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Adherence To Evidence-Based Recommendations For Surgical Site Infection Prevention Among Saudi Arabia Nurses

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Abstract:

Introduction: One major clinical issue for surgical patients who are admitted to the hospital is surgical site infection (SSI). SSIs have a significant annual impact on surgical morbidity and mortality. Among surgical patients, surgical site infections (SSI) are the most prevalent nosocomial infection, making up 15% of all nosocomial infections. Nurses' skills and knowledge are crucial in stopping the spread of infection.
The study's objectives were to evaluate nurses' knowledge, attitudes, and adherence to evidence-based guidelines for preventing surgical site infections (SSIs) and to identify any factors that would encourage them to use these strategies.
Settings: The study was carried out at King Abdullah Medical City (KAMC) – Mecca ;hepatobiliary surgical ward, digestive system surgical ward, and oncology surgical ward. Instruments: A questionnaire measuring nurses' knowledge and behaviors about surgical site infection prevention, as well as a sociodemographic and work characteristics interview schedule, were used to gather data.
Results: The study's findings showed that all adherence to EBP scores were high. On the other hand, inadequate measures to avoid surgical site infections were seen. The study's findings showed that even though the nurses surveyed had good knowledge, their behaviors were subpar, highlighting the urgent need for training programs and workshops to enhance nurses' surgical site infection control practices.
Conclusion: The results showed that while the nurses in this study knew a lot about preventing surgical site infections, their practice was lacking. Additionally, there was a favorable association between knowledge and practice in this study. Suggestions Nurses should participate in up-to-date conferences and workshops or in-service training for infection management, particularly surgical site infections.

Introduction:

Infections linked to healthcare (HAIs) pose a serious risk to patient safety and cause substantial morbidity, death, and financial losses for health systems around the globe [1]. Approximately 7 out of 100 hospitalized patients in high-income countries experience at least one HAI [1].

The World Health Organization (WHO) states that infections linked to medical care are a rising health issue that impacts millions of people annually. Recent research from wealthy nations indicates that at least 5% of hospitalized individuals contract an infection.

Surgical site infections (SSIs) were the most common healthcare-associated infections (HAIs), accounting for over 30% of HAI cases in the majority of studies (1).

According to a prevalence survey, 31% of hospitalized patients' HAIs are surgical site infections (SSIs) [2]. Between 2 and 5% of surgical patients in the US experience SSIs [3], with between 160,000 and 300,000 instances reported annually [4]. Depending on the surgical technique and the caliber of the data gathered, the incidence of SSIs in Europe can approach 20% [5]. Long hospital stays, readmissions, reinterventions, chronic disability, and even mortality are all linked to SSIs [6, 7]. Furthermore, according to data from the USA, microorganisms isolated from surgical wounds that are infected exhibit patterns of antibiotic resistance in 38.7% to 50.9% of cases [8].

Surgical site infections can have a significant effect on quality of life for the patient. They are associated with considerable morbidity and extended hospital stay **(2-3)**.

Healthcare providers bear a significant cost burden as a result of infections. Additionally, because patients are discharged quicker after day case and fast-track surgery, primary care is now seeing a rise in infections (4).

Any infections that develop within 30 days following the procedure are considered surgical site infections (5). It influences up to 5% of all surgical procedures in developed nations, but much more (5.5 to 25%) in underdeveloped nations. An infection that appears in the area of the body where surgery was done is known as a surgical site infection (SSI). Surgical site infections can be superficial infections that merely affect the skin (6). More serious infections at other surgical sites include organs, tissues beneath the skin, and implanted materials (7). resistance patterns [8].

SSIs arise from the presence of bacteria in a wound; these bacteria can spread by contact with the hands of nurses or surgeons, through the airborne particles during surgery, or through contact with the patient following surgery.Surgical site infections are most commonly caused by Streptococcus pyogenes and Staphylococcus aureus (8).

