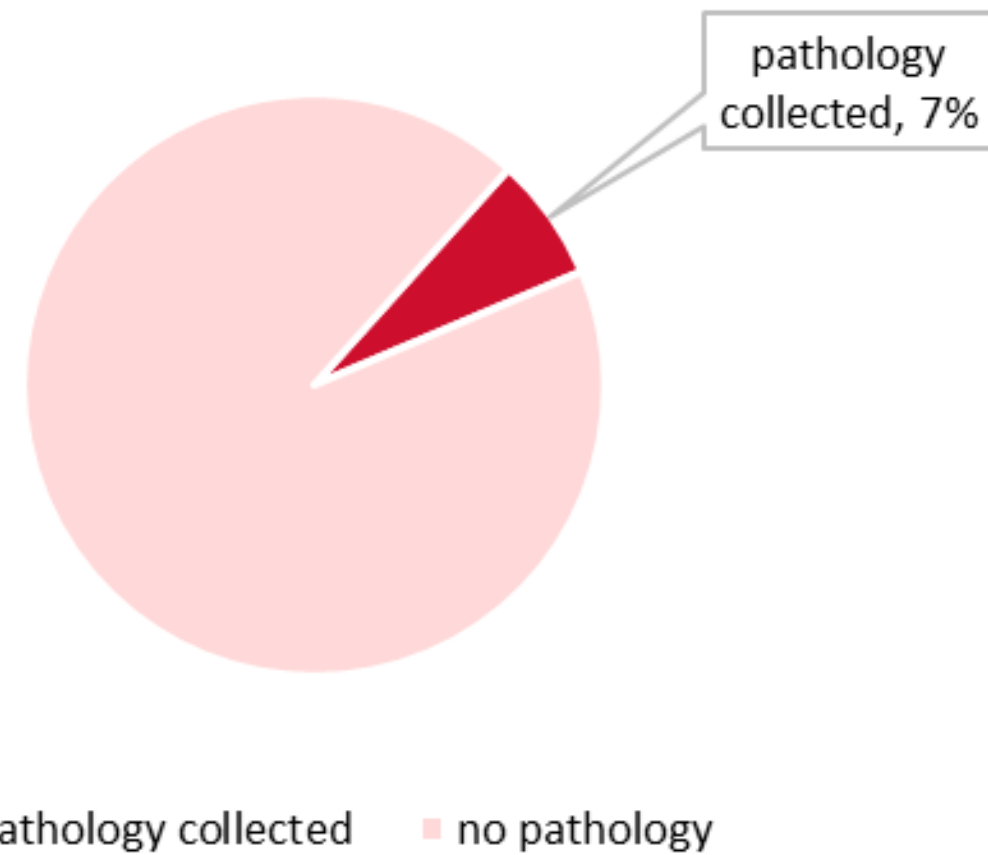


Table 1. Comparison of a number of characteristics between culture positive and culture negative FRI.

		CPFRI (n = 62)	CNFRI (n = 10)	p-value [^]
Type of fracture	Open	22	3	0.75
	Closed	40	7	
Antibiotics at initial fracture intervention	Pre-op only	1	0	
	Post-op only	11	2	
	Pre and Post-op	30	4	
	Nonsurgical	4	0	
	Info Unavailable	16	4	
Criteria	Confirmatory	52	7	0.93
	Suggestive only	10	3	
Op Note diagnosis	Infection only	31	6	0.4
	Nonunion + Infection	31	4	
Antibiotics prior to FRI intervention	Administered	28	2	0.97
	Mean duration*	7	22	
	Discontinued**	17	9	

[^] one tailed test; * in days; **in days prior to intervention

Conclusion

- Application of the new consensus criteria at our institution identified a high proportion of CNFRI, slightly higher than reported in the literature.
- With variable specimen data there was incomplete application of the FRI definition to all potential FRI with many cases having an "unknown FRI status."
- More comprehensive methodology would facilitate improved application of the criteria and could capture an even higher occurrence of FRI and CNFRI than our data suggests.
- More widespread efforts aimed at standardization in definitions, specimen collection, and utilization of clinical and surgical pathology are needed.

References

