
| RESEARCH ARTICLE

Assessment of Knowledge and Practice regarding the Prevention of Surgical Site Infection (SSI) among Nursing Staff at DHQ-Teaching Hospital, KDA Kohat and Liaquat Memorial Hospital Kohat

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| ABSTRACT

Among the most common infections associated with health care, surgical site infections are still the biggest cause of increased morbidity, prolonged hospital stays, mortality, and cost. By employing evidence-based infection prevention strategies, nursing staff can greatly lessen SSIs. Therefore, assessing their expertise and methods is important to enhance patients' and healthcare outcomes. The aim of this study was to assess the knowledge and behaviors of nursing staff members about surgical site infection prevention in DHQ Hospital KDA and Liaquat Memorial Hospital, Kohat. The study objectives included: (1) To assess the level of knowledge of nursing staff regarding the prevention of surgical site infections, and (2) To determine the preventive practices used by nursing staff in the prevention of surgical site infections. From January to July 2026, the nurses working in selected Kohat hospitals were involved in this quantitative descriptive cross-sectional study. (86) Participants were enrolled through a convenience sampling technique. For data collection, a structured questionnaire consisting of 20 questions about knowledge, 25 statements about practice, and demographic data was used. SPSS version 27 was used for the analysis of collected data. The results were summarized by using descriptive statistics such as frequencies, percentages, means, and standard deviations. The total number of participants was 86, out of which (45.3%) were women and (54.7%) were men. Most of the participants (44.2%) had 1 – 5 years of clinical experience, (44.2%) of them were between the ages of 20 and 29, and (40.7%) of them had a BSN degree. (55.8%) of the participants reported that they had not received formal training in SSI prevention. Results showed that the participants' level of knowledge regarding preventing surgical site infections was generally good, with one item of knowledge having the highest rate of correct responses, which was 94.2%. Furthermore, nursing staff demonstrated good preventive procedures, particularly in areas such as hand hygiene, using sterile dressing materials, aseptic techniques, disposing of contaminated materials properly, and keeping an eye on surgical wounds. However, there is still room for improvement because some gaps in knowledge and practice related to body mass index evaluation and preoperative patient education were found. Findings of the study revealed that the prevention of surgical site infections, nursing staff at DHQ Hospital KDA and Liaquat Memorial Hospital, Kohat, showed satisfactory practices as well as good expertise. Although the results revealed some positive outcomes, a large proportion of the participants did not receive formal training in SSIs. The results of the knowledge questions also showed certain gaps. Therefore, to further reduce the incidence of SSIs and enhance patient safety, ongoing professional development is needed, along with regular in-service training and strict adherence to evidence-based infection prevention guidelines.

| KEYWORDS

Surgical site infection, knowledge, practice, nursing staff, infection prevention, hand hygiene, patient safety

| ARTICLE INFORMATION

ACCEPTED: July 14, 2026

PUBLISHED: August 28, 2026

DOI: <https://doi.org/10.61424/ijmhr.v4i3.992>

1. Introduction

Healthcare Workers (HCWs) especially nurses provide care to patients in hospitals and they have a noteworthy role in the prevention of Surgical Site Infections (SSIs). Post-operative surgical wound infections is one of the preventable healthcare associated infection, which is associated to surgical operations, and could have several

outcomes such as amputation, septicaemia, prolong hospital visited and cost-effectiveness. Patients who develop SSIs are more likely to die as compared to patients who do not develop SSIs (Carvalho et al., 2017 & Boga, 2019).

SSI occurs when an infection develops after 1 to 12 months of surgery without the insertion of an implant or when there is an implant in place, and SSIs occur in up to 30% of surgeries and 14% of these are due to healthcare associated infections (HAIs), which are preventable. SSIs occur in 11% of patients due to surgery, resulting in morbidity, mortality and additional medical expenses (Patil et al., 2018 & Rahmah et al., 2020).

Any infection appears through the surgical cut or wound opening, post surgery can be considered as a medical issue. There are at least 312.9 million surgical procedures performed globally, and they are conducted at least each year. Although surgical techniques, hospital technology and environment have improved, along with the use of prophylactic antiseptic drugs, SSIs are still regarded as one of the most common post-operative problems that could potentially lead to poor clinical results. The two main settings which are related to the rising frequency of SSIs are critical care areas and surgical wards (Patil et al., 2018 & Ling et al., 2019).

Incidence of SSIs in low-middle income countries is 6.1%, to 7.8% (pooled incidence) in Singapore and SE Asia, 2.8% in Australia. USA continued to have an extremely low rate of the cumulative SSIs rate i.e. 0.9%, compared with that of the Republic of Korea 2.1%. These findings illustrate that there is a lack of awareness and understanding of the exact factors aggravating the disease among SE Asian people and they have to find effective methods to prevent infections within the community that do not require a huge investment of money (Bamoosa, et. al., 2020 & Mohsen et al., 2020).

