- *Basic Research*

Assessment of Nurses' Knowledge and Practices Regarding Prevention of Surgical Site Infection

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Abstract:
Surgical site infection (SSI) is a significant clinical problem for hospitalized surgical patients. SSIs contribute substantially to surgical morbidity and mortality each year. Surgical site infection (SSI) accounts for 15% of all nosocomial infections and, among surgical patients, represents the most common nosocomial infection. Knowledge and practices of nurses play a key role in the prevention of the spread of infection. Objective: This study aimed to assess nurses' knowledge and practices regarding the prevention of surgical site infection. Setting: The study was conducted at oncology surgical wards, Digestive system surgical wards, and hepatobiliary surgical ward at Alexandria Main University Hospital. Tools: Data was collected through Socio-demographic and work characteristics interview schedule, questionnaire of nurses' knowledge and practices regarding prevention of surgical site infection. Results: The study result revealed that the total scores of knowledges were good. While poor level of practices towards prevention of surgical site infection was noted. The results of this study revealed that, despite having good knowledge, the nurses surveyed had poor practices, indicating the urgent need for workshops and training programs to improve nurses' practices regarding prevention of surgical site infection. Conclusion According to the findings, the nurses in this study had a good level of knowledge but poor level of practice regarding prevention of surgical site infection. Moreover, in this study correlation between knowledge and practice was positive. Recommendations Nurses should attend updated conferences and in-service training program/or workshops, about infection control especially surgical site infections.

Keywords: Nurses, Knowledge and Practices, Surgical Site Infection SSI.

Introduction:

According to the World Health Organization (WHO), health-care-associated infections are a growing health-care concern that affects millions of individuals every year**.** According to recent studies in developed countries, at least 5% of hospitalized patients become infected. The most prevalent healthcare-associated infections (HAIs) were surgical site infections (SSIs), which accounted for more than 30% of HAI cases in most studies **(1).** 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)**. In addition, surgical site

infections result in a considerable financial burden to healthcare providers. In addition, increased numbers of infections are now being seen in primary care because patients are allowed home earlier following day case and fast-track surgery [4].

Infections at the surgical site are defined as infections that arise within 30 days of the procedure [5]. In developed countries, it affects up to 5% of all surgical operations, while in developing countries, it impacts substantially more (5.5 to 25%). A surgical site infection (SSI) is an infection that develops after surgery in the body part where the procedure was performed. Surgical site infections can be superficial infections that just affect the skin [6]. Other surgery site infections are more dangerous, affecting tissues beneath the skin, organs, and implanted materials [7].

SSIs occur when a bacteria is present within a wound, bacteria can be transmitted via touching surgeons' or nurses' hands, by being airborne during surgery, or by the patient coming into contact with bacteria after surgery .Streptococcus pyogenes and staphylococcus aureus are the most prevalent bacteria that cause surgical site infections[8].

SSIs have been associated in the literature to advanced age, malnutrition, metabolic problems, smoking, obesity, hypoxia, and immune suppression (9) Surgical site infections can be caused by a number of circumstances, including 1) all abdominal operations; 2) all operations lasting more than two hours; 3) a contaminated or dirty wound site; and 4) patients who had three or more co-morbidities when they left the hospital (10). A high BMI, re-operation, and the use of a post-surgical drain all increased the risk of surgical site infection, in addition to a contaminated or unclean wound site [11].

In an effort to reduce SSIs, various preventive measures have been proposed, as outlined by the Centers for Disease Control and Prevention and the Medicare Quality Improvement Community's Surgical Care Improvement Project. These involve patient and skin preparation, surgical team hand/forearm antisepsis, antimicrobial prophylaxis within 1 hour of incision, restriction of operating room traffic, hair clipping in the operating room, patient core body temperature control, asepsis, meticulous surgical technique, and postoperative incision care [12-13].

Nurses are in a unique position to engage in or lead programs aimed at reducing the incidence of SSI and thereby improving patient safety [14]. Nurses, unlike other health care providers, spend most of their time with patients and are responsible for the majority of SSI preventive measures [15]. This shows that nurses are the primary responsible bodies and can play a key role in preventing efforts by improving the quality of care they deliver, such as; improving the improper use of prophylactic antibiotics, poor hand hygiene practice,

improper donning and doffing of personal protective equipment, skin preparation practices and proper implementation of all other surgical safety checklists[14]

The level of nurses' cognition in terms of remembering, comprehending, and using procedures for preventing SSI in pre-operative and post-operative care is referred to as knowledge concerning the prevention of SSI (16). Preserving personal cleanliness and skin preparation, controlling underlying medical conditions, maintaining nutritional status, and administering antibiotic prophylaxis are all part of pre-operative care (17). Surgical wound care with aseptic precautions, wound assessment and SSI monitoring, and nutritional support are all part of post-operative care. Practice regarding prevention of SSI refers to the level of nurses' perception of their actions in imitating, manipulating, and precision in the prevention of SSI during pre-operative and post-operative care. The study's main goal was to analyze nurses' knowledge and practices regarding surgical site infection prevention [18].

