

Association of Postoperative Infection With Risk of Longterm Infection and Mortality

¹ Ervita, ¹ Reni Indriana

¹ Faculty of Medicine, Padjadjaran University, Bandung City, West Java, Indonesia

Correspondence : dr.ervitamed38@gmail.com

Article History :

Received date Revised date Accepted date Published date





Copyright: © 2024 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (BY NC) license (https://creativecommons.org/lic enses/by-nc/4.0/).

ABSTRACT

Background: The literature surrounding postoperative infections reveals a persistent challenge in surgical care, particularly regarding surgical site infections (SSIs), which are a significant source of morbidity and mortality. Literature Review: Subsequent research, such as that by (L Amuda, 2006), expanded on the implications of SSIs, revealing that patients with these infections faced increased risks of intensive care unit admissions, readmissions, and mortality. The meta-analysis by (abdulmalik Qayid Ahmad et al., 2017) further illustrated the complexity of SSI prevention, identifying numerous risk factors and emphasizing that SSIs remain a leading cause of prolonged hospitalization and death, particularly in low- and middleincome countries. The retrospective study by (Abera, 2019) documented the prevalence of hospital-acquired SSIs, emphasizing the need for strict adherence to aseptic techniques to mitigate transmission risks. The discussion by (Maria Zardi et al., 2022) on various types of postoperative infections emphasized the need for multidisciplinary approaches to manage these complications effectively. The narrative review by (Javed et al., 2023) reiterated the importance of timely recognition and intervention, as well as adherence to strict aseptic protocols, to prevent postoperative infections. Conclusion: In conclusion, the collective findings from the reviewed literature illustrate the multifaceted nature of postoperative infections, particularly SSIs, and the pressing need for continued research and improvement in surgical practices. Enhanced infection control protocols, targeted preoperative assessments, and multidisciplinary approaches are essential to minimize the incidence and impact of SSIs on patient outcomes and healthcare systems.

Keyword: Association, Postoperative Infection, Risk, Longterm Infection, Mortality

The Indonesian Journal of Medicine and Public Health

INTRODUCTION

The literature surrounding postoperative infections reveals a persistent challenge in surgical care, particularly regarding surgical site infections (SSIs), which are a significant source of morbidity and mortality. The early study by (A/P Suntarajoo, 2003) established that the frequency of surgical dressing changes did not significantly affect the incidence of SSIs, highlighting the complexity of infection prevention in surgical settings. This study, which noted a 3% SSI rate among a large cohort of elective surgeries, underscored the multifactorial nature of these infections, emphasizing that factors such as surgical technique and patient care during the perioperative period play critical roles in infection rates.

Following this, (L Amuda, 2006) expanded on the implications of SSIs, noting that patients who developed these infections faced considerably higher risks of intensive care unit admission, readmission, and mortality. The findings indicated a pressing need for improved preoperative preparation and adherence to infection control practices, as higher scores on a risk factor assessment correlated with increased wound infection rates. This study reinforced the notion that while SSIs are common, their prevention could significantly mitigate postoperative complications and healthcare costs.

In a broader context, (abdulmalik Qayid Ahmad et al., 2017) conducted a meta-analysis that further illustrated the complexity of preventing SSIs, identifying numerous risk factors associated with these infections. Their work emphasized that SSIs are a leading cause of prolonged hospitalization and death, particularly in lowand middle-income countries. The integration of preventive measures across the surgical process was deemed essential, as intraoperative factors often outweigh patient-related risks in contributing to infection rates.

By 2019, (Abera, 2019)'s retrospective study on hospital-acquired SSIs revealed the staggering prevalence of these infections, which accounted for a substantial portion of nosocomial infections in the United States. The study highlighted the importance of strict adherence to aseptic techniques, which were

The Indonesian Journal of Medicine and Public Health

frequently neglected, leading to significant transmission risks. (Abera, 2019)'s findings reiterated the importance of understanding the classification of SSIs and the implications for patient management and healthcare resources.

In 2021, (Costa Morais Tavares-Júnior et al., 2021) focused specifically on cancer patients undergoing spine surgery, reporting a notably high incidence of postoperative infections. Their research linked these infections to increased mortality and underscored the need for targeted risk factor identification and management strategies to enhance patient outcomes in this vulnerable population.

