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ASSESSMENT OF SURGICAL SITE INFECTION PROTOCOLS: NURSES' AWARENESS, KNOWLEDGE AND PRACTICES

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ABSTRACT

Surgical site infections (SSIs) remain a significant cause of postoperative morbidity, prolonged hospitalization, and increased healthcare costs, particularly in low- and middle-income countries. Nurses play a critical role in SSI prevention, yet data on protocol implementation and staff competence in provincial settings like Bohol, Philippines, remain scarce. This descriptive-correlational study aimed to assess existing SSI prevention protocols and evaluate the knowledge and practices of nurses in two public hospitals in Bohol, Philippines. A total of 72 staff nurses from the operating room, surgical wards, obstetrics-gynecology unit, and outpatient department participated in the study. Data were collected using a researcher-developed questionnaire based on the World Health Organization's 2018 Global Guidelines for SSI Prevention. Descriptive statistics, regression analysis, and t-tests were used to analyze the data. Nurses demonstrated very high awareness (mean range: 3.54–4.65) and excellent knowledge (mean range: 3.94–4.61) of SSI protocols. Self-reported practices were also strong, particularly in intraoperative aseptic techniques such as surgical hand preparation (M = 4.63), normothermia maintenance (M = 4.71), and sterile draping (M = 4.71). However, lower adherence was noted for hair removal using clippers (M = 3.88) and nasal decolonization (M = 3.88), indicating gaps in resource availability and protocol reinforcement. Area of clinical assignment was significantly associated with knowledge ($p = 0.048$), while sex was significantly associated with practice ($p = 0.008$), reflecting role-based task distribution rather than competency gaps. Nurses in the study settings possess a strong foundational knowledge and consistently adhere to core SSI prevention practices. However, targeted interventions are needed to address gaps in antimicrobial stewardship, availability of specialized equipment, and continuous education for non-

surgical units. Strengthening institutional support, audit systems, and interprofessional collaboration will further enhance alignment with global evidence-based standards for SSI prevention.

Keywords: *surgical site infection, nurses' knowledge, nurses' practices, infection prevention, antimicrobial stewardship, perioperative nursing, Bohol*

INTRODUCTION

Surgical site infection (SSI) remains one of the most common and preventable complications associated with surgical procedures. It occurs when microorganisms contaminate the incision, deep tissues, or organ spaces following an operation, resulting in delayed healing, prolonged hospitalization, increased healthcare costs, and, in severe cases, mortality. Globally, surgical site infection (SSI) continues to pose a significant challenge to patient safety despite advances in surgical techniques and infection control measures (Seidelman et al., 2023). Recognizing this burden, the World Health Organization (WHO, 2018) developed comprehensive guidelines that emphasize evidence-based interventions across the preoperative, intraoperative, and postoperative phases of care. These guidelines highlight that SSI prevention requires a coordinated, system-wide approach rather than isolated clinical actions.

The global burden of surgical site infections (SSI) remains substantial, particularly in low- and middle-income countries where healthcare resources, surveillance systems, and infection prevention capacities are often limited. Studies have consistently identified SSI as one of the most common healthcare-associated infections, with higher incidence rates observed in resource-constrained settings due to gaps in infrastructure, training, and compliance with standard protocols (Allegranzi et al., 2016). Moreover, research by Kulkarni and Arulampalam (2020) emphasized that SSI significantly contributes to increased morbidity and mortality, as well as prolonged hospital stays, higher readmission rates, and rising healthcare costs. Similarly, Mehtar et al. (2020) highlighted that inadequate infection control practices and limited monitoring systems further exacerbate the prevalence of surgical site infections in developing regions. These findings collectively underscore the urgent need for the effective and consistent implementation of evidence-based infection prevention measures across healthcare settings.

Nurses play a central role in the prevention of SSIs, as many critical interventions rely directly on nursing practice. These include adherence to aseptic techniques, proper wound care, hand hygiene, patient education, and postoperative monitoring. However, evidence suggests that the presence of guidelines alone does not guarantee compliance. Lin et al. (2019) identified that nurses' adherence to SSI prevention protocols is influenced by both facilitators and barriers such as knowledge level, access to guidelines, documentation practices, and patient involvement. Similarly, Gillespie et al. (2020) reported variations in wound care practices across healthcare settings despite the availability of standardized protocols, indicating inconsistencies in implementation. In addition, Wistrand et al. (2018) found that nurses demonstrated high compliance when

clear guidelines were available, but adherence declined when protocols were unclear or absent. These studies suggest that awareness, knowledge, and institutional support are critical determinants of effective SSI prevention.

Further studies highlight persistent gaps in knowledge and practice among healthcare professionals. Geberemariyam et al. (2018) found that healthcare workers who received training and had access to infection prevention guidelines demonstrated significantly better knowledge and safer practices. Likewise, Ayub Khan et al. (2018) identified major barriers to SSI protocol implementation, including lack of education, weak infection control culture, and absence of surveillance systems. In another study, Woldegioris et al. (2019) reported that although nurses exhibited moderate knowledge of SSI prevention, their practices were often inadequate, indicating a gap between knowledge and actual clinical application. These findings emphasize that improving SSI outcomes requires not only knowledge enhancement but also the translation of knowledge into consistent practice.

In the Philippine context, research on SSI remains limited and is largely concentrated in tertiary hospitals. Cabungcal et al. (2024) reported an SSI incidence of 1.85% in a government hospital setting, while observed improvements in SSI rates following the implementation of a prevention care bundle. However, these studies highlight the scarcity of localized data, particularly in provincial healthcare settings. Moreover, Henarejos et al. (2022) reported a high SSI risk of 28.8% during a surgical mission in the Philippines despite adherence to WHO protocols, suggesting that contextual factors such as resource availability and clinical practices significantly influence outcomes. Notably, no published studies have examined SSI protocols or nurses' awareness, knowledge, and practices in Region 7, particularly in the province of Bohol. This gap limits the ability of healthcare institutions to establish baseline data and evaluate the effectiveness of their infection prevention strategies.

