Together with the introduction of anesthesia, the ability to control the microbial influence on surgical outcomes was key in advancing the surgical care for patients. Aseptic and later antiseptic techniques reduced the risk for overwhelming post-operative infections and hence created an opportunity for cure by opening organ-spaces and cavities otherwise deemed lethal. Antibiotics were introduced after Alexander Fleming’s discovery of penicillin in 1928, and less than a century later, we are challenged in medicine in general and surgical specialties in particular with increasing rates of multiresistant bacteria, loss of access to antibiotics, and growing concerns about the microbiome’s influence on human health and disease.

Both after surgical procedures and for surgical diseases in general, the impact of an infection may range from a superficial wound infection managed by topical applications or wound debridement in an outpatient manner, to the most severe form of systemic infection leading to sepsis and septic shock and organ...
failure with prolonged intensive care management and very high mortality rates.

The importance of surgical site infections (SSIs) is well known to healthcare providers (1). In a global, prospective study involving more than 12,000 patients across several countries, some 12% had a post-operative SSI at 30 days after surgery (2). Notably, the rate was almost doubled in low- and middle-income countries (23.2% SSI) compared to high-income countries (9.4%). Of patients with available microbiology cultures, the antibiotic resistance rate occurred in more than one-third of all patients in low- and middle-income countries. Thus, this calls for actionable intervention on a global scale to both reduce SSI and reduce the risk for antibiotic resistance.

In 2018, the World Health Organization (WHO) (3) published updated global guidelines for the prevention of SSIs based on 29 items. The Centers for Disease Control and Prevention (CDC) guidelines were released in 2017 (an update on their 1999 guidelines) addressing several prevention-oriented measures in the perioperative period (4). The American College of Surgeons published their Surgical Infection Society recommendations the same year (5). So, essentially surgeons have at least 3 sources of valid information on best practice to choose from. Awareness of the multifactorial causes contributing to the development of SSIs is usually well established. For this reason, care bundles have been introduced in order to reduce SSIs, based on best available evidence. Despite this, the incidence of SSIs after surgery does not seem to be falling (6).

It is also well recognized that healthcare-associated infections (HAI) are extremely frequent. In the United States, HAIs have been reported to be associated with roughly 100,000 deaths yearly and an annual direct medical cost of up to US$45 billion (7). Out of these, some 17% are due to SSIs. Furthermore, patients with SSI are five times more likely to be readmitted within 30 days and twice as likely to die, compared to those who do not develop SSI (8). SSIs furthermore double hospital stay and costs and are thereby also a considerable health economic burden (9).

Protocols and guidelines against SSIs do not seem to be enough. Despite awareness of SSIs, there is a lack of effective and comprehensive prevention programs, and compliance is poor (10). However, multidisciplinary care bundles have shown efficacy and sustainability in reducing SSI, at least at the institutional level (11).

The absence of more uniform definitions for SSIs, in contradiction to surgical complications in general (12), contradicts proper studies. For SSIs, it is crucial to define some key elements of the care bundles that are both highly important, but also easy to follow and comply with. Factors contributing to SSIs are multifactorial, requiring a multifaceted intervention. It is to be stated that good safety and teamwork climate thus are not enough (13). However, it is sobering to know that evidence for even the most self-evident interventions, such as proper aseptic hand wash, skin prepping, and the use of wound dressings have few studies to document the health economic impact (14). Other interventions, such as antimicrobial sutures seem to have evidence to support their use (15), yet widespread adoption is not in place.

The well-recognized effects on morbidity and mortality by SSIs together with health economical aspects should render SSIs of the utmost priority (16). SSIs are common, complicate some 1%-10% of surgical procedures (17), and thereby consume considerable healthcare resources. By addressing key components of care bundles, most SSIs should be preventable (6). Key components should thus include antibiotic prophylaxis according to guidelines, no hair removal, maintaining normothermia together with maintaining normal oxygen supply to tissues, and general hygiene discipline in the operative theater. There is nonetheless a continuous need of updating SSI guidelines and care bundles, together with checklists and effective communication strategies for all healthcare providers, service commissioners, and patients (18). Thus, Web-based surveys with checklists, standardized orders, protocols, and surveillance programs have been proposed, though not in place in many surgeons’ institutions (19). The overall incentive should be to create a patient-educational initiative, involving an active partnership of all stakeholders (20).

There are some reported success stories that bring hope in SSI prevention. Using the surgical care improvement project (SCIP), a meaningful relationship between SCIP adherence and SSI rates has been reported (21). The international SSI bundles have also been reported to reduce SSIs and post-operative sepsis and decrease length of stay and costs (7). Surgeon-specific feedback on the SSI rates was considered as the most important factor for improvement (22). Surveillance and participation in surveillance network also reduced the risk of SSI. This was provided through infection control teams (23). Several aspects related to surgery, including technique, choice of suture material and ways of closing facia and skin may help reduce the rate of SSI (17).

On a national level, SSI surveillance programs have contributed to reducing the occurrence of SSIs in a substantial way, though overall compliance could substantially be improved (24). A positive effect concerning the incidence of SSIs has been reported through the development of high-volume centers for a number of procedures (25). The introduction of enhanced recovery programs has also provided a number of controllable parameters that actually influence on the incidence and development of SSIs (26).

Awareness of best practices includes the implementation of a more uniform SSI surveillance through, for example, national data registries (27). It is to state that optimal prevention includes a multi-holder process with educational understanding of risk factors, epidemiology, and novel strategies, also activating all different stakeholders involved (the society, the profession, and the patient). This should be done down to an individual level, as patients are differently prone to develop infectious complications (20). Some patient-related risk factors for SSIs are modifiable, such as smoking, obesity, and hyperglycemia. A meta-analysis demonstrated that protocol-driven intensive
perioperative blood glucose control was effective in reducing the risk of SSI compared to controls (odds ratio=0.43, 95% CI = 0.29–0.64; P < 0.001) (28).

Novel innovations may in the future help in reducing the risk for specific SSIs. One such idea is the development of a vaccine against Staphylococcus aureus (29), but currently, this is some way off being introduced in the clinic.

Furthermore, novel trials and involvement in surgical infection research are needed, as the impact on patient care is enormous and general infection trials usually do not consider the specific attributes to the surgical patients (30).

It is thus to conclude that it is time for a wake-up call for the prevention of SSIs. This includes a multifaceted regime that today is not fully addressed and only partly implemented. The responsibility to address this issue should be upon all stakeholders involved.

DECLARATION OF CONFLICTING INTERESTS

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

FUNDING

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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Received: September 13, 2019
Accepted: October 23, 2019