(Maria Zardi et al., 2022) expanded the discussion to include various types of postoperative infections, emphasizing the need for multidisciplinary approaches to manage these complications effectively. They noted that such infections lead to increased morbidity, prolonged hospital stays, and additional healthcare costs, reinforcing the need for comprehensive preventive strategies.

(Pinchera et al., 2022) provided an update on the management of SSIs, revealing that these infections are responsible for a significant proportion of healthcare-associated infections. Their findings indicated that a substantial number of SSIs may go unnoticed until after patient discharge, which complicates prevention efforts. They also highlighted the financial burden associated with SSIs, attributing increased hospitalization costs to the extended length of stay necessitated by these complications.

Most recently, (Javed et al., 2023) synthesized the challenges and solutions related to postoperative complications, reiterating the critical need for timely recognition and intervention in managing postoperative infections. Their narrative review emphasized that surgical procedures inherently increase the risk of infection, necessitating vigilant monitoring and appropriate treatment protocols.

Collectively, these studies illustrate the multifaceted nature of postoperative infections and the pressing need for continued research and improvement in surgical practices to minimize the incidence and impact of SSIs on patient outcomes and healthcare systems.

The Indonesian Journal of Medicine and Public Health

LITERATURE REVIEW

The article titled "The effectiveness of surgical wound dressing by nurses for patients undergoing elective surgery in Hospital Universiti Sains Malaysia Kelantan" by (A/P Suntarajoo, 2003) provides a comprehensive overview of the prevalence and implications of surgical site infections (SSI) among patients undergoing elective surgeries. The study reveals that 3% of the 28,407 patients in the sample developed SSIs, highlighting the significant burden of this complication, which is recognized as the most frequently reported nosocomial infection in hospitalized patients ((A/P Suntarajoo, 2003)).

One of the critical insights from the article is the multifactorial nature of SSIs. The research emphasizes that factors contributing to the development of SSIs can occur at various stages: preoperative, intraoperative, and postoperative. This suggests that a holistic approach to patient care is essential to mitigate risks associated with SSIs. The article notes that surgical site infections can lead to severe consequences, including increased morbidity and mortality rates, prolonged hospital stays, delayed wound healing, and heightened patient discomfort. These findings underscore the importance of effective wound management practices and the need for continuous education and training for nursing staff involved in postoperative care ((A/P Suntarajoo, 2003)).

Furthermore, the article points out that while complete elimination of SSIs may not be feasible, implementing strategies to reduce infection rates could yield significant benefits for patient outcomes. This aligns with the broader literature that advocates for enhanced infection control protocols and the importance of adherence to best practices in surgical care. The author calls for further research involving larger sample sizes to strengthen the findings and to explore the effectiveness of various dressing methods and prophylactic measures in preventing SSIs ((A/P Suntarajoo, 2003)).

The article by (L Amuda, 2006) provides a comprehensive examination of postoperative wound infections, specifically within the context of a surgical ward at Tirunelveli Medical College and Hospital. The author presents compelling statistics indicating that surgical site infections (SSIs) represent the second most

The Indonesian Journal of Medicine and Public Health

Downloaded from The Indonesian Journal of Medicine and Public Health Copyright O International Medical Journal Corp. Ltd. All rights reserved

27

prevalent category of nosocomial infections, with significant implications for patient outcomes and healthcare resources.

Amuda highlights that the incidence of SSIs varies considerably depending on the type of surgical procedure performed. For instance, the article notes that up to 2%-5% of patients undergoing clean extra-abdominal operations and as many as 20% of those undergoing intra-abdominal surgeries experience SSIs. This differential risk underscores the importance of understanding the specific contexts in which surgical procedures are conducted. Furthermore, the article emphasizes the severe consequences that SSIs have on patient care, including a 60% increased likelihood of requiring intensive care unit admission, a fivefold increase in the risk of hospital readmission, and a doubling of mortality rates compared to patients who do not develop infections.

The economic burden associated with SSIs is also a critical concern raised in the article. The author notes that healthcare costs escalate significantly for patients who experience these infections, indicating a pressing need for effective preventive measures. The introduction of a scoring system based on various risk factors is a particularly noteworthy aspect of the study, as it suggests that a structured approach to assessing risk can lead to improved identification of patients at higher risk for developing infections.