This study is anchored on Pender's Health Promotion Model, which emphasizes that health-related behaviors are influenced by individual knowledge, perceived benefits and barriers, and environmental factors. In the context of SSI prevention, the model suggests that nurses are more likely to adhere to infection control protocols when they possess adequate knowledge, recognize the importance of these practices, and operate in supportive clinical environments. Thus, assessing nurses' awareness, knowledge, and practices provides a comprehensive understanding of how infection prevention protocols are implemented in actual healthcare settings.

Given these considerations, this study aimed to assess the existing surgical site infection protocols and examine nurses' awareness, knowledge, and practices in their implementation in selected hospitals in Bohol. It further explored the relationship between nurses' profile and their knowledge and practices, and identified areas for policy enhancement. By generating evidence from provincial hospitals, this study seeks to contribute to the limited body of local literature on SSI prevention and support the development of context-specific strategies to improve patient safety and surgical outcomes.

Research Questions

This study aimed to assess the surgical site infection protocols of the hospitals and determine the knowledge and practices of nurses in the implementation of these protocols.

Specifically, it sought to answer the following questions:

1. What is the employment profile of nurses in terms of:
    1.1 age,
    1.2 sex,
    1.3 highest educational attainment,
    1.4 length of service,
    1.5 area of assignment?
2. What are the existing surgical site infection protocols whereby nurses are aware of its existence?
3. What is the extent of nurses' knowledge regarding the established protocols for preventing surgical site infections?
4. What are the practices of nurses in the implementation of the surgical site infection protocols?
5. Is there a relationship between the extent of nurses' knowledge in the prevention of surgical site infection and nurses' employment profile?
6. Is there a relationship between the practices in implementation of surgical site infection protocols and the nurses' employment profile?
7. Is there a significant difference in the extent of nurses' knowledge and practices in on surgical site infection protocols?
8. Based on the study findings, what internal policies should be revisited, and what guidelines are to be implemented that would fit the status of the research environment in the prevention of surgical site infection?

METHODOLOGY

Research Design

The study employed a descriptive–correlational research design. The descriptive component was used to assess the existing surgical site infection (SSI) protocols and to determine the extent of nurses' knowledge and practices in their implementation. Descriptive research provided a systematic and accurate representation of the phenomena under investigation, particularly focusing on SSI protocols and nurses' levels of knowledge and practices. The correlational component was utilized to examine the relationships among variables, specifically between nurses' knowledge, practices, and demographic profile (e.g., age, sex, and length of service). This approach enabled the study to determine the direction and strength of associations among variables without establishing causal relationships.

Research Environment

The study was conducted in two public hospitals in Bohol, Philippines: Don Emilio Del Valle Memorial Hospital (DEVMH) in Ubay and Teodoro B. Galagar District Hospital (TBGDH) in Jagna. DEVMH had an authorized bed capacity of 150 with an average daily census exceeding capacity, reflecting a high patient load and surgical demand. Its operating room department handled an average of 170 surgical procedures monthly. TBGDH, a Level 1 hospital, had an authorized bed capacity of 75 but operated beyond this capacity during peak periods. It provided both minor and major surgical services, including obstetric and orthopedic procedures. These hospitals were selected to represent provincial healthcare settings where limited studies on surgical site infection (SSI) prevention have been conducted. Their varying surgical volumes and patient profiles provided a relevant context for examining SSI protocols and nursing practices. Furthermore, the absence of published studies in Region VII, particularly in Bohol, highlighted the need to establish baseline data in these settings. As frontline public healthcare institutions and training sites for nurses, the selected hospitals offered an appropriate environment for assessing infection prevention practices and generating findings that may contribute to improving patient safety and clinical care.

Research Participants

The respondents of the study were staff nurses assigned to the Operating Room, Surgical Ward, Obstetrics and Gynecology Ward, and Outpatient Department of the selected hospitals. A total of 72 nurses participated in the study, with 52 from Don Emilio Del Valle Memorial Hospital (DEVMH) and 20 from Teodoro B. Galagar District Hospital (TBGDH). These nurses were directly involved in preoperative, intraoperative, and postoperative patient care. A complete enumeration technique was employed to ensure comprehensive participation of eligible respondents.

The inclusion criteria comprised registered nurses currently employed in the participating hospitals, assigned to surgical-related units, directly involved in perioperative care, and willing to participate by providing informed consent.

The exclusion criteria included nurses who were on extended leave during the data collection period, those assigned to non-surgical units such as medical or pediatric wards and administrative offices, nursing students or trainees who were not regular staff members, and respondents who did not complete the questionnaire.

Research Instrument

The primary instrument used for data collection was a researcher-developed questionnaire designed to assess nurses' awareness, knowledge, and practices regarding surgical site infection (SSI) prevention protocols. The instrument was developed based on selected recommendations from the World Health Organization (2018) Global Guidelines for the Prevention of Surgical Site Infection, particularly those

supported by moderate-quality evidence and classified as strong or conditional recommendations.

The questionnaire consisted of four parts. Part I gathered the demographic profile of the respondents. Part II measured the level of awareness of SSI prevention protocols using a 5-point Likert scale ranging from 1 (Not at all aware) to 5 (Extremely aware). Part III assessed the level of knowledge through 12 statements, rated using a 5-point Likert scale from 1 (Strongly disagree) to 5 (Strongly agree). Part IV evaluated the practices of nurses in implementing SSI prevention protocols using 12 statements measured on a 5-point Likert scale ranging from 1 (Never) to 5 (Always).

Prior to the conduct of the study, the instrument underwent pilot testing to establish its reliability. The results yielded a Cronbach's alpha coefficient of 0.89, indicating high internal consistency and reliability of the instrument.

Part	Construct	Scale/Weight	Qualitative Description	Interpretation
II	Awareness	1	Not at all aware	The respondent has no recognition of the protocol
		2	Slightly aware	The respondent has minimal recognition of the protocol
		3	Moderately aware	The respondent has a basic level of recognition of the protocol
		4	Very Aware	The respondent has a high level of recognition of the protocol
		5	Extremely aware	The respondent has a complete and thorough recognition of the protocol
III	Knowledge	1	Strongly disagree	The respondent strongly disagrees with the statement, indicating lack of knowledge or disagreement with the protocol.
		2	Disagree	The respondent disagrees with the statement, indicating limited knowledge or partial disagreement.
		3	Neither agree nor disagree	The respondent is uncertain or undecided about the statement.
		4	Agree	The respondent agrees with the statement, indicating adequate knowledge of the protocol.
		5	Strongly agree	The respondent strongly agrees with the statement, indicating excellent knowledge of the protocol.
III	Practice	1	Never	The practice is never performed or implemented.
		2	Rarely	The practice is performed only occasionally or in very few instances.
		3	Sometimes	The practice is performed about half of the time or on some occasions.
		4	Often	The practice is performed most of the time, with occasional lapses.
		5	Always	The practice is performed consistently and without exception.

