Surgical Site Infection Prevention: Evidence-Based Nursing Strategies

Tahani Murghilo Alhazmi[1], Maryam Muallaq Ajjaj Alruwaili[1], Refah Assri Mater Alhazmi[2], Mastourah Zaal K Alhazmi[1], Rshdah Tawih S Alrwili[1], Mina Mubarak Alhazmy[3], Alenez,Latifh Ayad S[1], Wadha Radoh Alhazmi[1], Hanan Hulayyil Bakheet Alruwaili[1], Maryam Muallaq Ajjaj Alruwaili[1]

[1]Nursing technician, Al Faisaliah Southern Healthcare Center, Arar, Saudi Arabia
[2]Nursing technician, Al Faisaliah Health Center, Arar, Saudi Arabia
[3]Nursing and Midwifery, Al Faisaliah Southern Healthcare Center, Arar, Saudi Arabia

Abstract

Surgical Site Infection (SSI) prevention is a critical aspect of surgical care that significantly impacts patient outcomes and healthcare costs. Evidence-based nursing strategies play a vital role in reducing the incidence of SSIs. Key interventions include adhering to strict aseptic techniques during preoperative, intraoperative, and postoperative phases. Nurses must ensure appropriate skin antisepsis is performed prior to incision, using recommended antiseptics like chlorhexidine. Additionally, maintaining normothermia in patients through the use of warming blankets can reduce the risk of infection. Education and compliance with guidelines, such as the use of prophylactic antibiotics as indicated, are essential components of a successful SSI prevention strategy. Moreover, the importance of multidisciplinary collaboration cannot be overstated in the effort to combat SSIs. Nursing staff should engage in ongoing surveillance of infection rates and participate in debriefings to discuss potential improvement areas. Implementing evidence-based checklists, such as the World Health Organization's Surgical Safety Checklist, enhances communication and ensures adherence to best practices. Furthermore, promoting patient engagement through preoperative education about wound care and signs of infection can empower patients and support their recovery. By employing a comprehensive approach that encompasses these evidence-based strategies, nurses can significantly contribute to reducing the incidence of surgical site infections.

Keywords: Surgical Site Infection, SSI prevention, evidence-based nursing strategies, aseptic techniques, skin antisepsis, normothermia, prophylactic antibiotics, multidisciplinary collaboration, infection surveillance, surgical safety checklist, patient engagement, wound care.

Surgical site infections (SSIs) represent a significant concern in the realm of healthcare, affecting patient outcomes, increasing hospital costs, and prolonging recovery times. Defined as infections occurring at or near the surgical incision within 30 days of the procedure, excluding infections that are present at the time of surgery, SSIs pose a major risk to surgical patients. According to the Centers for Disease Control and Prevention (CDC), SSIs account for approximately 31% of all healthcare-associated infections and contribute to a notable percentage

of postoperative complications. The prevention of SSIs has become an essential component of surgical care, prompting a focused effort on identifying and implementing effective strategies [1].

Evidence-based practice (EBP) in nursing includes the integration of the best available research, clinical expertise, and patient values into the decision-making process for patient care. In the context of SSI prevention, nurses play a pivotal role in several key stages of the surgical process, from preoperative assessment to postoperative care. The synthesis of evidence-based nursing strategies not only enhances the quality of patient care but also contributes to improved surgical outcomes. This introduction serves as a foundation for a comprehensive examination of evidence-based nursing interventions aimed at preventing SSIs, focusing on several core areas, including preoperative preparation, intraoperative techniques, and postoperative management [2].

SSIs can range from superficial infections that affect the skin to deeper infections involving the underlying tissues, organs, or implanted material. These infections are often associated with increased morbidity and mortality, longer hospital stays, and higher healthcare costs. Factors contributing to the risk of SSIs are multifaceted and can include patient-related variables such as age, nutritional status, comorbidities (e.g., diabetes, obesity), and the condition of the surgical site. Environmental and procedural factors, including the type of surgery, duration of the surgical procedure, and adherence to aseptic techniques, are also critical in determining the likelihood of developing an SSI [3].