The literature has linked SSIs to immune suppression, smoking, obesity, malnourishment, metabolic issues, advanced age, and hypoxia (9) In addition to a contaminated or dirty wound site, the risk of surgical site infection was elevated by a high body mass index, re-operation, and the use of a post-surgical drain (11).

The Centers for Disease Control and Prevention and the Medicare Quality Improvement Community's Surgical Care Improvement Project have both advocated a number of preventive interventions in an attempt to lower SSIs. They include patient and skin preparation, asepsis, careful surgical technique, postoperative incision care, limiting operating room traffic, hair clipping in the operating room, surgical team hand/forearm antisepsis, and antimicrobial prophylaxis within an hour of incision (12–13).

It has been projected that applying evidence-based measures can avoid about half of SSIs [9]. There are a number of known risk factors for SSIs, and prevention calls for combining a number of procedures carried out prior to, during, and following surgery [10]. Numerous evidence-based recommendations have been published for the prevention of SSIs [11], including those from the USA's Surgical Care Improvement Project (SCIP) [13] and the UK's National Institute for Clinical Excellence (NICE) [12], which have identified a number of practices that healthcare workers (HCWs) should implement.

The World Health Organization (WHO) recently released 29 guidelines for SSI prevention [14].

Therefore, regardless of the resources available, an expert consensus offered the finest scientific evidence to guarantee every patient receives high-quality care [15,16]. SSI rates have not decreased quantifiably, even though evidence-based advice are widely available. This is most likely the result of inadequate understanding of and/or disregard for appropriate procedures [17], particularly among nurses who have the capacity to take the lead in programs designed to reduce the risk of SSIs [18]. Therefore, the purpose of this study was to evaluate the degree of awareness, attitudes, and adherence to evidence-based guidelines for SSI prevention as well as to identify any factors that would encourage nurses to use evidence-based procedures for SSI infection prevention .

Nurses are uniquely positioned to participate in or oversee initiatives meant to lower the prevalence of SSI and enhance patient safety as a result (14). Unlike other medical professionals, nurses spend the majority of their time with patients and are in charge of most SSI prevention strategies (15). This demonstrates that nurses are the main accountable parties and may significantly contribute to prevention efforts by enhancing the standard of care they provide, including addressing inappropriate use of prophylactic antibiotics, inadequate hand hygiene practices, inappropriate skin preparation techniques, inappropriate PPE donning and doffing, and noncompliance with all other surgical safety checklists(14)

Knowledge on the prevention of SSI refers to the degree of nurses' cognitive ability to recall, understand, and apply protocols for preventing SSI in pre-operative and post-operative care (16). Pre-operative care includes maintaining personal hygiene and skin preparation, managing underlying medical disorders, preserving nutritional status, and giving prophylactic antibiotics (17).

Post-operative care includes wound assessment and SSI monitoring, nutritional support, and surgical wound care with aseptic precautions. Nurses' perceptions of their activities in mimicking, manipulating, and precisely preventing SSI during pre-operative and post-operative care are referred to as practice regarding SSI prevention. Analyzing nurses' actions and knowledge about preventing surgical site infections was the primary objective of the study (18).

Significant of the study:

Important research finding: SSI prevention is essential to implementing the principles of patient safety and high-quality treatment (19). With high rates of morbidity and death, surgical site infections (SSI) place a strain on the healthcare system, particularly in poor nations (20). Because they work around the clock, nurses are in a unique position to take part in or lead programs that aim to improve patient safety, including the prevention of SSIs, by ensuring quality of care [REFRE]. Nonetheless, a sizable body of research revealed that the majority of nurses did not practice appropriately in accordance with evidence-based standards and recommendations, and the majority lacked the necessary information regarding SSI prevention (21-22). Therefore, the study's primary goal was to evaluate nurses'

Aim of the Study:

The study's objectives were to evaluate nurses' knowledge, attitudes, and adherence to evidence-based guidelines for preventing surgical site infections (SSIs) and to identify any factors that would encourage them to use these strategies.

