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Evaluation of Nurses Knowledges, Practices and Associated Factors Regarding Prevention of Surgical Site Infection

Arbëresha Gurguri
Faculty of Public Health
University "Ismail Qemali" Vlorë, Albania

Abstract:- Surgical site infection (SSI) is one of the most common types of Healthcare-Associated infection accounting for 14% to 16% of all nosocomial infections among hospitalized surgical patients. SSI is a significant clinical problem associated to post-operative morbidity ,resulting serious consequences in patients' health , prolonged hospital stay and increasing costs.

- ***Purpose of the study:***

Aimed at assessing level of knowledge of nurses and associated factors regarding prevention of SSI in surgical units of Vlora and Fier Hospital and to determine relationship between both variables.

- ***Method and Material:***

A cross-sectional descriptive study included 66 randomly selected nurses who completed an anonymus questionnaire regarding surgical site infections during the period of study .The statistical analysis included the calculation of averages, frequencies and percentages while the Chi-Square test was used for the relationship between the variables . To see the relative effect of independent variables on the dependent variable, regression analysis was carried out.

- ***Results:***

The findings revealed that the majority of nurses (65%) had average knowledge and good practices (46%) regarding the prevention of surgical site infection. There was a significant relationship between the gender of the nurses and level of knowledge (p=0.001).Regarding nursing practice, there were significant relationships between age of nurses and level of practices (p=0.017). One area of their knowledge were at very low level including understanding prevention of infection for lengthy operation . Some areas of practices were less practicing including: advising patients to shower before surgery with antimicrobial agents. There were no statistically significant differences between knowledges and practice of the respondents in both hospitals while there have been observed some important relationships between specific questions of knowledge with nurses practices.

- ***Conclusions:***

The results suggest that increasing knowledge and focusing on some certain areas of prevention of SSI in practice need to be improved ,with a direct impact on patient's life and enhancing health care quality.

Keywords:- *Knowledge, Nurses, Practice, Prevention, Surgical Site Infection.*

I. INTRODUCTION

SSI is one of the most common nosocomial infections in surgical patients. In United State of America Surgical site infection account for 14%-16% of all health care associated infections [1].

Surgical site infection (SSI) is defined as an infection that occurs after an operation within 30 days if no implant or within one year if an implant is inserted into the organ [1].

Risk factors associated with the development of SSI are Intrinsic and extrinsic factors. Intrinsic factors referred to advance age, malnutrition, metabolic diseases, smoking, obesity, hypoxia, immune suppression, and length of pre-operative stay[2]. Extrinsic factors referred to duration and application of skin antiseptics, preoperative shaving, antibiotic prophylaxis, pre-operative skin preparation, inappropriate sterilization of instruments, surgical drains, surgical technique, surgical hand scrubs, and dressing techniques [2]. 25 % of infections can be prevented by nurses by implementing standard precautionary measures during care of the surgical patients. Nurses can help to prevent surgical site infection, reduces patient costs, economic burden and increase patient's quality of life through their knowledge and recommended practices[3].

This study is an attempt to asses knowledge of health care professionals about SSI control and their usual practices in operation theatres/wards to control or prevent them. The study findings will help the organizations in developing the training programs by evaluating the gaps between knowledge and practices of nurses related with prevention of surgical site infection. Appropriate knowledge and good practices by the nurses can improve patient care and may decrease the rate of infection in the hospitals.

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II. METHODOLOGY

The descriptive correlation study was conducted to evaluate the level of knowledge and practice of surgical nurses and identify the association between knowledge and practice regarding prevention of surgical site infection. Study data were collected from surgical wards of Fieri Hospital and Vlora Hospital. Nurses, working in surgical wards were included in the study.

Study Design: Cross-sectional descriptive design, was carried out in surgical units of Fieri Hospital and Vlora Regional Hospital for period of October 2018 to March 2019.

Sample of the Study: Non probability sampling was conducted .The sample consisted of 66 nurses working in the surgical units and operating theatre ,who were present during the study period and who agreed to participate in the study.

Study Instrument: A questionnaire which was adopted by Sickder et al [3] consisted from 29 items which include three parts. First part assessed socio-demographic features of study participants like age, gender, educational qualification, total work experience, experience in surgical units, organization, participating in training programs , availability of infection protocol (IP) guidelines, usage of IP guidelines . Second part consists of questions which assessed knowledge of participants regarding prevention of SSI, third part had questions which assessed various practices followed in units and operation theatre and compared with standard practices according to WHO infection control protocols.

The researcher divided collected scores into 3 levels. The outcome measures of this study were knowledge (good knowledge / average knowledge and poor knowledge) and practice (good practice/ average practice and poor practice), while the independent variables included sociodemographic factors.

