

Letter to the Editor

Focusing on the follow-up for detecting surgical site infections after total joint arthroplasty and cardiac surgery: A cohort study from the Swiss national surveillance system, 2009–2018

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To the Editor—After joint replacement and cardiac procedures, surgical site infections (SSIs) are infrequently observed but can have devastating consequences.^{1,2} To reduce their incidence, a high-quality surveillance system is necessary to compare rates over time and between hospitals, to identify risk factors, and to demonstrate the impact of interventions if measures are taken to prevent SSI. The duration of follow-up is crucial because, in view of the time and effort required for contacting each patient at 30 days and 1 year after the procedure, it should be as short as possible but not too short to miss infections that occur later in the course of illness. In this analysis, we sought to describe the time of occurrence of SSI during the follow-up period for arthroplasty and cardiac procedures.

More than 170 Swiss hospitals participate in the national SSI surveillance organized by Swissnoso, the National Center for Infection Prevention, described by Troillet et al.³ We analyzed data from this surveillance system collected between June 2009 and September 2018. We included all patients with first joint replacement (hip and knee replacement surgery; from 149 hospitals) or cardiac surgeries (from 16 hospitals), such as coronary artery bypass grafting, valve surgeries and others (except for heart transplantation, vascular surgery and pacemaker implantation), for which we had 30 days and/or 1 year follow-up after the procedure. We excluded all interventions reported as “contaminated or dirty infected procedures” as defined by the Centers for Disease Control and Prevention (CDC), and those in children aged <16 years.

In total, 212,256 procedures (82.6% arthroplasties and 17.4% cardiac surgeries) were included in the study, of which 96.3% had a 1-year follow-up. Also, 5,738 procedures were excluded or had missing data. We encountered low SSI rates (1.1% in arthroplasties and 5.2% in cardiac surgeries), and most of the arthroplasty-associated SSIs were classified as organ-space infection. For knee and hip replacement surgeries, the SSI rates were 28.1% superficial, 13.3% deep, and 58.6 organ-space. For cardiac

surgeries, the SSI rates were 39.1% superficial, 32.1% deep, and 28.8% organ-space. Of all procedures, 99.3% had no infection reported at the time of the 30-day follow-up. The patient characteristics were stratified by SSI (Supplementary Table 1 online).

For knee and hip replacement surgeries, 92.2% of SSIs occurred after discharge: 56.9% occurred within the first 30 days, and 24.9% occurred between 30 and 90 days after surgery (Fig. 1). Limiting the follow-up period to 90 days would have resulted in 18.1% of knee and hip SSIs being missed, most of which were organ-space infections: 6.1% superficial, 9.8% deep, and 84.1% organ-space.

For cardiac surgeries, 64.5% of SSIs occurred after discharge. 71.5% of SSIs occurred within 30 days and 19.7% occurred between 30 and 90 days after surgery (Fig. 1). Limiting the follow-up period to 90 days would have resulted in 135 SSIs (8.8%) after cardiac procedures being missed (16.3% superficial, 20.0% deep, 63.7% organ-space). Across all cardiac patients, those who underwent surgery other than coronary bypass surgery (that is, predominantly heart-valve surgery) were particularly affected by late SSI (representing 75.6% of all cardiac late infections). Limiting the follow-up in this subgroup to 90 days would have resulted in missing 15.4% of the SSIs.

In other words, with a follow-up shortened from 1 year to 90 days, we estimate seeing a decrease of the SSI incidence of 0.20% for arthroplasties and 0.46% cardiac surgeries, meaning that for every 502 joint replacements and 219 cardiac procedures, 1 SSI would be missed in our national surveillance.

The importance of capturing an SSI after patient discharge from the hospital has been known for years, but there is no international standard for proper follow-up methodology.² In a systematic review from 2016, Woelber et al¹ highlighted that 60% of all detected SSIs occur after discharge. The postoperative length of hospital stays has been declining for years around the globe, and that trend appears to be continuing; thus, emphasis should be placed on the role of postdischarge surveillance and on how high-quality surveillance is best achieved.