Research question:

1. What is the level of nurses' understanding of surgical site infection prevention?
2. How much do nurses actually do to avoid surgery site infections?

The design of the research

Using a descriptive research design, this study

Settings:

This study was conducted at oncology surgical wards, Digestive system surgical wards, and hepatobiliary surgical ward King Abdullah Medical City (KAMC) – Mecca–The estimated $1.4bn King Abdullah Medical City (KAMC) is the third referral specialist medical city in the country after King Fahd Medical City in Riyadh and King Fahd Specialist Hospital in Dammam. The area of the KAMC is 800,000m². The accommodation capacity of the five-storey building is 1,500 beds, of which 500 have been allotted to the specialist referral hospital. Al Rajhi Holding Group, China State, Construction, El Seif and Saudi Binladin Group have all entered the prequalification stage. The scope of work includes a cardiac centre (150 beds), a centre for specialised surgery and organ transplantation (100 beds), and a centre for cancer treatment and surgical oncology (200 beds). The project's consultants are RTKL/Saudi Diyar Consultants

Subjects:
A convenience sample of 240 nurse who recruited in the above-mentioned setting and were responsible for wound dressing.

Inclusion criteria:
Nurses who satisfied the following requirements were deemed qualified to take part in the study: Consenting to take part in the research, and Over a year of experience in a surgical unit.
Tool: After reviewing pertinent literature, the researchers employed two techniques to gather the required data.

Tool I: Workplace and sociodemographic traits Schedule of the interview:
It was created by the researcher following a study of relevant literature and has seven questions regarding the age, sex, education, marital status, years of experience, and prior infection control training of nurses.
Tool II: Surgical site infection prevention knowledge and practices of nurses
Nurses' knowledge and practices regarding surgical site infection prevention were evaluated using the Sickder et al. (2014) (23), designed questionnaire. The questionnaire was separated into two halves, with 25 items for practice and 25 for knowledge:
Part I: Nurses' Awareness of Surgical Site Infection Prevention
There are 25 multiple-choice questions in this section, each with three possible answers. The third option had the right response, while the other two were wrong. The right answer was assigned a "1" for each question, and the wrong answer was assigned a "0." Individuals who answered more than 14 correctly were classified as having "Good knowledge," whereas those who answered fewer correctly were classified as having "Poor knowledge."
Part II: Nurses' Strategies for Preventing Surgical Site Infections
From "never practice=1," "rarely practice=2," "sometimes practice=3," "often practice=4", and "always practice=5", there are 25 statements in this portion of the tool that are scored on a 5-point Likert scale. Participants who were accustomed to engaging in preventive behaviors, such as practicing more than 14 questions frequently and typically, were categorized as "Good Practice," whereas those who practiced infrequently or never at all were categorized as "Poor Practice."
Methods:
The study tool was translated into Arabic, and an Arabic to English back-to-back translation was completed. Five subject-matter experts evaluated the research instruments' content validity, and several of the statements were reworded. To verify the clarity and applicability of the research tools, a pilot study was conducted on 5% (n=17) of the study sample after all necessary revisions. The reliability of the study tools was evaluated. employing the Cronbach's Alpha test. The reliability coefficients for tools one and two were.989

Data collection:
A self-administered questionnaire was used to collect data for this investigation. Each study participant took roughly 15 to 20 minutes to complete the questionnaire, which was hand delivered to them in their workplaces along with the necessary instructions prior to distribution. the information gathered during the course of two months, from September 28, 2024, to November 25, 2024.The study participants' anonymity and the data's confidentiality were guaranteed.

Statistical analysis:
The relationship between the structural empowerment and work engagement of nursesand the leadership style of clinical nurse mangers was ascertained using appropriate statistical analysis methods. The statistical analysis version 24 of the SPSS (Statistical Package for Social Science) tool was used to edit, code, and input the data after it had been collected. The statistical analysis metrics listed below were applied.