Significant of study:

SSI prevention is the key element of applying the concept of patient safety and quality care [19]. Surgical site infections (SSI) represent a burden on the health care system especially in developing countries with significant morbidity and mortality [20]. Nurses, working around the clock, are in an ideal position to participate or play a leading role in taking initiatives that aimed to ensure quality of care and thus to enhance patient safety which includes prevention of SSIs [REFRE]. However, a significant number of studies indicated that most nurses lacked the required knowledge about prevention of SSIs and most of them did not practice properly according to evidence-based guidelines and recommendations [21-22]. SO, the main objective of the study was to assess nurses' knowledge and practices regarding the prevention of surgical site infection

Aim of the Study:

The study aim was to assess nurses' knowledge and practices regarding the prevention of surgical site infection.

Research Question

1.What is the level of Nurses' knowledge regarding prevention of surgical site infection
2.What is the level of nurses' practice regarding prevention of surgical site infection

Research Design:

Descriptive research design was utilized for this study.

Settings:

This study was conducted at oncology surgical wards, Digestive system surgical wards, and hepatobiliary surgical ward at Alexandria Main University Hospital

Subjects:

A convenience sample of 40 nurse who recruited in the above-mentioned setting and were responsible for wound dressing.

The study sample was estimated based on the Epi-info -7 program using the following parameters:

1- Population size: 40 nurses
2- Expected frequency: 50%
3- Acceptable error: 10%
4- Confidence coefficient: 95%
5- Minimum sample size: 40

Inclusion criteria:

Nurses were considered eligible to participate in the study if they met the following criteria:

5. Agreeing to participate in the study
6. Experience in surgical unit more than 5 years

Exclusion criteria:

1- Head nurses
2- Student nurses

Tool:

Two tools were used by the researchers to collect the necessary data based on the review of relevant literature.

Tool I: A socio-demographic and work characteristics interview schedule:

It was developed by the researcher after reviewing related literature and includes7 items about nurses age, sex, educational level, marital status, years of experience, previous training about infection control.

Tool II: Nurses knowledge and practices regarding prevention of surgical site infection

The questionnaire developed by Sickder et al (2014) [23], was adopted and was used to assess level of Nurses' knowledge and practices regarding prevention of surgical site infection the questionnaire was divided into 25 items for knowledge and 25 items for practice, and was split into two parts:

Part I: Nurses Knowledge regarding prevention of surgical site infection:

This part contains 25 multiple-choice questions, each with three options. Two of the alternatives were incorrect, while the third had the correct answer. For each question, the correct response was given a "1" while the incorrect response was given a "0." Participants with more than 14 right answers were labelled as having "Good knowledge," while those with less were labelled as having "Poor knowledge."

Part II: Nurses practices regarding prevention of surgical site infection

This section of the tool has 25 statements on a 5-point Likert scale (range from "never practice=1," "rarely practice=2," "sometimes practice=3," "often practice=4," and "always practice=5"). Participants who were habituated to doing preventive activities such as usually and often practice of more than 14 questions were classified as "Good Practice," whereas those who did not practice at all, seldom, or only occasionally were classified as "Poor Practice."

Method

The study was accomplished as follows:

- An official letter from Alexandria University, Faculty of nursing was submitted to the general directors of the surgical departments, Alexandria Main University Hospital. Permission to carry out the study was secured after complete explanation of the study aim.
- The study tools were tested for content validity by five experts in the field of Medical-Surgical nursing Alexandria University. Comments and suggestions were considered, and the tool was modified accordingly.
- The reliability of the developed tool was tested by using Cronbach's Alpha test the validity for tool I was 97.5%. tool II was 0.92, which mean the tools were reliable
- A pilot study was conducted on 10% of the study sample in order to evaluate the clarity and applicability of the study tool. Necessary modifications were done prior to data collection, and the final form of tools was reconstructed and ready for use.
- In order to meet the study's goal, the final draught of the structured tool was employed to gather data. The researcher used a personalized interview to obtain data for each nurse. A month's worth of data was collected (December 2019).

Ethical considerations

- Written consent was obtained from nurses after explanation the aim of the study.
- Approval from ethical committee was obtained
- Confidentiality and privacy of the collected data were secured.
- Nurses right to withdraw from research was considered and respected.

Statistical Analysis

- After the data was gathered, it was coded and converted into special design forms so that it could be fed into a computer. To avoid errors during data entering, checking and verification steps were carried out afterward. The Statistical Package for Social Sciences "SPSS" software version 20 was used to compute and statistically analyze the data. Count (numbers) and percentage, used for describing and summarizing qualitative data.