Several interventions, such as hand hygiene, use of sterile equipment, food intake, preoperative preparation of skin area for surgery, mechanical gastrointestinal evacuation, use of oral antibiotics, hair removal, can prevent or reduce SSIs. They all represent simple precautionary measures that can be followed, depending on the basic knowledge of medical protocol (Albishi et al., 2019 & Zucco et al., 2019). Appropriate nurses knowledge and best practices have the potential to enhance patient care and help to reduce the high incidence of patient infections in hospital facilities (Sadia et al., 2017).

Nurses play a key role in healthcare settings and according to the objectives of this study to see if there is a long term solution to this problem, to decrease patient suffering and financial burden on the healthcare system. SSIs have been shown to be one of the large concerns that negatively impacts on patient safety and quality of medical care. SSI is a common health issue in Pakistan as well as other developing countries. The purpose of this study is to determine the knowledge and practices of nurses regarding the prevention of SSIs to facilitate the safety and quality of patients' surgical care.

2. Methods and Materials

2.1 Study Design

Quantitative descriptive cross-sectional correlational design was selected to assess the practice and knowledge of staff nurses for surgical site infection (SSI) prevention and to explore the relationship between preventative activities of staff nurses and their knowledge.

2.2 Study Setting

The study was carried out in District Headquarter Teaching Hospital KDA, Kohat and Liaqat Memorial Hospital Kohat, from June 01 to July 31, 2026.

2.3 Population, Sample, and Sampling Technique

Male and Female Nurses working in different wards of selected hospitals.

A sample of 86 staff nurses was determined using the Open Epi calculator.

Convenience sampling technique is used to recruit the participant. The staff nurse who met the inclusion criteria and were present during the data collection were invited to participate in this study after taking the informed consent.

2.4 Inclusion criteria

Staff nurses between the age of 20-50 years
Both male and female nurses
Nurses with at least one year of work experience
Nurses who gave voluntary consent to participate and signed informed consent documents

2.5 Exclusion criteria

Head nurses
Student nurses
Staff nurses are younger than 20 years and older than 50 years
Nurses who have less than 1 years' experience in the profession
Nurses displeased with participation

2.6 Data Collection Instrument

A standardized structured close-ended questionnaire was used, and the instrument was borrowed from (Sadia et al., 2017) and divided into three sections, i.e.

2.6.1 Socio-demographic Characteristics

Age
Gender
Professional Qualification
Proficiency in employment duties for several years
SSI prevention training received

2.6.2 Knowledge Assessment

Comprised of 20 multiple-choice questions and there were three answers to each question with one correct answer, and one point was awarded for each correct answer.

2.6.3 Practice Assessment

Comprised 25 statements which were rated on a 5-point Likert scale:
Never = 1, Rarely = 2, Sometimes = 3, Often = 4, Always = 5
Participants reported their behavior as occurring often or always at least 14 times on the items that they practiced and were classified as having good practice. Responses to the frequency of each item in the list were taken as either never, rarely or sometimes with the remainder being considered poor practice.

2.7 Data Collection Procedure

Data collection was done by using a structured questionnaire to obtain information from 86 nursing personnel of both hospitals.

2.8 Statistical Analysis

Statistical Package for the Social Sciences (SPSS) version 27 was used for statistical analysis and data was summarized using their means, Standard deviation, frequencies and percentages.

2.9 Ethical Considerations

Ethical approval was granted by the ethical review committee of Kohat University of Science and Technology (KUST) Kohat, and permission was obtained from both the administration of DHQ Teaching Hospital, KDA Kohat and Liaquat Memorial Hospital Kohat.

Informed consent was obtained from all the participants before data collection. Participants confidentiality was maintained throughout data collection, analysis, and reporting; participation was voluntary, and participants were free to withdraw at any point without any effect on their career and employment.

3. Results

The result is presented under two major heads i.e. participants characteristics and surgical site infection prevention knowledge and practice.

The demographic section includes, Gender of participant, Age of participant, Education of participant, Year of clinical experience and received training on the prevention of surgical site infection.

Table 4.1 Gender of Participants

Gender	Frequency	Percentage
Male	47	54.7%
Female	39	45.3%
Total	86	100.0%

The study participants' gender displayed distribution is in Table 4.2. Of the 86 participants, 39 (45.3%) were women and 47 (54.7%) were men. The results show that there were somewhat more male participants in the study than female participants. This distribution is plainly shown in the accompanying graph.

