

STERILIZATION AND INFECTION PREVENTION OF SURGICAL SITE INFECTIONS STARTS WITH INSTRUMENT REPROCESSING

Thousands of surgical procedures are performed at hospitals worldwide every day. Reusable surgical instruments provide a potential route of transmission for pathogens between patients in healthcare facilities, as they can potentially be contaminated at point of use and may cause surgical site infections (SSI) (1). Today, there is a growing emphasis on the prevention of SSI as they have been suggested as a key indicator of high care quality. For this reason, planning and implementing initiatives preventing SSI is even more important (2). Therefore, the correct reprocessing of medical instruments is vital to patient safety. Any error in the reprocessing process risks instrument contamination and subsequently a healthcare-associated infection.

GLOBAL BURDEN OF SSI

SSI are one of the most common infection types, accounting for almost 20% of all healthcare-associated infections (HCAI) (3). They are defined as infections occurring within thirty days after surgery, affecting either the incision or deep tissue at the surgical site. In case of implants this time period is prolonged to one year after surgery (4). Despite considerable advances in the use of prophylactic antibiotics, in surgical techniques and environmental improvements in the operating theatre, SSI remain a significant cause of surgical morbidity and mortality (5).

Infections in conjunction with surgical incisions are associated with an increased length of hospital stay, which in turn means a prolonged patients' risk of exposure to further pathogens. Due to the treatment expenses, repeated admissions to the hospital and reoperations, SSI stand for substantial healthcare costs, making this complication a concern for all hospital teams (6). According to European data the mean cost of prolonged hospitalization due to SSI is \in 325 per day (4). If a hospital with an annual surgical volume of 10,000 operations could reduce their SSI by half; this would result in an average annual cost savings of approximately \$ 450,000 (7). In addition to the increased healthcare costs associated with SSI, there are indirect costs resulting from lost productivity on the part of the patients and their families. SSI therefore continuously pose a paramount clinical risk and challenge (4).

LOW AND MIDDLE HUMAN DEVELOPMENT INDEX COUNTRIES (LMHDICS)

Research/ Studies performed on SSI in LMHDICs found a high rate of infections compared with data of studies done in high Human Development Index countries (8). The international Nosocomial Infection Control Consortium (INICC) reports SSI prevalence rates of 7.2%, 6.2%, 5.9% and 2.9% in Brazil, China, Sweden and the USA, respectively (6). The higher prevalence of infections in low-income nations may partially be caused by antibiotic-resistant bacteria, associated with a higher usage of antibiotics before and after surgery (9). However, also structural features of a hospital can influence not only the efficacy of the treatment provided, but also patient outcome in terms of surgical site infection prevention (10).

TRUE RISK MAY BE EVEN HIGHER

Published numbers on the SSI prevalence may even underestimate the risk as many infections do not become apparent until after the patient has been discharged from hospital (11). Furthermore, the limited number of studies on this subject in low-income and middle-income countries could lead to an underestimation of the actual burden of SSI in this specific part of the world (6).

INSTRUMENT PROCESSING AS A SIGNIFICANT RISK FACTOR

There are several causes of SSI. Potential patient-related factors include older age, pre-existing infections, colonization with Staphylococcus aureus and other potential pathogens, diabetes and smoking (12). Procedure-related factors include the surgical technique, duration of operation, quality of preoperative skin preparation and inadequate sterilization of surgical instruments (4). Thus, instrument reprocessing is a significant risk factor controlled by the hospital and therefore mentioned in the guidelines of the Centers for Disease Control and Prevention (CDC). The CDC notes in its recommendations for prevention of SSI that, "Inadequate sterilization of surgical instruments has resulted in SSI outbreaks" (13). Instrument processing has the potential to significantly impact the prevention of surgical site infections. Therefore, patient safety dependents upon sterile processing personnel performing their functions competently and correctly.

BARRIERS TO BEST PRACTICES REGARDING INSTRUMENT MANAGEMENT

Correct handling of instruments should facilitate the removal of protein and assure the efficacy of sterilization procedures in removing microorganisms including prions (14). Improperly prepared or reprocessed instruments or supplies can harbor microorganisms, which can result in patient infections. When reprocessing instruments, the responsible health care workers are required to follow all steps carefully to provide adequately cleaned, disinfected and sterilized instruments for patient care. Key barriers to getting instruments reprocessed for reuse rapidly have been summarized in existing literature as lack of resources, equipment flow related issues and communication difficulties with the Central Sterile Supply Department (CSSD, also called Sterile Processing Department (SPD)), standardization of practice and training (11). Even though the entire process of sterilization, delivery and use of surgical instruments is time consuming, it represents an indispensable prerequisite to performing safe surgery.

A previous study has shown that a large amount of hazards exist throughout the entire delivery/ reprocessing process of surgical instruments (15, 16). Very likely, the complexity of medical devices, including their cleaning and sterilization requirements, will continuously increase, raising the burden/ demands placed on the CSSD / SPD.

CSSD / SPD WORKFLOW OPTIMIZATION VIA DIGITALIZATION

A systematic approach is useful in work processes where standardization is important to achieve consistent and reproducible outcomes. Introducing standardized processes for instrument handling can contribute to a risk reduction for SSI. Systems should be in place to ensure that surgical instruments are correctly handled before and after surgery (11).



The TOM (Tray Organizing Manager)-App is a digital solution for CSSD / SPD processes, allowing for simple data administration and documentation, either available on tablet or computer. The app enables employees in sterile goods departments to assemble surgical instruments optimally, quickly and easily according to the type of surgical intervention. Using the app may reduce errors, stress and pressure in the CSSD / SPD and facilitate adherence to procedures and guidelines. In addition, TOM

"In the past I had to search for the right set lists in folders stored in an extra storeroom."

Ben Rahner (CSSD / SPD manager hospital Ingelheim)

allows to update and share information instantly with the team. The 100% paperless organization of the tray packing process makes spreadsheets or handwritten documents redundant.

Equipping each packing station with the TOM app allows for instant and easy cloud-based access to the latest set lists, instrument pictures, handling, cleaning and assembly

Time constraints on healthcare personnel working in the CSSD / SPD can be cut down and facilitate the reduction of errors in sterile

instructions.

processing.



"The solution is TOM! It is a very simple concept and does no require any paper set lists or binders...I have a listing of all sets and trays right here on the tablet, which saves a huge amount of time...Another big advantage is that I have the opportunity to find specific trays in the quick search function."

Ben Rahner (CSSD / SPD manager hospital Ingelheim)

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