The implications of SSIs extend beyond the physical well-being of patients. The emotional and psychological toll, coupled with the economic burden on healthcare systems, emphasizes the urgent need for effective prevention strategies. These strategies must be grounded in rigorous research and supported by a culture of safety and quality within healthcare institutions [4].

Nursing interventions for the prevention of SSIs must be systematic and comprehensive, covering the entire perioperative continuum. In the preoperative phase, evidence underscores the importance of patient education, screening for MRSA (Methicillin-resistant Staphylococcus aureus), and optimizing nutritional status to improve immune function. Effective communication among the surgical team members, including surgeons, anesthetists, and nursing staff, is also crucial to identify potential risks and mitigate them before surgery [5].

During the intraoperative phase, adherence to strict aseptic techniques, including thorough hand hygiene, appropriate surgical attire, and the use of sterile instruments, is paramount. Studies have demonstrated that maintaining normothermia and appropriate blood glucose levels during surgery can significantly lower the risk of SSIs. Additionally, utilizing standardized checklists has been shown to enhance teamwork and communication, further reducing complications during procedures [6].

The postoperative phase requires vigilant monitoring of the surgical site for early signs of infection, along with educating patients on signs to watch for during recovery. Effective wound care protocols, timely administration of prophylactic antibiotics, and strategies to promote mobility and reduce pressure injuries are also essential components of nursing care in this phase [3].

Prevalence and Risk Factors of Surgical Site Infections

The prevalence of SSIs can vary significantly based on numerous factors, including the type of surgery performed, the patient's underlying health conditions, and the environment in which the procedure is conducted. According to data from the Centers for Disease Control and Prevention (CDC), SSIs account for approximately 31% of all hospital-acquired infections in surgical patients. The overall rate of SSIs has been reported to vary from 1% to 3% in

clean surgical procedures to as high as 20% or more in contaminated or dirty procedures. For instance, surgeries involving the abdomen or chest tend to have higher SSI rates compared to orthopedic or plastic surgery, emphasizing the type of surgical intervention as a significant determinant of infection risk [7].

Moreover, the introduction of enhanced recovery after surgery (ERAS) protocols and evidence-based guidelines have led to a reduction in SSI rates in many healthcare institutions. Despite these advancements, the continued occurrence of surgical infections highlights the complexity of managing infection control and the necessity for ongoing vigilance and research in this field [8].

The risk factors for SSIs can be broadly categorized into patient-related, surgical-related, and environmental factors, each presenting unique challenges in prevention strategies.

1. Patient-Related Factors [7, 9]:

o Underlying Medical Conditions: Comorbidities such as diabetes mellitus, obesity, chronic obstructive pulmonary disease (COPD), and immunosuppression significantly increase the risk of SSIs. For instance, diabetes can impair wound healing due to poor blood sugar control and compromised immune responses.

o Nutritional Status: Malnutrition or being underweight can hinder optimal healing and immune function, increasing susceptibility to infections. Adequate protein intake, vitamins, and minerals are critical to wound healing and infection prevention.

o Age: Older adults typically exhibit a higher incidence of SSIs, as age-related physiological changes can affect immune function and wound healing capacities.

2. Surgical-Related Factors [10]:

o Type of Surgical Procedure: As mentioned earlier, the complexity and nature of the surgery play crucial roles in infection risk. Procedures involving the gastrointestinal tract, orthopedic implants, or surgeries that are prolonged tend to have higher infection rates.

o Duration of Surgery: Surgical duration is directly correlated with infection rates; prolonged operations may increase the risk of skin flora contamination and impair the body's natural barriers against infections.

o Sterile Techniques: Adherence to aseptic techniques and protocols is fundamental in preventing SSIs. Inadequate sterilization of instruments, improper hand hygiene among surgical staff, and breaches in sterile barriers can increase infection risks.

3. Environmental Factors [11, 12]:

o Hospital Practices: The presence of a robust infection control program, the application of prophylactic antibiotics, and the implementation of standardized care bundles can substantially reduce SSI rates. Facilities that emphasize surgical safety culture and continuous staff education are often more successful in minimizing infections.

o Operating Room Conditions: Factors such as the cleanliness of the surgical environment, ventilation systems, and the handling of surgical materials can all impact the likelihood of SSIs. Maintaining a controlled environment significantly contributes to infection prevention efforts.