Nurses's knowledge regarding the prevention of SSIs was measured by 10 questions with "Yes" and "No" , in which "Yes" is the correct answer and "No" the incorrect answer. The questions refered to the most important recommendations by the WHO infection prevention and patient safety guideline (presurgical skin preparation, hand hygiene etc.). The correct response for each question receives score 1 and incorrect response will have 0. Those participants who scored less than 5 points were categorized as "Poor knowledge" , those who scored 6-8 points were categorized as "Average knowledge" and those who scored 9- 10 points were categorized as "Good knowledge" .

Nurses's practices in the prevention of SSIs were measured by 10 questions in which responses were answered in a 5-point Likert scale (never practiced, rarely practiced ,sometimes practiced, often practiced and always practiced). Total score range from 1 to 5. Those participants who scored less than 40 points were categorized as "Poor Practice" , those who scored 41-45 points were categorized as " Average knowledge " and those with more than 45 points were categorized as "Good Practice".Demographic characteristics of all respondents were presented as frequencies and percentages.

Statistical analysis: The data of the study were analyzed by using (SPSS-version.19) program. Frequencies and Percentages used to describe the study variables. The Chi-square test is used for determining the relationships between sociodemographic data and nurses knowledges, practices regarding prevention of surgical site infection and to see the correlation between knowledge and practice scores. **A** regression analysis was carried out to determine the relative effect of independent variables on the dependent variable.Testing the significant association for this study was used the significant P-value ≤ 0.05.

III. RESULTS

The characteristics of the respondents in both hospitals are presented in Table (1). Table (1) shows that a total of 41 nurses (62.1%) from Fieri hospital and 25 (37.9%) from Vlora hospital were contributed in the study. Most of subjects were female (74.2%).and (25.8%) were male nurses.

Nurses' age ranged between 25 to 45 years. Respondent qualification represents that most of the subjects had completed a Master degree(54.5%) followed by (43.9%) BSc degree and (1.5%) diploma nurses. According to table (1) (27.3%) n=18 of subjects have less than 1 year total work experience and 6-10 year total work experience, n=19 (28.8%) have 1-5 year experience and only n=11(16.7%) have above 10 year experience.Only 29 (43.9%) of the study participants claim they were trained in the infectious control program.

Demographic data	***Characteristics***	***Frequency***	***Percentage***
Gender	Male	17	25.8%
	Female	49	74.2%
Age	<25years	12	18.2%
	26-35years	43	65.2%
	36-45years	9	13.6%
	>45years	2	3.0%
Qualification	BSN	29	43.9%
	MSN	36	54.5%
	Secondary Nursing School	1	1.5%
Total work Experience	<1 year	18	27.3%
	1-5 years	19	28.8%
	6-10 years	18	27.3%
	>10 years	11	16.7%
Work experience in surgical ward	<1 year	10	15.2%
	1-5 years	37	56.1%
	6-10 years	15	22.7%
	>10 years	4	6.1%
Attending in training programs	Yes	29	43.9%
	No	37	56.1%
Availability of IP guidelines	Yes	31	47.0%
	No	35	53.0%
Usage of IP guidelines	Yes	20	64.5%
	No	11	35.5%
Organization	Fieri Hospital	41	62.1%
	Vlora Hospital	25	37.9%

Table (1): Socio Demographic Characteristics of study sample (n = 66).

Questions	***Frequency of Correct Answers***	***Percentage of Correct Answers***
Does pre-operative shaving performed in day before surgery?	66	100%
Does staff existing and reentering the theater affect the incidence of surgical site infection?	58	87.9%
Are preoperative showers with antiseptics are cost effective in preventing surgical site infection?	51	77.3%
Does removal of jewelry, artificial nails and nail polish reduces the incidence of surgical site infection?	46	69.7%
Does the puncture rate of surgical gloves correlate with the incidence of surgical site infection?	46	69.7%
Does administration of prophylactic antibiotics help in preventing surgical site infection?	62	93.9%
Does increased pain and discharge from wound site indicate surgical site infection?	55	83.3%
Does time period of operation have effect developing surgical site infection?	15	22.7%
Does surgical patients with compromised immune system have more chance of developing surgical site infection?	55	83.3%
Prolong preoperative hospitalization associated with development of surgical site infection?	42	63.6%

Table (2) : Knowledge of Nurses Regarding Prevention of Surgical Site Infections.

Table (2)shows the responses of the subjects to each of the knowledge question which show that most of the nurses have average knowledge about surgical site infection. Responses of knowledge of nurses for the best time for pre-operative shaving results that all 66 (100%)were responded correctly which show that they know about it. Another question about staff existing and reentering the theater effect the incidence of surgical site infection, in which 58 (87.9%) nurses responded correctly ,while 46 (69.7 %) replied correctly for the question that puncture rate of the surgical gloves correlate with the incidence of surgical site infection ,which result that most of the subjects have information about the significance of wearing gloves during procedure.

