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Original Article

Asessing the Nurses Knowledge and Practice Regarding Prevention of Surgical Site Infection

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ABSTRACT

Background: Nurses contribute to surgical site infection (SSI) prevention, but knowledge and reported preventive practices may vary across clinical activities. Objective: To assess nurses' knowledge and self-reported practices regarding SSI prevention at the University of Lahore Teaching Hospital, Lahore, Pakistan. Methods: A descriptive cross-sectional study was conducted from September to December 2024 among 37 conveniently sampled staff nurses aged 20–30 years. A structured questionnaire assessed demographic characteristics, knowledge using 10 multiple-choice items, and practice using 10 five-point frequency items. Frequencies and percentages summarized categorical findings. The age–practice association was examined using a two-sided Fisher's exact test and an unadjusted conditional odds ratio (OR) with an exact 95% confidence interval (CI). Results: Moderate knowledge was reported in 20 nurses (54.1%), good knowledge in 15 (40.5%), and poor knowledge in two (5.4%). Thirty nurses (81.1%) were classified as having good self-reported practice. Correct responses were lowest for wound-dressing timing (16.2%) and SSI diagnosis (37.8%). Good practice was reported in 91.3% of nurses aged 22–25 years and 64.3% aged 25–30 years (OR 5.53; 95% CI 0.74–68.42; p = 0.080). Conclusion: Knowledge and self-reported preventive practices were uneven, with specific gaps in wound-dressing timing and SSI recognition. These findings identify areas for local assessment without establishing observed adherence or effects on infection outcomes. Keywords: Surgical site infection; Nurses; Knowledge; Self-reported practice; Cross-sectional study.

INTRODUCTION

Surgical site infections (SSIs) are an important healthcare-associated complication that can increase postoperative morbidity, prolong hospitalization, and impose additional costs on patients and healthcare services. Their prevention requires coordinated care throughout the period of perioperative, including appropriate patient preparation, infection-control procedures, and postoperative wound management. Nurses have a central role in these activities because of their involvement in direct patient care, wound assessment, medication administration, and patient education. Understanding nurses' knowledge and preventive practices is therefore important for identifying areas in which infection-prevention care may require improvement (1,2).

Effective SSI prevention involves both understanding recommended measures and applying them appropriately during clinical care. Relevant nursing responsibilities include hand hygiene, aseptic wound-dressing techniques,

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the use of sterile materials, appropriate administration of prescribed prophylactic antibiotics, and recognition of possible infection. Assessment of knowledge can identify gaps in understanding these measures, whereas assessment of practice can indicate how consistently nurses report performing them. These outcomes should be considered separately because familiarity with preventive recommendations does not necessarily establish their consistent application in clinical settings (1,3). Implementation research further distinguishes clinical preventive measures from strategies intended to improve their uptake, such as education, audit and feedback, and organizational support (4).

Previous research demonstrates variation in nurses' knowledge and practices across healthcare settings. A cross-sectional study in hospitals in Benishangul Gumuz, Ethiopia, identified deficiencies in both knowledge and SSI-prevention practices, indicating a need for closer attention to the implementation of preventive guidance (5). In contrast, a study at Buea Regional Hospital in Cameroon reported generally favourable knowledge of SSI prevention and care, although some gaps remained (6). These findings indicate that knowledge and practice cannot be assumed to be uniform across nursing populations. However, differences in questionnaires, scoring thresholds, sampling approaches, and clinical contexts limit direct comparisons between the proportions classified as having adequate knowledge or good practice (1,5,6).

Evidence from Pakistan also identifies concerns relevant to nursing care. A study at Allied Hospital, Faisalabad, reported deficiencies in nurses' knowledge and practices concerning SSI prevention and a positive relationship between the two domains (7). Similarly, research among nurses and midwives working in obstetric and gynaecological wards in Karachi reported inadequate knowledge and practice regarding the prevention of SSIs following caesarean section (8). Together, these studies support the relevance of assessing SSI-prevention knowledge and practice within Pakistani hospitals. Nevertheless, findings from a particular institution or surgical specialty do not directly establish the needs of nurses working in another hospital or across a different combination of clinical units.