Efforts aimed at minimizing SSIs require a multifaceted approach that integrates the identification of risk factors with evidence-based preventative strategies. These strategies include but are not limited to the following [9]:

• Preoperative Optimization: Ensuring patients receive appropriate preoperative assessments, nutritional optimization, and management of comorbid conditions. Surgical teams should assess and mitigate any patient-specific risk factors during preoperative consultations [11].

• Antimicrobial Prophylaxis: The judicious use of prophylactic antibiotics can effectively reduce the risk of SSIs, particularly in surgeries identified as high-risk. Timing and choice of antibiotics are critical in maximizing their efficacy while minimizing resistance [10].

- Aseptic Technique: Emphasizing strict adherence to sterile techniques throughout the surgical process. This includes using sterile instruments, maintaining a sterile field, and ensuring that all surgical personnel practice effective hand hygiene [2].
- Postoperative Care: Implementing structured postoperative care protocols that monitor for signs of infection and promote timely interventions when SSIs are identified. Educating patients about wound care and signs of infection can empower them to seek help early if needed [13].

The Role of Nurses in Infection Prevention

Nurses serve as frontline healthcare providers, playing a vital role in each phase of the surgical process — from pre-operative assessments to postoperative care. Their involvement in SSI prevention begins in the preoperative phase, where they conduct thorough assessments of patients, educate them about infection risks, and ensure that all necessary preoperative preparations are completed [14].

Preoperative Education and Preparation

In the preoperative phase, nurses educate patients about the importance of proper hygiene and the need to follow specific instructions leading up to their surgery. Patients are often instructed to shower using antibacterial soap, avoid shaving the surgical site to minimize skin microtrauma, and disclose any medications or health conditions that may increase SSI risk [15].

Moreover, nurses are responsible for ensuring that preoperative assessments are meticulous. This includes obtaining a detailed medical history and evaluating the patient's nutritional status, as malnutrition can significantly impair wound healing. Educating patients about the importance of smoking cessation and glycemic control is also crucial, particularly for those with conditions that predispose them to infections [13].

Adherence to Sterile Techniques

During the surgical phase, adherence to strict sterile techniques is paramount. Nurses play a critical role in maintaining the sterile field and adhering to protocols designed to prevent contamination. Their responsibilities include preparing surgical instruments properly, ensuring that surgical drapes are correctly placed, and monitoring the surgical environment for any lapses in aseptic practices [15].

Intra-operative nurses also monitor the administration of prophylactic antibiotics, ensuring that they are given within the recommended timeframe and dosages. The timing and choice of antibiotics can be crucial in preventing SSIs, as they decrease the risk of bacterial contamination during surgery [16].

Postoperative Monitoring and Care

In the postoperative phase, nursing care continues to be instrumental in SSI prevention. Nurses are responsible for closely monitoring surgical wounds for any signs of infection, such as increased redness, swelling, or drainage. Early identification of potential infections allows for timely intervention, which can significantly improve patient outcomes [17].

Furthermore, nurses educate patients on proper wound care, emphasizing the importance of keeping the surgical site clean and dry, recognizing signs of infection, and adhering to follow-up appointments. They also stress the importance of nutrition and hydration to support the healing process. Ensuring that patients understand their role in wound care empowers them to remain vigilant post-surgery and enhances their recovery [18].

Interprofessional Collaboration

The prevention of SSIs is a responsibility shared across the healthcare team, and nurses play a central role in facilitating interprofessional collaboration. Effective communication among surgeons, anesthesiologists, surgeons, and nursing staff is crucial for developing and implementing infection prevention protocols. Nurses often function as key coordinators, ensuring that everyone on the team is informed about each patient's needs and the best practices for preventing infections [18].

Participating in quality improvement initiatives and multidisciplinary rounds allows nurses to advocate for best practices and raise awareness about infection control measures. Engaging in continuous professional development through training and education enhances their knowledge and skills, keeping them abreast of the latest guidelines and research on infection prevention [12].

