



Cumulative Metabolic-Risk Score Predicts Fracture-Related Infection Following Operative Fixation of Proximal Humerus Fractures

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BACKGROUND

- The incidence of fracture-related infection (FRI) after proximal humerus fracture (PHF) repair is 1-4%.
- Prior reported risk factors for FRI include glenohumeral dislocation, operative duration, preoperative skin prep with CHG, and prophylactic antibiotics (other than 1st gen cephalosporins).

OBJECTIVES

- To evaluate whether a cumulative 3-component metabolic-risk score, defined by body mass index (BMI) >30 kg/m², diabetes mellitus, and current tobacco use, is associated with increased risk of FRI following operative fixation of PHF.

METHODS

- We identified all patients undergoing operative fixation for PHF from a single orthopaedic group— multiple institutions— based on procedure codes and verified by manual chart review.
- Design: Retrospective Review, surgery date 2010-2024
- Minimum 1-year follow-up; Adult patients
- Final included cohort = 532 patients
- Infection defined using the 2020 FRI consensus definition by Govaert et al.
- Metabolic Risk Score Calculation:
 - +1 point = BMI >30 kg/m²
 - +1 point = Diabetes Mellitus diagnosis
 - +1 point = current tobacco use
- Low-risk = score 0-1, High risk = score 2-3
- FRI rates (1-yr) were compared across risk-groups
- Patient demographics, comorbidities, operative and postoperative variables were obtained by chart review
- Multivariable logistic regression performed to determine if risk score was independently associated with increased FRI risk.

RESULTS

Table 1. Select variables of patients undergoing fixation of PHF comparing high-risk and low-risk patients grouped by metabolic risk score.

Variables, n (%)	High-Risk (n=73)	Low Risk (n=459)	P value
Age, y, mean (SD)	58 (14)	60 (16)	0.56
Female Sex, n (%)	49 (67)	283 (62)	0.37
BMI, kg/m ² , mean (SD)	35.4 (6)	27.3 (7)	<0.001
Procedure (ORIF)	67 (92)	414 (90)	0.72
Wound Antisepsis (NS/None)	56 (77)	383 (84)	0.55
COPD	5 (7)	28 (6)	0.13
Renal Insufficiency	5 (7)	7 (2)	0.003
Coronary Artery Disease (CAD)	12 (16)	32 (7)	0.004
CCI Group			0.001
Mild (0-2)	60 (82)	421 (92)	
Moderate (3-4)	13 (18)	28 (6)	
Severe (5+)	0 (0)	10 (2)	
Operative Duration, min, mean (SD)	97 (28)	96 (32)	0.95