The specific issue addressed by the present study is the level of SSI-prevention knowledge and self-reported practice among eligible staff nurses working in selected units of the University of Lahore Teaching Hospital. The literature reviewed provides evidence from other settings but does not establish the knowledge profile or reported preventive practices of this particular nursing population. A local assessment can identify which aspects of SSI prevention are understood and which reported behaviours may warrant further investigation. Such information may help guide the content of nursing education and subsequent practice audits, while recognizing that questionnaire responses alone cannot establish observed adherence, explain the causes of practice gaps, or demonstrate an effect on patient infection rates.

Accordingly, this descriptive cross-sectional study aimed to assess nurses' knowledge and self-reported practices regarding the prevention of surgical site infections in selected clinical units of the University of Lahore Teaching Hospital.

MATERIAL AND METHODS

A descriptive cross-sectional study was conducted at the University of Lahore Teaching Hospital, Lahore, Pakistan, from September to December 2024 to assess nurses' knowledge and self-reported practices regarding the prevention of surgical site infections (SSIs). This design provided a questionnaire-based assessment of the two outcomes during the study period without introducing an intervention or undertaking longitudinal follow-up.

The target population comprised staff nurses working in orthopaedic, surgical, surgical intensive care, operating theatre, and gynaecological units. Male and female staff nurses aged 20–30 years were eligible. Student nurses, intern nurses, and individuals who did not meet the eligibility criteria were excluded. Participants were selected using convenience sampling from the designated clinical units, and 37 nurses were included in the study.

The sample-size calculation used a finite-population correction for estimating a proportion. For a stated source population of 40 nurses, an anticipated proportion of 0.50, a 95% confidence level, and an absolute precision of 0.05, the calculation was expressed as $n = NZ^2p(1-p)/[e^2(N-1) + Z^2p(1-p)]$, where Nrepresented the population size, $Z$the standard normal value corresponding to the confidence level, $p$the anticipated proportion, and $e$the absolute precision. Substitution of $N = 40$, $Z = 1.96$, $p = 0.50$, and $e = 0.05$yielded approximately 36.31

participants, which was rounded upward to a target sample of 37. This calculation determined the recruitment target; participant selection remained non-probabilistic.

Administrative permission for data collection was obtained from the hospital's nursing superintendent. Nurses completed a structured, closed-ended questionnaire in approximately 10–15 minutes, with a study assistant present during completion. Data collection involved questionnaire responses rather than direct observation of clinical procedures. Accordingly, the practice outcome represented participants' reported frequency of performing SSI-prevention activities.

The questionnaire was adapted from the instrument described by Sham et al. and comprised three sections addressing demographic characteristics, SSI-prevention knowledge, and self-reported preventive practices (1). Demographic information included age, gender, clinical unit, and duration of nursing experience. The knowledge section contained 10 multiple-choice questions, each with three response options and one designated correct answer. As described in the study instrument, the correct answer occupied the third response position. Knowledge items addressed recognition and investigation of SSI, surgical handwashing, wound-dressing timing, prophylactic antibiotics, selection of dressing solutions, and the relevance of nutritional status to surgical care. Each correct response received one point, and each incorrect response received zero points, producing a total possible score of 0–10. Scores of 8–10 were classified as good knowledge, 5–7 as moderate knowledge, and 0–4 as poor knowledge.

The practice section contained 10 statements assessing the reported frequency of SSI-prevention activities. These included skin antisepsis, handwashing before and after wound dressing, administration of preoperative prophylactic antibiotics, perioperative glucose testing in patients with diabetes, advice to immunocompromised patients, use of sterile dressing materials, selection of wound-cleansing solutions, aseptic dressing technique, cleaning and disinfection of dressing trolleys, and disposal of soiled materials. Responses were scored on a five-point scale: never, one; seldom, two; sometimes, three; often, four; and always, five. Summation across the 10 items produced a possible total score of 10–50, with higher scores indicating more frequent self-reported performance of the listed activities. Knowledge and practice were assessed through the same questionnaire administration, and no patient-level SSI outcomes were measured.

