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Research Article

Nurse's awareness of infection control measures in operating room

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Abstract: ***Background:*** Infection control measures are essential for the containment of surgical infections. The current Operating Room (OR) should therefore, have well-developed policies for managing infections. The efficacy of those policies depends on how well they are adhered to by OR staff. Thus nurses ought to have great knowledge and strict adherence to the prevention of infections. ***Aim:*** The study aimed to study nurse's awareness of infection control measures in the operating room. ***Methods:*** A cross sectional study was carried out between June and august 2018 in port said general hospital. Data were collected for a purposive sample of all nurses (140), who work at the operating room. The instrument was used to collect study data include **nurses' socio-**demographic and nurses knowledge as infection control principles and knowledge base related to the principles of asepsis .Results: Most of the studied nurses were female, more than one third of them in the age group 26-34 years, nearly half of them had bachelor's degree and work as staff nurses for 1-3 years working experience in operating theatre. Shows that there are a highly Mean ± SD of nurse's overall knowledge scores regarding infection control measures were found in items related to infection control basis**. While** highly significant relation were found between nurse's sociodemographic characteristics and their knowledge regarding basis of sterilization and principles ,infection control basics mainly in items related to marital status , educational level**. Conclusion:** Despite the good knowledge and awareness of infection control measures that founded in operation room than knowledge in basis of sterilization and principles. We can concluded that there are a gab in infection control measures application regarding sterilization basis and principles**.** ***Recommendations:*** the study suggested that, continuous education training programs for nurses, and activating the role of infection control team. There are obvious needs to posted manual / standardized guidelines regarding infection control measures and sterilization techniques.

Keywords: Nurse's, Awareness, Infection Control Measures, Operating Room.

INTRODUCTION

Surgical site infections (SSIs) are a common h azard of surgical procedures but one of the most commo n types of inpatient infection(Lo Giudice *et al.,* 2019). Health care professionals are vulnerable to micro-organisms all the time. Many would cause major or perhaps even fatal infections (Twitchell, 2003 &Fashafsheh *et al.,* 2015). Throughout their nursing operations, nurses in particular are often subjected to multiple infections (Kosgeroglu *et al.,* 2004& Fashafsheh *et al.,* 2015).

Surgical-related infections make both great patient suffering and high societal costs. Avoidance of surgical site infections (SSIs) should therefore be a major priority to all operating settings (Andersson *et al.,* 2010, & Qvistgaard *et al.,* 2019). Though the prevalence of SSIs in low-and middle-income countries is much higher than in high-income countries, even high-income countries SSIs are still a common cause of infection (Allegranzi *et al.,* 2016). Clearly better prevention of SSIs is necessary. Preventing SSI requires a multifactorial approach, as that antibiotic resistance growth makes it important that the Operating Room (OR) is as clean as it can be. Bad behavior, in the operating theatre (OR) and ensuing surgical site sepsis (SSI) may result in environmental contamination. This analysis will focus on the continuing assessment of OR worker behaviors using a motion tracking system and their influence throughout surgical procedures on the risk of SSI(Birgand *et al.,* 2014).

The need to manage infections in health care facilities arises from the need to avoid infection connected with Healthcare (HCAIs). HCAI may be described as an infection that occurred in a patient during the treatment process in a hospital or other

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health care facility that was not present or incubated at admission. This leads to greater morbidity and mortality, longer hospitalization time and higher treatment costs in both resource-poor and developed countries (WHO, 2009). The frequency of hospitalized patients in the developing world was estimated to be 15%, it is also as high as 37% for patients assigned to the intensive care unit (WHO, 2009 and Iliyasu *et al*., 2016).

