

Narrative Review

Post Operative Surgical Site Infection: A Narrative Review

Misdaq Batool^{1*}, M Tauseef Asad¹, Ijaz Ahmad¹, Usman Irshad¹, Hafiz M. Mohsin¹, Muqaddas Muazma¹, M. Ibrahim¹

¹Allied Health Sciences-University of Sargodha

*Corresponding Author: Misdaq Batool; Visiting lecturer; Email: misdaaqbatool@yahoo.com.ph

Conflict of Interest: None.

Batool M., et al. (2023). 3(2): DOI: <https://doi.org/10.61919/jhrr.v3i2.101>.

ABSTRACT

Background: Surgical Site Infections (SSIs) are a critical concern in postoperative care, significantly affecting patient outcomes and healthcare resources globally. These infections arise from the proliferation of microorganisms at the site of surgical intervention and are classified into early-onset (within 30 days of surgery) and late-onset (occurring more than 30 days post-surgery).

Objective: This review aims to comprehensively analyze the prevalence, risk factors, and broader impact of SSIs, with an emphasis on the disparity between high-income and low- and middle-income countries (LMICs).

Methods: An extensive literature review was conducted using databases such as Google Scholar and PubMed. The focus was on studies that detailed the incidence, risk factors, and prevention strategies of SSIs.

Results: The review highlights a notably higher incidence of SSIs in LMICs compared to high-income countries. SSIs are a predominant cause of healthcare-associated infections (HAIs) and are more frequently observed in emergency surgeries than elective procedures. Prominent risk factors identified include patient's age, type of surgery, specific microbial agents, blood transfusions, and comorbid conditions. Diabetes mellitus, reduced postoperative hematocrit levels, significant weight loss within six months prior to surgery, and ascites are strongly associated with an increased risk of SSI. In contrast, tobacco use, steroid use, and chronic obstructive pulmonary disease (COPD) were not found to be significant predictors. The role of surgical departments in reducing SSI occurrence through stringent antimicrobial protocols and thorough preoperative evaluations is also highlighted.

Conclusion: SSIs present a significant challenge in global health, particularly in LMICs. Effective management of SSIs necessitates a multifaceted approach, incorporating improved infection control practices, individualized patient risk assessments, and international initiatives to reduce disparities. This review calls for increased awareness and targeted strategies to minimize the prevalence and impact of SSIs.

Keywords: Surgical Site Infections, SSI Prevalence, High-Income Countries, Low- and Middle-Income Countries, Healthcare-Associated Infections, HCAI, Antibiotic Resistance, Postoperative Complications, Infection Control, Risk Assessment.

INTRODUCTION

Global Challenges and Strategies in Managing Surgical Site Infections

Surgical site infections (SSIs) represent a significant postoperative complication, affecting both patient outcomes and healthcare systems globally. These infections, occurring at the site of surgical intervention, can range from superficial skin irritations to severe, life-threatening conditions. The incidence of SSIs varies, with estimates indicating they occur in 2-3% of surgeries, though this figure is likely underreported due to incomplete post-discharge data (2,3). Notably, the Nosocomial Infection National Surveillance Service (NINSS) observed a prevalence of up to 10% in United Kingdom hospitals, underscoring the gravity of this healthcare challenge (4). SSIs can manifest in various forms, from minor wound discharges to critical conditions, necessitating a nuanced understanding of their impact (6). These infections are the third most common nosocomial infection, accounting for 14-16% of all such infections in healthcare settings (7, 8). The consequences of SSIs are far-reaching, including prolonged hospital stays, increased healthcare costs, and heightened patient morbidity and mortality, with some cases escalating to sepsis (9). Diagnosis typically involves clinical signs like redness, swelling, and pain, alongside laboratory tests (10). A troubling aspect of SSIs is the growing resistance to antibiotics, which complicates treatment and poses broader public health challenges (11).

Preventative measures are key in managing SSIs. These include stringent hand hygiene protocols, preoperative antiseptic bathing, appropriate antibiotic use, and maintaining sterile surgical environments. However, the prevalence of SSIs is notably higher in low-

and middle-income countries (LMICs) compared to high-income countries (HICs), reflecting disparities in healthcare resources and practices (12).

