

G5: Is there a role for universal screening and decolonization for methicillin-resistant *Staphylococcus aureus* (MRSA) in patients undergoing major orthopaedic procedures?

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Response/Recommendation:

There is no concrete evidence to support universal screening for methicillin-resistant *Staphylococcus aureus* (MRSA) in patients undergoing orthopaedic procedures. Given the cost-effectiveness of modern decolonization protocols, we recommend universal nasal decolonization in all patients undergoing major orthopaedic procedures, preferably using a non-antibiotic antiseptic agent.

Level of Evidence: Moderate

Delegate Vote:

Rationale:

Nasal colonization with *Staphylococcus aureus* in patients undergoing surgery is increasingly prevalent and has been shown to increase the risk of surgical site infection (SSI) by 3- to 6-fold [1]. Current protocols for the eradication of nasal *Staphylococcus aureus* carriage consist of the administration of topical or systemic antimicrobial agents [2,3] and subsequent screening for methicillin-sensitive *Staphylococcus aureus* (MSSA) and methicillin-resistant *Staphylococcus aureus* (MRSA) using culture or gene sequencing-based techniques [4]. However, the efficacy of these interventions in mitigating the risk of SSI remains unclear and is inconsistent across the existing literature [5–7].

We conducted a systematic review to ascertain whether the screening and decolonization of the MRSA group decreased the risk of SSI compared with the control group (no screening and decolonization) in orthopaedic procedures.

A random effects model with a random intercept logistic regression was used [8]. Heterogeneity was evaluated using the I^2 statistic and the *Chi*-square test. The systematic review included 10 studies encompassing 55,816 patients to evaluate the impact of MRSA screening and decolonization on the development of SSI following orthopaedic surgery [9–18]. The majority of included studies were retrospective cohort studies ($n = 6$, 60%), with historically controlled trials ($n = 2$, 20%) and prospective cohorts ($n = 2$, 20%) comprising the remainder. Heterogeneity across studies was substantial, with between-study variance estimated at $\tau^2 = 0.856$ (95% confidence interval (CI): 0.304–4.392) and $\tau = 0.925$ (95% CI: 0.551 – 2.096). The I^2 statistic of 93.2% (95% CI: 89.5 – 95.6%) indicated that over 93% of the variability in effect estimates arose from actual differences among studies rather than chance, further supported by the Q test ($Q = 132.32$, degrees of freedom (df) = 9, $P < 0.0001$).

In total, 10 studies evaluated the SSI risk between patients who received both screening and decolonization when compared to those who did not receive screening or decolonization. The

pooled prevalence of MRSA colonization across studies reporting this metric was 3.1% (0.47 – 5.0%). Although the risk of SSI in the MRSA decolonization group was lower than the control group (0.76 versus 1.05%), under the random-effects model, MRSA decolonization did not significantly reduce the risk of SSI (OR = 0.62, 95% CI: 0.32 – 1.22, $P = 0.17$). Among the 10 studies, four concluded no difference in SSI rates between decolonized and control groups, while five favored screening and decolonization. Notable outliers included the study by Malcolm et al. (2016), which reported a pronounced decrease in SSI risk (odds ratio (OR) = 0.03, 95% CI: 0.002 – 0.50), and the study by Baratz et al. (2015), which observed a paradoxically increased risk of SSI in screened and decolonized patients (OR = 4.26, 95% CI: 3.00 – 6.05).

Subgroup analysis of arthroplasty procedures (90,316 patients) yielded similar results (OR = 0.65, 95% CI: 0.31 – 1.38, $P = 0.26$), with heterogeneity remaining high ($I^2 = 93.3\%$, $\tau^2 = 0.970$). Larger cohorts more frequently supported decolonization, whereas smaller studies reported mixed outcomes. Moreover, five studies evaluated the cost-effectiveness of MRSA screening and decolonization, and all concluded that it can be a cost-effective approach [9,19–22]. While this analysis found no statistically significant reduction in SSI risk with MRSA decolonization (OR = 0.62, $P = 0.17$), the high heterogeneity ($I^2 > 93\%$) underscores critical variability in study designs, decolonization protocols, and patient populations. More extensive studies highlighted potential benefits, and cost-effectiveness was noted in select settings, emphasizing the need for tailored approaches.

Based on currently available literature, universal screening protocols for MSSA and MRSA in patients undergoing orthopaedic procedures appear to have limited utility. In light of recent evidence demonstrating the cost-effectiveness and efficacy of modern universal decolonization protocols [23], we recommend routine nasal decolonization of all patients undergoing major orthopaedic procedures, preferably using a non-antibiotic antiseptic agent.

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