Research Procedure

Prior to data collection, ethical clearance was secured from the Ethics Review Board of Holy Name University and Don Emilio Del Valle Memorial Hospital (DEVMH). Formal letters requesting permission to conduct the study were submitted to the Chief of Hospital of DEVMH through the Chief Nurse, the Provincial Health Officer, the Chief of Hospital of Teodoro B. Galagar District Hospital (TBGDH), and the identified respondents.

The researcher personally administered the survey questionnaires to the respondents and remained available to provide clarification when needed, ensuring the smooth conduct of data collection. Each questionnaire was assigned a control number to facilitate tracking and ensure data authenticity. Data collection was conducted over a period of approximately four months. Confidentiality of all respondents was strictly maintained throughout the study. Completed questionnaires were retrieved upon completion, and the collected data were organized, statistically processed, and interpreted accordingly.

Data Analysis

The data collected from the respondents were consolidated, tabulated, and analyzed to derive meaningful interpretations. Descriptive statistics were employed to present the demographic profile of the respondents, with categorical variables expressed in frequencies and percentages, and continuous variables summarized using means.

Inferential statistics were utilized to examine relationships and differences among variables. The Pearson product–moment correlation coefficient (r) was used to determine the relationship between respondents' demographic profile and their level of knowledge, as well as between demographic variables and practices. Furthermore, an independent samples t-test was applied to determine the significant difference between the levels of knowledge and practices of the respondents.

RESULTS

The results of the study are presented based on the research objectives. Data are organized in tabular form and are supported by corresponding analysis and interpretation. Relevant and recent literature (2019–2025) is integrated to substantiate and contextualize the findings.

Table 1. Demographic Profile of Respondents

Age	**Frequency**	**Percent**
20-30 years old	19	26.4
31-40 years old	46	63.9
41-50 years old	1	1.4
51-60 years old	6	8.3
Total	72	100.0
Sex	**Frequency**	**Percent**
Male	17	23.6
Female	55	76.4
Total	72	100.0

Age	Frequency	Percent
20-30 years old	19	26.4
31-40 years old	46	63.9
41-50 years old	1	1.4
51-60 years old	6	8.3
Highest Educational Attainment	**Frequency**	**Percent**
Bachelor's Degree	68	94.4
Master's Degree	3	4.2
Doctorate's Degree	1	1.4
Total	72	100.0
Length of Service	**Frequency**	**Percent**
0-5 years	33	45.8
6-10 years	31	43.1
11-15 years	7	9.7
16-20 years	1	1.4
21 years and above	0	0
Total	72	100.0
Area Of Assignment	**Frequency**	**Percent**
Operating Room	26	36.1
Obstetrics and Gynecology Ward	22	30.6
Surgical and Orthopedics Ward	12	16.7
Out-Patient Department	12	16.7
Total	72	100.0

Table 1 presents the demographic profile of the respondents. The majority (63.9%) were within the 31–40 age group, indicating that most respondents belong to the mid-career stage. This suggests that the workforce is composed of individuals who have already gained a certain level of experience and are likely capable of handling clinical responsibilities effectively. A smaller proportion falls within the younger age group of 20–30 years (26.4%), while only a few respondents belong to older age brackets, indicating a relatively concentrated age distribution.

In terms of sex, female respondents comprised the majority (76.4%), while male respondents accounted for 23.6%. This indicates that the nursing workforce in the study is predominantly female, reflecting the common composition of the profession.

Regarding educational attainment, most respondents (94.4%) held a bachelor's degree, with only a small percentage having pursued graduate studies. This shows that the respondents meet the minimum qualification required for professional nursing practice, although advanced academic qualifications remain limited among the group.

While the length of service, the largest proportion of respondents had 0–5 years of experience (45.8%), followed closely by those with 6–10 years (43.1%). This indicates that the workforce is relatively young in terms of professional experience, with only a small number having more than 10 years of service. This distribution suggests a workforce that is still developing its expertise and may benefit from continuous training and professional guidance.

In terms of area of assignment, the highest number of respondents were assigned to the operating room (36.1%), followed by obstetrics and gynecology wards (30.6%). The remaining respondents were distributed equally between surgical and orthopedics wards and the outpatient department (16.7% each). This indicates that a significant portion of

the respondents are assigned to areas directly involved in surgical procedures and patient care.

Overall, the findings show that the respondents are predominantly mid-career, female, bachelor's degree holders, with relatively short length of service, and are primarily assigned to surgical-related units. This profile provides an overview of the workforce characteristics relevant to the implementation of clinical practices in the hospital setting.