Risk factors for SSIs are multifaceted. Microbial agents like *Staphylococcus aureus*, particularly methicillin-resistant strains (MRSA), are significant contributors, found in 15-20% of hospital-related SSIs (16). Blood transfusions, comorbidities such as Diabetes Mellitus, and certain surgical factors like the length of the procedure also elevate the risk (17, 18, 20). Age is another critical factor, with older patients showing a higher incidence of SSIs, especially in procedures like total hip replacement (19).

In-depth reviews of 20 papers from sources like Google Scholar and PubMed reveal that SSIs are less prevalent in HICs and more common in emergency than elective surgeries. These infections are linked with various risk factors, including surgical duration, patient age, and underlying health conditions. The studies emphasize the crucial role of the surgical department in mitigating SSI risks through comprehensive preoperative assessments and adherence to antimicrobial protocols (21).

For instance, a systematic review by Zhou et al. (2020) on SSIs following spine surgery reported a combined incidence of 3.1%, with variations based on the surgical site and specific conditions like neuromuscular scoliosis (22). Moreover, a study by Badia (2017) highlighted the economic burden of SSIs, pointing to longer hospital stays, increased need for repeat surgeries, and higher mortality rates in affected patients (23).

In conclusion, SSIs present a complex challenge in the postoperative landscape, with significant implications for patient health and healthcare systems. Addressing these infections requires a multifaceted approach, encompassing preventive measures, careful monitoring, and tailored treatment strategies, especially in light of antibiotic resistance and varying global prevalence rates.

CONCLUSION AND IMPLICATIONS

The narrative review on surgical site infections (SSIs) demands a critical and debative approach towards both healthcare practice and policy. While the review underscores the necessity of stringent infection control measures and robust surveillance systems, it also reveals significant gaps in current practices, particularly in low- and middle-income countries (LMICs). This disparity raises questions about the global allocation of healthcare resources and the effectiveness of current international health policies in addressing such inequalities.

On the one hand, the review advocates for rigorous infection control protocols and the prudent use of antibiotics, highlighting their critical role in reducing SSIs. However, this recommendation comes with its own set of challenges. The growing antibiotic resistance presents a paradox where their use is essential yet simultaneously contributes to a larger global health threat. This dilemma calls into question the sustainability of current infection control practices and the urgency for innovative treatment strategies.

The emphasis on preoperative screening and risk assessment for patients, while crucial, also opens a debate on healthcare equity. High-risk patients often require more resources for effective management, yet in resource-limited settings, such prioritization might inadvertently widen health disparities. This raises ethical concerns about patient care and the allocation of limited healthcare resources.

Furthermore, the review's call for international collaboration and support to address disparities in SSI prevalence between high-income countries and LMICs is easier said than done. It challenges the global health community to reconsider how health aid is structured and delivered, moving beyond short-term interventions to sustainable, long-term solutions that genuinely build healthcare capacity in LMICs.

While the narrative review lays out a comprehensive strategy for tackling SSIs, it also invites a deeper, critical examination of existing healthcare practices and policies. It highlights the need for a balance between immediate, practical measures and long-term, sustainable solutions to address both the immediate challenges of SSIs and the broader issues of global health inequities and antibiotic resistance.

REFERENCES

1. Sway A, Solomkin JS, Pittet D, Kilpatrick C. Methodology and background for the World Health Organization global guidelines on the prevention of surgical site infection. *Surgical infections*. 2018;19(1):33-9.
2. Kirby JP, Mazuski JE. Prevention of surgical site infection. *Surgical Clinics of North America*. 2009;89(2):365-89.
3. Urban JA. Cost analysis of surgical site infections. *Surgical infections*. 2006;7(S1):s19-s22.
4. Bagnall NM, Vig S, Trivedi P. Surgical-site infection. *Surgery (Oxford)*. 2009;27(10):426-30.
5. Okasha H. Risk factors and key principles for prevention of surgical site infections. *Surgical Infections-Some Facts*: IntechOpen; 2019.
6. Women's NCCf, Health Cs. Surgical site infection: prevention and treatment of surgical site infection. 2008.
7. Smyth E, Emmerson A. Surgical site infection surveillance. *Journal of Hospital Infection*. 2000;45(3):173-84.