1- Mean, median and standard deviation, used for describing and summarizing quantitative data.
2- Minimum- Maximum used for presenting nonparametric quantitative data.

3- Significance of the obtained results was judged at the 5% level.
4- Cronbach's alpha reliability test: It was used to measure the reliability of the developed tools.

The used tests were

1 - Student t-test

For normally distributed quantitative variables, to compare between two studied groups

2 - F-test (ANOVA)

For normally distributed quantitative variables, to compare between more than two groups

3 - Pearson coefficient

To correlate between two normally distributed quantitative variables

Results:

Table (1) shows the distribution of studied nurses according to their socio-demographic characteristics. The age of the studied nurses ranged from 20 to 59 years and two fifth 40 % of them ranged between 50 to 59 years. The table also shows that around three quarter of nurses (80%) were married and all studied nurses were female. On the other hand, it was noticed that the majority 92.5% of the studied nurses had diploma level; while 7.5% of them had technical institute, no bachelor degree noticed.

Regarding of experience, more than half of the studied nurses (57.5%) had more than 20 years of experience in nursing. It was also noticed that about (32.5%) of the studied nurses receive training regarding infection control with a mean score 3.0 ± 2.45

Table (2): Describe the responses of the studied nurses to each of the knowledge question, The nurses scored the highest marks for the question on which laboratory is used to ensure SSI (87.5), the laboratories used in assessing patient's nutritional status (80%), and how to disinfect surgical site before surgery (75%). However, they scored the lowest on questions about how to prevent infection in patients with immunodeficiency disorder (only 12 % answered correctly), the best method for pre-operative shaving& the best time for pre-operative hair removal (only 20 % answered correctly), when should surgical patients receive prophylaxis antibiotics (22 %), and the best agent for pre-operative skin preparation (27.5 %)

Figure (1) Show distribution of the studied nurses according to total knowledge regarding prevention of surgical site infection. More than half of studied nurses (57.5%) had good knowledge regarding prevention of surgical site infection. While (42.5%) of them had poor knowledge with total mean score38.05 ± 3.80

Table (3): Describe the responses of the studied nurses to each of the practice question. It was found that 55% of the nurses who participated in this study had poor practice in preventing SSI (Figure 2). This indicates that the nurses had good knowledge but exercised poor practice towards the prevention of SSI. Because most of them claimed that they

sometimes practiced washing hands before and after changing wound dressing and touching the surgical site (45. %); perform pre-operative shaving right before surgery (47%). Beside most of the nurses who claimed that they never assess the patient's body mass index (BMI) before and after surgery 70%, and about 55% never used Alcohol and chlorohexidine gluconate (CHG) as antimicrobial for patient's skin preparation in surgical ward , and 20% never perform pre-operative shaving right before surgery.

Figure (2) : Show distribution of the studied nurses according to total practices regarding prevention of surgical site infection, .More than half of studied nurses (55.0%) had Poor practice regarding prevention of surgical site infection. While (45.0%) of them had Good practice with total mean score 81.27 ± 21.66

Table (4): Show relation between percent score of knowledge with socio-demographic data. Regarding age statistically significant difference was noticed between nurses age and their knowledge with (p = 0.009).The nurses in the age group between 50-59 years had higher mean score 60.50 ± 14.30 . Regarding the educational level, no statistically significant difference was found between nurses educational level and their knowledge with (p = 0.085). As well as, it was noticed that, the higher mean score 52.76 ± 15.66 was found among nurses who had a Diploma of secondary technical school of nursing. Statistically significant difference was noticed between nurse's experience and level of knowledge with (p = 0.023) in which nurses above years 20 experience had higher mean score 58.09 ± 11.93 than other. On the other hand statistically significant difference was noticed between nurse's training program regarding infection control and level of knowledge with (p = 0.022) in which nurses receive training program regarding infection control had higher mean score of knowledge 60.00 ± 15.75 .

Table (5): Show relation between percent score of practice with socio-demographic data. Regarding age statistically significant difference was noticed between nurses age and their practice with (p = 0.001) with higher mean score 72.88 ± 15.98 with found between age 50-59. Regarding the educational level, statistically significant difference was found between nurses educational level and their practice with (p = 0.045). As well as, it was noticed that, the higher mean score 58.22 ± 21.37 was found among nurses who had a Diploma of secondary technical school of nursing. Statistically significant difference was noticed between nurse's experience and level of practice with (p = 0.007) in which nurses above years 20 had higher mean score 63.52 ± 21.15 than other. On the other hand statistically significant difference was noticed between nurse's training program regarding infection control and level of practice with (p = 0.001) in which nurses receive training program regarding infection control had higher mean score of practice74.46 ± 15.63.

