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Risk factors for Staphylococcus aureus surgical site infections after orthopedic surgery in a French university hospital

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Background: Surgical site infections (SSI) following orthopedic surgery are associated with substantial morbidity rates, prolonged hospital stays, and increased healthcare costs. *Staphylococcus aureus* is the most common microbial cause but risk factors for mono microbial *S. aureus* SSI are not

well-known. Furthermore, in France, systematic *S. aureus* screening and decolonization are not recommended before orthopedic surgery. The aim of this study was to evaluate risk factors for *S. aureus* SSI after orthopedic surgery in a French University Hospital.

Material/methods: A case-control study nested within a prospective cohort of patients undergoing orthopedic surgery (hip arthroplasty, knee arthroplasty, revision of hip arthroplasty, revision of knee arthroplasty, osteosynthesis) was performed at the Grenoble Alpes University Hospital from January 1st 2012 to April 30th 2015. SSI were defined according to CDC criteria. All patients were surveyed for one year following surgery. Cases were patients with *S. aureus* SSI; controls were patients without SSI. Matching was performed on year of intervention, age, sex, and similar procedure. Demographic and clinical data were compared to identify risk factors of *S. aureus* SSI. Variables with $p < 0.1$ on univariate analysis were entered into an unconditional logistic regression. The significance level was 0.05. Statistics were performed using STATA 14.0.

Results: Of 7438 selected interventions, 137 (1.84%) SSI were identified; 50 (0.67%) were only due to *S. aureus*. Among these *S. aureus* SSI, 35 (70%) infections were deep and 8 (16%) were organ/space. A total of 46 (92%) SSI were due to methicillin-sensitive *S. aureus* and 4 (8%) to methicillin-resistant *S. aureus*. For risk factor analysis, 46 *S. aureus* SSI were matched to 91 controls. Univariate analysis revealed that, patients with *S. aureus* SSI were significantly more diabetic (19.6% vs 7.7%), hemiplegic or paraplegic (6.5% vs. 0%), had more significantly a National Nosocomial Infections Surveillance System score (NNISS) of one or more (82.6% vs 53.4%) and have received significantly more antibioprophyllaxis with a non-appropriate drug (7,1% vs 0%) than controls. Cases have significantly received less pre-operative antiseptic showers (43.5% vs. 79.1%) than controls. Independent risk factors for *S. aureus* SSI from multivariable analysis were smoking (odds-ratio (OR) 8.35, 95% CI 1.17-59.60), and NNISS score of one or more (OR 5.77, 95% CI 1.75-19.05). Bathing one or two times with antiseptic soap prior to intervention was protective (OR 0.26, 95% CI 0.12-0.65) against *S. aureus* SSI.

Conclusions: In our population, *S. aureus* SSI represents one third of SSI after orthopedic surgery. It seems imperative to recall the importance of preoperative showers and smoking cessation before orthopedic surgery. Furthermore, the risk factors identified from our study can be used to identify high risk patients for *S. aureus* SSI that will benefit from *S. aureus* screening and decolonization.