To decrease the incidence of healthcare-associated infections, every patient should be equipped with uniform infection prevention and control strategies(Gammon *et. al*, 2008). Nevertheless, compliance with any of these measures has been shown to be very low especially in operational environment, including needle stick exposure, hand hygiene, and handling of gloves(Shobowale *et.al.* 2017). Even globalized organizations focused on these measures. For example, the WHO has stated that more than 80% of needle stick exposures can be avoided by using security tools and programs (Brady *et al.,* 208). The causes for this weak compliance were examined, and the main factors affecting information were, in addition to their workload, the level of education, expertise and attitude of the health care team (Zafar *et al.,* 2009).

The literature has suggested strong educational programs on the prevention and control of infections in both academic and clinical settings. These programs must be an essential part of their job, where they spend most of their clinical years in healthcare facilities where they gain most of their skills (De Bono et.,2014). In addition, the British Nursing and Midwifery Council does not register nurses as professional nurses without having shown a high level of skills and attitudes including commitment to infection control and prevention measures and ensuring that the rest of the team complies with these requirements as well Hansen etal.,2014. Surgical site infections are the next greatest public cause of hospital-associated infections rendering to the centers for disease control and prevention (CDC) and outcome in an estimated yearly charge of 1.5 billion dollars (Spry, 2009).

Significance of the study

Significance of the research From the clinical experience of the researcher it has been found that raised surgical site infections, the investigator wondered the origin of the increasing rate of infection in wound operations, for three main reasons Nurses are facing higher workloads than ever before: increased demand for nurses, insufficient supply of nurses and inadequate supply of nurses, which main to the requirement to Study nurse's awareness of infection control measures in operating room.

SUBJECTS AND METHOD

Aim of the study: The study aimed to study nurse's awareness of infection control measures in operating room.

Research questions: the following two research questions were formulated to achieve the aim of the current study:

1. What are levels of nurses' knowledge about infection control measures in operating room?

2.Are there relationship between sociodemographic and nurses knowledge about infection control measures in operating room?

Research design: A cross sectional study was carried out for this study**.**

Study Setting: The data were collected from operating room at port-said general hospital in Port Said city, Egypt**.**

Study Sample: A purposive sample consisted of all nurses (140), who work in the previously mentioned setting requested to join in the study. The study was carried out between June and august 2018.

Tool of the study: For data collection a self-administrative questionnaire was established by researchers based on Labrague *et al.,* 2012 & Abraham *et al.,* 2016 and used to assess:

a. Nurses' Socio-Demographic: variable such as age, age sex, marital status, education, and years of experience.

b. Nurses Knowledge:

was assessed by two section. **The first section** was knowledge base related to infection control principles composed of 11 question multiple choice questions .**The second section** assess knowledge base related to the principles of asepsis composed of 7 multiple choice questions . **Scoring system** as follows: each question had a group of answer points, one point was given for each correct answer and incorrect or I don't know answer took zero. Correct responses were summed up to get a total knowledge scores for each participant.

Validity and reliability of the study: The questionnaire was reviewed and validated by panel of 5 experts in academic and health field; they approved and no comments. Internal consistency among the questionnaire items was 0.80 Cronbach's alpha (α) and it was measured within the satisfactory range.

Pilot study

The pilot study was carried out on ten nurses to test the clarity, applicability, and feasibility of the tools. Based on the outcome results of the pilot study, adjustments and deletions of some particulars and then

established the last forms were shown. No clarification of questions was required. All questions were answered. The researchers also estimated that completion of the questionnaire would take twenty (25) minutes.

Ethical Consideration

Prior to conducting the investigation, the researcher obtained the approval of the Port Said general Hospital. Preventative measures have been taken to safeguard the legal rights of respondents to the study prior to the actual questioning, the participants were given consent forms and only a code number on the questionnaire had maintained the confidentiality and anonymity of the respondents.