Table (6): Revealed that, there was statistically significant indicated a positive correlation between knowledge and practice regarding prevention of surgical sit infection among studied nurses.

Table (1): Distribution of the studied nurses according to socio-demographic characteristics (n = 40)

Q	Socio-demographic characteristics	No.	%
1	**Age (years)**		
	20 – < 30	5	12.5
	30 – <40	14	35.0
	40 – < 50	5	12.5
	50 – 59	16	40.0
2	**Sex**		
	Male	0	0.0
	Female	40	100.0
3	**Marital Status**		
	Married	32	80.0
	Divorced	4	10.0
	Widow	2	5.0
	Single	2	5.0
4	**Level of Education**		
	Technical institute nursing degree	3	7.5
	Diploma of secondary technical school of nursing	37	92.5
	Others	0	0.0
5	**Experience (Years)**		
	0 – 5 years		
	6 – 10 years	3	7.5
	11 – 15 years	7	17.5
	16 – 20 years	7	17.5
	Aboveyears20	23	57.5
6	**Have you ever taken any training regarding infection control**		
	Yes	**13**	**32.5**
	No	27	67.5
7	**If yes mention the number of training program you attend (n=13)**		
	Min. – Max.	1.0 – 13.0	
	Mean ± SD.	3.0 ± 2.45	

Table (2): Distribution of the studied nurses according to nurses' knowledge regarding prevention of surgical site infection (n = 40)

Q	Nurses Knowledge regarding prevention of surgical site infection	Incorrect		Correct	
		No.	%	No.	%
1	Which one is the best method for pre-operative shaving?	32	80.0	8	20.0
2	When is the best time for pre-operative hair removal?	34	85.0	6	20.0
3	Which one is the best agent for pre-operative skin preparation?	29	72.5	11	27.5
4	What is the purpose for pre-operative skin preparation?	18	45.0	22	55.0
5	How would you disinfect surgical site before surgery?	10	25.0	30	75.0
6	Which one is true answer for prophylaxis antibiotic?	11	27.5	29	72.5
7	When should you administer prophylaxis antibiotic to surgical patients?	31	77.5	9	22.5
8	What is the purpose of pre-operative showering?	22	55.0	18	45.0
9	What is the best skin agent for pre-operative showering to prevent surgical site infection?	14	35.0	26	65.0
10	Which one is correct for the malnourished surgical patients?	9	22.5	31	77.5
11	What are laboratories in assessing patient's nutritional status?	8	20.0	32	80.0
12	What is the correct level of blood sugar which enhances function of white blood cell adequate to prevent SSI?	11	27.5	29	72.5
13	What is the best antiseptic solution to disinfect the surface of dressing trolley?	27	67.5	13	32.5
14	Which is the correct purpose for surgical hand washing?	10	25.0	30	75.0
15	Which are the correct steps of hand washing?	17	42.5	23	57.5
16	Which one is the correct answer for the benefit of wound dressing?	16	40.0	24	60.0
17	When do you change the surgical wound dressing?	29	72.5	11	27.5
18	How do you select dressing solution?	21	52.5	19	47.5
19	What is the purpose of maintenance of normal nutritional status for surgical patients?	11	27.5	29	72.5
20	What kinds of diet should be provided for the post-operative patients?	12	30.0	28	70.0
21	Which one is the correct answer for surgical patients with compromised immune system?	11	27.5	29	72.5
22	How do you prevent infection of patients with immunodeficiency disorder?	35	87.5	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. Mean ± SD.	30.0 – 44.0 38.05 ± 3.80			