Similarly the response of the subjects to another statement that removal of jewelry, artificial nails and nail polish reduces the incidence of surgical site infection , which show that most of the participants 46(69.7%) have knowledge about this question.

Responses of the subjects to another important question which refers that time period of operation has effect developing surgical site infection 15 (22.7%) participants were agree about the statement and 51(77.3%) of nurses knew that preoperative showers with antiseptics are cost effective in preventing surgical site infection.

55(83.3%) of study sample answered the question that increased discharge and pain from wound site indicate surgical site infection correctly and knew that surgical patients with suppressed immune system were more at risk of developing surgical site infection Participants of the study were asked about the administration of prophylactic antibiotics in preventing surgical site infection for which 62(93.9%) response of the participants were correct while 42(63.6%) of participants knew that prolong preoperative stay is related with development of surgical site infection.

Knowledge Level	***Frequency n***	***Percentage %***
Low	4	6.06%
Average	43	65.15%
Good	19	28.79%

Table (3) :Description of nurses' knowledge level regarding prevention of surgical site infection.

The results in the Table (3) shows that the level of total knowledge regarding surgical site infection in this group of participants was at average level (65.15%) about the surgical site infection and its prevention, with minimum score of 5 and a maximum score of 10 out of 10 items . The mean knowledge score of the study participants was 7.52 ±1.32 . 28.79% of participants had good knowledge of surgical site infection prevention followed by low level of knowledge (6.06%).

Questions	Always n %	Often n %	Sometimes n %	Rarely n %	Never n %
I wash my hands before and after changing wound dressing and touching the surgical site	57 86.4%	9 13.6%	0 0%	0 0%	0 0%
I wash my hands before wearing sterile gloves	34 51.5%	26 39.4%	6 9.1%	0 0%	0 0%
I perform pre-operative shaving right before surgery	49 74.2%	7 10.6%	1 1.5%	3 4.5%	6 9.1%
I administer pre-operative prophylactic antibiotic within one hour before surgery	38 57.6%	18 27.3%	5 7.6%	2 3%	3 4.5%
I advice my patient to take pre-operative showering with antimicrobial agent	24 36.4%	15 22.7%	19 28.8%	7 10.6%	1 1.5%
I use sterilized dressing materials for cleansing surgical wound dressing	54 81.8%	12 18.2%	0 0%	0 0%	0 0%

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Questions	Always n %	Often n %	Sometimes n %	Rarely n %	Never n %
I use an antiseptic technique during surgical wound dressing	42 63.6%	16 24.2%	8 12.1%	0 0%	0 0%
I assess and monitor surgical site condition	55 83.3%	10 15.2%	0 0%	1 1.5%	0 0%
I use face mask during cleansing surgical wound dressing	22 33.3%	18 27.3%	23 34.8%	3 4.5%	0 0%
I separate infected from non-infected cases during dressing	58 87.9%	8 12.1%	0 0%	0 0%	0 0%

Table (4): Practice of Nurses Regarding Prevention of Surgical Site Infections.

Table (4)shows the responses of the subjects to each of the practice question which shows that (36.4%) of nurses always advised surgical patients about performing pre-operating showering with antimicrobial agents and (33.3%) of them used always face mask during cleansing surgical wound.

These results indicated that some nurses have poor practice in these areas.

The responses of practice questionnaire with highest percentage of nurses “always practice” were : performing hand washing before and after changing dressing and touching the surgical site (86.4%), using sterile dressing materials for performing wound dressing (81.8%), assessing and monitoring surgical site condition (83.3%) and separating infected from non-infected materials during dressing (87.9%).

Practice Level	***Frequency*** ***n***	***Percentage*** ***%***
Low	8	12.12%
Average	27	40.91%
Good	31	46.97%

Table (5): Description of nurses’practice level regarding prevention of surgical site infection.

The results shown in table(5) revealed that nurses’practice of surgical site infection was at good level (46.97%) about the surgical site infection and its prevention, with minimum score of 34 and a maximum score of 50 out of 10 items . The mean practice score of the study participants was 44.68 ±3.47. (40.91%) of study participants had average practice and only 12.12% of them had practice at low level towards prevention of surgical site infection.