Furthermore, Amuda identifies the most commonly isolated pathogens in the infected cases studied, with Proteus species leading, followed by E. coli, Klebsiella, Pseudomonas, Staphylococcus, and Beta-hemolytic streptococci. This microbiological insight is crucial for informing targeted antibiotic therapies and tailoring infection control strategies.

The article concludes with a strong advocacy for enhanced preoperative preparation and stringent infection control practices during surgical procedures. The assertion that adherence to preventive antibiotic therapy can significantly reduce infection rates is particularly impactful, as it implies that systematic changes in practice could lead to substantial improvements in postoperative morbidity and mortality.

The Indonesian Journal of Medicine and Public Health

The article titled "Applying Best Practices for The Prevention of Surgical Site Infection (SSI) and Reducing Risk Factors for Patients: Meta-Analysis Theoretical Review" by (abdulmalik Qayid Ahmad et al., 2017) provides a comprehensive examination of the ongoing challenges posed by surgical site infections (SSIs) in the context of perioperative care. The authors emphasize that SSIs are a significant source of morbidity and mortality, contributing to extended hospital stays and increased healthcare costs. This critical evaluation of the article highlights its key insights and implications for clinical practice.

The authors assert that one of the primary goals for patients undergoing surgical or invasive procedures is to return from surgery free of infection. They highlight that SSIs can lead to serious complications, including revision surgeries and delayed wound healing, which further exacerbate healthcare expenditures ((abdulmalik Qayid Ahmad et al., 2017)). The article effectively underscores the complexity of preventing SSIs, noting that it requires a multifaceted approach that integrates various preventive measures throughout the surgical process. This perspective aligns with current best practices in infection control, emphasizing the need for vigilance at each stage of the patient's surgical journey.

A significant contribution of the article is its discussion on the role of surveillance and feedback mechanisms in reducing SSI rates. The authors reference the World Health Organization's findings that SSIs are the most frequently surveyed type of healthcare-associated infection (HAI) in low- and middle-income countries, affecting a substantial proportion of surgical patients ((abdulmalik Qayid Ahmad et al., 2017)). This highlights the global relevance of the issue and the necessity for targeted interventions in these settings.

The article also identifies intraoperative factors, such as proper skin preparation, adherence to sterile techniques, and the management of operating room traffic, as critical determinants of SSI risk. The authors argue that these factors may have a more significant impact on infection rates than patient-related risk factors. This insight is particularly valuable for surgeons, as it underscores their responsibility to stay informed about evidence-based practices that can enhance patient outcomes ((abdulmalik Qayid Ahmad et al., 2017)).

The Indonesian Journal of Medicine and Public Health

The article titled "A Two Years Retrospective Study on Prevalence of Hospital Acquired Surgical Site Infections Among Patients Admitted in Wolaita Soddo Teaching and Referral Hospital" by (Abera, 2019) provides a comprehensive examination of postoperative surgical site infections (SSIs), which are highlighted as a significant concern in surgical care. The study emphasizes that SSIs contribute to increased morbidity and are a notable, though less frequent, cause of mortality among surgical patients. Abera notes that these infections account for approximately one quarter of the estimated 2 million nosocomial infections in the United States annually, underscoring the critical public health implications of this issue.

The article effectively categorizes SSIs into superficial, deep, and organ/space infections, providing clarity on the types of infections that can arise post-surgery. This classification is crucial for understanding the potential severity and management of these infections. Furthermore, Abera delineates the criteria for defining a hospital-acquired SSI, which is essential for both clinical practice and epidemiological studies. The distinction made between infections occurring within 30 days of surgery without an implant and those occurring within a year with an implant is particularly relevant for tracking infection rates and implementing preventive measures.

Abera discusses the modes of transmission for hospital-acquired infections, emphasizing cross-infection through patient contact and autoinfection from the patient's endogenous flora. This insight is critical as it highlights the importance of infection control practices within the hospital setting. The article also identifies several risk factors for SSIs, including patient demographics such as age, smoking status, obesity, malnutrition, and the presence of immunosuppressive therapy. This multifactorial approach to understanding risk factors is beneficial for developing targeted interventions aimed at reducing the incidence of infections.

