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Staphylococcus aureus infections in German type 2 diabetes mellitus patients after orthopaedic surgery: incidence, risk factors and clinical and health-economic outcomes

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Background:

Type 2 diabetes mellitus (T2DM) patients have been reported to face an above-average infection risk. This study assessed the *Staphylococcus aureus* (*S. aureus*) infection risk among German T2DM patients undergoing an orthopedic surgery.

Material/methods:

All T2DM patients in the years 2010-2012 were identified from a German claims database. First observed inpatient knee/hip/spine surgery between July 2010 and December 2011 was selected as index surgery; patients with a *S. aureus* infection in the previous 90 days before index surgery were excluded.

Cumulative *S. aureus* incidence (based on ICD-10 codes) was calculated for the index inpatient hospitalization stay and for 30, 90, 180, and 365 days after index surgery; following a Kaplan-Meier methodology, observation stopped at date of any follow-up surgery that was not done at the same location of the body as the index surgery. A case-control analysis was conducted to assess mortality, health care resource use (HCRU) and all-cause direct health care costs associated with *S. aureus*.

Results:

We identified 9,401 T2DM patients who underwent a knee (3,784), hip (4,111) or spine surgery (1,506). Mean age was 72.58 years, 63.32% were female. Overall, 1.08% of patients experienced a *S. aureus* infection in the 365 days follow-up period, 0.22% at index hospital stay and 0.31%, 0.68% and 0.83% at 30, 90, 180 days post-surgery, respectively. Compared to hip surgery patients, knee/spine surgery patients faced a lower infection risk (Figure 1).

Patients with *S. aureus* infection were associated with more all-cause hospitalizations (3.15 vs 0.84 per patient follow-up year, $p < 0.001$) and overall direct healthcare costs (22,752.29 vs 4,259.75, $p < 0.001$) as compared to patients without *S. aureus* infection. (Table 1). Mortality at the 365 days follow-up was 25.52% in the *S. aureus* patients versus 5.22% in the non-*S. aureus* patients ($p < 0.001$).

Conclusions:

S. aureus infections are associated with a substantial health care economic burden and high mortality. Effective infection control measures should be considered to target this population with the aim to reduce the risk of postsurgical *S. aureus* infection after an orthopedic surgery.

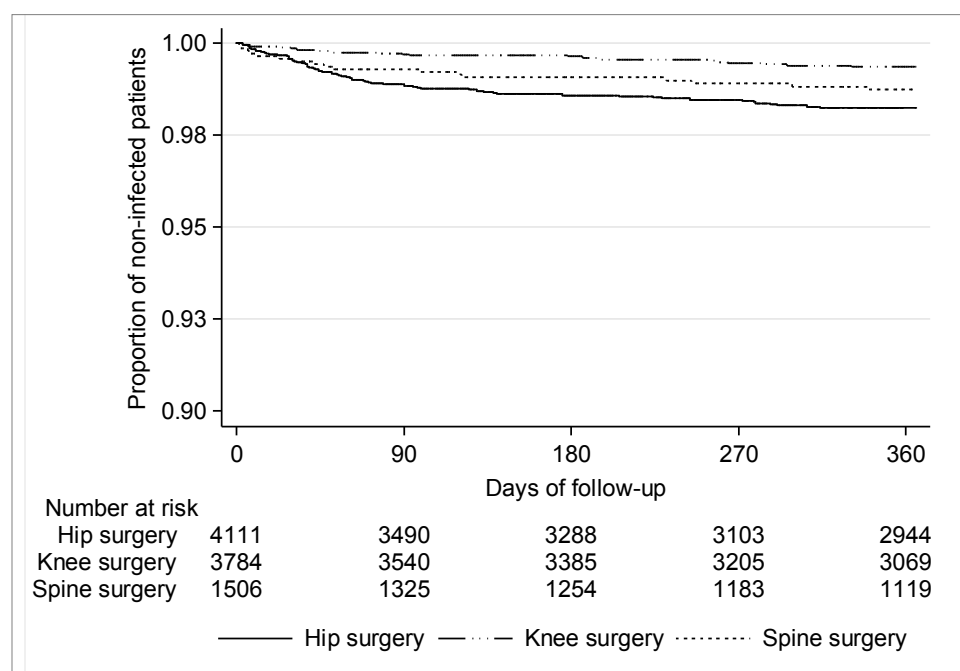


Figure 1: Kaplan-Meier survival curve of *S. aureus*-free patients. Log Rank tests hip versus knee < 0.001 ; hip versus spine $= 0.223$; knee versus spine $= 0.024$.

Table 1: Mortality, HCRU and Cost for Patients with or without a *S. aureus* Infection

	<i>S. aureus</i> patients	Non- <i>S. aureus</i> patients	p-value
N	239	9,162	
Mortality (%)			
During hospital stay	2.09	1.09	0.146
30 days	1.67	1.51	0.834
90 days	8.37	2.74	< 0.001
180 days	15.48	3.75	< 0.001
365 days	25.52	5.22	< 0.001
HCRU per patient-year (number)			
Outpatient GP visits	5.84	5.29	0.574
Outpatient specialist visits	8.49	9.56	< 0.001
All-cause hospitalizations ¹	3.15	0.84	< 0.001
Hospital days ¹	50.40	7.90	< 0.001

	<i>S. aureus</i> patients	Non-<i>S. aureus</i> patients	p-value
Cost (€) per patient-year	22,752.29	4,259.75	< 0.001

1 Index hospitalization excluded