Figure 4.1 Gender of Participants

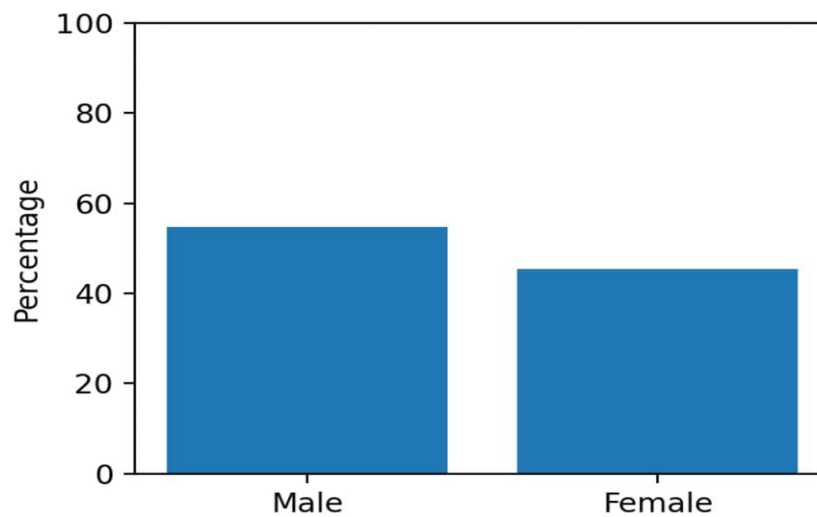
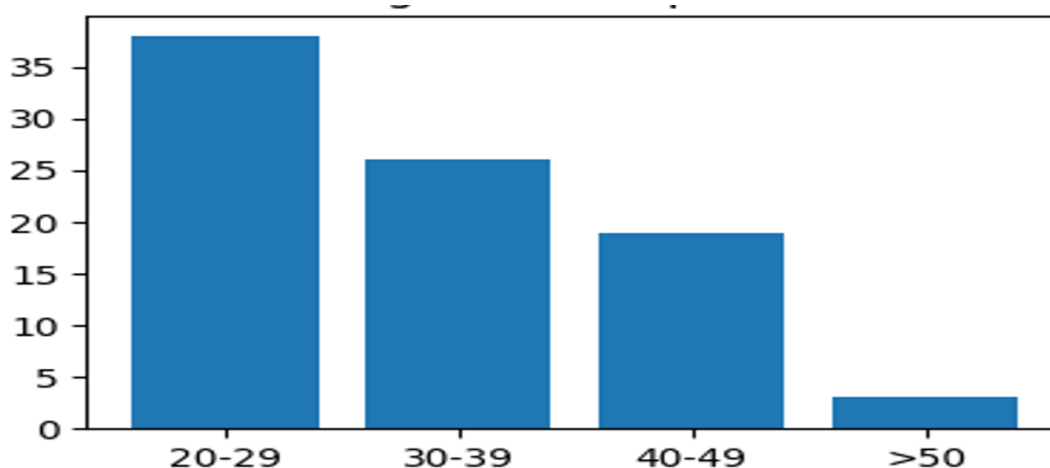


Table 4.2 Age of Participants

Age of Participants	Frequency	Percentage
20-29	38	44.2%
30-39	26	30.2%
40-49	19	22.1%
>50	3	3.5%
Total	86	100.0%

Table 4.2 shows the participants' age distribution. 38 (44.2%) of the 86 participants were between the ages of 20 and 29, making this the largest age group. Twenty-six (30.2%) individuals between the ages of thirty and thirty-nine and nineteen (22.1%) individuals between the ages of forty and forty-nine came next. Just three (3.5%) of the participants were older than fifty. The related bar graph shows that most participants were between the ages of 20 and 29.

Figure 4.2 Age of Participants**Table 4.3 Professional Education of Participants**

Education	Frequency	Percentage
Diploma	26	30.2%
Generic BSN	35	40.7%
Post RN	24	27.9%
MSN	1	1.2%
Total	86	100.0%

The participants' educational backgrounds are shown in Table 4.3. Out of all the participants, 35 (40.7%) had a generic BSN, 26 (30.2%) had a diploma, 24 (27.9%) had a post-RN, and 1 (1.2%) had an MSN. The bar graph shows that most study participants were Generic BSN holders.

Figure 4.3 Professional Education of Participants

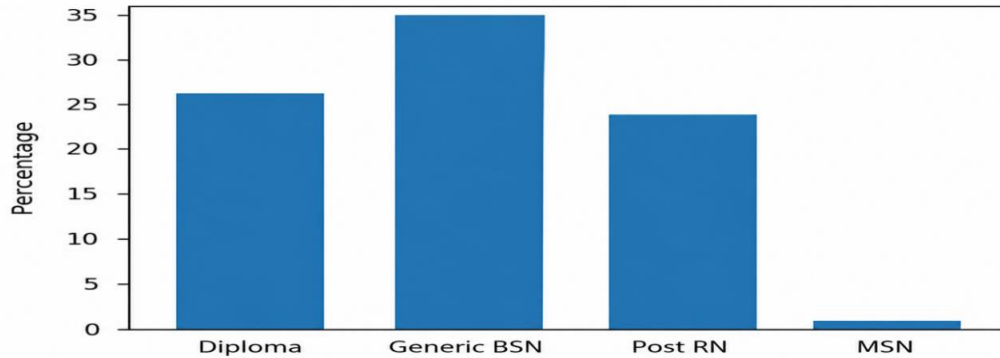


Table 4.4 Clinical Experiences of Participants

Clinical Experience	Frequency	Percent
<1	3	3.5
1-5	38	44.2
6-10	25	29.1
11-15	10	11.6
>15	10	11.6
Total	86	100.0

The individuals' clinical experiences are shown in Table 4.4. 38 (44.2%) of the largest group had one to five years of clinical experience. Twenty-five (29.1%) participants with six to ten years of experience came next. Only 3 (3.5%) of the participants had less than a year of experience, compared to 10 (11.6%) who had 11–15 years and more than 15 years. Most participants had one to five years of clinical experience, according to the graph.