Completed questionnaire data were reviewed before analysis using IBM SPSS Statistics version 25. Categorical demographic characteristics and item responses were summarized using frequencies and percentages. Knowledge classifications were presented as counts and percentages, while total practice scores were summarized using the mean, standard deviation, and observed range. Exploratory, unadjusted chi-square analyses examined associations between demographic characteristics and categorical knowledge and practice levels. Statistical significance was assessed using a threshold of $p < 0.05$.

RESULTS

Thirty-seven nurses participated in the study. Of these, 23 (62.2%) were aged 22–25 years and 24 (64.9%) were female. Twenty participants (54.1%) worked in the combined surgical and surgical intensive care category, and 16 (43.2%) had less than one year of nursing experience (Table 1). Moderate knowledge was reported in 20 participants (54.1%), good knowledge in 15 (40.5%), and poor knowledge in two (5.4%). Thirty participants (81.1%) were classified as having good self-reported practice, while seven (18.9%) were classified as having poor practice (Table 2).

Correct responses varied across knowledge items. Thirty-three participants (89.2%) correctly answered each of the items concerning disinfection of an infected surgical site, prophylactic antibiotics, and the purpose of maintaining normal nutritional status. In comparison, six participants (16.2%) correctly identified the timing of wound-dressing changes, and 14 (37.8%) correctly answered the SSI-diagnosis item (Table 3).

Table 1. Demographic characteristics of participating nurses (N = 37)

Characteristic	Category	n (%)
Age, years	22–25	23 (62.2)
Age, years	25–30	14 (37.8)
Gender	Male	13 (35.1)
Gender	Female	24 (64.9)
Clinical unit	Orthopaedic	6 (16.2)
Clinical unit	Gynaecology	3 (8.1)

Characteristic	Category	n (%)
Clinical unit	Surgical and SICU	20 (54.1)
Clinical unit	Operating theatre	8 (21.6)
Nursing experience, years	<1	16 (43.2)
Nursing experience, years	2–3	13 (35.1)
Nursing experience, years	3–4	5 (13.5)
Nursing experience, years	>4	3 (8.1)

SICU, surgical intensive care unit.

Table 2. Reported classifications of SSI-prevention knowledge and self-reported practice (N = 37)

Outcome	Classification	n (%)
Knowledge	Good	15 (40.5)
Knowledge	Moderate	20 (54.1)
Knowledge	Poor	2 (5.4)
Self-reported practice	Good	30 (81.1)
Self-reported practice	Poor	7 (18.9)

SSI, surgical site infection. Knowledge classifications: good, 8–10; moderate, 5–7; poor, 0–4 correct responses.

Table 3. Responses to SSI-prevention knowledge items with internally consistent reported counts (N = 37)

Knowledge item	Correct, n (%)	Incorrect, n (%)
Diagnosis of SSI	14 (37.8)	23 (62.2)
Laboratory investigation for SSI	28 (75.7)	9 (24.3)
Disinfection of an infected surgical site	33 (89.2)	4 (10.8)
Timing of surgical wound-dressing changes	6 (16.2)	31 (83.8)
Prophylactic antibiotics	33 (89.2)	4 (10.8)
Timing of prophylactic antibiotic administration	24 (64.9)	13 (35.1)
Selection of dressing solution	28 (75.7)	9 (24.3)
Purpose of maintaining normal nutritional status	33 (89.2)	4 (10.8)
Signs indicating absence of SSI	30 (81.1)	7 (18.9)

SSI, surgical site infection.

Table 4. Frequency of self-reported SSI-prevention activities with internally consistent reported counts (N = 37)

Practice item	Never, n (%)	Seldom, n (%)	Sometimes, n (%)	Often, n (%)	Always, n (%)
Alcohol and chlorhexidine gluconate use	3 (8.1)	9 (24.3)	3 (8.1)	9 (24.3)	13 (35.1)
Handwashing before and after wound dressing	2 (5.4)	6 (16.2)	3 (8.1)	3 (8.1)	23 (62.2)
Administration of preoperative prophylactic antibiotics	1 (2.7)	2 (5.4)	8 (21.6)	6 (16.2)	20 (54.1)
Glucose testing before and after surgery in patients with diabetes	5 (13.5)	6 (16.2)	2 (5.4)	24 (64.9)	0 (0.0)
Advising immunocompromised patients to avoid contact with people with infections	2 (5.4)	4 (10.8)	4 (10.8)	3 (8.1)	24 (64.9)
Use of sterile dressing materials	2 (5.4)	2 (5.4)	6 (16.2)	3 (8.1)	24 (64.9)
Povidone-iodine/normal saline use for wound dressing	1 (2.7)	2 (5.4)	6 (16.2)	6 (16.2)	22 (59.5)
Aseptic technique during surgical wound dressing	1 (2.7)	6 (16.2)	3 (8.1)	3 (8.1)	24 (64.9)
Cleaning and disinfection of the dressing trolley	2 (5.4)	1 (2.7)	8 (21.6)	4 (10.8)	22 (59.5)