Table 2. Nurses Awareness in the Surgical Site Infection Prevention Protocols

Protocols	Mean	S.D.	Qualitative Description
Preoperative			
Preoperative bathing using plain soap or an antimicrobial soap	4.38	0.696	Extremely aware
Patients undergoing cardiothoracic and orthopedic surgery with known nasal carriage of S. aureus should receive perioperative intranasal applications of mupirocin 2% ointment with or without a combination of CHG body wash.	3.54	1.243	Very aware
Administration of SAP within 120 minutes before incision, while considering the half-life of the antibiotic.	4.21	0.865	Extremely aware
Mechanical bowel preparation alone (without administration of oral antibiotics) should not be used for the purpose of reducing SSI in adult patients undergoing elective colorectal surgery	4.14	0.810	Very aware
Patients undergoing any surgical procedure, hair should either not be removed or, if absolutely necessary, it should be removed only with a clipper.	4.01	1.021	Very aware
Alcohol-based antiseptic solutions based on CHG for surgical site skin preparation in patients undergoing surgical procedures	4.30	0.812	Extremely aware
Surgical hand preparation should be performed by scrubbing with either a suitable antimicrobial soap and water or using a suitable alcohol-based handrub before donning sterile gloves	4.57	0.597	Extremely aware
Composite Mean	**4.22**		**Extremely aware**
Intra-operative			
Adult patients undergoing general anesthesia with tracheal intubation for surgical procedures should receive an 80% fraction of inspired oxygen intraoperatively	4.41	0.784	Extremely aware
Use of warming devices in the operating room and during the surgical procedure for patient body warming	4.49	0.669	Extremely aware
Either sterile, disposable non-woven or sterile, reusable woven drapes and gowns can be used during surgical operations	4.59	0.595	Extremely aware
Use of antimicrobial-coated (triclosan) sutures	4.33	0.804	Extremely aware
Composite Mean	**4.46**		**Extremely aware**
Postoperative			
Discontinuation of surgical antibiotic prophylaxis immediately within 24 hours after surgery	4.65	0.533	Extremely aware
Composite Mean	**4.65**		**Extremely aware**
Overall Composite Mean	**4.36**		**Extremely Aware**

Table 2 indicates that respondents demonstrated a high level of awareness of surgical site infection (SSI) prevention protocols across all operative phases, as reflected in the overall composite mean of 4.36, interpreted as "extremely aware." This suggests

that perioperative nurses possess strong familiarity with evidence-based infection control practices, which is essential in promoting patient safety and minimizing postoperative complications.

During the preoperative phase, the highest awareness was observed in surgical hand preparation (M = 4.57) and the use of alcohol-based antiseptic solutions (M = 4.30), both interpreted as “extremely aware.” These findings indicate that respondents are highly knowledgeable about fundamental aseptic techniques essential for preventing microbial contamination. However, a relatively lower mean was noted for nasal decolonization using mupirocin (M = 3.54), suggesting comparatively lower awareness of more specialized preventive measures.

For the intraoperative phase, respondents demonstrated consistently high awareness, particularly in the use of sterile drapes and gowns (M = 4.59) and patient warming techniques (M = 4.49), both categorized as “extremely aware.” This reflects strong knowledge of maintaining sterile conditions and ensuring optimal patient physiological status during surgery. Awareness of antimicrobial-coated sutures (M = 4.33) further indicates familiarity with advanced infection prevention interventions.

In the postoperative phase, discontinuation of surgical antibiotic prophylaxis within 24 hours (M = 4.65) obtained the highest mean and was interpreted as “extremely aware.” This highlights strong awareness of appropriate antibiotic use and adherence to recommended postoperative guidelines.

Overall, the findings suggest that nurses exhibit excellent awareness of SSI prevention protocols, particularly those routinely applied in perioperative care. However, the relatively lower awareness of specialized interventions indicates areas for improvement through targeted training and reinforcement. This finding is supported by Branch-Elliman et al. (2019), who emphasized the importance of appropriate antibiotic stewardship in surgical care, and Mehtar et al. (2020), who highlighted that strengthening awareness and surveillance systems is essential for effective SSI prevention, particularly in clinical practice settings.

Table 3. Extent of Nurses’ Knowledge in Surgical Site Infection Prevention Protocols

Protocols	Mean	S.D.	Qualitative Description
Preoperative			
Preoperative bathing using plain soap or an antimicrobial soap	4.51	0.645	Strongly Agree
Patients undergoing cardiothoracic and orthopedic surgery with known nasal carriage of S. aureus should receive perioperative intranasal applications of mupirocin 2% ointment with or without a combination of CHG body wash.	3.94	0.918	Agree
Administration of SAP within 120 minutes before incision, while considering the half-life of the antibiotic.	4.40	0.720	Strongly Agree
Mechanical bowel preparation alone (without administration of oral antibiotics) should not be used for the purpose of reducing SSI in adult patients undergoing elective colorectal surgery	4.31	0.844	Strongly Agree

Patients undergoing any surgical procedure, hair should either not be removed or, if absolutely necessary, it should be removed only with a clipper.	4.32	0.847	Strongly Agree
Alcohol-based antiseptic solutions based on CHG for surgical site skin preparation in patients undergoing surgical procedures	4.47	0.781	Strongly Agree
Surgical hand preparation should be performed by scrubbing with either a suitable antimicrobial soap and water or using a suitable alcohol-based handrub before donning sterile gloves	4.51	0.799	Strongly Agree
Composite Mean	**4.35**		**Strongly Agree**
Intra-operative			
Adult patients undergoing general anesthesia with tracheal intubation for surgical procedures should receive an 80% fraction of inspired oxygen intraoperatively	4.48	0.673	Strongly Agree
Use of warming devices in the operating room and during the surgical procedure for patient body warming	4.53	0.726	Strongly Agree
Either sterile, disposable non-woven or sterile, reusable woven drapes and gowns can be used during surgical operations	4.60	0.700	Strongly Agree
use of triclosan-coated sutures	4.39	0.721	Strongly Agree
Composite Mean	**4.50**		**Strongly Agree**
Postoperative measures			
Discontinuation of surgical antibiotic prophylaxis immediately within 24 hours after surgery	4.61	0.678	Strongly Agree
Composite Mean	**4.61**		**Strongly Agree**
Overall Composite Mean	**4.44**		**Strongly Agree**

Table 3 presents the extent of nurses' knowledge in surgical site infection (SSI) prevention protocols. The overall composite mean of 4.44, interpreted as "strongly agree," indicates that nurses possess a high level of knowledge regarding evidence-based practices essential for preventing SSIs. This finding suggests that respondents are generally well-equipped with the necessary knowledge to support patient safety and reduce postoperative complications. Adequate knowledge among nurses plays a crucial role in ensuring compliance with infection prevention protocols, which in turn contributes to improved clinical outcomes and reduced incidence of SSIs (Allegranzi et al., 2016).