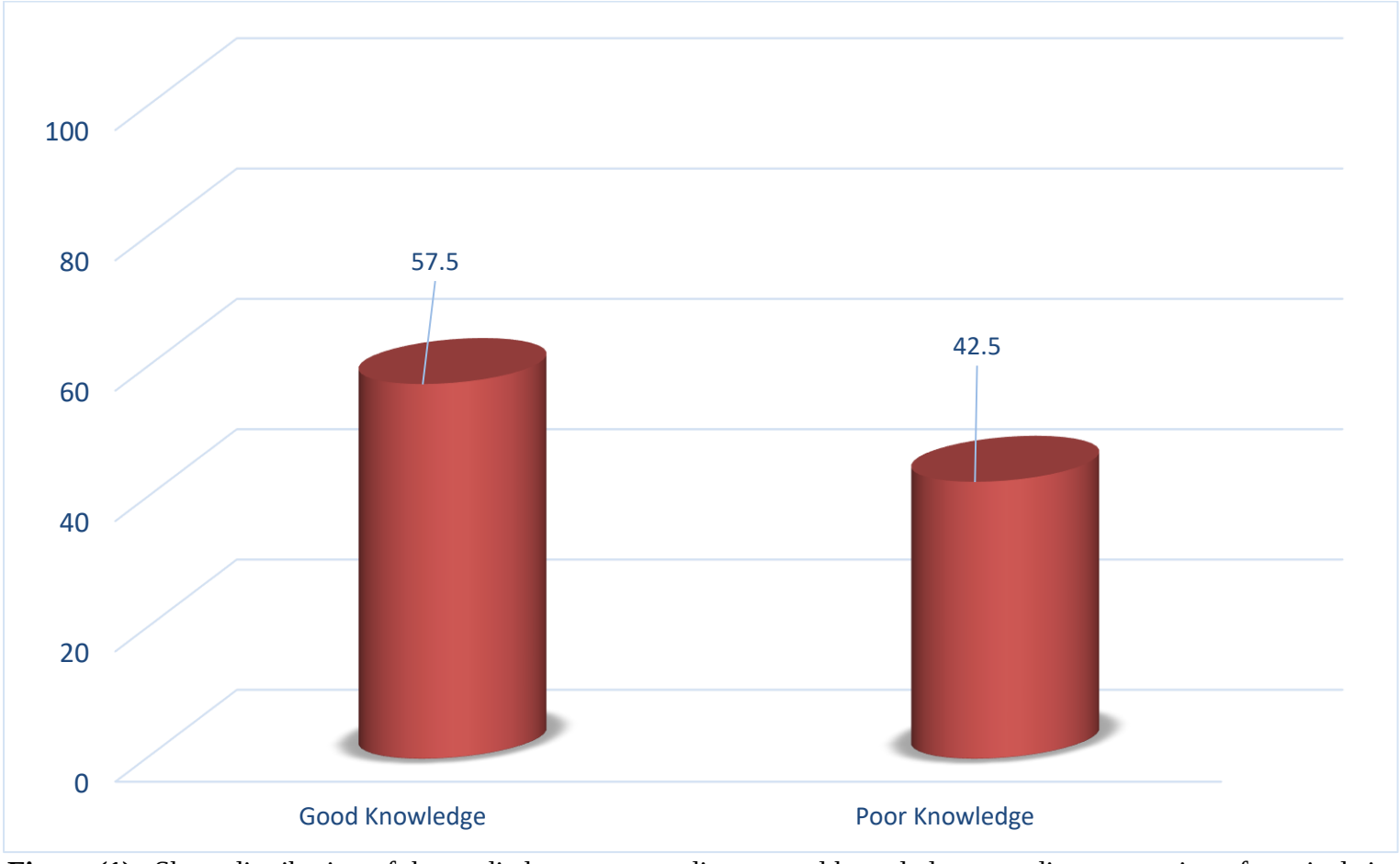

Figure (1) Show distribution of the studied nurses according to total knowledge regarding prevention of surgical site infecti

Table (3): Distribution of the studied nurses according to nurses' practices regarding prevention of surgical site infection (n = 40)

Q	Nurses' practices regarding prevention of surgical site infection	Never practice		Rarely practice		Sometime practice		Often practice		Al ways practice	
		No.	%	No.	%	No.	%	No.	%	No.	%
1	Alcohol and chlorohexidine gluconate (CHG) is the most commonantimicrobials used for patient's skin preparation in my ward	22	55.0	4	10.0	10	25.0	2	5.0	2	5.0
2	I Advise the patient to shower before surgery with antimicrobial agents	0	0.0	8	20.0	14	35.0	0	0.0	18	45.0
3	I wash my hands before and after changing wound dressing and touching the surgical site	4	10.0	4	10.0	18	45.0	4	10.0	10	25.0
4	I wash my hand before wearing sterile gloves	4	10.0	12	30.0	16	40.0	0	0.0	8	20.0
5	I perform pre-operative shaving right before surgery	8	20.0	6	15.0	19	47.5	0	0.0	7	17.5
6	I administer pre-operative prophylactic antibiotic within one hour before surgery	2	5.0	4	10.0	22	55.0	4	10.0	8	20.0
7	I advise my patient to take pre- operative showering 6 to 12 hours before surgery	7	17.5	13	32.5	6	15.0	6	15.0	8	20.0
8	I perform prescribed glucose test before and after surgery in a diabetic patient	2	5.0	10	25.0	12	30.0	2	5.0	14	35.0
9	I administer injection insulin or give oral medication as ordered in a diabetic patient	0	0.0	6	15.0	16	40.0	4	10.0	14	35.0
10	I assess my patient's body mass index (BMI) before and after surgery	28	70.0	8	20.0	4	10.0	0	0.0	0	0.0
11	I advise a malnourished patient to intake nutritious (especially protein) diet	2	5.0	4	10.0	22	55.0	0	0.0	12	30.0
12	I advise my patient to take vegetables and fruits before and after surgery	2	5.0	4	10.0	26	65.0	0	0.0	8	20.0
13	I advise my patient with compromised immune system avoiding contact with people who have infections	2	5.0	0	0.0	24	60.0	6	15.0	8	20.0
14	I advise and obese patient to less intake of carbohydrate	2	5.0	5	12.5	19	47.5	4	10.0	10	25.0