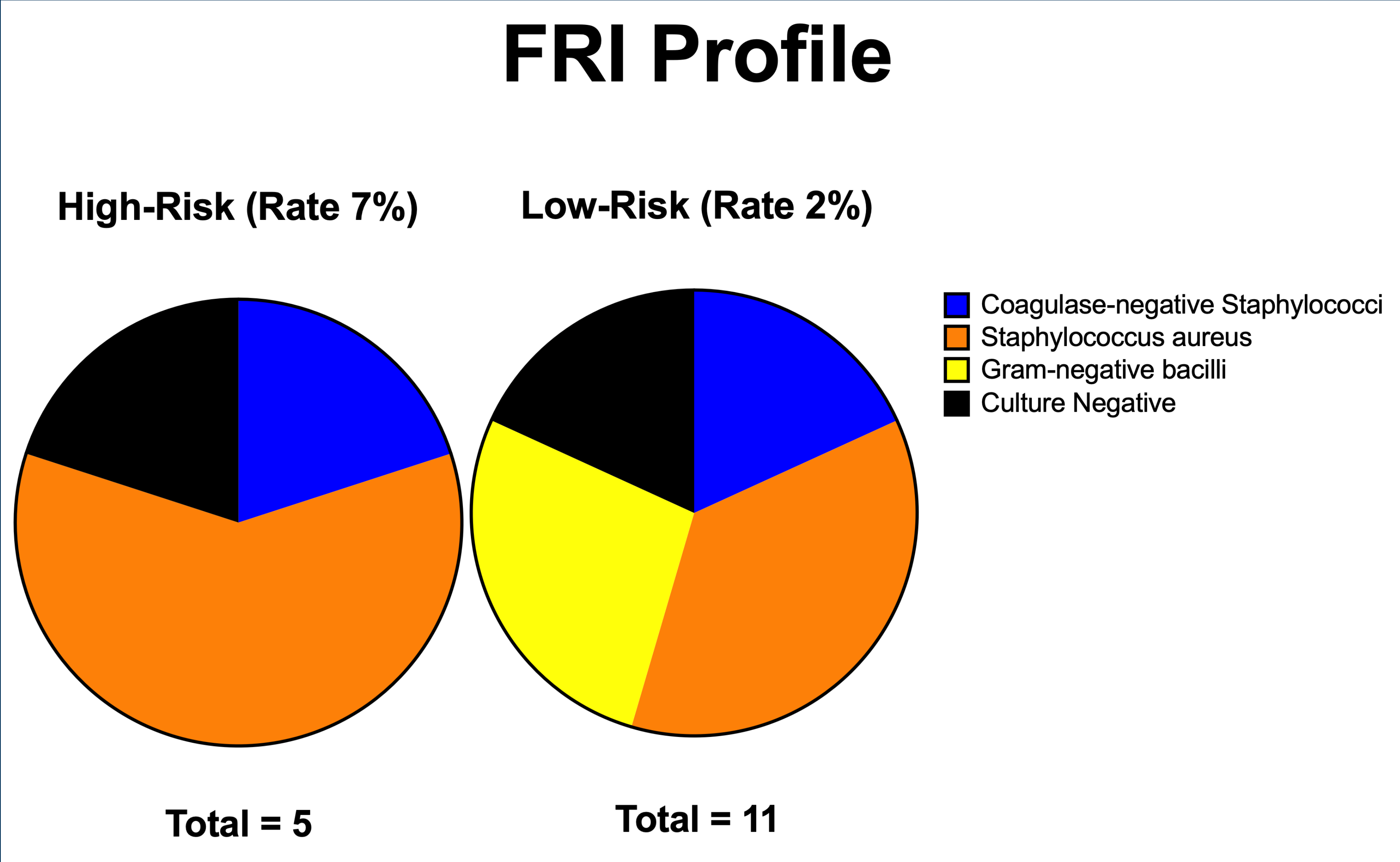
FRI Rate (1-yr) by study group (p = 0.03):
High-risk (metabolic score 2-3): 7%
Time from surgery (mean): 33 d
Low-risk (metabolic score 0-1): 2%
Time from surgery (mean): 175 d

Table 3. Multivariable analysis for association of metabolic risk score and 1-year FRI risk in patients undergoing operative fixation of PHF.

Variables	Odds Ratio	95% Confidence Interval	P value
Metabolic Risk Score (2-3)	3.01	1.05-8.75	0.04

*Covariates controlled for in multivariable model include: CAD, CCI Group, Renal Insufficiency

Figure 1. Pie chart demonstrating the breakdown of FRI type by pathogen for the High-Risk and Low-Risk groups by metabolic risk score for patients undergoing operative fixation of PHF.



CONCLUSIONS

- A simple 3-component cumulative metabolic-risk score incorporating obesity, diabetes mellitus, and current smoking status is successful in differentiating high-risk patients from low-risk patients for FRI after proximal humerus fracture.
- Cumulative metabolic risk scores of ≥ 2 are associated with increased risk of postoperative FRI following operative fixation of proximal humerus fractures.
- While this may represent a high-risk cohort who could benefit from intensified wound surveillance, perioperative optimization, and closer postoperative follow-up, large, prospective randomized validation studies are needed to substantiate these conclusions.

DISCLOSURES

- Detailed disclosure information is available at <https://disclosure.aaos.org/>
- We have nothing relevant to disclose.

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