Preoperative Measures:

Patient Skin Antisepsis

One of the most critical measures nurses employ in reducing SSIs is ensuring proper skin antisepsis prior to surgery. Skin is a common reservoir for bacterial pathogens, making it imperative to reduce microbial load at the surgical site. The nursing team leads this effort through meticulous cleaning and preparation protocols [19].

Preoperative Skin Preparation Techniques

The first step in patient skin antisepsis involves thorough education for patients about the significance of preoperative skin cleanliness. Nurses often guide patients through pre-surgical instructions, which may include hygiene practices such as showering with antimicrobial soap on the day before or the day of the surgery. This initial preparation diminishes the number of skin flora bacteria [20].

Once at the healthcare facility, nurses employ various antiseptics for skin cleansing. Common agents include chlorhexidine gluconate and iodine-based solutions. Chlorhexidine gluconate has gained popularity due to its sustained antimicrobial activity, broad-spectrum efficacy, and reduced irritability compared to iodine. Nurses are trained to apply these agents according to evidence-based guidelines, often working in tandem with surgical teams to ensure a robust antisepsis regimen [21].

The application of antiseptics generally follows a systematic process: skin should be cleaned in a circular motion starting from the incision site and moving outward, minimizing the potential for contaminating the surgical field with bacteria. Nurses also ensure that antiseptic solutions are allowed sufficient contact time with the skin to maximize efficacy before the sterile drapes are applied [20].

Patient Education and Engagement

Patient engagement does not solely involve compliance with cleansing protocols; it also encompasses educating patients about the importance of reducing the risk of infections. Patients who are informed about skin preparation understand their vital role within the surgical process. Furthermore, nurses must consider individual patient factors, including allergies to antiseptic agents, dermatological conditions, or other health issues that could necessitate alternative antiseptic protocols [22].

Preoperative Antibiotic Administration

In addition to skin antisepsis, the timely administration of prophylactic antibiotics is another critical strategy in SSI prevention. Studies demonstrate that the appropriate use of antibiotics can effectively reduce the risk of infection, especially in high-risk patients or procedures [22].

Identifying Candidates for Antibiotic Prophylaxis

Nurses assess patients preoperatively to determine candidates for antibiotic prophylaxis. Factors influencing this decision include the type of surgical procedure, the patient's medical history, and any underlying risk factors such as diabetes mellitus, obesity, or compromised immunity. Surgical specialties often have specific protocols. For instance, orthopedic or cardiac surgeries might warrant different antimicrobial strategies compared to general surgical procedures [23].

Timing and Administration of Antibiotics

The efficacy of antibiotic prophylaxis hinges on timely administration. Evidence suggests that antibiotics should be administered within a specific window; ideally, within one hour prior to the incision to ensure adequate tissue levels during surgery. Nursing protocols are in place to ensure that antibiotics are appropriately timed, with nurses confirming the correct dosage and

monitoring for any possible allergic reactions or side effects [24].

Surveillance and Documentation

Following the administration of prophylactic antibiotics, nurses maintain vigilance in monitoring patients through the perioperative phase. This includes documentation of administered medications, ensuring compliance with protocols, and noting any adverse reactions. This meticulous record-keeping is vital in tracking infection rates and refining preoperative strategies aimed at reducing SSIs [23].

Intraoperative Measures:

A sterile environment is a foundational element in preventing SSIs. Surgical nurses play a vital role in maintaining this sterile field through strict adherence to aseptic techniques. This involves meticulously preparing the operating room (OR) prior to surgery by ensuring all surgical instruments and supplies are properly sterilized and organized [25].

Preparation of the Surgical Field:

Before any surgical procedure begins, nurses are responsible for scrubbing the surgical site, the proper donning of sterile gowns, gloves, masks, and caps, and the setup of the instrument table. This preparation must occur in a manner that minimizes the risk of contamination. Surgical nurses must be vigilant to prevent breaks in sterility, as even minor lapses can introduce pathogens [26].