Continue Table (3): Distribution of the studied nurses according to nurses' practices regarding prevention of surgical site infection (n = 40)

15	I use sterilized dressing materials for cleansing surgical wound dressing	0	0.0	4	10.0	18	45.0	0	0.0	18	45.0
16	I use povidone-iodine and normal saline for cleansing surgical wound dressing	0	0.0	2	5.0	22	55.0	0	0.0	16	40.0
17	I use an aseptic technique during surgical wound dressing	0	0.0	3	7.5	19	47.5	0	0.0	18	45.0
18	I learn shaving method from others and apply to pre-operative patients	8	20.0	12	30.0	10	25.0	6	15.0	4	10.0
19	I used aseptic technique during obtaining swab culture	0	0.0	11	27.5	11	27.5	4	10.0	14	35.0
20	I advise an immunodeficiency disorder patient to maintain personal hygiene	0	0.0	6	15.0	22	55.0	2	5.0	10	25.0
21	I assess and monitor surgical site condition	2	5.0	9	22.5	17	42.5	0	0.0	12	30.0
22	I separate infected from non-infected cases during dressing	6	15.0	6	15.0	14	35.0	6	15.0	8	20.0
23	I use face mask during cleansing surgical wound dressing	0	0.0	8	20.0	14	35.0	0	0.0	18	45.0
24	I clean and disinfect the surface of the dressing trolley with antiseptic solution	2	5.0	2	5.0	18	45.0	4	10.0	14	35.0
25	I discard the soiled material in the proper place after performing wound dressing	0	0.0	0	0.0	22	55.0	0	0.0	18	45.0
	Total score Min. – Max. Mean ± SD.										57.0 – 109.0 81.27 ± 21.66

Figure (2): **Show distribution of the studied nurses according to total practices regarding prevention of surgical site infection**

Table (4): Relation between percent score of kn87owledge with socio-demographic data (n = 40)

Socio-demographic data	N	% Score of knowledge		Test of Sig.	p
		Min. – Max.	Mean ± SD.		
Age (Years)					
20 – < 30	**5**	20.0 – 64.0	49.60 ± 18.24	F= 4.480*	0.009*
30 – <40	**14**	24.0 – 64.0	49.14 ± 12.79		
40 – < 50	**5**	32.0 – 40.0	36.80 ± 3.35		
50 – 59	**16**	20.0 – 76.0	60.50 ± 14.30		
Level of Education					
Technical institute nursing degree	**3**	40.0 – 48.0	45.33 ± 4.62	t= 2.003	0.085
Diploma of secondary technical school of nursing	**37**	20.0 – 76.0	52.76 ± 15.66		
Experience (Years)					
6 – 10 years	**3**	32.0 – 60.0	50.67 ± 16.17	F= 3.567*	0.023*
11 – 15 years	**7**	20.0 – 60.0	41.14 ± 12.59		
16 – 20 years	**7**	20.0 – 68.0	44.57 ± 19.79		
Aboveyears20	**23**	36.0 – 76.0	58.09 ± 11.93		
Have you ever taken any training regarding infection control					
Yes	**13**	20.0 – 76.0	60.00 ± 15.75	t= 2.382*	0.022*
No	**27**	20.0 – 68.0	48.44 ± 13.69		

t: Student t-test **F**: **F for ANOVA test**

p: p value for association between different categories

Table (5): Relation between percent score of practice with socio-demographic data (n = 40)

Socio-demographic data	N	% Score of practice		Test of Sig.	p
		Min. – Max.	Mean ± SD.		
Age (Years)					
20 – < 30	**5**	36.0 – 78.0	46.60 ± 17.64	F= 8.955*	<0.001*
30 – <40	**14**	32.0 – 82.0	47.79 ± 20.36		
40 – < 50	**5**	34.0 – 39.0	36.60 ± 1.95		
50 – 59	**16**	41.0 – 84.0	72.88 ± 15.98		
Level of Education					
Technical institute nursing degree	**3**	32.0 – 33.0	32.33 ± 0.58	t= 2.073*	0.045*
Diploma of secondary technical school of nursing	**37**	33.0 – 84.0	58.22 ± 21.37		
Experience (Years)					
6 – 10 years	**3**	38.0 – 39.0	38.67 ± 0.58	F= 4.671*	0.007*
11 – 15 years	**7**	32.0 – 41.0	36.00 ± 4.16		
16 – 20 years	**7**	33.0 – 83.0	60.29 ± 23.19		
Aboveyears20	**23**	34.0 – 84.0	63.52 ± 21.15		
Have you ever taken any training regarding infection control					
Yes	**13**	39.0 – 84.0	74.46 ± 15.63	t= 4.504*	<0.001*
No	**27**	32.0 – 82.0	47.52 ± 18.60		

t: Student t-test **F**: **F for ANOVA test**

p: p value for association between different categories

Table (6): Correlation between knowledge and practice (n = 40)

	r	p
Knowledge vs. Practice	0.635*	<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)].