In the preoperative phase, the composite mean of 4.35 ("strongly agree") reflects strong knowledge of preventive measures prior to surgery. Notably, surgical hand preparation (M = 4.51), preoperative bathing (M = 4.51), and the use of alcohol-based antiseptic solutions (M = 4.47) obtained the highest ratings. These findings indicate that nurses are highly aware of standard infection control practices aimed at reducing microbial load before surgical procedures. Literature supports that nurses' knowledge plays a critical role in the effective implementation of infection prevention practices, including proper hand hygiene and appropriate skin antisepsis, which are among the most effective strategies in minimizing the risk of surgical site infections when consistently applied (Habtie et al., 2025). However, nasal decolonization using mupirocin (M = 3.94), interpreted as "agree," obtained the lowest mean within this category, suggesting comparatively lower familiarity with specialized or targeted interventions. Previous studies have noted that such knowledge gaps may arise when specific protocols are not routinely practiced or emphasized in clinical settings (Garcia et al., 2025).

In the intraoperative phase, nurses demonstrated a very high level of knowledge, as evidenced by a composite mean of 4.50 (“strongly agree”). The highest-rated indicators include the use of sterile drapes and gowns (M = 4.60) and patient warming techniques (M = 4.53). These results reflect strong awareness of maintaining aseptic conditions and physiological stability during surgery. Evidence indicates that adherence to sterile techniques and the maintenance of normothermia are critical in reducing infection risk and improving surgical outcomes (Allegranzi et al., 2016).

Additionally, the high rating for triclosan-coated sutures (M = 4.39) suggests that nurses are knowledgeable about advanced infection prevention technologies, which have been associated with reduced bacterial colonization and lower surgical site infection rates (Khan et al., 2020).

In the postoperative phase, the highest level of knowledge was observed, with a composite mean of 4.61 (“strongly agree”). The discontinuation of surgical antibiotic prophylaxis within 24 hours (M = 4.61) was highly recognized by respondents, indicating strong awareness of antimicrobial stewardship practices. Appropriate timing of antibiotic discontinuation is essential to prevent antimicrobial resistance while maintaining effective infection control. Studies have shown that limiting postoperative antibiotic use to recommended durations does not increase SSI risk but significantly reduces unnecessary antibiotic exposure (Branch-Elliman et al., 2019).

Overall, the findings reveal that nurses possess a strong and comprehensive understanding of SSI prevention protocols across preoperative, intraoperative, and postoperative phases. Nevertheless, the relatively lower mean in specialized interventions, such as nasal decolonization, indicates the need for continuous professional development and targeted training. Enhancing education on less commonly applied protocols may further strengthen nurses’ competence and ensure more consistent implementation of comprehensive infection prevention strategies.

Table 4. Nurses’ Practices in Surgical Site Infection Prevention Protocols

Protocols	Mean	S.D.	Qualitative Description
Preoperative measures			
Preoperative bathing using plain soap or an antimicrobial soap	4.47	0.623	Always
Patients undergoing cardiothoracic and orthopedic surgery with known nasal carriage of S. aureus should receive perioperative intranasal applications of mupirocin 2% ointment with or without a combination of CHG body wash.	3.88	1.053	Often
Administration of SAP within 120 minutes before incision, while considering the half-life of the antibiotic.	4.50	0.707	Always
Mechanical bowel preparation alone (without administration of oral antibiotics) should not be used for the purpose of reducing SSI in adult patients undergoing elective colorectal surgery	4.35	0.767	Always
Patients undergoing any surgical procedure, hair should either not be removed or, if absolutely necessary, it should be removed only with a clipper.	3.88	1.258	Often
Alcohol-based antiseptic solutions based on CHG for surgical site skin preparation in patients undergoing surgical procedures	4.32	0.984	Always
Surgical hand preparation should be performed by scrubbing with either a suitable antimicrobial soap and water or using a suitable alcohol-based handrub before donning sterile gloves	4.63	0.564	Always
Composite Mean	**4.29**		**Always**

Intra-operative measures			
Adult patients undergoing general anesthesia with tracheal intubation for surgical procedures should receive an 80% fraction of inspired oxygen intraoperatively	4.56	0.668	Always
Use of warming devices in the operating room and during the surgical procedure for patient body warming	4.71	0.538	Always
Either sterile, disposable non-woven or sterile, reusable woven drapes and gowns can be used during surgical operations	4.71	0.538	Always
use of triclosan-coated sutures	4.49	0.776	Always
Composite Mean	**4.62**		**Always**
Postoperative measures			
Discontinuation of surgical antibiotic prophylaxis immediately within 24 hours after surgery	4.71	0.512	Always
Composite Mean	**4.71**		**Always**
Overall Composite Mean	**4.47**		**Always**

Table 4 presents the nurses' practices in surgical site infection (SSI) prevention protocols. The overall composite mean of 4.47, interpreted as "always," indicates that nurses consistently demonstrate a high level of adherence to SSI prevention practices across all perioperative phases. This suggests that established infection control protocols are effectively implemented in clinical settings, reflecting strong professional competence and institutional support. Consistent compliance with these practices is essential in reducing the risk of postoperative infections and improving patient outcomes (Allegranzi et al., 2016).

In the preoperative phase, the composite mean of 4.29 ("always") reflects strong adherence to preventive measures prior to surgery. The highest level of practice was observed in surgical hand preparation (M = 4.63), followed by administration of surgical antibiotic prophylaxis (M = 4.50) and preoperative bathing (M = 4.47). These findings indicate that nurses consistently perform fundamental infection prevention measures aimed at reducing microbial load before surgery. However, relatively lower practice was observed in nasal decolonization (M = 3.88) and hair removal using clippers (M = 3.88), both interpreted as "often," suggesting that more specialized or context-dependent interventions are not performed as consistently as routine practices.

In the intraoperative phase, nurses demonstrated a very high level of practice, as indicated by a composite mean of 4.62 ("always"). The highest-rated indicators were the use of warming devices (M = 4.71) and sterile drapes and gowns (M = 4.71), reflecting strong compliance with intraoperative aseptic techniques and patient management protocols. The consistent use of triclosan-coated sutures (M = 4.49) further indicates the integration of advanced infection prevention strategies during surgical procedures (Khan et al., 2020).

In the postoperative phase, the highest level of practice was observed, with a composite mean of 4.71 ("always"). The discontinuation of surgical antibiotic prophylaxis within 24 hours (M = 4.71) demonstrates strong adherence to recommended postoperative practices. This reflects awareness of appropriate antimicrobial use, which is essential in preventing unnecessary antibiotic exposure while maintaining effective infection control (Branch-Elliman et al., 2019).