Descriptive statistical measures, included the mean with standard deviation and percentage

and frequencies to describe the scale and categorical data and description of the study subjects' characteristics, respectively. - Statistical analysis tests, which included: Chi square, T test and One way ANOVA (F-ratio test).

Ethical considerations:
Nurses gave their written consent after being informed of the study's purpose.
• The ethics committee's approval was acquired; • The privacy and confidentiality of the information gathered were protected.
• The right of nurses to decline participation in study was taken into account and honored.

Results:
The distribution of the nurses under study based on their sociodemographic attributes is displayed in Table (1). The nurses in the study were between the ages of 20 and 59, with 41.00% of them falling between the 50 and 59 age range. The chart also reveals that majoeity of the nurses in the study were female and that about three quarters of them (83%) were married. However, it was found that 62.5% of the nurses in the study had only a diploma, and 16.55% had a technical institute degree and 20.83 bachelor's degree. In terms of experience, over half of the nurses in the study (54.5%) had worked as nurses for more than 20 years. Additionally, it was shown that approximately 33.33% of the nurses in the study undergo infection control training, with a mean score 3.0 ± 2.45

Table 1: frequency distribution of studied nurses:

Socio-demographic characteristics	No. (%)
Age (years)	
20 – < 30	30 (12.5)
30 – <40	80(33.33)
40 – < 50	30 (12.5)
50 – 59	100(41.0)
Sex	
Male	80(33.33)
Female	160(66.66)
Marital Status	
Married	200(83.0)
Divorced	20 10.0
Widow	10(5.0)
Single	10(5.0)
Level of Education	
Technical institute nursing degree	40(16.55)
Diploma of secondary technical school of nursing	150(62.5)
BSCs	50(20.83)
Experience (Years)	
1 – 5 years	20 10.0
6 – 10 years	30 (12.5)
11 – 15 years	80(33.33)
16 – 20 years	30 (12.5)
Aboveyears20	130(54.5)
Have you ever taken any training regarding infection control	
Yes	80(33.33)
No	160(66.66)

If yes mention the number of training program you attend (n=80)	
Min. – Max.	1.0 – 13.0
Mean ± SD.	3.0 ± 2.45

The questions on which laboratory is used to assure SSI (87.5), which laboratories are used to examine the nutritional state of patients (80%), and how to clean the surgical site prior to surgery (75%), received the highest scores from the nurses. They did, however, receive the lowest scores on questions concerning the best pre-operative shaving technique and timing for preoperative hair removal (only 20% correctly answered), the best agent for pre-operative skin preparation (27.5%), when surgical patients should receive prophylactic antibiotics (22%), and how to prevent infection in patients with immunodeficiency disorder (12%).

Table (2): level of adherence of EBP for surgical site infection prevention

	Incorrect Correct	**Correct**
	No. %	**No. %**
1 Which one is the best method for pre-operative shaving?	80.0	20.0
2 When is the best time for pre-operative hair removal?	85.0	20.0
3 Which one is the best agent for pre-operative skin preparation?	72.5	27.5
4 What is the purpose for pre-operative skin preparation?	45.0	55.0
5 How would you disinfect surgical site before surgery?	25.0	75.0
6 Which one is true answer for prophylaxis antibiotic?	27.5	72.5
7 When should you administer prophylaxis antibiotic to surgical patients?	77.5	22.5
8 What is the purpose of pre-operative showering?	55.0	45.0
9 What is the best skin agent for pre-operative showering to prevent surgical site infection?	35.0	65.0
10 Which one is correct for the malnourished surgical patients?	22.5	77.5
11 What are laboratories in assessing patient's nutritional status?	20.0	80.0
What is the correct level of blood sugar which enhances function of white blood cell adequate to prevent SSI?	27.5	72.5
13 What is the best antiseptic solution to disinfect the surface of dressing trolley?	67.5	32.5
14 Which is the correct purpose for surgical hand washing?	25.0	75.0
15 Which are the correct steps of hand washing?	42.5	57.5
16 Which one is the correct answer for the benefit of wound dressing?	40.0	60.0
17 When do you change the surgical wound dressing?	72.5	27.5
18 How do you select dressing solution?	52.5	47.5
19 What is the purpose of maintenance of normal nutritional status for surgical patients?	27.5	72.5
20 What kinds of diet should be provided for the post-operative patients?	30.0	70.0
21 Which one is the correct answer for surgical patients with compromised immune system?	27.5	72.5
22 How do you prevent infection of patients with immunodeficiency disorder?	87.5	12.5
23 Which statement is correct for diagnosis of surgical site infection?	31 77.5	9 22.5
24 Which answer is a good sign of no surgical site infection?	24 60.0	16 40.0
25 Which laboratory is used to ensure SSI?	5 12.5	35 87.5