8. Minucci M, Donati T, Luparelli A, Scurto L, Paolini J, Sica S, et al., editors. Severe local wound infections after vascular exposure in the groin and other body areas: prevention, treatment and prognosis. *Seminars in Vascular Surgery*; 2023: Elsevier.
9. Rosa R, Sposato K, Abbo LM. Preventing surgical site infections: implementing strategies throughout the perioperative continuum. *AORN journal*. 2023;117(5):300-11.
10. Farsi S, Salama I, Escalante-Alderete E, Cervantes J. Multidrug-Resistant Enterococcal Infection in Surgical Patients, What Surgeons Need to Know. *Microorganisms*. 2023;11(2):238.
11. Närhi-Ratkovskaja O. Preventing surgical site infections in intraoperative care from nurses' perspective: A Literature review. 2023.
12. Lakoh S, Yi L, Sevalie S, Guo X, Adekanmbi O, Smalle IO, et al. Incidence and risk factors of surgical site infections and related antibiotic resistance in Freetown, Sierra Leone: a prospective cohort study. *Antimicrobial Resistance & Infection Control*. 2022;11(1):1-12.
13. Kumar A, Rai A. Prevalence of surgical site infection in general surgery in a tertiary care centre in India. *International Surgery Journal*. 2017;4(9):3101-6.
14. Barchitta M, Matranga D, Quattrocchi A, Bellocchi P, Ruffino M, Basile G, et al. Prevalence of surgical site infections before and after the implementation of a multimodal infection control programme. *Journal of antimicrobial chemotherapy*. 2012;67(3):749-55.
15. Parameswaran R, Satyanarayana V, Srinivasan R. Prevalence of Surgical Site Infections and Antimicrobial Prophylaxis in Major Abdominal Surgeries. *The Journal of Medical Sciences*. 2023;8(1-4):5-9.
16. Ellen Korol KJ, Nathalie Waser, Frangiscos Sifakis, Hasan S. Jafri, Mathew Lo, Moe, Kyaw H. A Systematic Review of Risk Factors Associated with Surgical Site Infections among Surgical Patients. *PLoS ONE*. 2013;8(12):9.
17. Murphy PJ CC, Hicks GL Jr, Blumberg N. Homologous blood transfusion as a risk factor for postoperative infection after coronary artery bypass graft operations. *The Journal of Thoracic and Cardiovascular Surgery*. 1992;104(4):8.
18. Debra L. Malone M.D. TGMD, J.Kathleen Tracy M.A., Christopher Gannon M.D., Lena M. Napolitano M.D. Surgical Site Infections: Reanalysis of Risk Factors. *Journal of Surgical Research*. 2002;103(1):7.
19. Bischoff P, Kramer TS, Schroder C, Behnke M, Schwab F, Geffers C, et al. Age as a risk factor for surgical site infections: German surveillance data on total hip replacement and total knee replacement procedures 2009 to 2018. *Euro Surveill*. 2023;28(9).
20. Risk Factors for Surgical Site Infection. *Surgical Infections*. 2006;7(s1):s7-s11.
21. Korol E, Johnston K, Waser N, Sifakis F, Jafri HS, Lo M, et al. A systematic review of risk factors associated with surgical site infections among surgical patients. *PloS one*. 2013;8(12):e83743.
22. Zhou J, Wang R, Huo X, Xiong W, Kang L, Xue Y. Incidence of surgical site infection after spine surgery: a systematic review and meta-analysis. *Spine*. 2020;45(3):208-16.
23. Badia J, Casey A, Petrosillo N, Hudson P, Mitchell S, Crosby C. Impact of surgical site infection on healthcare costs and patient outcomes: a systematic review in six European countries. *Journal of Hospital Infection*. 2017;96(1):1-15.