SSI, surgical site infection.

Table 5. Age-specific distribution of reported practice classifications (N = 37)

Age group, years	Participants, n	Good practice, n (%)	Poor practice, n (%)
22–25	23	21 (91.3)	2 (8.7)
25–30	14	9 (64.3)	5 (35.7)

Table 6. Unadjusted association between age group and reported good practice

Age comparison, years	Unadjusted OR	Exact 95% CI	p-value
22–25 versus 25–30	5.53	0.74–68.42	0.080

OR odds ratio; CI, confidence interval. Reference category: 25–30 years. OR estimated by conditional maximum likelihood with an exact conditional 95% CI. p-value calculated using a two-sided Fisher's exact test. No covariate adjustment.

For self-reported practices, 24 participants (64.9%) selected "always" for each of the items concerning sterile dressing materials, aseptic wound-dressing technique, and advice to immunocompromised patients. Twenty-three participants (62.2%) reported always washing their hands before and after wounds , while 20 (54.1%) reported always administering preoperative prophylactic antibiotics. Alcohol and chlorhexidine gluconate use was reported as "always" by 13 participants (35.1%). For glucose testing before and after surgery in patients with diabetes, 24 participants (64.9%) selected "often," and none selected "always" (Table 4).

Good self-reported practice was recorded in 21 of 23 nurses aged 22–25 years (91.3%) and nine of 14 nurses aged 25–30 years (64.3%) (Table 5). The unadjusted conditional odds ratio was 5.53, with a wide exact 95% confidence interval of 0.74–68.42. The two-sided Fisher's exact test yielded p = 0.080 (Table 6). Although the observed proportion differed between age groups, the confidence interval included the null value and indicated substantial uncertainty in the association estimate.

DISCUSSION

This study identified uneven knowledge of surgical site infection (SSI) prevention among nurses working in selected units of the University of Lahore Teaching Hospital. Although moderate knowledge and good self-reported practice were the most frequent classifications, item-level responses revealed gaps in wound-dressing timing and recognition of SSI. Reported preventive behaviours also varied across activities. These findings address the study's descriptive objective by identifying specific areas of understanding and reported practice that may warrant closer assessment. The apparent difference between knowledge and practice classifications should not, however, be interpreted as a demonstrated relationship between the two outcomes, because their participant-level association was not established.

The knowledge findings are broadly consistent with research from Ethiopia and Pakistan identifying deficiencies in nurses' understanding of SSI prevention. Jaleta et al. reported knowledge and practice gaps among nurses in Benishangul Gumuz hospitals, while Sadaf et al. described similar concerns at Allied Hospital, Faisalabad (5,7). Research among nurses and midwives involved in caesarean-section care in Karachi also identified inadequate knowledge and preventive practices (8). Conversely, the study from Buea Regional Hospital in Cameroon reported generally favourable knowledge of SSI prevention and care (6). These differences suggest that findings are sensitive to the population and clinical context. Differences in questionnaire content, classification thresholds, and assessment methods also limit direct comparison of the proportions labelled as having good or inadequate knowledge across studies (1,5–8).

Within the present study, knowledge was stronger for selected preventive measures than for wound-dressing timing and SSI diagnosis. This pattern suggests that familiarity with individual procedures may coexist with difficulty applying knowledge to decisions about assessment and wound management. Recognition of a possible infection and selection of an appropriate response involve different aspects of clinical reasoning from recalling the purpose of a preventive measure. However, the responses do not establish whether the observed gaps reflect limited understanding, ambiguous question wording, or difficulties with the designated answer options. The findings therefore support examining the content and clarity of these items alongside their clinical relevance before using them to determine educational priorities. Previous assessments of nurses' SSI-prevention knowledge similarly support evaluating specific domains rather than relying exclusively on an overall classification (1,3).