Total score		
Min. – Max.	30.0 – 44.0	
Mean ± SD.	38.05 ± 3.80	

The distribution of the nurses under study based on their overall level of surgical site infection prevention knowledge is displayed in Figure 1. Over half of the nurses in the study (54.0%) knew a lot about preventing surgical site infections. However, 42% of them exhibited little knowledge, with a mean score of 38.05 ± 3.80 overall.

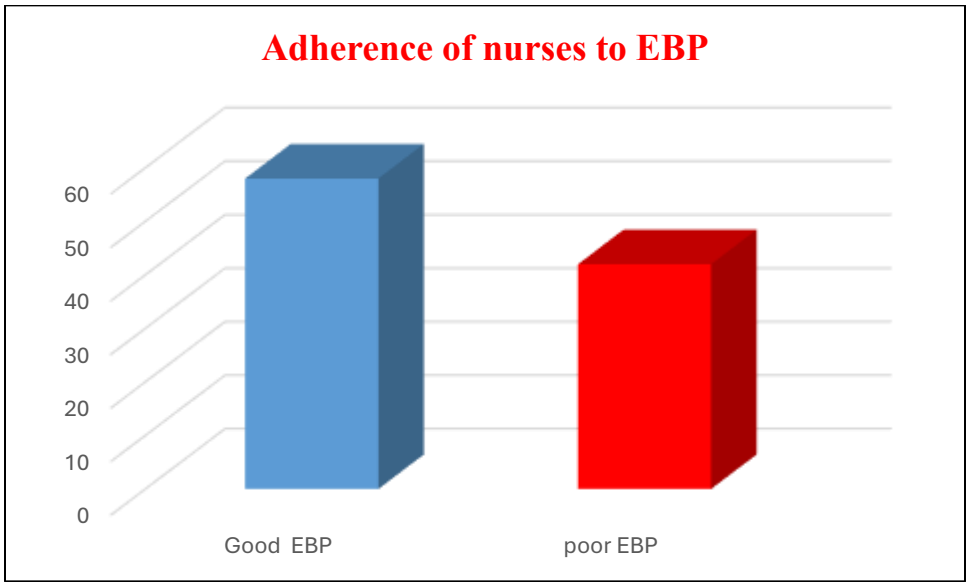

Figure 1 adherence of EBP of surgical infection prevention

Table 3: Explain how the nurses under study answered each practice question. 55% of the nurses who took part in the study had inadequate SSI prevention practices, according to the findings This suggests that although the nurses were knowledgeable, their methods for SSI avoidance were subpar. Pre-operative shaving was done immediately before surgery (47%), as the majority of them stated that they occasionally practiced washing their hands before and after changing wound dressings and touching the surgical site (45%).

About 55% of nurses said they never used alcohol and chlorohexidinegluconate (CHG) as antimicrobials for patient skin preparation in the surgical ward, 70% of nurses said they never checked the patient's body mass index (BMI) before and after surgery, and 20% said they never shaved the patient's skin before surgery. The distribution of the nurses under study based on overall surgery site infection control strategies is depicted in Figure (2).Over half of the nurses in the study (55.0%) had poor surgery site infection prevention practices. However, 45.0% of them demonstrated good practice, with a mean score of 81.27 ± 21.66 overall.