Demographic Data	***Knowledge of nurse’s*** ***P-value***	***Practice of nurse’s*** ***P-value***
Sex	**0.001***	0.153
Age	0.810	**0.017***
Organization	0.875	0.567
Qualification	0.661	0.135
Total work Experience	0.758	0.805
Work Experience in surgical ward	0.140	0.796
Attending in training programs	0.696	0.393
Availability of IP guidelines	0.492	0.533
Usage of IP guidelines	0.710	0.243

Table (6): Differences in nurses’ knowledge and practice with respect to selected sociodemographics

□Significant at p□□□□□□□□□□□□□□□□□□□□□□□ □□□

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IV. DISCUSSION

The aim of this study was to assess the knowledge and practice of nurses and identify factors associated with them regarding prevention of surgical site infections and examine the relationships they have.

1.Knowledge Regarding Prevention of SSI

The findings highlight ed that total knowledge regarding the prevention of SSI was at average level of knowledge. The majority of the nurses had a Master degree in nursing (54.5%). (56.1%) of nurses had not been trained in the infection control training programs. The findings showed that the working experience in the surgical wards of subjects was 1-5 years (56.1%).

The appropriate timing for removing the hair at the incision site was answered correctly in 100% of nurses . A previous study[3] found that only (24.20%)of subjects correctly answered that pre-operative shaving should be done immediately before the operation.

The study also revealed that participant's sex was significantly associated with knowledge regarding prevention of surgical site infection. The results of present study[4] agree with they evaluate the knowledge, attitude and efficacy of nursing staffs in hospital about infections control they revealed that there a significant relationship between knowledge and gender. A similar study[5] has also found that the gender is significantly associated with knowledge of SSI prevention.

The odd of female nurse's was almost 3 times higher to have good knowledge than males regarding prevention of surgical site infections. The possible reasons for this result might be due to the fact that in this study the proportion of females was higher compared to females.

There were no significant difference between demographic variables(age, organization, qualification, total work experience , work experience in surgical ward , attending in training programs, availability of IP guidelines in both hospitals, usage of IP guidelines) with level of knowledge 'nurses regarding prevention of surgical site infections.

Another study also revealed that training program did not effect any significant difference in the knowledge level between control and experimental groups [6].

Moreover, this finding is also in agreement with another study[5] where , no significant relationship was found between job position, ward, enrolment in SSI prevention program and practice score.

2.Practice Regarding Prevention of SSI

The findings showed that total practice regarding the prevention of SSI was at a good level (46.97%). This indicated that nurses had good nursing practice for the prevention of SSI.

The findings of this study are similar to a study which was done by Joshi[7] in India in which nurses" practice regarding surgical site infection prevention was also at high level. The results are in the same line to a study which in Ethiopia, in which nurses" practice were at good level [8]. For the others item of practice, it was shown that nurses lacked in some areas of practice where, 1.5% of nurses never advised surgical patients about performing pre-operating showering with antimicrobial agents. Another study found also some nurses lacked practice in these area.[3]

3.Relationship between Nurses' knowledge and practice with demographic variables regarding prevention of surgical site infection.

The analysis reveals statistically significant differences between knowledges of female and male nurses. 90% of nurses with good knowledge are women, 75% of nurses with average knowledge are women and all nurses with low knowledges are men. ODDS (good / average) = 2,988 indicates that the probability of having good knowledge in women is approximately 3 times higher than in men. ODDS(low / average) = 0.0001 indicates that the probability of having low knowledge in women is as much as 1/1000 of men.

The analysis showed that there are statistically significant differences between nurses practices and different ages. 63% of nurses with low practice are under 25 years of age, while those with average and good practice are in the 26-35 age group (67% and 74%).ODDS (good / average) = 0.001 indicates that the probability of good practices in the age group of up to 45 years is 1/1000 of the probability of over 45 years of age in nurses. ODDS (low / average) = 4.219 indicates that the probability low practices <25 years of age is 4 times higher than those> 45 years old.

According to a study nurses who were 30 years and above were found being about 2 times more likely to practice surgical site infection prevention actives compared to those who were less than 30 years (AOR = 1.79, 95% CI)[8]. Results in this study agree with Kang, et al [9] they evaluated hospital nurses' knowledge and compliance on multidrug-resistant organism infection control guideline, in Korea, they showed that there were significant relationship between nursing practice and age and the type of units .Correlation analysis showed that there were no statistical differences between knowledge and practice of nurses. Another study had found no relationships between knowledge and practice in infection prevention measures [10].

The study concludes that the majority of nurses had average level of knowledge and good level of practices (46%) regarding the prevention of surgical site infection. There were significant relationship between the nurses'knowledge and gender and between nurses' practice and ages at $p \geq 0.05$ value. The results and conclusions of the study suggest that increasing knowledge and focusing on some specific areas of prevention of SSI in practice need improvement ,with a direct impact on patient's safety and enhancing health care quality**.** Hospital institutions should

provide for implementation standard guidelines for the prevention of surgical site infection in the surgical units.

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