

Stress-Induced Hyperglycemia is a Risk Factor for Surgical-Site Infections in Nondiabetic Patients with Open Leg Fractures

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CLINICAL CONTEXT & METHODS

INTRODUCTION

Open leg fractures carry a substantial risk of surgical-site infection (SSI). Trauma-related stress hyperglycemia may impair innate immunity even in patients without diabetes, but its value at the time of emergency admission is not well defined in this specific orthopaedic population.

STUDY AIM

To evaluate whether stress-induced hyperglycemia is associated with SSI and prolonged hospital care after open leg fracture treatment in nondiabetic patients.

STUDY DESIGN

Design: retrospective observational cohort, reported according to STROBE.
Period: 2017–2021.
Population: 80 adults without diabetes, treated for an open leg fracture.
Follow-up: minimum 1 year.
Primary endpoint: SSI within 1 year after surgery.

ORTHOPAEDIC PATHWAY

- Emergency assessment**
Admission glucose measured in the Emergency Department.
- Damage-control surgery**
Debridement and temporary external fixation within 24 hours.
- Definitive fixation**
Plate-and-screw fixation or intramedullary nailing after stabilization.
- Infection surveillance**
Clinical follow-up for SSI through 1 year.

COHORT SNAPSHOT

n = 80
open leg fractures

45.9 y
mean age

75%
male

24.6
mean BMI, kg/m²

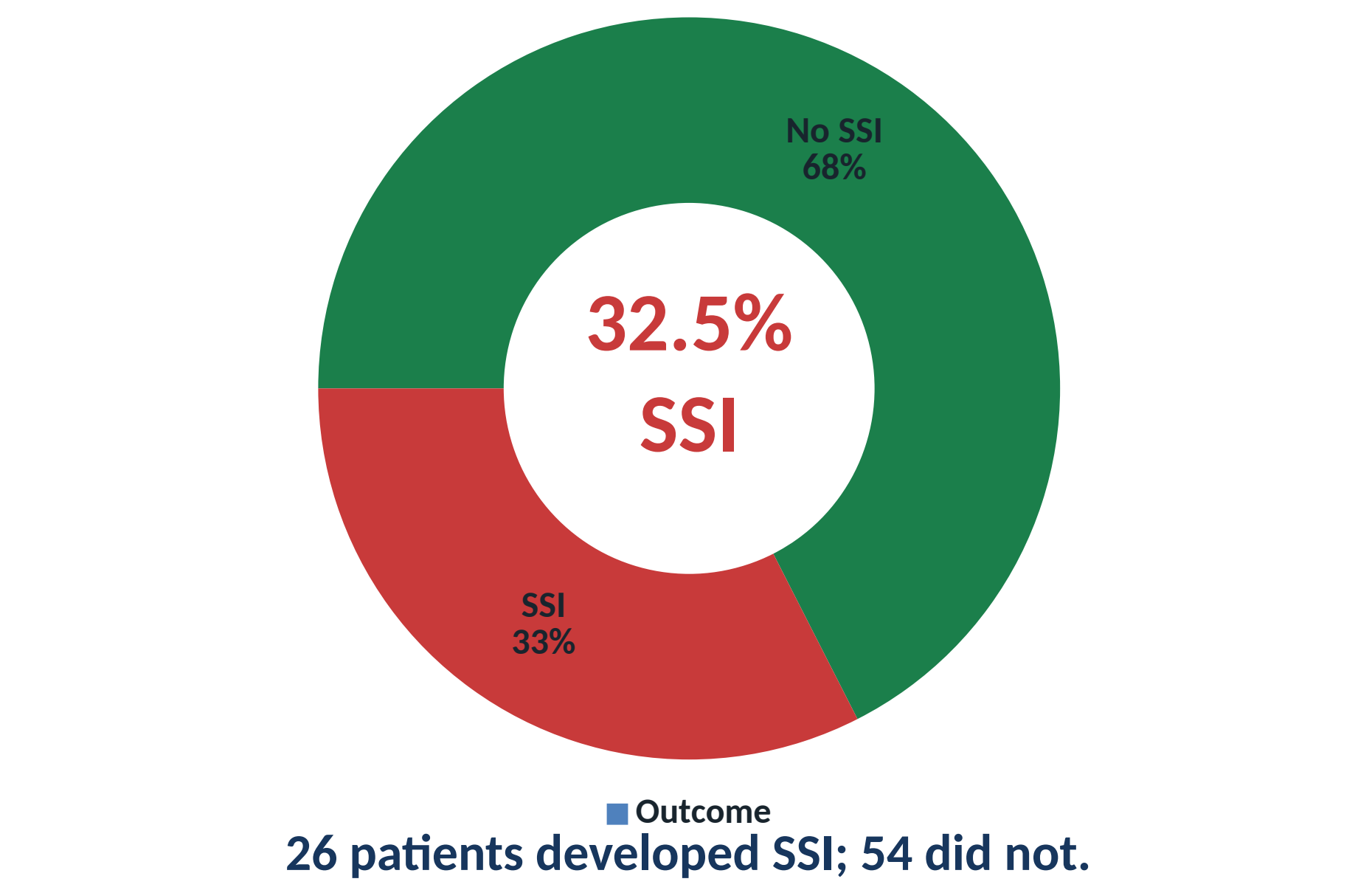
GLUCOSE ASSESSMENT

Blood glucose at ED admission
Postoperative day 1
Postoperative day 3
SSI and non-SSI groups compared
Multivariable logistic regression for SSI

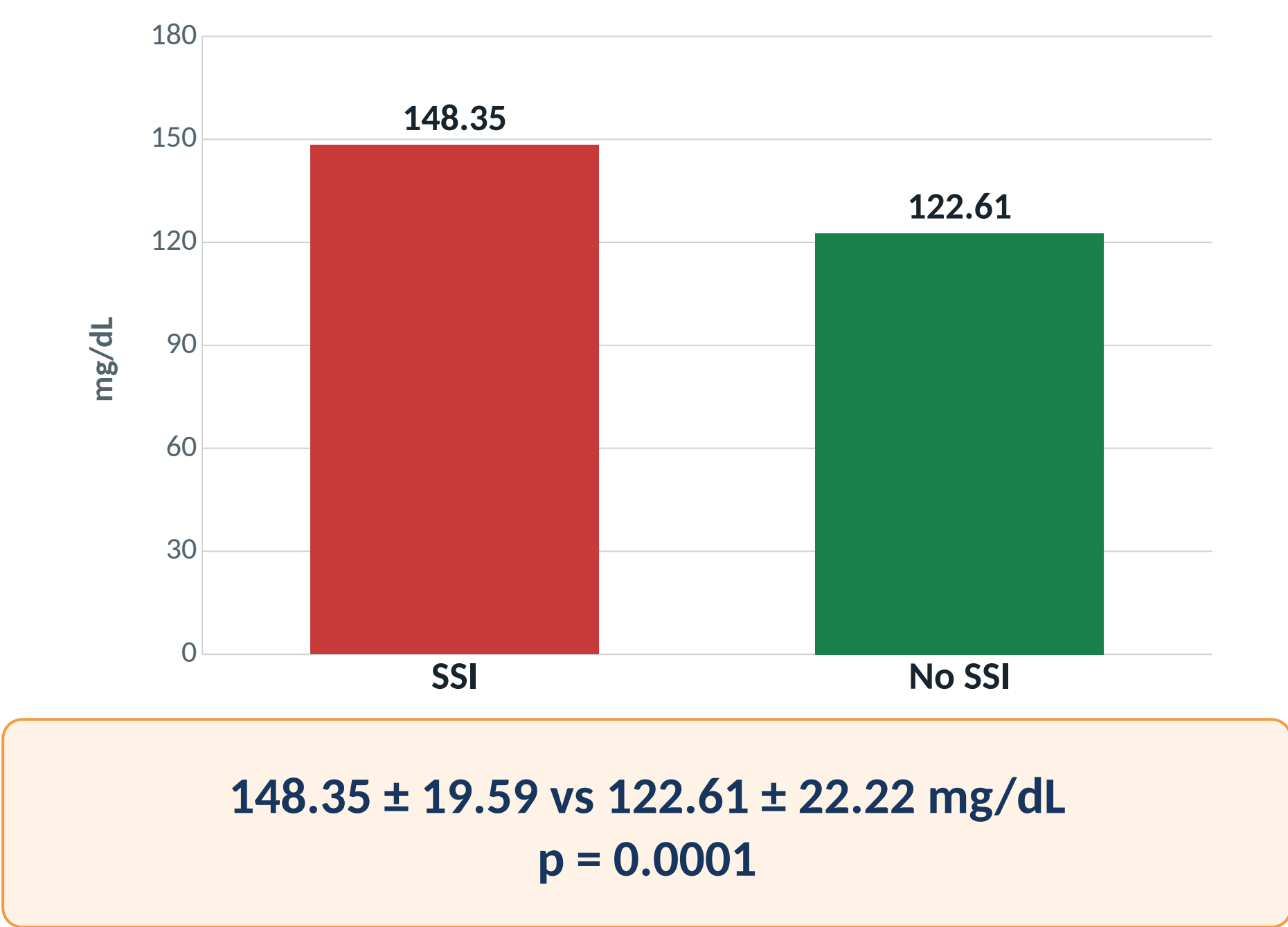
Stress hyperglycemia was evaluated as a readily available marker of systemic injury response—not as proof of a causal mechanism.