Most participants were classified as having good self-reported practice, but this aggregate finding did not indicate uniform performance of all assessed activities. Frequent reporting of sterile dressing materials, aseptic technique, and handwashing contrasted with more variable responses for other items. Such differences may reflect the frequency with which particular activities are required, nurses' responsibilities within their units, or access to relevant supplies and protocols. These explanations remain hypotheses because the study did not measure workload, resource availability, institutional policies, or opportunities to perform each activity. Implementation research distinguishes the availability of preventive recommendations from the processes that support their consistent use, including education, feedback, and organizational support (4).

The interpretation of practice responses also depends on the clinical circumstances in which an activity is appropriate. For example, glucose testing concerns patients with diabetes, and antibiotic administration depends on a prescription and the nurse's clinical role. A lower frequency response cannot therefore automatically be treated

as evidence of inappropriate care without information about the relevant opportunities and indications. Similarly, a reported frequency of antiseptic or wound-cleansing solution use does not establish whether the agent, timing, or technique was appropriate. The distinction between reported frequency and clinically appropriate performance is important when interpreting questionnaire-based assessments of SSI prevention (1,3).

The observed proportion classified as having good practice was greater in the younger age group, but the exact analysis did not provide clear evidence of an age association. The wide confidence interval indicates that the magnitude of any association remains uncertain. This pattern cannot establish that younger nurses are more competent or that recent education explains their responses. Although previous research has examined demographic and professional characteristics in relation to SSI-prevention knowledge and practice, these relationships must be assessed within the measurement and sampling conditions of each study (1,5). The present findings do not support identifying age, experience, or ward assignment as independent determinants of practice.

The practical contribution of this study lies primarily in identifying questionnaire items that may guide a more focused assessment of local nursing needs. Reviewing understanding of wound-dressing timing and SSI recognition could help determine whether additional education or clarification of clinical guidance is warranted. Practice audits could also examine whether reported behaviours correspond to care delivered in relevant clinical situations. These implications are consistent with the emphasis on education and implementation support in the existing literature, but the present study did not evaluate an educational programme or demonstrate that any proposed response would reduce SSI incidence (4,7,8). Its public-health relevance is therefore as a local needs assessment rather than evidence of clinical effectiveness.

Strengths include the inclusion of nurses from several clinical units, assessment of both knowledge and self-reported practice, and presentation of item-level responses. The item-level findings provide greater specificity than a single overall score and help distinguish areas of stronger understanding from potential gaps. Nevertheless, the small, single-centre convenience sample and restriction to nurses aged 20–30 years limit applicability to the wider nursing workforce. The cross-sectional design cannot establish temporal relationships or causality. Self-report may be affected by recall and social desirability, particularly because a study assistant was present during questionnaire completion, and no direct observation or patient-level infection outcomes were available.

Measurement and reporting limitations further constrain interpretation. The shortened questionnaire and modified response scale require clearer evidence of validity, and the conflicting definitions of good practice weaken interpretation of the aggregate classifications. The reported placement of every correct knowledge answer in the third response position may also have introduced response-pattern bias. Inconsistent item counts prevented inclusion of the complete knowledge and practice item sets, while contradictions between item-level responses and aggregate practice statistics prevented reliable interpretation of the reported mean and range. Ambiguous age and experience boundaries, sparse cells, and the absence of adjusted analyses further limit demographic comparisons. Consequently, the most defensible interpretation is that this sample showed specific knowledge gaps and variation in reported preventive activities, while conclusions about overall competence and associated factors remain less secure.

CONCLUSION

Nurses in the selected units of the University of Lahore Teaching Hospital demonstrated uneven knowledge and self-reported practices regarding SSI prevention. Moderate knowledge was the most frequent classification, with particular gaps in wound-dressing timing and SSI recognition, while reported practice varied across preventive activities. These findings identify specific areas for local assessment but do not establish observed clinical adherence or an effect on patient infection outcomes.

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