In the literature, majority of studies conducted in this regard are related to nursing staff. Though nursing staff is crucial to the success of any preventive program aimed at reducing the incidence of infection [(15)]. So, the researchers conducted this study among staff nurses to assess their knowledge and their practices towards prevention of SSI because these are the subjects who are involved in patient care for pre-operative period, intraoperative and post-operative management round the clock[(23)].

Concerning gender, all studied nurses included in this research were female. This study result is in line with study finding conducted by **(Mwakanyamale, 2013)** [(25)] who reported that Majority of the respondents in their study (76.5%) were female nurses. This percent of females in the study can be explained by the dominance of the nursing profession in Egypt.

The result of our study showed that almost of study participants not had previous infection control training and most of them had diploma level; while 7.5% of them had technical institute, and no bachelor's degree noticed, and from the researcher point of view this finding emphasizes the need to schedule regular infection control training sessions to train them. The findings of this study are similar to a study conducted by **(Patil et al., 2018)** [(9)] who revealed almost 60% of study participants hadn't had previous infection control training and the majority of them were interns and junior residents as well as **(Chipfuwa et al., 2014)**[(26)] reported that in similar study about Barriers to infection prevention and control (IPC) practice among nurses ; Majority of nurses did not attend any workshop on IPC which contributed to poor IPC practice.

Regarding distribution of the studied nurses according to total knowledge about prevention of surgical site infection. More than half of studied nurses (57.5%) had good knowledge level regarding prevention of surgical site infection. This study finding was contradictory with study finding in Jordanian **(Qasem MN, Hweidi IM, 2017)**[(27)] they revealed that the analysis of total knowledge scores of the total sample showed that Jordanian registered nurses working in acute care settings knowledge level regarding evidence based guidelines for the prevention of SSIs was low based on their median score.

This study examines the level of nurse's practice regarding the prevention of SSIs, and less than half (45.0%) of them were found to have a good practice regarding the prevention of SSI. This means, in the reverse more than half of the nurses were practicing poorly regarding the prevention of SSI. This finding is in agreement with studies conducted in Bangladesh, Nigeria, and Ethiopia (Amhara regional state), in which the level of nurse's practice towards prevention of SSIs was at a low level **[28].** The possible interpretation of these findings from the researcher point of view is that there are various factors that might be affecting SSI prevention practices among nurses. These includes insufficient practice resources, inadequate in-services training and refreshing of skills; and lack of proper SSI preventive guidelines.

This result is supported by a study conducted in Tanzania which showed more than half of the participants 57.7% practices were poor regarding postoperative wound care **(Mwakanyamale, 2013)** [25] However, the finding is in contrast with a study in Pakistan and another study in Bangladesh in that the overall practice of staff nurses regarding preventing and managing surgical site infection was at a good level **[5].** This difference might be due to differences in sample size, attitude, training and workload of nurses regarding prevention of SSI.

The result showed that there is a statistically significant difference was noticed between nurse's experience and level of practice in which nurses above years 20 had a higher mean score of 63.52 ± 21.15 than others. We found a statistically significant association between the number of years in practice and the investigated outcome of interest. This result could be ascribed to while the number of years in practice increases, nurses become more experienced about infection prevention through working with senior medical staff **[29].**The Researcher possible examination for this finding Moreover, with increasing work experience in clinical settings, their motivation for further learning and respecting updated guidelines will increase

Regarding relation between nurse's training program and percent score of knowledge there were statistically significant difference was noticed between nurse's training program regarding infection control and level of knowledge in which nurses receive training program regarding infection control had higher mean score of knowledge. This finding is supported by **(Patil et al., 2018) [9]** who emphasizes the significance of offering training programs on infection control protocols at frequent intervals for freshly joined learners, personnel nurses, and advisors.

Concerning to relation between percent score of practice with socio-demographic data. Regarding age statistically significant difference was noticed between nurses age and their

practice with (p = 0.001) with higher mean score 72.88 ± 15.98 with found between age 50-59. This finding is supported by**(Mwakanyamale, 2013)[25]** who reported that younger nurses had poor postoperative wound care compared to older ones .This is be attributed by lack of experience in nursing care .