Statistical Analysis:

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0**.(**Armonk, NY: IBM Corp**)**Qualitative data were described using number and percent. Quantitative data were described using range (minimum and maximum), mean, standard deviation. Significance of the obtained results was judged at the 5% level. The used tests were: Student t-test For normally distributed quantitative variables, to compare between two studied groups , F-test (ANOVA) For normally distributed quantitative variables, to compare between more than two groups

RESULTS

Table (1): Shows that more than one third of nurses (36.4%) were in age group 26-34 years while (60.7%) of them were female and (43.6%) of them had bachelor degree of education. (25.0%) of them assisted in orthopedic operations. (54.3%) of them had from 1-3 years working experience in operating theatre.

Table (2): shows that there are a highly Mean ± SD of nurse's overall knowledge scores regarding infection control measures were found in items related to infection control basis (30.98±16.99).

Table (3): revealed that there are a highly significant relation were found between nurse's sociodemographic characteristics and their knowledge regarding basis of sterilization and principles ,infection control basics mainly in items related to marital status , educational level, years of experience worked in nursing , hospital with p= (0.003, 0.001 ,0.001, 0.026) respectively.

Table (4): revealed that there are a highly significant relation were found between nurse's sociodemographic characteristics and their knowledge regarding basis of sterilization and principles ,infection control basics mainly in items related to favorite shift time in the operation room , number of assistance nurse's assistant with p= (0.001, 0.002) respectively

Figure (1): illustrated that there are a highly significant relation were found between nurse's level of education and their overall knowledge regarding infection control measures.

Figure (2): illustrated that there are a highly significant relation were found between nurse's years of experience in nursing field, hospital, and operating room and their overall knowledge regarding infection control measures**.**

Table (1) Distribution of nurses according to their sociodemographic characteristics (N=140)

Items (n=140)	No	%
Age		
less than 25	31	22.1
26-34	51	36.4
35-44	23	16.4
45-54	28	20.0
more than55	7	5.0
Gender		
Male	55	39.3
Female	85	60.7
Education		
Diploma	57	40.7
Bachelor	61	43.6
Others	22	15.7
SURGICAL DISCIPLINES		
orthopedic	35	25.0
Neuro	26	18.6
cardiac	9	6.4
vascular	8	5.7
obstatrric and gynaecology	7	5.0
child	5	3.6
plastic	6	4.3
general	30	21.4
ophthalmology	14	10.0
EXPERIENCES		
less than one year	16	11.4
one year to 3year	76	54.3

4 to 6	23	16.4
more than 6 year	25	17.9

Table (2): Mean and SD of nurse's knowledge scores regarding infection control measures in operation room (n = 140)

Nurses' knowledge about infection control in operation room	Total score	% score
Infection control basics		
Min. – Max.	0.0 – 6.0	0.0 – 75.0
Mean ± SD.	2.48±1.36	30.98±16.99
Basis of sterilization and principles		
Min. – Max.	1.0 – 6.0	9.09 – 54.55
Mean ± SD.	3.09±1.13	28.05±10.32
Overallknowledge		
Min. – Max.	1.0 – 10.0	5.26 – 52.63
Mean ± SD.	5.56±1.91	29.29±10.05

Table (3): Relation between Nurses' knowledge regarding infection control in operation room with their sociodemographic