Figure 4.4 Clinical Experiences of Participants

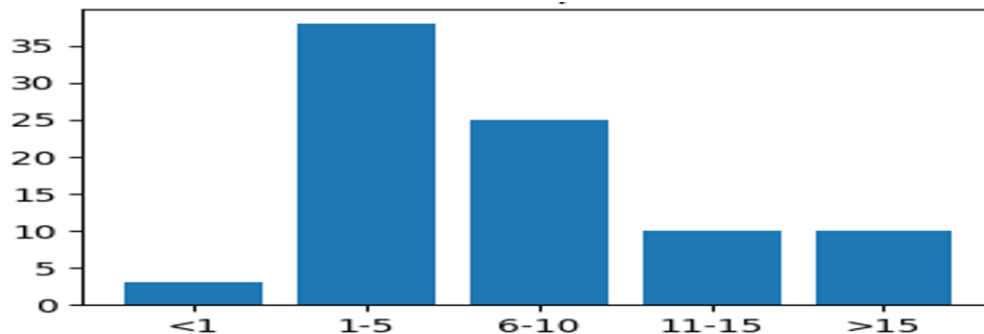


Table 4.5 Participants Received Training on the Prevention of Surgical Site Infection

SSI Training	Frequency	Percent
Yes	35	40.7
No	48	55.8
Missing	3	3.5
Total	86	100.0

The participants' history of Surgical Site Infection (SSI) training is shown in Table 4.5. Of the 86 participants, 35 (40.7%) had received SSI training, whereas 48 (55.8%) had not. Three (3.5%) participants' data was missing. Most individuals did not receive SSI training, according to the related graph.

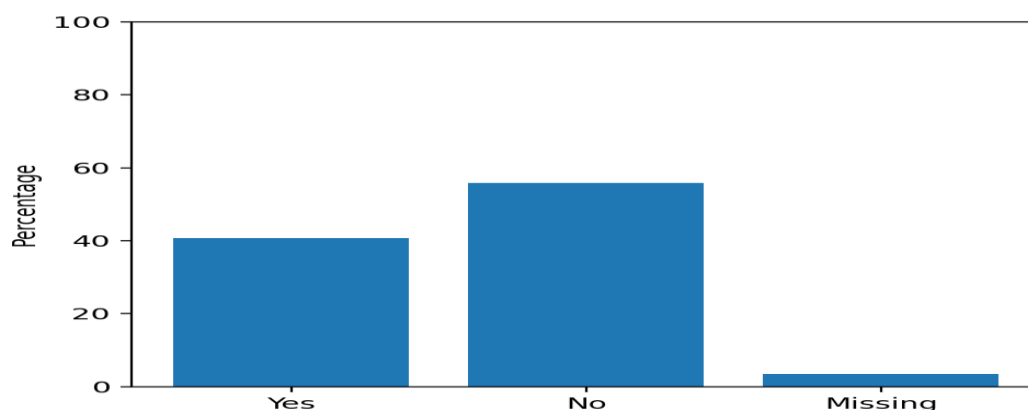
Figure 4.5 Participants Received Training on the Prevention of Surgical Site Infection

Table 4.6 Participants Knowledge Regarding the Prevention of Surgical Site Infections

Question	Correct (n)	Correct (%)	Incorrect (n)	Incorrect (%)
KQ1	51	59.3	35	40.7
KQ2	46	53.5	40	46.5
KQ3	62	72.1	24	27.9
KQ4	67	77.9	19	22.1
KQ5	73	84.9	13	15.1
KQ6	61	70.9	25	29.1
KQ7	65	75.6	21	24.4
KQ8	51	59.3	35	40.7
KQ9	59	68.6	27	31.4
KQ10	64	74.4	22	25.6
KQ11	63	73.3	23	26.7
KQ12	81	94.2	5	5.8
KQ13	58	67.4	28	32.6
KQ14	56	65.1	30	34.9
KQ15	54	62.8	32	37.2
KQ16	41	47.7	45	52.3
KQ17	37	43.0	49	57.0
KQ18	48	55.8	38	44.2
KQ19	50	58.1	36	41.9
KQ20	62	72.1	24	27.9

86 nursing staff members' answers to the 20 knowledge questions about surgical site infection (SSI) prevention are shown in Table 4.6 and the accompanying bar graph. The results show that most participants provided accurate answers to most of the knowledge questions. KQ12 had the largest percentage of correct answers, with 81 (94.2%) participants giving the right answer and only 5 (5.8%) giving the wrong answer. KQ5 (73, 84.9%), KQ4 (67, 77.9%),

KQ7 (65, 75.6%), KQ10 (64, 74.4%), KQ11 (63, 73.3%), and KQ3 and KQ20 (62, 72.1%) all had high percentages of right answers.

