



## Original Article



## Knowledge and Practices of Nurses Regarding Prevention of Surgical Site Infections in Tertiary Care Hospitals Peshawar

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### ABSTRACT

Surgical procedures have many complications of which the leading one is post-surgical site infection (SSI), which can be prevented by following appropriate guidelines. SSI may lead to loss of body parts, septicemia and increase hospital bed occupancy. **Objective:** To assess nurses' knowledge and practices regarding the prevention of surgical site infections in tertiary care hospitals in Peshawar. **Methods:** Descriptive cross-sectional study was conducted among 172 nurses recruited through convenient sampling. Study settings were two tertiary care hospitals in Peshawar. Data was collected through an adopted, self-administered questionnaire and were analyzed by SPSS version 26.0. **Results:** Findings of the study revealed that the knowledge level of the nurses was poor about the prevention of SSI, while their practice levels were also average. A significant difference was found in the knowledge level of the study participants on the basis of their gender with a p value; 0.001, qualification with a p value; 0.000. Years of experience with a p value; 0.007, and attending infection control courses with a p value; 0.03. In addition, a significant difference was found among the practices of nurses regarding the prevention of SSI on the basis of their gender with a p value; 0.012. **Conclusion:** The study's findings revealed that nurses had a poor level of knowledge about SSI, while their practices were average according to arbitrary.

### INTRODUCTION

In the healthcare setup, the Healthcare Workers [HCWs] are directly involved in the provision of patient care. They perform an important role in the prevention of SSI. Post-operative surgical wounds have a direct relation with surgical interventions and are one of the important preventable Healthcare-Associated Infections [HCAIs]. SSI hints at several consequences, which may include loss of body parts, septicemia, cost-effectiveness, and increased length of hospital duration. The mortality rate of patients who are suffering from SSIs is greater than that of those who have not developed SSIs [1, 2]. A Surgical Site Infection [SSI] can be defined as an infection following a surgical procedure that develops within thirty days without

placement of any implant or one year later if an implant is placed. Despite being preventable, Surgical Site Infections [SSIs] account for up to 30%, of which 14% are due to Healthcare-Associated Infections [HAIs]. 11% of patients become infected due to surgical procedures, which leads to the risk of increased morbidity, mortality, and healthcare expenses. Among Healthcare-Associated Infections [HAIs], SSI is one of the most widely reported infections. It is a great concern for infection control team to control the increasing rate of infection following surgical intervention [3, 4]. A wound infection that develops following surgical procedures can be considered a health problem. Worldwide, at least 312.9 million surgical procedures are



carried out yearly. SSI is regarded as one of the major postoperative problems that can lead to unfavorable patient outcomes, despite advances in surgical techniques, hospital technology, environmental enhancements, and the use of preventative antibiotics. Critical care units and surgical wards are the main contributing areas to increase the incidence of healthcare-related infections [3, 5]. The global incidence rate of SSI varies from 7.8% in Singapore and Southeast Asia [pooled incidence] to 6.1% in countries of low middle income. Australia contributes 2.8% to the total, while in Italy the incidence rate is 2.6%. The Republic of Korea's rate was 2.1%, while the USA rate was very low and was 0.9% of the cumulative SSI rate. What absolutely stands out is the peak incidence rates in low- and middle-income countries and Southeast Asia, but in comparison, the Australia, USA, and Europe rates are very low. This finding indicates the requirement for SE Asians to find out the exact contributing factors that worsen the condition and plan operational infection prevention strategies, and these would be affordable for the local population [6, 7]. Surgical site infection can be prevented or decreased in a number of ways, such as hand washing, use of sterilized instruments, nutritional maintenance, preoperative cleaning, mechanical gut evacuation, oral antibiotic use, hair removal, and skin preparation of the operative site. All of these preventive measures can be easily adopted with just a basic understanding of medical protocol [8-10]. Literature revealed that some intrinsic factors such as old age, metabolic diseases, malnutrition, cigarette smoking, overweight, immune suppression, hypoxia, and the time of hospitalization contribute to SSIs [11-13]. Nursing staff working in Tertiary Care Hospital Peshawar are engaged with different surgically intervened patients, which include general surgery, thoracic surgery, urology surgery, neurosurgery, and Paediatrics surgery patients. Patients in old age are more susceptible to infections. The greater attachment of nursing staff with surgically wounded patients stresses the importance of nursing staff knowledge level regarding prevention of surgical site infection.

Despite global evidence-based guidelines for surgical site infection (SSI) prevention, limited regional data exist regarding nurses' knowledge and practical adherence in tertiary care hospitals of Peshawar, particularly considering demographic and training-related factors. Previous studies have highlighted inadequate SSI prevention practices, but there remains a gap in evaluating how professional qualification, infection control training, and workplace settings influence nurses' competency in this context. The aim of the study was to evaluate the knowledge and practice level of nurses about SSI. Though many studies highlight that the majority of nurses engaged

in patient care are not equipped with proper education on the prevention of operated wound infections, numerous of these nurses did not provide care to patients as recommended by evidence-based practice guidelines [14].