Environmental Controls:

Intraoperatively, nurses must ensure that the OR is maintained at optimal conditions to further reduce SSI risk. This includes controlling airflow, humidity, and temperature within the surgical suite. Studies have demonstrated that unidirectional airflow, commonly seen in laminar flow systems, can significantly reduce airborne bacteria levels in the OR. Regular checks and maintenance of these systems are imperative, ensuring a clean environment conducive to surgical procedures [24].

Prophylactic Antibiotic Administration

One of the most effective interventions in preventing SSIs is the timely administration of prophylactic antibiotics. Nurses must be well-versed in both the guidelines surrounding antibiotic prophylaxis and the specific protocols for each surgical procedure. Typically, antibiotics should be administered within one hour prior to surgical incision to achieve effective tissue concentration [9].

Monitoring and Documentation:

It is crucial that nurses accurately monitor the timing of antibiotic administration and document it as part of the patient's surgical record. Furthermore, nurses should ensure that patients have no allergies to the administered antibiotics to prevent adverse reactions, thereby creating a seamless and safer surgical experience [26].

Patient Monitoring During Surgery

The intraoperative phase is a critical time for nurses to monitor various parameters to ensure patient safety and optimize outcomes. Vigilant ongoing assessment allows for early detection of any complications that could predispose the patient to SSIs. Key metrics include maintaining appropriate body temperature, blood pressure, and oxygen saturation levels [27].

Temperature Management:

Maintaining normothermia (average body temperature) is especially vital, as hypothermia is known to increase the incidence of SSIs significantly. Normothermic surgical patients have been shown to have better outcomes. Therefore, induced hypothermia must be prevented by utilizing warming blankets, warming rooms, and warmed intravenous fluids. Nurses should continuously monitor the patient's core temperature and intervene promptly if the temperature deviates from normal ranges [28].

Fluid and Blood Loss Monitoring:

Intraoperative blood loss can also increase the risk of infection. As such, nurses are tasked with the responsibility of closely monitoring blood loss and administering appropriate volume resuscitation when needed. Maintaining a well-balanced fluid volume supports circulation and helps optimize the perfusion of tissues, which is essential for recovery [28].

Engagement in Communication and Team Collaboration

Effective communication is critical in the OR. Nurses must continually communicate with surgeons, anesthesiologists, and other healthcare professionals during the surgery to ensure that protocols are followed and to address any emergent issues that arise. A collaborative approach enhances the surgical team's ability to maintain sterility and execute infection control measures efficiently [29].

Surgical Checklists:

The implementation of surgical checklists, such as the World Health Organization's Surgical Safety Checklist, has been shown to reduce complications, including SSIs. These checklists serve as tools for nurses to confirm that prophylactic measures, such as the administration of antibiotics, proper sterilization techniques, and the completion of environmental checks, have been executed before surgery starts [7].

Postoperative Care

Wound care is fundamental to preventing SSIs. Proper assessment and management of the surgical wound are paramount in the postoperative period. Nurses serve as essential providers of wound care, responsible for monitoring the healing process and managing potential complications. Key components of effective wound management include [12]:

1. Maintaining Cleanliness and Sterility: Nurses must adhere to strict aseptic techniques during dressing changes to minimize the risk of introducing pathogens. This includes using sterile gloves, cleaning solutions, and following established protocols for wound maintenance [30].

2. Assessing Wound Healing: Routine assessment of the surgical site is critical. Nurses should evaluate the incision for signs of infection, such as increased redness, swelling, or purulent drainage. Early detection allows for timely intervention, which can significantly alter the course of infection progression [11].

3. Dressing Management: The choice of dressings can also impact healing. Nurses must be knowledgeable about different types of dressings and their roles in wound healing, including moisture balance, protecting against external contaminants, and facilitating gas exchange [2].

4. Patient-Centric Care: Engaging patients in their care can improve outcomes. Encouraging patients to observe and report any changes at the site promotes active participation in their health, leading to better adherence to care recommendations [30].