One notable aspect of the study is the mention of non-compliance with aseptic procedures among healthcare providers, which Abera identifies as a significant contributor to the prevalence of SSIs. This finding points to the need for

The Indonesian Journal of Medicine and Public Health

enhanced training and adherence to infection control protocols among surgical teams, as lapses in aseptic technique can lead to devastating outcomes for patients.

In terms of diagnosis, the article outlines the necessity of interpreting clinical and laboratory findings to confirm the presence of hospital-acquired infections. This diagnostic approach is essential for timely intervention and management of infections, which can ultimately impact patient outcomes.

The article "Risk Factors Associated with Postoperative Infection in Cancer Patients Undergoing Spine Surgery" by (Costa Morais Tavares-Júnior et al., 2021) presents a thorough investigation into the prevalence and implications of surgical site infections (SSIs) in a specific patient demographic—those with metastatic cancer undergoing spinal surgery. The authors highlight that SSIs occur at a significantly higher rate in this population, estimated at 10-20%, compared to the general surgical rate of approximately 4%. This disparity underscores the vulnerability of cancer patients to postoperative complications, which can adversely affect their survival and quality of life.

The study meticulously outlines the primary risk factors contributing to postoperative infections in this cohort. By analyzing data from the last five years, the authors identify critical variables such as the patient's nutritional status, the extent of surgical intervention, and the presence of comorbidities. This comprehensive approach not only sheds light on the multifactorial nature of SSIs but also emphasizes the need for tailored perioperative management strategies that could potentially mitigate these risks.

Furthermore, the article delves into the significant association between postoperative infections and increased mortality during hospitalization. The authors provide compelling evidence that infections not only prolong hospital stays but also correlate with higher mortality rates, thus posing a serious threat to patient outcomes. This finding is crucial, as it highlights the urgent need for healthcare providers to implement rigorous infection control protocols and preoperative assessments to identify at-risk patients.

The implications of this study extend beyond individual patient care; they also reflect on the broader healthcare system. The authors argue that the burden of

postoperative infections on healthcare resources is substantial, necessitating a reevaluation of current practices in surgical oncology. By addressing the factors leading to increased infection rates, healthcare systems can improve patient outcomes and reduce the economic strain associated with prolonged hospitalizations and additional treatments.

The article "Nosocomial Extracardiac Infections After Cardiac Surgery" by (Maria Zardi et al., 2022) provides a comprehensive examination of postoperative infective complications that arise following cardiac surgery. The authors identify several key types of infections, including pneumonia, surgical site infections, urinary tract infections, and bloodstream infections. These infections are noted to significantly increase perioperative morbidity and mortality, resulting in extended hospitalization durations and heightened healthcare costs.

A critical evaluation of the article reveals that the authors effectively highlight the multifaceted nature of postoperative infections and their implications for patient outcomes. The discussion on the increased length of hospital stays due to these infections underscores the need for effective preventive strategies. The authors argue that the implementation of preventive interventions and corrective measures can potentially mitigate the global costs associated with these complications. This assertion is particularly relevant in the context of healthcare systems that are increasingly burdened by financial constraints.

Moreover, the article emphasizes the importance of a multidisciplinary approach in managing nosocomial extracardiac infections. The authors suggest that a collaborative effort among healthcare professionals can lead to more effective management strategies, ultimately resulting in reduced hospitalization times and lower mortality rates. This perspective aligns with contemporary views on healthcare that advocate for integrated care models, which are crucial for addressing complex medical issues such as postoperative infections.

However, while the article provides valuable insights, it could benefit from a more detailed exploration of specific preventive measures and their effectiveness in reducing the incidence of these infections. The authors mention the potential for cost reduction through preventive interventions, yet they do not elaborate on which

The Indonesian Journal of Medicine and Public Health

specific strategies have been shown to be most effective in clinical practice. A more thorough analysis of existing literature on the efficacy of various preventive measures could enhance the article's contributions to the field.