KQ6 (61, 70.9%), KQ9 (59, 68.6%), KQ13 (58, 67.4%), KQ14 (56, 65.1%), KQ15 (54, 62.8%), KQ1 and KQ8 (both 51, 59.3%), KQ19 (50, 58.1%), KQ18 (48, 55.8%) KQ2(46,53.5%). KQ17 had the lowest percentages of correct answers, with just 37 (43.0%) participants answering correctly and 49 (57.0%) answering wrong. This was followed by KQ16, with 41 (47.7%) participants answering correctly and 45 (52.3%) answering incorrectly. Except for KQ16 and KQ17, where incorrect answers were more common than correct answers, the bar graph generally shows that the percentage of correct answers exceeded the percentage of incorrect answers for most knowledge questions.

Figure 4.6 Participants Knowledge Regarding Prevention of Surgical Site Infection

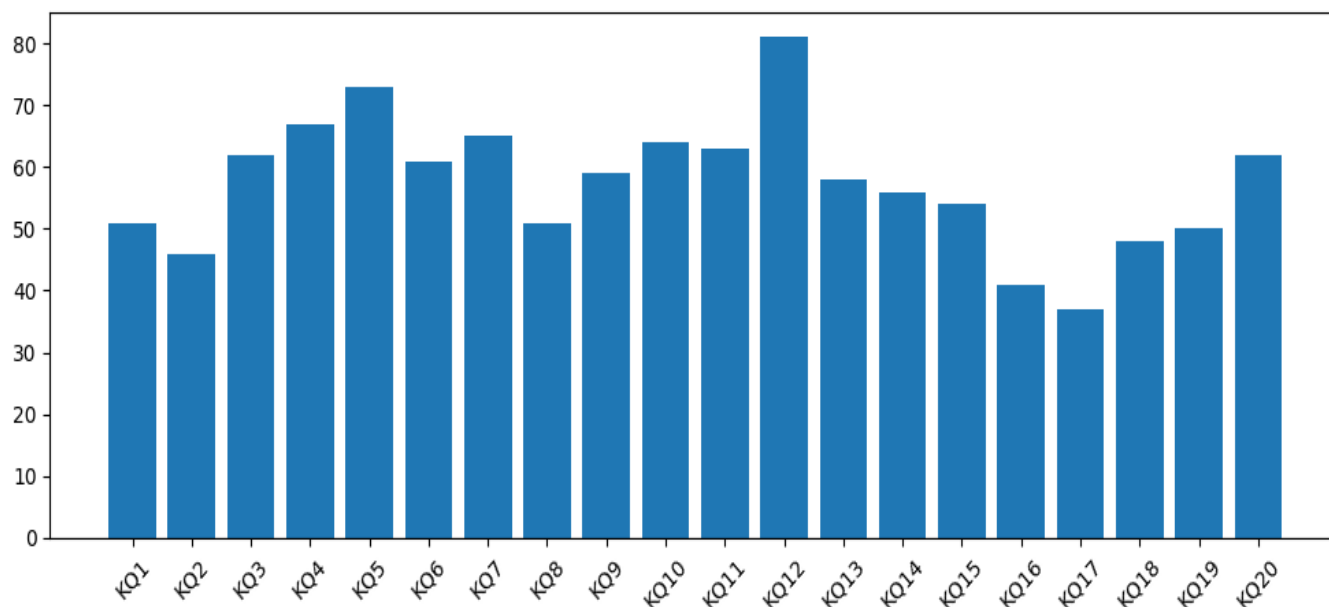


Table 4.7 Practices of Nursing Staff Regarding Prevention of Surgical Site Infection (SSI)

S.No.	Items	Never (n)	Rarely (n)	Sometimes (n)	Often (n)	Always (n)	Total %
1	Alcohol and chlorhexidine gluconate are most common antimicrobials used in my ward	15 (17.4%)	4 (4.7%)	15 (17.4%)	26 (30.2%)	26 (30.2%)	100.0%
2	I wash my hands before and after changing wound dressing and touching the surgical site	5 (5.9%)	4 (4.7%)	15 (17.6%)	22 (24.7%)	40 (47.1%)	100.0%