## METHODS

The current study was conducted among nurses employed by two tertiary care hospitals in Peshawar. The study population was 310 nurses providing care in different surgical units, including surgical ward, surgical ICU, emergency department, and Operation Theater (OT). The study design was descriptive cross-sectional. The sample size of the study participants was  $n = 172$ ; the sample size was calculated by the Raosoft sample size calculator with alpha: 0.05 and response distribution: 50%, with a 10% attrition. The eligible nurses were recruited by convenience sampling technique. The data from study participants were collected between September 2023 and November 2023. The data were obtained from those nurses who matched the inclusion criteria, such as registered nurses with at least 1 year of working experience in surgical units, emergency rooms, SICUs, and OTs of the selected hospital; nurses who were available at the time of data collection; and nurses who were willing to participate voluntarily. Nurses were not involved in the direct care of patients (head nurses), and nurses who were on leave were excluded from the study. All the study participants responded timely. The response rate was 100% and there was 0% attrition. Before the data collection, approval from the IRB was obtained (KMU-INS/14-10/6230). Then informed written consent was obtained from each of the study participants, and data were collected through a validated and adopted questionnaire. The data were collected by Sickder et al., 2014 scale; CVI of the tool was 0.97, and Cronbach's Alpha of the scale was 0.92 [14]. The questionnaire has three major parts. Part A was the general part of the questionnaire, including information regarding demography, training sessions, and workplace experience. Part B was based on the knowledge section. Questions were related to testing the respondents' knowledge about the prevention of SSI. The knowledge part of the scale was divided into 25 items. In the first part, I (Knowledge part), there are 25 multiple-choice questions, 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 considered as having "good knowledge." Part C section was related to practice questions regarding surgical site infection. There are 25 questions on a 5-point Likert scale (ranging from "never practice=1," "rarely practice=2," "sometimes practice=3," "often practice=4," and "always practice=5"). Participants who were familiar

with practicing preventive activities, such as practicing more than 14 questions frequently and usually, were considered "Good Practice," while those who did not practice at all, seldom, or only occasionally, were classified as "Poor Practice" [14, 15]. The data were collected from all the participants matching the inclusion criteria. To analyze the data, SPSS version 26.0 was used. The findings were represented in the form of bar and pie charts as well as in detailed descriptions. In descriptive analysis, mean and standard deviation were calculated for numerical variables, while frequency and percentages were computed for categorical variables. Associations were assessed by using parametric tests such as independent samples t-test for dichotomous variables and one-way ANOVA.

## RESULTS

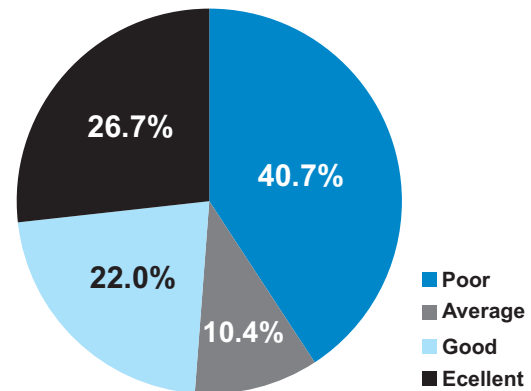
Selected hospitals had a total strength of 310 nurses working in surgical wards, ICUs, ERs, and OTs, out of which 172 nurses participated in this study with a response rate of 100%. The following table showed the demographic data of the study participants. Both hospitals had proper infection control manuals or refresher courses, but a great proportion of nurses (66%) had not attended any infection control training as shown in (Table 1).

**Table 1:** Demographic Characteristics of The Participants

Variables	Category	Mean ± SD/ Frequency (%)
Age	Mean ± SD	26.9 ± 3.636
Gender	Male	72 (41.9%)
	Female	100 (58.1%)
Qualification	Diploma	74 (43.0%)
	BSN	96 (55.8%)
	MSN	2 (1.2%)
Total Professional Experience in Year	1-2 Year	38 (22.1%)
	3-4 Year	64 (37.2%)
	5-6 Years	40 (23.3%)
	More than 6 Years	30 (17.4%)
Department	General Surgical Ward	72 (41.9%)
	Critical Care Unit	38 (22.1%)
	ER	22 (12.8%)
	OT	40 (23.3%)
Training of Infection Control	Yes	58 (33.7%)
	No	114 (66.3%)

The study findings reported that 40.7% of the nurses had poor knowledge level, 10.4 % had average knowledge, 22 % had good knowledge and 26.74% of nurses had excellent knowledge regarding surgical site infection (Figure 1).

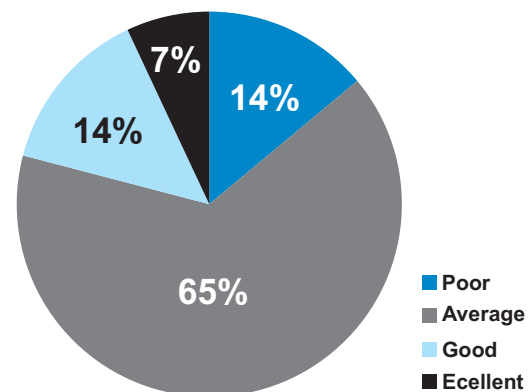
### Knowledge Level



**Figure 1:** Knowledge Level of the Study Participant's

The current study revealed that the majority of the nurses, 65%, had an average level of practice scores, 14% had good practice scores, 14% had poor practice scores, and only 7% of the studied participants had excellent practice scores regarding surgical site infection. Therefore, it can be inferred that the majority of nurses have poor knowledge regarding SSI, and their practices regarding the prevention of SSI are also poor (Figure 2).