Patient education is an integral part of nursing care, particularly concerning postoperative recovery and SSI prevention. Effective educational interventions ensure that patients comprehend the importance of wound care and recognize early signs of infection. Several educational strategies may significantly enhance patient understanding and compliance [31]:

1. Understanding the Healing Process: Educating patients about what to expect during their recovery can alleviate anxiety and prepare them for normal healing symptoms versus signs of infection. Emphasizing what constitutes a "normal" recovery—that is, mild redness or swelling, for example—can help patients differentiate between typical postoperative changes and concerning symptoms [32].

2. Instruction on Wound Care: Nurses should provide clear, step-by-step instructions on how to care for their surgical site, including how to change dressings, signs to watch for, and proper techniques to maintain hygiene around the incision site. Providing written materials and demonstrations can reinforce these teachings [32].

3. Discussing Symptoms of Infection: Patients must be informed of specific signs of infection to watch for, including fever, increased pain, and changes in wound appearance. Understanding when to seek help empowers patients to act promptly, potentially averting more severe complications [33].

4. Tailoring Education to Individual Needs: Recognizing that each patient may have different levels of understanding and education, nurses should tailor their teaching to suit individual learning styles. This may involve utilizing visual aids, teach-back methods to assess comprehension, and encouraging family members to participate in the education process [33].

Early Identification of Infection Signs

The capacity for early detection of infection can be a critical factor in preventing SSIs. Nurses are uniquely positioned to observe changes in patients' surgical sites and overall condition due to their proximity and continuous patient care. Signs that must be closely monitored include [34]:

1. Wound Assessment: Regular evaluation for localized signs such as increased warmth, tenderness, or drainage can reveal early-stage infection. Nurses should promptly document and report any significant changes to the surgical team for evaluation [34].

2. Systemic Signs of Infection: RN evaluation should also extend to the patient's vital signs. Fever, increased heart rate, and elevated white blood cell count may indicate systemic infection, necessitating immediate medical review [7].

3. Patient Feedback: Encouraging patients to communicate any new symptoms they experience is essential. A patient-centered approach wherein patients feel comfortable expressing concerns can significantly aid in early identification [35].

4. Interprofessional Collaboration: Effective communication between nurses, physicians, and other healthcare team members facilitates shared knowledge and rapid intervention if signs of infection are observed. An integrated approach can enhance the overall quality of care provided to the patient [35].

Conclusion:

In conclusion, the prevention of surgical site infections (SSIs) is a multifaceted challenge that necessitates the integration of evidence-based nursing strategies and collaborative efforts within the healthcare team. By adopting strict aseptic techniques, implementing appropriate preoperative and postoperative measures, and ensuring effective communication, nurses play a pivotal role in minimizing SSIs and enhancing patient outcomes. Additionally, fostering patient engagement through education on wound care and infection awareness can significantly empower individuals in their recovery journey. Ongoing monitoring and evaluation of infection rates are essential to refine practices and promote continuous improvement in surgical care. Ultimately, a comprehensive approach that combines evidence-based interventions with a commitment to patient safety will contribute to a marked reduction in SSIs, leading to improved healthcare quality and reduced costs for both patients and healthcare systems.

WORKS CITED

Sadia H, Kousar R, Azhar M, Waqas A, Gilani S. Assessment of nurses' knowledge and practices regarding prevention of surgical site infection. Saudi J Med Pharm Sci. (2017) 3(6):585–95. 10.17656/jsmc.10284 [DOI] [Google Scholar]

Fashafsheh I, Ayed A, Eqtait F, Harazneh L. Knowledge and practice of nursing staff towards infection control measures in the Palestinian hospitals. J Educ Pract. (2015) 6(4):79–90.

Leaper D, Edmiston C. World health organization: global guidelines for the prevention of surgical site infection. J Hosp Infect. (2017) 95(2):135–6. 10.1016/j.jhin.2016.12.016 [DOI] [PubMed] [Google Scholar]

Ding S, Lin F, Marshall A, Gillespie B. Nurses' practice in preventing postoperative wound infections: an observational study. J Wound Care. (2017) 26(1):28–37. 10.12968/jowc.2017.26.1.28 [DOI] [PubMed] [Google Scholar]