Overall, the findings indicate that nurses exhibit excellent and consistent practices in SSI prevention, particularly in routine and protocol-driven interventions. Nevertheless, the relatively lower implementation of specialized measures such as nasal decolonization and appropriate hair removal techniques highlights areas for improvement. Strengthening targeted training and reinforcing adherence to less frequently applied protocols may further enhance the overall effectiveness of infection prevention practices in clinical settings.

Table 5. Relationship Between Knowledge and Demographic Profile

Variable	B	t	Sig	Decision
Age	0.004	0.045	0.964	Accept Ho
Sex	-0.241	-1.466	0.147	Accept Ho
Education	-0.054	-0.232	0.817	Accept Ho
Length of Service	-0.011	-0.104	0.918	Accept Ho
Area of Assignment	-0.137	-2.019	0.048	Reject Ho

Table 5 presents the relationship between nurses' knowledge of surgical site infection (SSI) prevention protocols and their demographic profile. The results indicate that among the variables examined, only area of assignment showed a statistically significant relationship with knowledge ($p = 0.048$), leading to the rejection of the null hypothesis. In contrast, age, sex, educational attainment, and length of service were not significantly related to nurses' level of knowledge, as evidenced by p-values greater than 0.05.

This finding suggests that nurses' knowledge of SSI prevention protocols is more influenced by their clinical exposure and work environment than by individual demographic characteristics. Nurses assigned to high-risk areas, such as operating rooms and surgical wards, are more likely to demonstrate higher levels of knowledge due to their direct and consistent involvement in sterile procedures, infection control practices, and surgical safety protocols. Regular exposure to these activities reinforces familiarity and understanding of infection prevention measures.

The absence of significant relationships between knowledge and variables such as age and length of service indicates that experience alone does not necessarily translate to updated or adequate knowledge of SSI prevention. Rather, knowledge appears to be shaped by active engagement in relevant clinical practices. Similarly, the lack of significant association with sex and educational attainment implies that knowledge of infection prevention protocols is generally uniform among nurses, likely due to standardized training and institutional guidelines.

Overall, the findings highlight the critical role of clinical exposure and workplace environment in enhancing nurses' knowledge of SSI prevention protocols. Strengthening infection control training across all clinical areas, including non-surgical units, is essential to promote consistent knowledge and ensure effective implementation of evidence-based practices.

Table 6. Relationship Between Practices and Demographic Profile

Variable	B	t	Sig	Decision
Age	0.039	0.470	0.640	Accept Ho
Sex	-0.411	-2.721	0.008	Reject Ho
Education	0.040	0.185	0.854	Accept Ho
Length of Service	-0.147	-1.557	0.124	Accept Ho
Area of Assignment	0.034	0.547	0.586	Accept Ho

Table 6 presents the relationship between nurses' practices in surgical site infection (SSI) prevention and their demographic profile. The results show that among the variables examined, only sex demonstrated a statistically significant relationship with practices ($p = 0.008$), leading to the rejection of the null hypothesis. In contrast, age, educational attainment, length of service, and area of assignment were not significantly related to nurses' practices, as indicated by p-values greater than 0.05.

This finding indicates that differences in SSI prevention practices may be associated with variations in roles or task assignments linked to sex within the clinical setting. Nurses who are more frequently involved in direct patient care activities, such as wound management, aseptic preparation, and perioperative support, may demonstrate more consistent adherence to infection prevention protocols. However, this association should be interpreted with caution, as practice behaviors are primarily guided by institutional standards rather than individual characteristics.

The absence of significant relationships between practices and variables such as age, educational attainment, length of service, and area of assignment suggests that adherence to SSI prevention protocols is generally uniform across nurses. This implies that standardized training, established protocols, and routine supervision contribute to consistent implementation of infection control practices regardless of demographic differences.

Overall, the findings highlight that while sex shows a statistically significant association with practice, nurses' adherence to SSI prevention protocols is largely influenced by institutional systems and the clinical environment. Ensuring consistent implementation of guidelines, equitable distribution of responsibilities, and continuous reinforcement of infection control measures are essential to sustain high levels of compliance among all nursing personnel.

Table 7. Differences in Knowledge and Practices According to Demographics

Grouping Variable	F/t-value	p-value	Decision
Age	0.876 / 0.515	0.458 / 0.673	Accept Ho
Sex	1.640 / 2.314	0.105 / 0.024	Reject Ho (Practice)
Education	1.189 / 0.145	0.311 / 0.865	Accept Ho
Length of Service	1.363 / 0.172	0.261 / 0.915	Accept Ho
Area of Assignment	2.322 / 0.774	0.083 / 0.512	Accept Ho

Table 7 presents the differences in nurses' knowledge and practices in surgical site infection (SSI) prevention when grouped according to selected demographic

variables. The results reveal that no statistically significant differences were found in knowledge and practices across age, educational attainment, length of service, and area of assignment ($p > 0.05$). However, a significant difference was observed in practices when grouped according to sex ($p = 0.024$), leading to the rejection of the null hypothesis for this variable.

The absence of significant differences across most demographic variables indicates that nurses generally demonstrate uniform knowledge and consistent adherence to SSI prevention protocols, regardless of their background characteristics. This suggests that standardized institutional training, protocol dissemination, and continuous professional development programs are effectively implemented across different units. Previous studies have emphasized that structured infection-control education and regular competency-based training contribute to uniform knowledge and practice among healthcare professionals (Allegranzi et al., 2016; Geberemariyam et al., 2018).

The significant difference observed in practices according to sex may be attributed to variations in clinical roles and task distribution within hospital settings rather than differences in competence. In many clinical environments, female nurses are more frequently engaged in direct patient care activities, including wound care, sterile field maintenance, and perioperative procedures, which may enhance their practical exposure to SSI prevention measures. Supporting this, studies have noted that practice variations may arise from differences in assigned responsibilities and workflow patterns rather than demographic capability (Alshammari et al., 2021; Kim & Lee, 2020).