### Practice Level



**Figure 2:** Practice Level of the Study Participant's

Table 2 showed the differences between the knowledge level and practice scores among the study participants on the basis of their demographic characteristics. It was discovered by the current study that males were more knowledgeable regarding SSI as compared to female nurses, with a p-value reported as 0.001. Similarly, there was a significant difference between the knowledge level of those nurses who had attended the infection control training and those who had not attended it, with the p-value reported as 0.030. Furthermore, a significant difference in the knowledge level was found among the study participants on the basis of their qualification with a p-value reported as <0.001, years of clinical experience with the p-value reported as 0.007, and department [unit of practice] with a p-value of <0.001. On the other hand, the study also discovered that there was a significant

difference in practices regarding the prevention of SSI among nurses on the basis of their gender, with a p-value of 0.012. There was only significance found in the gender status of study participants, with a p-value reported as 0.012 (Table 2).

**Table 2:** Comparison between Demographic Variable and Knowledge and Practice Score

Variables	Status	Knowledge Significance	Practice Significance
Gender	Male	p = 0.001 t = -0.973	p = 0.012 t = 0.401
	Female		
Qualification	Diploma	p = <0.001 f = 117.934	p = 0.250 f = 0.646
	BSN		
	MSN		
Total Professional Experience	1-2 Year	p = 0.007 f = 4.146	p = 0.106 f = 2.069
	3-4 Year		
	5-6 Years		
	More than 6 Years		
Department	General Surgical Ward	p = <0.001 f = 13.873	p = 0.699 f = 0.76
	Critical Care Unit		
	ER		
	OT		
Training of Infection Control	Yes	p = 0.003 t = 4.460	p = 0.424 t = -1.803
	No		

## DISCUSSION

The purpose of this study was to assess the knowledge and practices of nurses regarding the prevention of Surgical Site Infection [SSI]. The current study revealed that the majority of nurses have poor knowledge and average practices scores regarding the prevention of SSI. These findings were in line with many other studies conducted across the world. Accordingly, a study conducted in Ethiopia reported that the majority of nurses had insufficient knowledge about the prevention of SSIs [16]. Similarly, another study conducted in Egypt reported a low level of knowledge among surgical unit nurses [17]. Moreover, a study conducted in Lahore, Pakistan, also reported a low level of knowledge among nurses regarding the prevention of SSI [18]. However, the findings of some studies were in contrast with the current study. In this regard, a study conducted in Lahore, Pakistan, reported that 75% of the study participants had an excellent level of knowledge regarding SSI. It was reported by the aforementioned study that most of the nurses had attended the refresher courses regarding infection control and prevention; that's why their knowledge level and practice scores were excellent [19]. In the current study, most of the nurses had not attended the training on infection control and prevention; therefore, their scores were poor. Similarly, a study conducted in Northwest Ethiopia reported that training in infection control has enhanced the knowledge level and practices of nurses

regarding the prevention of SSI [20]. The findings of the present study reported that the majority of the nurses have an average level of practice scores regarding the prevention of SSI. These findings were aligned with research in the South West Region of Cameroon, which revealed that nurses in the surgical units had pitiable practices for the prevention of SSI [21]. Similarly, research conducted by Jaleta also reported average levels of practice among nurses in the prevention of surgical wound infection [22]. Moreover, a study conducted by Mengesha revealed that the practices of nurses were poor in the prevention of SSI.

This study was limited by its cross-sectional design, convenience sampling, and inclusion of only two tertiary care hospitals, which may restrict generalizability and causal interpretation. Self-reported questionnaires may also introduce response bias, as participants may overestimate their knowledge or practices. Future research should involve larger multicenter studies with randomized sampling and observational assessments to provide more representative findings. Regular infection prevention training programs, continuous professional development courses, and institutional audits are strongly recommended to enhance nurses' adherence to SSI prevention guidelines.

## CONCLUSIONS

The study findings showed that the knowledge level and practices of nurses regarding the prevention of SSI were inadequate. Based on these findings, the researcher recommends the arrangement of proper infection control training for clinical nurses regularly, as well as a focus on infection control courses in academia. In addition, the study highlighted that the most significant demographic factor for the prevention of surgical site infection is qualification, which signifies the role of high qualification in the prevention of surgical site infection.

## Authors' Contribution

Conceptualization: SM  
 Methodology: SM, SUH, MR  
 Formal analysis: SM, MNK  
 Writing and Drafting: SM, MNK, SUH, MR  
 Review and Editing: SM, MNK, SUH, MR

All authors approved the final manuscript and take responsibility for the integrity of the work

## Conflicts of Interest

The authors declare no conflict of interest.

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