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High risk *S. aureus* transmission in the operating room; a call for widespread improvements in perioperative hand hygiene and patient decolonization practices

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Background: Awareness of the epidemiology and implications of intraoperative transmission of more pathogenic strain characteristics is needed to improve compliance with infection control measures. We examined the association of *S. aureus* multilocus sequence types (MLST) with clonal transmission, biofilm formation, antibiotic resistance, and postoperative infection development.

Methods: *S. aureus* isolates (N=178) collected from 3 academic medical centers in the United States underwent phenotypic and genomic analysis to identify clonally-related transmission events. The association of *S. aureus* MLST with transmission, biofilm absorbance, antibiotic resistance, and infection development was then assessed.

Results: *S. aureus* MLST 5 (IRR adj 6.67, 95% CI 1.82-24.41, P=0.0008), 8 (IRR adj 8.33, 95% CI 2.31-30.12, P=0.0001), and 15 (IRR adj 5.73, 95% CI 1.35-24.33, P=0.009) were associated with increased risk of transmission. MLST 5 was associated with greater biofilm absorbance [(MLST 5 median absorbance 3.08, SD 0.642) vs. (other MLST median absorbance 2.38, SD 1.01), corrected P=0.021], multidrug resistance (OR 7.82, 95% CI 2.19-27.95, P=0.002), and increased risk of infection (6/38 MLST 5 vs. 6/140, RR 3.68, 95% CI 1.26-10.78, P=0.022). Provider hands and patients were confirmed as sources of MLST5 infection.

Conclusions: *S. aureus* MLST 5 isolates are associated with increased transmission, biofilm formation, antibiotic resistance, and infection development. Improved compliance with hand hygiene and patient decolonization measures is indicated.