Furthermore, the lack of significant variation based on age and length of service suggests that adherence to infection-prevention practices is not solely dependent on experience but is strongly influenced by institutional systems such as supervision, monitoring, and audit mechanisms. Evidence indicates that compliance with infection-control protocols is primarily driven by organizational culture, availability of resources, and leadership support rather than individual demographic factors (Habtie et al., 2025; Lim et al., 2021).

Overall, the findings demonstrate that SSI prevention knowledge and practices are well standardized among nurses, with minimal variation across demographic groups. The observed difference in practice by sex highlights the need for equitable task distribution and continuous reinforcement of infection-control practices across all personnel to ensure consistent and high-quality patient care.

DISCUSSION

This study, titled “Assessment of Surgical Site Infection Protocols and Nurses’ Knowledge and Practices,” sought to evaluate the implementation of existing surgical site infection (SSI) prevention protocols, assess the extent of nurses’ knowledge and practices regarding SSI prevention, and determine whether selected demographic variables such as age, sex, educational attainment, length of service, and area of assignment relate to their knowledge and practice levels. The research employed a

descriptive quantitative design and utilized a structured questionnaire covering pre-, intra-, and postoperative components of SSI prevention. Respondents were staff nurses from two public hospitals in Bohol who were actively engaged in perioperative and surgical care.

Data were analyzed using frequency, percentage, mean, standard deviation, and inferential statistics such as t-tests and regression analysis. The findings were organized in accordance with the Statement of the Problem, beginning with the respondents' demographic profile, followed by their awareness of institutional SSI protocols, their knowledge and practice levels, and the relationship between these constructs and demographic factors. The study also examined group differences in knowledge and practice to provide an evidence-based understanding of SSI prevention among perioperative nurses in the local context.

Findings

The findings of this study were summarized as follows:

1. Demographic Profile

The majority of the nurses were aged 31–40 years (63.9%), female (76.4%), and BSN graduates (94.4%), with 0–5 years of service (45.8%). Most were assigned to the Operating Room (36.1%). This profile reflects a young, predominantly female, early-career workforce highly concentrated in high-risk surgical areas. The composition suggests a group that is both technically skilled and adaptable, capable of assimilating updated SSI guidelines through continuing education and mentoring.

2. Awareness of existing SSI Protocols

Nurses demonstrated very high awareness and adherence to SSI protocols. The highest-rated practices were surgical hand preparation (M = 4.57) and postoperative antibiotic discontinuation (M = 4.65). High ratings across all items indicate institutional emphasis on asepsis and infection control.

3. Extent of Nurses' Knowledge

The nurses exhibited excellent knowledge of SSI prevention, particularly in surgical hand preparation (M = 4.51), preoperative bathing (M = 4.51), and postoperative antibiotic discontinuation (M = 4.61). Knowledge of hair removal techniques scored slightly lower, signaling minor uncertainty in the correct method.

4. Nurses' Practices

Nurses displayed strong compliance in intraoperative SSI prevention measures, particularly in hand scrubbing (M = 4.63), normothermia maintenance (M = 4.71), and sterile draping (M = 4.71). The lower mean for hair removal with clippers (M = 3.88) indicates resource or training gaps.

5. Relationship Between Knowledge and Employment Profile

Only the area of assignment showed a significant relationship with knowledge ($p = 0.048$), indicating that nurses in high-exposure areas such as the operating room and surgical wards possess stronger SSI-related knowledge. Variables such as age, sex, education, and length of service were not significant.

6. Relationship Between Practices and Employment Profile

Among the demographic variables, only sex was significantly related to practice ($p = 0.008$). Female nurses exhibited slightly higher compliance, likely due to more frequent engagement in aseptic patient care tasks. Other variables were not significant, implying that practice uniformity results from standardized protocols and collective team responsibility rather than personal characteristics.

7. Differences in Knowledge and Practice According to Demographics

No significant differences were found in knowledge or practices when grouped by age, education, length of service, or area of assignment. Only sex showed a significant difference in practice ($p = 0.024$). This consistency across demographics demonstrates effective policy dissemination and institutional training, ensuring equitable competency among nurses.

Conclusions

The results of the study revealed that nurses in the participating hospitals possess high levels of knowledge and consistently strong practices in implementing surgical site infection (SSI) prevention protocols. This indicates a well-established culture of infection control and patient safety supported by institutional policies and ongoing professional training.

Furthermore, the study established that knowledge is primarily influenced by the nurses' work environment rather than demographic factors such as age, sex, education, or length of service. Nurses assigned to high-exposure areas such as the operating room and surgical wards displayed higher knowledge levels, suggesting that clinical exposure and unit specialization promote continuous learning and procedural competence.

While practice levels were generally high, the observed differences based on sex were found to be role-related rather than competence-based, reflecting typical task assignments within perioperative settings rather than skill disparities. The lack of significant differences across other demographic groups confirms the effectiveness of standardized training and policy implementation.

Overall, the study concludes that systemic, environmental, and behavioral factors, rather than personal demographics, shape nurses' adherence to SSI prevention standards. Continuous training, adequate resources, and consistent leadership support remain crucial in sustaining high-quality, evidence-based infection control performance among perioperative nurses.

Recommendations

Based on the findings of the study, it is recommended that:

1. Hospitals should reinforce continuous professional development by incorporating updated SSI prevention guidelines into in-service training and competency-based re-orientation programs. Regular educational sessions and simulation-based skill revalidations focusing on surgical hand preparation, preoperative bathing, and proper hair removal using clippers would bridge the minor procedural inconsistencies observed in practice. In addition, adequate resource provision—such as the consistent availability of clippers, antiseptic solutions, and single-use sterile drapes—must be ensured to support full compliance with aseptic standards.
2. Nursing administrators and unit managers should consider the value of unit-based mentoring and peer-coaching systems to sustain adherence to SSI protocols, especially among early-career nurses who form the majority of the workforce. Task distribution should be examined to minimize gender-based role clustering and to promote equitable participation in aseptic and perioperative activities, thereby ensuring uniform practice performance across all staff. Routine audits, feedback mechanisms, and recognition programs can further enhance motivation and accountability for infection-control compliance.
3. Future research should expand beyond the nursing perspective by including surgeons, anesthesiologists, and infection-control officers to provide a more holistic understanding of institutional SSI prevention. Continuous evaluation and evidence-based refinement of infection-prevention protocols will ensure that local hospital practices remain responsive to evolving standards of patient safety and nursing excellence.