3	I wash my hands before wearing sterile gloves	4 (4.7%)	6 (7.0%)	10 (11.6%)	19 (22.1%)	47 (54.7%)	100.0%
4	I perform pre-operative shaving right before surgery	7 (7.0%)	10 (11.6%)	12 (14.0%)	21 (24.4%)	36 (41.9%)	100.0%
5	I administer pre-operative prophylactic antibiotics within one hour before surgery	6 (7.0%)	8 (9.3%)	21 (24.4%)	16 (18.6%)	35 (40.7%)	100.0%
6	I advise patient to take pre-operative shower 6–12 hours before surgery	9 (10.5%)	10 (11.6%)	15 (17.4%)	25 (29.1%)	27 (31.4%)	100.0%
7	I advise patients to take antimicrobial shower	4 (4.7%)	9 (10.5%)	19 (22.1%)	27 (31.4%)	27 (31.4%)	100.0%
8	I perform glucose test before and after surgery in diabetic patient	5 (5.8%)	7 (8.1%)	5 (5.8%)	14 (16.3%)	55 (64.0%)	100.0%
9	I administer insulin/oral medication as ordered	6 (7.0%)	9 (10.5%)	12 (14.0%)	22 (25.6%)	37 (43.0%)	100.0%
10	I assessed BMI before and after surgery	7 (8.1%)	8 (9.3%)	17 (19.8%)	23 (26.7%)	31 (36.0%)	100.0%
11	I advise nutritious (protein) diet	2 (2.3%)	9 (11.6%)	10 (10.5%)	28 (32.7%)	37 (43.0%)	100.0%
12	I advise vegetables and fruits before & after surgery	3 (3.5%)	8 (9.3%)	14 (16.3%)	17 (19.8%)	44 (51.2%)	100.0%
13	I advise avoiding infected people	4 (4.7%)	8 (9.3%)	16 (18.6%)	13 (15.1%)	45 (52.3%)	100.0%
14	I advise obese patients to reduce carbohydrate intake	2 (2.3%)	9 (10.5%)	12 (14.0%)	21 (24.4%)	42 (48.8%)	100.0%
15	I use sterilized dressing materials	3 (3.5%)	6 (7.0%)	6 (7.0%)	18 (20.9%)	53 (61.6%)	100.0%

16	I use povidone-iodine and normal saline	6 (7.0%)	4 (4.7%)	16 (18.6%)	18 (20.9%)	42 (48.8%)	100.0%
17	I use antiseptic techniques during dressing	1 (1.2%)	2 (2.3%)	11 (12.8%)	16 (18.6%)	56 (65.5%)	100.0%
18	I learn shaving methods from others	6 (7.0%)	6 (7.0%)	12 (14.0%)	14 (16.3%)	48 (55.8%)	100.0%
19	I use antiseptic technique during swab culture	6 (7.0%)	4 (4.7%)	5 (5.8%)	22 (25.6%)	49 (57.0%)	100.0%
20	I advise immunodeficiency patient on hygiene	6 (7.0%)	6 (7.0%)	12 (14.0%)	21 (24.4%)	41 (47.7%)	100.0%
21	I assess and monitor surgical site	4 (4.7%)	12 (14.0%)	13 (15.1%)	12 (14.0%)	45 (52.3%)	100.0%
22	I separate infected from non-infected cases	4 (4.7%)	7 (8.1%)	7 (8.1%)	21 (24%)	47 (54.7%)	100.0%
23	I use face mask during dressing	1 (1.2%)	3 (3.5%)	13 (15.1%)	18 (20.9%)	51 (59.3%)	100.0%
24	I disinfect dressing trolley surface	4 (4.7%)	1 (1.2%)	12 (14.0%)	12 (14.0%)	57 (66.35%)	100.0%
25	I discard soiled material properly	1 (1.2%)	3 (3.5%)	5 (5.8%)	10 (11.6%)	67 (77.9%)	100.0%

Data describing distribution of nursing staff ways to prevent surgical site infections (SSI). Results show that they regularly or consistently practice recommended SSI preventive actions. Infection control measures, 30.2% stated that alcohol and chlorhexidine gluconate were the most used antimicrobial agents in their ward and 17.4% reported that alcohol and chlorhexidine gluconate were never used. Fewer than one in ten (5.9%) respondents never washed their hands before and/or after dressing wounds and the surgical wound site. Nearly half (47.1%) respondents washed their hands routinely before and/or after dressing wounds and the surgical wound site.

More than half (54.7%) of respondents always and 22.1% did frequently attempt to clean their hands prior to putting on sterile gloves. When asked about shaving prior to surgery, 24.4% of the respondents shaved right before surgery often and 41.9% shaved right before surgery always. Similarly, 18.6 % stated that they did provide prophylactic antibiotics very soon (within an hour) before surgery, and 40.7 % did provide these antibiotics always just before surgery. Approximately 1/3 (31.4%) of respondents assessed patients prior to surgery and had them take a pre-op shower 6 to 12 hours before surgery; 29.1% did so 'frequently'. Likewise, 31.4% assessing patient prior surgery recommended frequent use of an antibacterial shower before surgery and 31.4% of those that assessed patients before surgery recommended an antibacterial shower before surgery. Most (64.0%) assessed blood sugar level preoperatively and postoperatively in diabetic patients and performed blood sugar testing regularly, and

43.0% administered insulin/oral medications as prescribed regularly. 36.0% always calculated their body mass index (BMI) before and after surgery, and 26.7% frequently did it.

The following practices were followed in nutritional counselling: 43.0% of the patients were always given a protein diet, and 51.2% of the patients were always provided with a diet of vegetables and fruits preceding and following surgery. Fifty-two percent of respondents also reported always recommending to the patient to avoid contact with infected patients, while 48.8% always counseled obese patients to cut back on their intake of carbohydrates.

Concerning wound care practices, 61.6% used always Sterilized dressing materials and 48.8% used always Povidone-iodine and normal saline for wounds. Over 2/3 (65.5%) of the respondents reported using antiseptic techniques every time administering wound dressings and 57.0% reported that they always used antiseptic techniques to obtain swab cultures.