Sickder HK, Lertwathanawilat W, Sethabouppha H, Viseskul N. Nurses' surgical site infection prevention practices in Bangladesh. Pac Rim Int J Nurs Res Thail. (2017) 21(3):244–57.

de Oliveira AC, Sarmento Gama C. Surgical site infection prevention: an analysis of compliance with good practice in a teaching hospital. J Infect Prev. (2017) 18(6):301–6. 10.1177/1757177417703190 [DOI] [PMC free article] [PubMed] [Google Scholar]

Kolade OA, Abubakar S, Adejumoke SR, Funmilayo HV, Tijani A. Knowledge, attitude and practice of surgical site infection prevention among post-operative nurses in a tertiary health institution in north-central Nigeria. Int J Nurs Midwifery. (2017) 9(6):65–9. 10.5897/IJNM2017.0262 [DOI] [Google Scholar]

Biccard BM, Madiba TE, Kluyts H-L, Munlemvo DM, Madzimbamuto FD, Basenero A, et al. Perioperative patient outcomes in the african surgical outcomes study: a 7-day prospective observational cohort study. Lancet. (2018) 391(10130):1589–98. 10.1016/S0140-6736(18)30001-1 [DOI] [PubMed] [Google Scholar]

Patil VB, Raval RM, Chavan G. Knowledge and practices of health care professionals to prevent surgical site infection in a tertiary health care centre. Int Surg J. (2018) 5(6):2248–51. 10.18203/2349-2902.isj20182231 [DOI] [Google Scholar]

Mwakanyamale AA, Mukaja AMA, Ndomondo MD, Zenas JP, Stephen AM, Mika EZ. Nursing practice on post-operative wound care in surgical wards at muhimbili national hospital, dar-es-salaam, Tanzania. Open J Nurs. (2019) 9(8):870–90. 10.4236/ojn.2019.98065 [DOI] [Google Scholar]

Desalew G, Geda B, Mengistie B, Demis A, Demis S. Surgical site infection prevention practices and associated factors among nurses working in government hospitals of harari regional state and dire dawa city administration, Eastern Ethiopia. (2019) 3(6):214–25. 10.12032/TMRIN20191209

Famakinwa T, Bello B, Oyeniran Y, Okhiah O, Nwadike R. Knowledge and practice of post-operative wound infection prevention among nurses in the surgical unit of a teaching hospital in Nigeria. Int J Basic Appl Innov Res. (2014) 3(1):23–8.

Spruce L. Back to basics: hand hygiene and surgical hand antisepsis. AORN J. (2013) 98(5):449–60. 10.1016/j.aorn.2013.08.017 [DOI] [PubMed] [Google Scholar]

CDC. National healthcare safety network: surgical site infection (SSI) event (2010).

De Lissovoy G, Fraeman K, Hutchins V, Murphy D, Song D, Vaughn BB. Surgical site infection: incidence and impact on hospital utilization and treatment costs. Am J Infect Control. (2009) 37(5):387–97. 10.1016/j.ajic.2008.12.010

Sahiledengle B. Decontamination of patient equipment: nurses' self-reported decontamination practice in hospitals of southeast Ethiopia. BMC Res Notes. (2019) 12(1):1–7. 10.1186/s13104-019-4427-5

Teshager FA, Engeda EH, Worku WZ. Knowledge, practice, and associated factors towards prevention of surgical site infection among nurses working in amhara regional state referral hospitals, northwest Ethiopia. Surg Res Pract. (2015) 2015:1–6. 10.1155/2015/736175

Forrester JA, Koritsanszky L, Parsons BD, Hailu M, Amenu D, Alemu S, et al. Development of a surgical infection surveillance program at a tertiary hospital in Ethiopia: lessons learned from two surveillance strategies. Surg Infect. (2018) 19(1):25–32. 10.1089/sur.2017.136

Mengesha A, Tewfik N, Argaw Z, Beletew B, Wudu M. Practice of and associated factors regarding prevention of surgical site infection among nurses working in the surgical units of public hospitals in Addis Ababa city, Ethiopia: a cross-sectional study. PloS One. (2020) 15(4):e0231270. 10.1371/journal.pone.0231270