RESULTS & ORTHOPAEDIC IMPLICATIONS

SURGICAL-SITE INFECTION



ADMISSION GLUCOSE



PERIOPERATIVE GLUCOSE

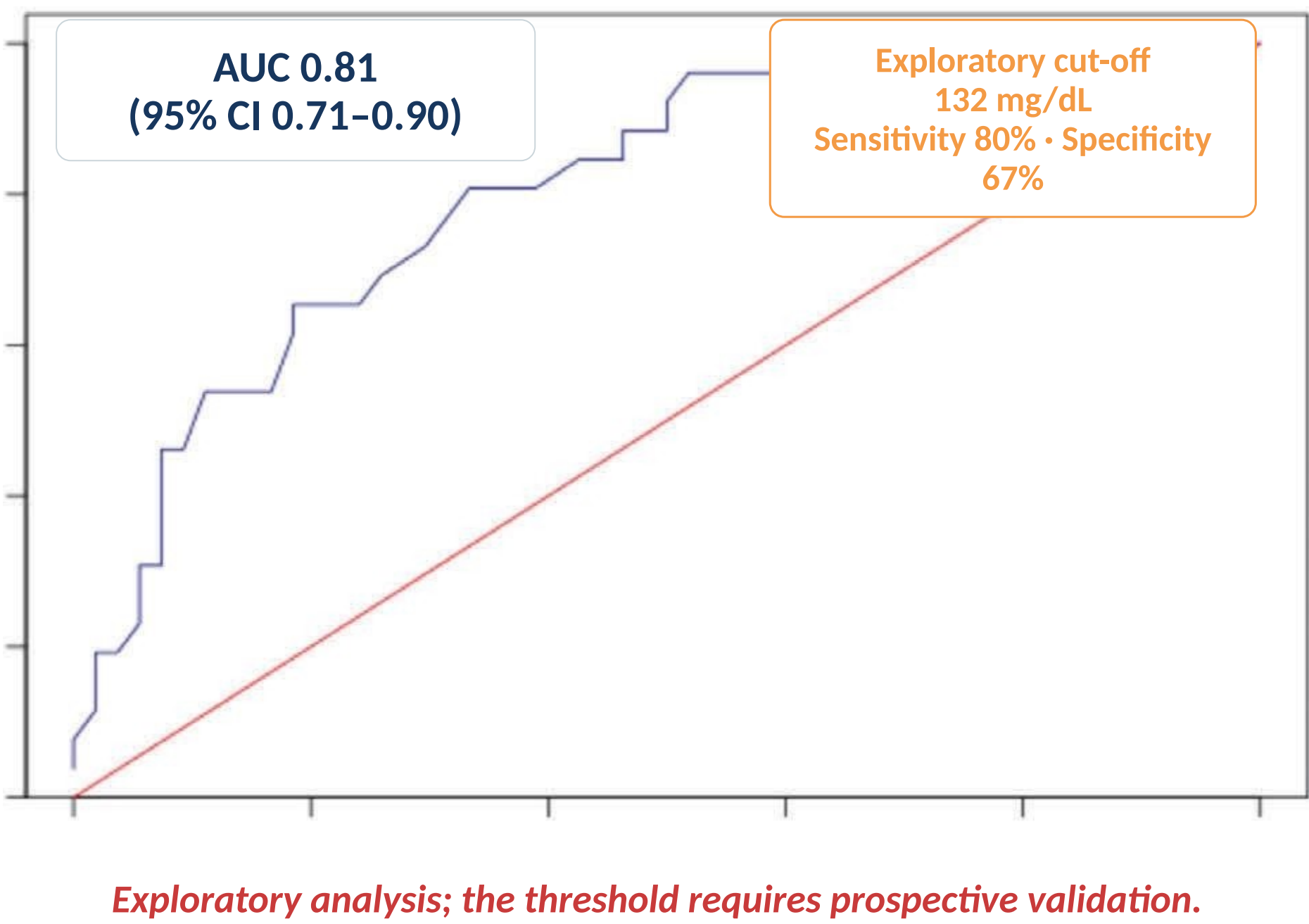
Timepoint	SSI	No SSI	p
Admission	148.35 ± 19.59	122.61 ± 22.22	0.0001
POD 1	113.81 ± 21.07	99.02 ± 17.60	0.001
POD 3	100.13 ± 18.84	95.07 ± 10.00	0.20