These findings are further supported by**(Teshager et al., 2015**) [1] who noticed that age of the study participants was one of the sociodemographic factors which were significantly associated with the practice of activities of prevention of surgical site infection. Positive association of year of service with practice of infection prevention activities can be explained by the fact that practice makes perfect, which means they might have improved their practice from year to year.

Moreover, statistically significant difference was noticed between nurse's experience and level of practice in which nurses above years 20 had higher mean score than other. As well as statistically significant difference was noticed between nurse's training program regarding infection control and level of practice. This goes on line with **(Hussien ME, 2012) [30]** who recommended that attending continuing education courses about hospital infection had a positive effect on infection control procedures and compliance with universal precautions

Based on the findings of the study, it is concluded that though nurses working in the surgical wards demonstrated evidence of good knowledge of SSIs prevention, the level of knowledge did not translate into desired practices on SSIs prevention. The authorities of hospitals too should provide on regular basis the necessary consumables and supplies to ensure strict adherence to SSIs prevention guidelines **[28].** In the same way, the use of education, information and communication materials need to be conspicuously displaced in and around the ward to help keep nurses on their toes on infection prevention. Lastly, there is need for patients' education and empowerment on their rights and the responsibilities and obligations care providers owe them. This is important to enable them to realize when their rights are being trampled upon and their safety threatened by the negligence of care providers **[28].**

Recommendations

Based on the findings of the present study

1- Nurses should attend updated conferences and in-service training program/or workshops, about infection control especially surgical site infections.
2- The nursing curriculum should be adjusted to include the prevention of surgical site infection in the contents.
3- Similar studies should be carried out in other words, including operating rooms, as well as other hospitals.

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الملخص العربي

تقييم معلومات وممارسات الممرضات المتعلقه بالوقايه من العدوى مكان الجراحه

ملخص البحث

المقدمه: تعد عدوى مكان الجراحه من المشاكل السريرية الكبيرة لمرضى الجراحة في المستشفيات. وتساهم عدوى مكان الجراحه بشكل كبير في معدل حدوث الوفيات والامراض بين المرضي الخاضعين للجراحه كل عام. وتمثل عدوى مكان الجراحه حوالي15 ٪ من جميع حالات عدوى المستشفيات ، تعتبر عدوى المستشفيات هي الأكثر شيوعًا بين مرضى الجراحة. وبذلك تلعب معرفة وممارسات الممرضات دورًا رئيسيًا في منع انتشارهذه العدوى. **هدف البحث:** تقييم معرفة وممارسات الممرضات فيما يتعلق بالوقاية من عدوى مكان الجراحة.**اسئلة البحث :** سوف تجيب هذه الدراسه عن الاسئله الاتيه , ما هو مستوى معرفة الممرضات فيما يتعلق بالوقاية من عدوى مكان الجراحه,ما هو مستوى ممارسات الممرضات فيما يتعلق بالوقاية من عدوى مكان الجراحه **مكان البحث:** اجريت الدراسة في ثلاثة أقسام جراحية وهي جراحة الأورام وجراحة الجهاز الهضمي وجراحة الكبد والمراره بمستشفى الرئيسى الجامعى جامعه الاسكندريه .

عينه البحث : عينه ملائمه مكونه من 40 ممرضه . **ادوات البحث:** تم جمع البيانات من خلال جدول المقابلات الاجتماعية والديموغرافية وخصائص العمل ، واستبيان معرفة وممارسات الممرضات فيما يتعلق بالوقاية من عدوى مكان الجراحه.

تصميم البحث: اجريت هذه الدراسه باستخدام تصميم وصفى.

النتائج: أوضحت نتائج الدراسة أن مجموع درجات المعرفة كانت جيدة. بينما يوجد ضعف في مستوى الممارسات لدى الممرضات تجاه الوقاية من عدوى مكان الجراحه. أظهرت نتائج الدراسة الحالية أنه على الرغم من المعرفة الجيدة ، فإن الممرضات ا لديهن ممارسات سيئة مما يشير إلى الحاجة الضروريه لورش عمل وبرامج تدريب لتحسين ممارسات الممرضات فيما يتعلق بالوقاية من عدوى مكان الجراحه.

الخلاصة: علي ضوء هذه النتائج نستخلص أن الممرضات في هذه الدراسة يتمتعن بمستوى جيد من المعرفة ومستوى ضعيف من الممارسات فيما يتعلق بالوقاية من عدوى مكان الجراحة. علاوة على ذلك ، وجد في هذه الدراسة أن العلاقة بين المعرفة والممارسة إيجابية.

التوصيات : افضت نتائج هذه الدراسه الي التوصيات الاتيه 1-يجب على الممرضات حضور المؤتمرات وبرامج التدريب و ورش العمل عن مكافحة العدوى وخاصة عدوى مكان الجراحة.