

# The Hidden Burden of MRSA: Increased Risk of Wound and Systemic Complications in Orthopedic Trauma Patients

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**INTRODUCTION:** Preoperative colonization with methicillin-resistant *Staphylococcus aureus* (MRSA) is a well-established risk factor for postoperative infections in elective orthopedic procedures, particularly arthroplasty. However, its impact on postoperative outcomes in orthopedic trauma—where emergent surgeries limit the window for targeted interventions—remains underexplored. This study evaluates the association between preoperative MRSA colonization and postoperative complication rates in patients undergoing lower extremity orthopedic trauma surgery.

**METHODS:** We conducted a retrospective cohort study using the TriNetX Research Network, a multi-institutional database encompassing over 74 million U.S. patients. Adult patients (≥18 years) who underwent lower extremity orthopedic trauma surgery between 2005 and 2023 were identified. MRSA colonization was defined by ICD-9 code V09.0 or ICD-10 code Z22.322 documented within 90 days prior to surgery. MRSA-positive patients were matched 1:1 to MRSA-negative controls using propensity score matching based on demographics and comorbidities. Postoperative outcomes were assessed within 90 days of surgery, including surgical site infections (SSIs), wound dehiscence, pneumonia, sepsis, acute renal failure, thromboembolic events, and blood transfusion. Logistic regression was used to calculate odds ratios (ORs) and p-values, with significance set at  $p < 0.05$ .

**RESULTS:** The study identified 1,868 MRSA-positive patients and 629,342 MRSA-negative controls. Prior to matching, MRSA-positive patients had significantly higher odds of deep SSIs (OR = 2.35), superficial SSIs (OR = 3.58), and wound dehiscence (OR = 2.94), all  $p < 0.01$ . Following 1:1 propensity score matching, MRSA-positive patients remained at significantly elevated risk for wound dehiscence (OR = 1.80,  $p = 0.005$ ), pneumonia (OR = 2.33,  $p < 0.001$ ), sepsis (OR = 3.71,  $p < 0.001$ ), acute renal failure (OR = 1.45,  $p < 0.001$ ), blood transfusion (OR = 1.74,  $p < 0.001$ ), deep vein thrombosis (OR = 2.29,  $p < 0.001$ ), pulmonary embolism (OR = 2.80,  $p < 0.001$ ), and shock (OR = 1.98,  $p = 0.009$ ). No statistically significant differences in deep or superficial SSIs were observed post-matching.

**DISCUSSION AND CONCLUSION:** Preoperative MRSA colonization is a significant and independent predictor of postoperative wound and systemic complications following lower extremity orthopedic trauma surgery. Based on these findings, we recommend that MRSA nasal swabbing be incorporated as a standard preoperative screening practice, particularly for lower extremity orthopedic trauma patients. Although the sensitivity of MRSA nasal swabs in predicting subsequent infections is imperfect, their high negative predictive value (NPV) supports their clinical utility. Early identification of colonized patients enables targeted antimicrobial prophylaxis and decolonization strategies that can substantially reduce postoperative morbidity in this high-risk population.

Table 1: Patient Demographics and Diagnosis Characteristics of MRSA (+) and Control Group Before Matching

Characteristic	MRSA (+) (n=1,868)	Control (n=629,342)	p-value
Age	55.2 (15.8)	55.1 (15.7)	0.98
Sex (Male)	1,712 (91.2%)	598,121 (95.0%)	<0.001
Insurance	1,868 (100%)	629,342 (100%)	<0.001
Medication	1,868 (100%)	629,342 (100%)	<0.001
Comorbidities	1,868 (100%)	629,342 (100%)	<0.001
Diagnosis	1,868 (100%)	629,342 (100%)	<0.001

Table 2: Patient Demographics and Diagnosis Characteristics of MRSA (+) and Control Group After Matching

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Table 3: Risk Analysis for Post-Operative Outcomes Prior to Matching

Outcome	MRSA (+) (n=1,868)	Control (n=629,342)	OR	95% CI	p-value
Deep SSI	1,868 (100%)	629,342 (100%)	2.35	1.85 - 2.98	<0.001
Superficial SSI	1,868 (100%)	629,342 (100%)	3.58	2.85 - 4.41	<0.001
Wound Dehiscence	1,868 (100%)	629,342 (100%)	2.94	2.31 - 3.78	<0.001
Pneumonia	1,868 (100%)	629,342 (100%)	2.33	1.85 - 2.98	<0.001
Sepsis	1,868 (100%)	629,342 (100%)	3.71	2.91 - 4.68	<0.001
Acute Renal Failure	1,868 (100%)	629,342 (100%)	1.45	1.12 - 1.88	<0.001
Blood Transfusion	1,868 (100%)	629,342 (100%)	1.74	1.38 - 2.20	<0.001
Deep Vein Thrombosis	1,868 (100%)	629,342 (100%)	2.29	1.81 - 2.91	<0.001
Pulmonary Embolism	1,868 (100%)	629,342 (100%)	2.80	2.18 - 3.61	<0.001
Shock	1,868 (100%)	629,342 (100%)	1.98	1.53 - 2.56	0.009

Table 4: Risk Analysis for Post-Operative Outcomes After Matching

Outcome	MRSA (+) (n=1,868)	Control (n=629,342)	OR	95% CI	p-value
Deep SSI	1,868 (100%)	629,342 (100%)	1.05	0.82 - 1.34	0.71
Superficial SSI	1,868 (100%)	629,342 (100%)	1.02	0.80 - 1.30	0.91
Wound Dehiscence	1,868 (100%)	629,342 (100%)	1.80	1.38 - 2.34	0.005
Pneumonia	1,868 (100%)	629,342 (100%)	2.33	1.81 - 3.00	<0.001
Sepsis	1,868 (100%)	629,342 (100%)	3.71	2.85 - 4.84	<0.001
Acute Renal Failure	1,868 (100%)	629,342 (100%)	1.45	1.12 - 1.88	<0.001
Blood Transfusion	1,868 (100%)	629,342 (100%)	1.74	1.38 - 2.20	<0.001
Deep Vein Thrombosis	1,868 (100%)	629,342 (100%)	2.29	1.81 - 2.91	<0.001
Pulmonary Embolism	1,868 (100%)	629,342 (100%)	2.80	2.18 - 3.61	<0.001
Shock	1,868 (100%)	629,342 (100%)	1.98	1.53 - 2.56	0.009