Moreover, 55.8% have learned to learn how to always shave from them. When it comes to preventing post-surgical infections, 47.7% always recommended immunodeficient patients to care for their hygiene.

Over half (52.3%) always inspected and inspected surgical site; 54.7% always divided into infected and non-infected cases. 66.3% said that they always sterilized the surface of the dressing trolley, and 59.3% said that they always used face masks when putting the trolley together. The highest rate of encouraging soiled materials was to always discard contaminated materials, which was the most observed practice in the proper disposal of soiled materials.

Excessive half (52.3%) of respondents were wisely assessing and monitoring the surgical site consistently; more than half (54.7%) of the respondents were consistently separating infected cases from non-infected cases; 59.3% responded that they were consistently cleaning the surface of the dressing trolley and 66.3% of them were consistently assessing the surface of the dressing trolley. Proper disposal of soiled materials was the most consistent (77.9%) item with respect to the reporting of being always disposed of properly. The results indicated that nursing staff usually reported that they were performing effective procedures to prevent surgical site infections; many of the respondents reported that they were frequently or always adhering to the suggested infection prevention measures. As seen from the results of patient education preoperatively and BMI assessment, there were relatively low levels of consistent adherence that can be further trained and reinforced.

4. Discussion

The aim of the present study was to assess nursing staff of DHQ Hospital KDA and Liaquat Memorial Hospital, Kohat, regarding their knowledge and practice about prevention of surgical site infections (SSI). SSI are amongst most prevalent infections associated with health care and are associated with substantial burden in terms of hospital stay, morbidity and mortality along with medical expenses. Due to their involvement in preoperative, intraoperative and postoperative care of patients, nurses play a vital role in reduction of SSI. Thus, to safeguard the patient, it appears that the evaluation of their preventative behavior and knowledge could be a key point. 86 nursing staff were involved in the present study to assess their demographics, preventive behaviors and understanding about SSI prevention.

4.1 Talk about the population of the region

Results of the demographic characteristics of the study showed that majority of the participants were young (20-29 years). Most of the responders had one to five years of clinical experience and had a generic BSN. More than half of the participants had no formal training in preventing surgical site infections (SSI).

The substantial number of young nurses could be because the public hospitals have taken many young, qualified nurses. They might be more likely to know the correct evidence-based practices for infection prevention — this could have been acquired through their time at nursing school. As with the graduate nursing programmer there is a high emphasis on infection control and patient safety, a high proportion of BSN qualified nurses may therefore be responsible for their good understanding of this study. But what is evident is the need for their continued professional development as most of them had no formal SSI training. Similar results were also reported by Sadia et

al. (2017) and stated increases the nurses' understanding and infection prevention principles by conducting sessions frequently. To update the nurses' skills about SSI prevention hospitals should provide continued in-service training.

4.2 Knowing more about how to prevent SSIs

The study findings showed overall nursing staff had high knowledge about SSI prevention expert. Most of the knowledge participants correctly responded to most of the questions. The question giving the highest percentage of right answers (94.2 % of the participants gave the right answer) was KQ12. Also, the questions KQ5 (84.9%), KQ4 (77.9%), KQ7 (75.6%), KQ10 (74.4%) and KQ11 (73.3%) had a high percentage of right answers. Findings suggested that the level of knowledge of the nursing staff about critical surgery site infection prevention is adequate. The findings from the present study were similar to the study conducted by Sadia et al. (2017) and noticed a satisfactory level of SSI prevention knowledge among nurses. Improvements in nursing adequate knowledge may come from nursing education, clinical experience, regular infection control practices in the health care setting. But there was some knowledge gaps identified. The questions KQ17 (43.0%) and KQ16 (47.7%) had the lowest percentage of right answers, which means that many the participants were ignorant of some aspects of SSI prevention. Labeau et al. (2010) found that nurses did not have enough knowledge of evidence-based guidelines for infection prevention. poor training, opportunities, limited access to up-to-date recommendations and poor continuing education could be responsible for these gaps. Although the knowledge was adequate, it was observed that there were some areas with gaps in them and hence frequent educational sessions, workshops and infection control training courses were to be held. Continuous education will enhance the capacity of nurses in using evidence and following recommendations.

4.3 Surgical microorganisms and practices that can facilitate the spread of infection.

The current study revealed that nursing staff were generally practicing good infection prevention measures to the surgical site infection (SSI). The majority of participants indicated as often or always complying with recommended behaviors for preventing infection, suggesting good adherence to recommended infection control practices. Good practices identified in this study were hand hygiene. Prior to wearing sterile gloves and sterile dressings on a wound, most responders cleaned their hands, followed by the application of the dressings. Most responders cleaned hands before putting on sterile gloves and dressings on wounds, and then applied the dressings. The results obtained from the present study are in line with the recommendations of World Health Organization (WHO) (World Health Organization, 2015): Hand cleaning is to prevent diseases associated with care. This finding was corroborated by similar results reported by Patil et al. (2018) who found that healthcare workers were practicing the right-hand hygiene and SSI prevention. Moreover, the study reveals good compliance to the pre-operative procedures which were shown to be evidence of hair removal immediately prior to surgery and timely infusion of prophylactic antibiotic. In addition, majority of the participants mentioned that sterile dressing materials and aseptic care of the wound were used, and the contaminated dressing materials were disposed of properly by their participants. These procedures demonstrate nursing staff professionalism and are important activities that help prevent SSIs.