Haile TG, Engeda EH, Abdo AA. Compliance with standard precautions and associated factors among healthcare workers in gondar university comprehensive specialized hospital, northwest Ethiopia. J Environ Public Health. (2017) 2017:1–8. 10.1155/2017/2050635

Woldegioris T, Bantie G, Getachew H. Nurses' knowledge and practice regarding prevention of surgical site infection in bahir dar, northwest Ethiopia. Surg Infect. (2019) 20(1):71–7. 10.1089/sur.2018.081

Palumbo VD, Bruno A, Di Trapani B, Tomasello G. 2016 WHO global guidelines for the prevention of surgical site infection: a new step to improve patients' safety before, during and after surgery. Healthcare Safety. (2017) 5(1):2283–7604. 10.12882/2283-7604.2017.5.1

Sahiledengle B, Gebresilassie A, Getahun T, Hiko D. Infection prevention practices and associated factors among healthcare workers in governmental healthcare facilities in Addis Ababa. Ethiop J Health Sci. (2018) 28(2):177–86. 10.4314/ejhs.v28i2.9

Aveling EL, Zegeye DT, Silverman M. Obstacles to implementation of an intervention to improve surgical services in an Ethiopian hospital: a qualitative study of an international health partnership project. BMC Health Serv Res. (2016) 16(1):393. 10.1186/s12913-016-1639-4

Allegranzi B, Bischoff P, Sd J, Kubilay NZK, Zayed B, Gomes SM, et al. New WHO recommendations on preoperative measures for surgical site infection prevention: an evidence-based global perspective. Lancet Infect Dis. (2016) 16(12):e276–e87. 10.1016/S1473-3099(16)30398-X

Boga SM. Nursing practices in the prevention of post-operative wound infection in accordance with evidence-based approach. Int J Caring Sci. (2019) 12(2):1229.

Mengesha A, Tewfik N, Argaw Z, Beletew B, Wudu M. Preoperative knowledge and practices of surgical site infection prevention among nursing staff in public hospitals. J Glob Health. (2019) 9(1):010401. 10.7189/jogh.09.010401

Sahiledengle B, Gebresilassie A, Getahun T, Hiko D. Evaluation of infection prevention practices among nurses in governmental healthcare facilities in Addis Ababa. Ethiop J Health Sci. (2018) 28(2):177–86. 10.4314/ejhs.v28i2.9

Teshager FA, Engeda EH, Worku WZ. Infection control practices and associated factors among nurses in Amhara region referral hospitals. Int J Nurs Sci. (2016) 3(2):188–94.

Mengesha A, Tewfik N, Argaw Z, Beletew B, Wudu M. Assessment of surgical site infection prevention practices among nurses in Addis Ababa public hospitals. Afr J Nurs Midwifery. (2017) 1(1):1–8.

Hamoole Tahmasebi F, Amini Rarani S, Ghadami A. The effects of two surgical gowning and gloving methods on the extent of contamination of surgical team members' gowns and gloves: A single-blind controlled trial. Nurs Midwif Studies. 2023;12(2):69–74. doi: 10.48307/nms.2023.175263.

Assadian O, Golling M, Krüger CM, Leaper D, Mutters NT, Roth B, Kramer A. Surgical site infections: guidance for elective surgery during the SARS-CoV-2 pandemic - international recommendations and clinical experience. J Hosp Infect. 2021 May;111:189–199. doi: 10.1016/j.jhin.2021.02.011.

Seidelman JL, Mantyh CR, Anderson DJ. Surgical Site Infection Prevention: A Review. JAMA. 2023 Jan;329(3):244–252. doi: 10.1001/jama.2022.24075.

Hechenbleikner EM, Hobson DB, Bennett JL, Wick EC. Implementation of surgical quality improvement: auditing tool for surgical site infection prevention practices. Dis Colon Rectum. 2015 Jan;58(1):83–90. doi: 10.1097/DCR.0000000000000259.

Leaper DJ, Edmiston CE. World Health Organization: global guidelines for the prevention of surgical site infection. J Hosp Infect. 2017 Feb;95(2):135–136. doi: 10.1016/j.jhin.2016.12.016.