Figure 2 practices of nurses surgical infection prevention

Table (3): Distribution of the studied nurses according to nurses' practices regarding prevention of surgical site Infection

	Never practice%	Rarely practice%	Sometime practice%	Often practice%	Al ways practice%
Alcohol and chlorohexidine gluconate (CHG) is the most common antimicrobials used for patient's skin preparation in my ward	55.0	10.0	25.0	5.0	5.0
I Advise the patient to shower before surgery with antimicrobial agents	0	20.0	35.0	0	45.0
I wash my hands before and after changing wound dressing and touching the surgical site	10.0	10.0	45.0	10.0	25.0
I wash my hand before wearing sterile gloves	10.0	30.0	40.0	**0**	20.0
I perform pre-operative shaving right before surgery	20.0	15.0	47.5	0 0.	17.5
I administer pre-operative prophylactic antibiotic within one hour before surgery	5.0	0.0	55.0	10.0	20.0
I advise my patient to take pre- operative showering 6 to 12 hours before surgery	0	20.0	35.0	0	45.0
I perform prescribed glucose test before and after surgery in a diabetic patient	10.0	30.0	40.0	**0**	20.0
I administer injection insulin or give oral medication as ordered in a diabetic patient	0 0.	15.0	40.0	10.0	35.0
I assess my patient's body mass index (BMI) before and after surgery	70.0	10.0	20.0	0	0
I advise a malnourished patient to intake nutritious especially protein) diet	0 0.	15.0	40.0	10.0	35.0

I advise my patient to take vegetables and fruits before and after surgery	10.0	30.0	40.0	**0**	20.0
I advise my patient with compromised immune system avoiding contact with people who have infections	5.0	0.0	60.0	15.0	20.0
I advise and obese patient to less intake of carbohydrate	5.0	12.5	47.5	10.0	25.0
Total score					
Min. – Max.	57.0 – 109.0				
Mean ± SD.	81.27 ± 21.66				

Table (4) showed that among the nurses in the study, there was a statistically significant positive link between knowledge and practice regarding surgical site infection prevention.

Table (6): Correlation between knowledge and practice

	r	**p**
Knowledge vs. Practice	0.456*	<0.001*

r: Pearson coefficient *: Statistically significant at $p \leq 0.05$

Discussion:

Prevention of SSIs is one of the most important challenges in delivering optimum health care **(24)**. Despite advanced operative techniques, availability of higher antibiotics and modern sterilization techniques, higher rate of SSI in government set up after major surgeries is quite worrisome. Wound complications delays recovery of patients, increases hospital stay, induces psychological trauma. It robs credit of surgeon and his hours of dedicated work of surgeries, induces anxiety and threatens his confidence **(18).**

Nursing staff are the subject of the majority of research in this area that have been done in the literature. Despite this, nursing staff is essential to any preventative program that aims to lower the frequency of infection (15). The purpose of this study was to evaluate staff nurses' knowledge and practices regarding SSI prevention, as they are the ones who provide round-the-clock pre-operative, intraoperative, and post-operative patient care (23).

As far as we know, this study is among the first to investigate nurses' knowledge, attitudes, and evidence-based behaviors for SSI prevention. The nursing staff must understand the importance of associated complications since they play a crucial role in SSI prevention [18]. The study's findings revealed certain knowledge gaps among nursing professionals. In fact, around 50% of the sample lacked sufficient understanding regarding when preoperative hair removal should be done. Furthermore, almost 30% of the sample was unaware of what a bundle is, which is concerning given that "care bundles" are evidence-based procedures that were implemented to stop SSIs. The care bundle is a real example of the standard of surgical patient care in the wards, in addition to optimizing treatment and reducing the risk of SSIs [10].