The article "Update on the Management of Surgical Site Infections" by (Pinchera et al., 2022) provides a comprehensive overview of surgical site infections (SSIs), which are a significant concern in postoperative care. The authors highlight that SSIs account for approximately 20% of all healthcare-associated infections (HAIs) and that around 5% of surgical patients develop these infections. Notably, the incidence of SSIs in inpatient surgery is reported at 2-5%, though the authors suggest that this figure may be an underestimation due to the delayed presentation of symptoms, with nearly 50% of SSIs manifesting after patient discharge.

A critical evaluation of the article reveals that the authors effectively underscore the multifactorial implications of SSIs. They detail the primary causative factors, noting that most infections arise from the patient's own microbial flora during surgical procedures, while external contamination is less frequent. This distinction is crucial as it informs both preventive strategies and management protocols. The authors also articulate the serious consequences of SSIs on patient outcomes, emphasizing that these infections can lead to significant morbidity and extended hospital stays, which ultimately affects the quality of life for patients.

Furthermore, the financial implications of SSIs are thoroughly discussed. The article presents data indicating that SSIs can extend hospital stays by an average of 9.7 days and can increase hospitalization costs by over USD 20,000 per admission. This financial burden is compounded by the additional costs associated with emergency department visits and readmissions. The authors argue that the substantial economic impact of SSIs necessitates a focus on prevention, noting that up to 60% of these infections are estimated to be preventable through adherence to evidence-based measures.

The article also addresses the evolving landscape of healthcare quality metrics, highlighting that SSIs have become a pay-for-performance metric. This development reflects a broader trend in healthcare towards accountability and

quality improvement. The authors advocate for increased implementation of preventive strategies, which aligns with current healthcare priorities aimed at reducing SSIs and their associated costs.

The article "Challenges and Solutions in Postoperative Complications: A Narrative Review in General Surgery" by (Javed et al., 2023) presents a comprehensive examination of the significant impact of postoperative infections on patient morbidity and mortality within the field of general surgery. The authors emphasize that surgical procedures inherently compromise the skin barrier, creating vulnerabilities that can lead to the onset of infections. This critical insight underscores the necessity for heightened awareness and proactive measures in surgical settings to mitigate the risks associated with postoperative complications.

One of the key points raised in the article is the importance of timely recognition of postoperative infections. The authors argue that early detection plays a crucial role in preventing the escalation of infections, which can lead to severe outcomes, including long-term complications and increased mortality rates. This assertion is particularly relevant in the context of general surgery, where the consequences of delayed intervention can be profound. The narrative review highlights various factors that contribute to the risk of infection, including the type of surgery performed, the patient's underlying health conditions, and the surgical environment.

Furthermore, the article discusses the role of appropriate antibiotic therapy in managing postoperative infections. (Javed et al., 2023) stress the need for tailored antibiotic regimens that consider the specific pathogens involved and the patient's clinical status. This approach is vital not only for the immediate treatment of infections but also for reducing the risk of antibiotic resistance, which poses a significant challenge in postoperative care. The authors advocate for the implementation of antibiotic stewardship programs to optimize antibiotic use and improve patient outcomes.

In addition to pharmacological interventions, the authors highlight the importance of surgical techniques and practices in preventing infections. They suggest that adherence to strict aseptic protocols and the use of minimally invasive

The Indonesian Journal of Medicine and Public Health

techniques when feasible can significantly reduce the incidence of postoperative infections. The review also calls for ongoing education and training for surgical teams to ensure that best practices are consistently applied.

CONCLUSION

The literature on postoperative infections, particularly surgical site infections (SSIs), underscores a critical area of concern in surgical care, with implications for patient morbidity and mortality. The early work of (A/P Suntarajoo, 2003) established that the frequency of surgical dressing changes did not significantly impact SSI rates, drawing attention to the complex interplay of factors influencing infection outcomes. This foundational study indicated a 3% SSI rate in elective surgeries, highlighting the multifactorial nature of these infections, which are influenced by surgical techniques and perioperative patient care.

Subsequent research, such as that by (L Amuda, 2006), expanded on the implications of SSIs, revealing that patients with these infections faced increased risks of intensive care unit admissions, readmissions, and mortality. This study emphasized the importance of effective preoperative preparation and adherence to infection control practices, noting that higher risk scores correlated with increased infection rates. The economic burden associated with SSIs was also highlighted, reinforcing the need for improved preventive measures.