Compliance with Ethical Consideration

This study adhered to established ethical standards in research. The researcher declared no conflict of interest and had no affiliation with the respondents or related health agencies. Participation was voluntary, and respondents were free to withdraw at any time without consequence. Ethical approval was obtained from the HNU Ethics Review Board, and informed consent was secured prior to data collection. Confidentiality and privacy were strictly maintained, with all responses anonymized through data coding and used solely for research purposes. The study posed minimal risk, as it involved routine clinical practice questions, and participants were allowed to skip any item they found uncomfortable. No incentives were provided; however, respondents were acknowledged for their voluntary participation.

REFERENCES

Allegranzi, B., Bischoff, P., De Jonge, S., Kubilay, N. Z., Zayed, B., Gomes, S. M., ... & Solomkin, J. S. (2016). New WHO recommendations on preoperative measures for surgical site infection prevention: An evidence-based global perspective. *The Lancet Infectious Diseases, 16*(12), e276–e287.

Alshammari, A. S., Alshammari, H., & Alshammari, S. (2021). Factors associated with adherence to COVID-19 preventive measures among Saudi Arabians. *Cureus, 13*(4).

Ayub Khan, M. N., Verstegen, D. M., Bhatti, A. B. H., Dolmans, D. H. M., & van Mook, W. N. A. (2018). Factors hindering the implementation of surgical site infection control guidelines in the operating rooms of low-income countries: A mixed-method study. *European Journal of Clinical Microbiology & Infectious Diseases, 37*(10), 1923–1929.

Branch-Elliman, W., O'Brien, W., Strymish, J., Itani, K., Wyatt, C., & Gupta, K. (2019). Association of duration and type of surgical prophylaxis with antimicrobial-associated adverse events. *JAMA Surgery, 154*(7), 590–598.

Garcia, R., Septimus, E. J., LeDonne, J., Sturm, L. K., Moureau, N., DeVries, M., & DeBaun, B. (2025). Prevention of Vascular Access Device–Associated Hospital-Onset Bacteremia and Fungemia: A Review of Emerging Perspectives and Synthesis of Technical Aspects. *Clinical Infectious Diseases*, *80*(2), 444-450.

Geberemariyam, B. S., Donka, G. M., & Wordofa, B. (2018). Assessment of knowledge and practices of healthcare workers towards infection prevention and associated factors in healthcare facilities of West Arsi District, Southeast Ethiopia: A facility-based cross-sectional study. *Archives of Public Health, 76*(1), 69.

Gillespie, B. M., Walker, R., Lin, F., Roberts, S., Eskes, A., Perry, J., ... & Chaboyer, W. (2020). Wound care practices across two acute care settings: A comparative study. *Journal of Clinical Nursing, 29*(5–6), 831–839.

Habtie, T. E., Kitaw, T. A., Taye, A. B., & Adisu, M. A. (2025). Global insights into healthcare providers' knowledge, attitudes, practices, and concerns on pre-exposure prophylaxis: A systematic review and meta-analysis. *Preventive Medicine Reports*, 103304.

Habtie, T. E., Feleke, S. F., Terefe, A. B., Alamaw, A. W., & Abate, M. D. (2025). Nurses' knowledge and its determinants in surgical site infection prevention: A comprehensive systematic review and meta-analysis. *PloS one*, *20*(1), e0317887.

Henarejos, V., O'Connor, K., Barrasa, A., Villalonga, A., Pastor, C., Puyana, J. C., & Merck, B. (2022). Implementing a mHealth-based patient and nurse educational program to reduce wound infection in rural Philippines. *Annals of Global Health, 88*(1), 76.

Khan, F. U., Khan, Z., Ahmed, N., & Rehman, A. U. (2020). A general overview of incidence, associated risk factors, and treatment outcomes of surgical site infections. *Indian Journal of Surgery*, *82*(4), 449-459.

Kulkarni, N., & Arulampalam, T. (2020). Laparoscopic surgery reduces the incidence of surgical site infections compared to the open approach for colorectal procedures: A meta-analysis. *Techniques in Coloproctology, 24*(10), 1017–1024.

Lim, S., Bae, J. H., Kwon, H. S., & Nauck, M. A. (2021). COVID-19 and diabetes mellitus: From pathophysiology to clinical management. *Nature Reviews Endocrinology, 17*(1), 11–30.

Lin, F., Gillespie, B. M., Chaboyer, W., Li, Y., Whitelock, K., Morley, N., ... & Marshall, A. P. (2019). Preventing surgical site infections: Facilitators and barriers to nurses' adherence to clinical practice guidelines—A qualitative study. *Journal of Clinical Nursing, 28*(9–10), 1643–1652.

Mehtar, S., Wanyoro, A., Ogunsola, F., Ameh, E. A., Nthumba, P., Kilpatrick, C., ... &

Solomkin, J. S. (2020). Implementation of surgical site infection surveillance in low- and middle-income countries: A position statement for the International Society for Infectious Diseases. *International Journal of Infectious Diseases, 100*, 123–131.

Park, Y. J., Choe, Y. J., Park, O., Park, S. Y., Kim, Y. M., Kim, J., ... & Jeong, E. K. (2020). Contact tracing during coronavirus disease outbreak, South Korea, 2020. *Emerging Infectious Diseases, 26*(10), 2465.

Seidelman, J. L., Mantyh, C. R., & Anderson, D. J. (2023). Surgical site infection prevention: A review. *JAMA, 329*(3), 244–252.

Wistrand, C., Falk-Brynhildsen, K., & Nilsson, U. (2018). National survey of operating room nurses' aseptic techniques and interventions for patient preparation to reduce surgical site infections. *Surgical Infections, 19*(4), 438–445.

Woldegioris, T., Bantie, G., & Getachew, H. (2019). Nurses' knowledge and practice regarding prevention of surgical site infection in Bahir Dar, Northwest Ethiopia. *Surgical Infections, 20*(1), 71–77.

World Health Organization. (2018). *WHO report on surveillance of antibiotic consumption: 2016–2018 early implementation*.

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