The results are like Joshi (2014) and Ayed (2015) who found out that nurses had strong infection prevention procedures. They are however different from the study of Teshager et al. (2015) and Famakinwa et al. (2014) where nurses exhibited inferior infection control procedures. These differences in the results may be due to variation in hospital resources, hospital policies and continuing education on suggested SSI prevention strategies. Overall, the findings showed that selected institutions' nursing staff members practice the recommended SSI prevention measures, but this cannot be guaranteed and maintained without further education and regular inspections.

4.4 Comparison with previous studies

Overall, the knowledge and the preventive activities reported in this study were better than in several poor countries, such as low knowledge level and lack of practice in preventing SSI reported by Teshager et al. (2015) in Ethiopia, and Famakinwa et al. (2014) in Nigeria. In contrast, in many of the participants had proper understanding and most of them frequently followed suggested preventive measures. These differences could reflect differences in nursing education, in infection control measures in hospital practice and the resources or nursing education

available in hospitals. In contrast, the findings were similar to Sadia et al. (2017) in Pakistan and also Rahmah et al. (2020) who found that the knowledge regarding SSI preventive measures and practices among nurses were generally good. The results are consistent in that recently there has been an improvement in the knowledge of infection control among the Pakistani Nurses.

5. Conclusion

We aimed to evaluate the knowledge and practice of the staff members of DHQ Hospital KDA and Liaquat Memorial Hospital, Kohat about the prevention of surgical site infections (SSI). The surgery assistants, who were 86, were selected for a structured question form. Most participants were knowledgeable and had good practices in relation to SSI prevention. The knowledge questions had high scores by most of the study participants. Most correct responses were found to be associated with aseptic procedure and hand washing and method of disease control. There were some gaps in knowledge identified in a few areas. Specifically, the proportion of respondents who answered incorrectly was greater for the knowledge items which had more complex content related to SSI prevention. Most of the nursing staff reported that they regularly or consistently followed recommended SSI preventive measures hand washing, using of sterile dressing materials, antiseptic method, throwing away the contaminated materials and monitoring the surgical wound according to the practice findings. Other practices, such as screening for BMI, educating patients prior to surgery, and some other preventative measures before surgeries had relatively low adherence rates. In demographic results, more than half of the respondents indicated that they had not implemented SSI training; therefore, continuous education and regular training is needed to ensure that everyone in the nursing profession adheres to the strict infection control requirements. They have good knowledge and practices of infection control for surgeries, but for wider advancement and those with gap in knowledge, it is crucial to uphold the guidelines of infection control through continuing education and strict adherence to the guidelines to improve the care of the patient, reduce infections in this area and increase surgical operations' safety.

5.1 Limitations

The results are limited to the following scopes of the study:

Results cannot be generalized to all hospitals in Pakistan as the study was conducted in only two hospitals of Kohat. Selection bias might have been introduced due to the use of convenient sampling.

Among 86 participants, results generalization was limited due to the small study sample size.

Cause-and-effect relations cannot be drawn due to the design of the study which was cross-sectional.

Since self-structured questionnaires were used to collect data from participants, the results might be affected by social desirability and recall bias.

Instead of observing nursing personnel by oneself, it is judged what is being reported to be done in clinical practice.

5.2 Recommendations

Nurses should be involved in periodic in-service training and continuing education courses on SSI prevention.

Periodic training and hand refreshing courses on hospital based Evidenced-based SSI prevention guidelines should be conducted.

By clinical audits and supportive monitoring, infection prevention and control committees should regularly evaluate nurses' practices through.

All surgical units should have access to WHO infection prevention recommendations and SOPs (Standard Operating Procedures).

If nurses, hospital management should encourage them to attend seminars and other teaching programs on infection prevention.

To obtain more generalizable findings in the future, research with a larger sample and from multiple hospitals in different parts of Pakistan should be conducted.

To get more accurate assessments of nursing practice, future researchers should explore observational methods in addition to surveys.

Any factors associated with the knowledge and practice of nursing in health facilities such as education level, years of service, and previous training in infection control should be the subject of future research.

Declarations

Availability of data and materials: The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Conflicts of interest: The authors declare no conflict of interest.

Author contributions: All authors contributed to study conception and design, data collection, analysis and interpretation of results, and manuscript preparation. All authors read and approved the final manuscript.

Acknowledgements: All the authors thank to the administration and nursing staff of DHQ Teaching Hospital, KDA Kohat and Liaquat Memorial Hospital Kohat.

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Artificial Intelligence (AI) Use Disclosure: The authors declare that no artificial intelligence tools were used in the preparation of this manuscript.

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