The meta-analysis by (abdulmalik Qayid Ahmad et al., 2017) further illustrated the complexity of SSI prevention, identifying numerous risk factors and emphasizing that SSIs remain a leading cause of prolonged hospitalization and death, particularly in low- and middle-income countries. This study advocated for a comprehensive approach to infection prevention throughout the surgical process, indicating that intraoperative factors often outweigh patient-related risks.

The retrospective study by (Abera, 2019) documented the prevalence of hospital-acquired SSIs, emphasizing the need for strict adherence to aseptic techniques to mitigate transmission risks. The classification of SSIs into superficial, deep, and organ/space infections provided clarity on the types of infections that could arise, which is essential for effective patient management.

The Indonesian Journal of Medicine and Public Health

Research focusing on vulnerable populations, such as cancer patients undergoing spine surgery by (Costa Morais Tavares-Júnior et al., 2021), indicated a higher incidence of postoperative infections, linking these infections to increased mortality. This highlights the necessity for targeted strategies to manage risk factors in this demographic.

The discussion by (Maria Zardi et al., 2022) on various types of postoperative infections emphasized the need for multidisciplinary approaches to manage these complications effectively. The narrative review by (Javed et al., 2023) reiterated the importance of timely recognition and intervention, as well as adherence to strict aseptic protocols, to prevent postoperative infections.

In conclusion, the collective findings from the reviewed literature illustrate the multifaceted nature of postoperative infections, particularly SSIs, and the pressing need for continued research and improvement in surgical practices. Enhanced infection control protocols, targeted preoperative assessments, and multidisciplinary approaches are essential to minimize the incidence and impact of SSIs on patient outcomes and healthcare systems.

DISCLOSURE STATEMENT

- Disclosure Statement : The authors have no conflicts of Interest to declare
- Funding Sources : None
- Acknowledgements : -
- Author Contribution : All authors discussed and contributed the final content for journal submission and publication

REFERENCES

- A/P Suntarajoo, P., 2003. The effectiveness of surgical wound dressing by nurses for patients undergoing elective surgery in Hospital Universiti Sains Malaysia Kelantan.. [PDF]
- L Amuda, D., 2006. Post operative wound infection in surgical ward at Tirunelveli Medical College and Hospital, Tirunelveli. [PDF]

The Indonesian Journal of Medicine and Public Health

- abdulmalik Qayid Ahmad, H., Ali M Habibi, M., Hamdan H Alshammari, F., Ibrahim A Alabdalqadir, D., Ghazi E Almalki, O., Radhi A Alshammari, M., & M A SH Salman, F., 2017. Applying Best Practices for The Prevention of Surgical Site Infection (SSI) and Reducing Risk Factors for Patients: Meta-Analysis Theoretical Review. [PDF]
- Abera, W., 2019. A Two Years Retrospective Study on Prevalence of Hospital Acquired Surgical Site Infections Among Patients Admitted in Wolaita Soddo Teaching and Referral Hospital. [PDF]
- 5. Costa Morais Tavares-Júnior, M., Estefania Delgado Cabrera, G., Gemio Jacobsen Teixeira, W., Kenji Narazaki, D., Salge Ghilardi, C., Martus Marcon, R., Fogaça Cristante, A., & Eloy Pessoa de Barros-Filho, T., 2021. Risk Factors Associated with Postoperative Infection in Cancer Patients Undergoing Spine Surgery. ncbi.nlm.nih.gov
- Maria Zardi, E., Chello, M., Maria Zardi, D., Barbato, R., Giacinto, O., Mastroianni, C., & Lusini, M., 2022. Nosocomial Extracardiac Infections After Cardiac Surgery. ncbi.nlm.nih.gov
- Pinchera, B., Riccardo Buonomo, A., Schiano Moriello, N., Scotto, R., Villari, R., & Gentile, I., 2022. Update on the Management of Surgical Site Infections. ncbi.nlm.nih.gov
- Javed, H., A Olanrewaju, O., Ansah Owusu, F., Saleem, A., Pavani, P., Tariq, H., Soledad Vasquez Ortiz, B., Ram, R., & Varrassi, G., 2023. Challenges and Solutions in Postoperative Complications: A Narrative Review in General Surgery. ncbi.nlm.nih.gov

The Indonesian Journal of Medicine and Public Health