In our cohort, the proportion of infections occurring after 90 days was higher after joint replacement and valve surgery, which may point to the role that foreign material plays in increasing the infection risk. In implant surgery, we hypothesize that metastatic infection after bacteremia—and not SSI—is a common

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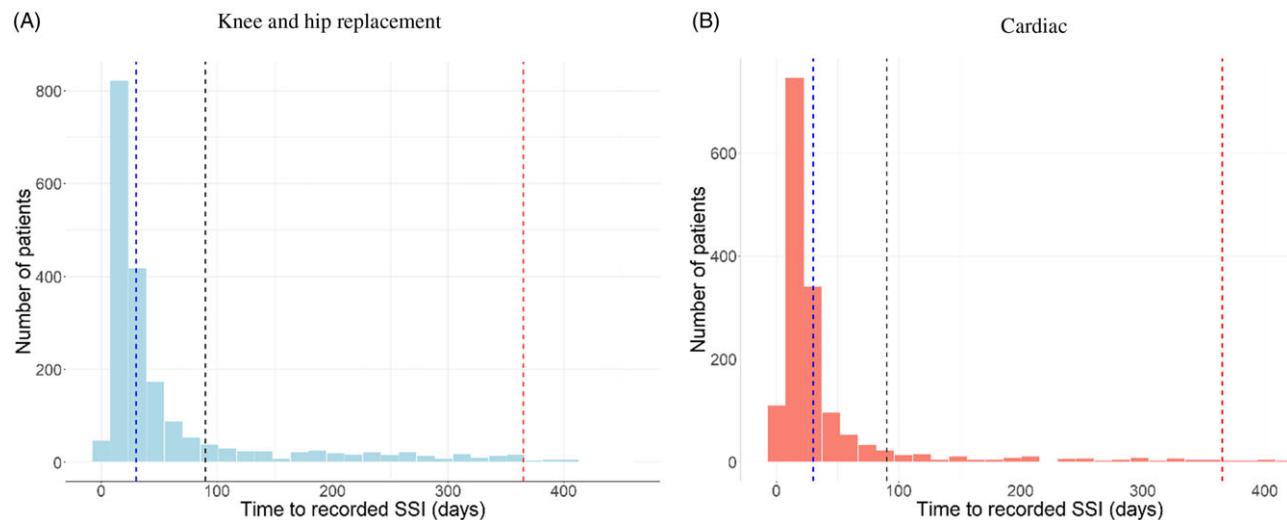


Fig. 1. Distribution of time to recorded SSI from date of procedure for hip and knee replacement (left panel) and cardiac (right) surgeries with cutoffs at 30 days (blue dashed), 90 days (black dashed line), and 365 days (red dashed line). Note. SSI, surgical site infection. A. Knee and hip replacement B. Cardiac

mechanism that may increase the number of late infections, but it may not be preventable by perioperative measures.

The data presented here are consistent with other studies that investigated the impact of duration of postdischarge surveillance on the reported SSI incidence. In 2015, based on data from the Netherlands (1999–2008), Koek et al⁴ recommended limiting the follow-up time for implant surgery to 90 days and maintaining a 30-day time frame exclusively for implant-free surgery. In the United States, the national healthcare safety network (NHSN) surveillance has a standard follow-up period of 90 days (and for selected procedures 30 days).⁵

After evaluating the data presented here, Swissnoso changed the follow-up duration from 1 year to 90 days for all procedures captured in the national SSI surveillance in 2021 for the following reasons: (1) most international surveillance systems use a 90-day follow-up to offer better comparability on an international level, (2) relatively few late infections would be missed, and (3) the timely feedback of the results to the surgical teams increases the impact of feedback.

Supplementary material. To view supplementary material for this article, please visit <https://doi.org/10.1017/ice.2022.77>

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Conflicts of interest. All authors report no conflicts of interest relevant to this article.

References

1. Woelber E, Schrick EJ, Gessner BD, Evans HL. Proportion of surgical site infections occurring after hospital discharge: a systematic review. *Surg Infect (Larchmt)* 2016;17:510–519.
2. Anderson DJ, Podgorny K, Berrios-Torres SI, et al. Strategies to prevent surgical site infections in acute care hospitals: 2014 update. *Infect Control Hosp Epidemiol* 2014;35:605–627.
3. Troillet N, Aghayev E, Eisenring MC, Widmer AF. First results of the Swiss National Surgical Site Infection Surveillance Program: who seeks shall find. *Infect Control Hosp Epidemiol* 2017;38:697–704.
4. Koek MB, Wille JC, Isken MR, Voss A, van Benthem BH. Postdischarge surveillance (PDS) for surgical site infections: a good method is more important than a long duration. *Euro Surveill* 2015;20(8).
5. National Health Safety Network. Surgical site infection event (SSI). Procedure-associated module. Centers for Disease Control and Prevention website. <https://www.cdc.gov/nhsn/pdfs/pscmanual/9pscssicurrent.pdfCDC>. Published 2022. Accessed April 10, 2022.