MULTIVARIABLE MODEL

Admission glucose
OR 1.067 per mg/dL | 95% CI 1.027–1.109 | p = 0.001

Time to definitive fixation
OR 1.027 per day | 95% CI 1.004–1.050 | p = 0.024

EXPLORATORY ROC ANALYSIS



RESOURCE USE & TIMING

57.9 d
hospital stay with SSI

18.4 d
hospital stay without SSI

Hospital stay: 57.92 ± 42.43 vs 18.41 ± 14.21 days | p = 0.01

External fixation to definitive synthesis:
29.00 ± 35.50 vs 20.78 ± 30.54 days | p = 0.02

SSI PROFILE

Timing: 17 SSIs before definitive fixation; 9 after.
Cultures: 18 patients had positive microbiology.
Pattern: 13 polymicrobial and 5 monomicrobial infections.
Frequent organisms: Enterobacteriaceae, P. aeruginosa, Acinetobacter spp. and S. aureus.

ORTHOPAEDIC INTERPRETATION

At first contact: admission glucose is available before definitive reconstruction decisions.
Risk awareness: higher values may identify a host under greater physiological stress.
Treatment pathway: infection prevention still depends on meticulous debridement, stabilization, soft-tissue management and timely definitive fixation.
Clinical response: consider closer glucose surveillance and multidisciplinary optimization; evidence does not yet support a treatment threshold.

CONCLUSION

In nondiabetic patients with open leg fractures, higher admission glucose was associated with SSI within 1 year and remained significant in the multivariable model. SSI was also associated with substantially longer hospitalization and a longer interval to definitive fixation.
CLINICAL MESSAGE: admission glucose may help flag higher-risk patients early in the orthopaedic trauma pathway.

LIMITATIONS

Retrospective, single-center design and modest sample size. Residual confounding cannot be excluded. The 132 mg/dL cut-off was derived in this cohort and is exploratory. Prospective studies are needed before changing glucose targets or treatment algorithms.

SELECTED REFERENCES

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