While the vast majority of the sample acknowledged that certain evidence-based practices, as recently updated by the WHO guidelines [14], were effective in reducing the incidence of SSIs, other evidence-based practices, like the use of sutures containing triclosan and preoperative showering with aseptic agents, received lower scores. Numerous controlled trials [20–22] and meta-analyses [23,24] have demonstrated a clinically and statistically significant impact of triclosan-containing sutures in reducing SSIs to date; nonetheless, the WHO deemed the strength of its recommendation regarding their use to be conditional [16].

Our study's results indicated that nearly all of the participants had never received infection control training before, and the majority had only a diploma. However, 7.5% of the participants had attended a technical

institution, and no bachelor's degree was observed. From the perspective of the researcher, this finding highlights the necessity of regularly scheduling infection control training sessions to train them. The results of this study are comparable to those of a study by Patil et al. (2018) (9) that found that nearly 60% of study participants had never received infection control training before, and that most of them were interns and junior residents.

This study's results are comparable to those of a study by Patil et al. (2018) (9) that found that nearly 60% of study participants had never received infection control training before, and that most of them were interns and junior residents. Additionally, a study by Chipfuwa et al. (2014) (26) about barriers to infection prevention and control (IPC) practice among nurses found that the majority of nurses did not attend any IPC workshops, which led to subpar IPC practice.

About how the nurses in the study were distributed based on their overall level of surgery site infection prevention knowledge. Over half of the nurses in the study (57.5%) knew a lot about preventing surgical site infections. The results of this study were in conflict with those of a study conducted in Jordan (Qasem MN, Hweidi IM, 2017)(27), which found that Jordanian registered nurses employed in acute care settings had a low levels of knowledge about evidence-based guidelines for the prevention of SSIs, according to their median score.

According to this study, which looks at nurses' degree of SSI preventive practice, less than half (45.0%) of them were found to have good SSI prevention practices. On the other hand, this indicates that over 50% of the nurses were not doing a good job in SSI prevention. This result is consistent with research done in Bangladesh, Nigeria, and Ethiopia (Amhara regional state), where nurses' practices for SSI prevention were inadequate (28). From the perspective of the researcher, these data could be interpreted as suggesting that SSI preventive measures among nurses are influenced by a number of factors. These include inadequate in-service training and skill refresher, a lack of practice resources, and ack of proper SSI preventive guidelines. This finding is corroborated by a Tanzanian study that revealed that 57.7% of individuals had inadequate postoperative wound care practices (Mwakanyamale, 2013) (25) The results, however, differ from those of two earlier studies conducted in Bangladesh and Pakistan, which found that staff nurses' general practices for monitoring and avoiding surgical site infections were at a good level (5). This discrepancy may result from variations in the sample size, attitudes, workload, and training of nurses with regard to SSI prevention. According to the study's findings, nurses who worked on surgical wards showed a good understanding of SSI prevention, however this understanding did not translate into the required SSI preventive behaviors. Hospital administrators should also regularly supply the consumables and materials required to guarantee rigorous adherence to the prevention guidelines for SSIs (28). Similarly, to help nurses stay vigilant about infection control, educational, informational, and communication resources should be prominently positioned throughout the ward. Finally, people must be empowered and educated about their rights as well as the duties and commitments that healthcare practitioners have to them. This is crucial so they can recognize when care providers' negligence is endangering their safety and violating their rights (28).

Conclusion:

The study's conclusions offer a chance to emphasize the necessity of a wound culture when SSI symptoms or indicators are present. Given that wound swabs take days to yield findings, one could argue that the diagnosis of an SSI should be left up to the clinical opinion of the clinician. For epidemiological reasons as well, wound swabs should be collected for culture at the surgical site of any suspected infection. In fact, it has been demonstrated that SSI surveillance combined with feedback of relevant data is a crucial part of risk reduction strategies [11].

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