Q	Sociodemographic data	N	Infection control basics	Basis of sterilization and principles	Overall knowledge
			Mean ± SD	Mean ± SD	Mean ± SD
	Age (years)				
	Less than 25	**31**	31.85 ± 15.76	31.09 ± 9.32	31.41 ± 8.86
	From 26-34	**51**	28.92 ± 15.51	23.35 ± 7.98	25.70 ± 7.49
1	From35-44	**23**	27.72 ± 23.22	29.64 ± 13.49	28.83 ± 15.54
	From45-54	**28**	35.27 ± 15.61	31.82 ± 10.05	33.27 ± 7.85
	More than55	**7**	35.71 ± 13.36	28.57 ± 8.18	31.58 ± 10.08
	F(p)		1.001 (0.409)	4.883* (0.001*)	3.397*(0.011*)
	Sex				
2	Male	**55**	28.41 ± 16.92	29.92 ± 10.45	29.28 ± 12.02
	Female	**85**	32.65 ± 16.94	26.84 ± 10.11	29.29 ± 8.61
	t(p)		1.447(0.150)	1.734 (0.085)	0.003(0.998)
	Marital status				
	Married	**72**	34.72 ± 16.01	27.65 ± 10.28	30.63 ± 10.08
3	Un married	**40**	25.31 ± 15.63	32.27 ± 9.86	29.34 ± 9.53
	Widow	**9**	16.67 ± 13.98	18.18 ± 7.87	17.54 ± 9.49
	Divorce	**19**	35.53 ± 18.76	25.36 ± 8.34	29.64 ± 8.08
	F(p)		5.765* (0.001*)	6.039* (0.001*)	4.919* (0.003*)
	Education				
	Diploma	**57**	23.90 ± 14.42	25.20 ± 11.27	24.65 ± 9.65
4	Bachelor	**61**	34.02 ± 17.70	28.32 ± 9.26	30.72 ± 9.13
	Others	**22**	40.91 ± 14.01	34.71 ± 7.23	37.32 ± 7.06
	F(p)		11.071* (<0.001*)	7.408* (0.001*)	16.839* (<0.001*)
	Years of Experience in nursing				
	Less than 1	**5**	27.50 ± 13.69	40.0 ± 4.98	34.74 ± 2.88
5	From 1-3 year	**31**	42.34 ± 16.03	28.74 ± 9.99	34.47 ± 8.47
	From 4-6 year	**22**	30.68 ± 7.45	32.64 ± 8.26	31.82 ± 5.26
	More than 6	**82**	26.98 ± 17.62	25.83 ± 10.35	26.32 ± 10.78
	F(p)		7.005* (<0.001*)	5.486* (0.001*)	6.863* (<0.001*)
	How long have you been working in this hospital				
	Less than one year	**5**	27.50 ± 13.69	40.0 ± 4.98	34.74 ± 2.88
6	From one to 3 year	**41**	35.67 ± 13.57	29.49 ± 9.27	32.09 ± 8.63
	From 4to 6 years	**57**	25.88 ± 18.58	26.95 ± 10.30	26.50 ± 11.03
	More than 6 year	**37**	34.12 ± 16.57	26.54 ± 11.01	29.73 ± 9.55
	F(p)		3.415*(0.019*)	3.120*(0.028*)	3.186*(0.026*)
	How long have you been working in the operating room in operation room				
	Less than one year	**16**	31.25 ± 15.81	31.25 ± 9.94	31.25 ± 9.70
7	From one year to 3year	**76**	30.10 ± 17.34	25.36 ± 11.04	27.35 ± 10.70
	From 4 to 6	**23**	32.07 ± 15.46	32.02 ± 5.39	32.04 ± 8.08
	More than 6 year	**25**	32.50 ± 18.75	30.55 ± 9.78	31.37 ± 9.05
	F(p)		0.164 (0.920)	4.118* (0.008*)	2.123 (0.100)
	how many hours you are work in the operation room				
	4hours	**16**	34.38 ± 16.14	26.14 ± 10.95	29.61 ± 5.39
8	8hours	**111**	29.50 ± 16.58	28.09 ± 10.22	28.69 ± 10.38
	16hours	**9**	44.44 ± 21.75	29.29 ± 11.83	35.67 ± 12.83
	24	**4**	28.13 ± 6.25	31.82 ± 9.09	30.26 ± 2.63
	F(p)		2.490 (0.063)	0.400(0.753)	1.373(0.254)

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

p: p value for association between different categories *: Statistically significant at $p \leq 0.05$

Table (4): Relation between Nurses' knowledge regarding infection control measures in operation room with their sociodemographic data"continue"

Q	Demographic data	N	Infection control basics Mean ± SD	Basis of sterilization and principles Mean ± SD	Overall knowledge Mean ± SD
	What is the favorite time for you in the operation room				
	Morning shift	**87**	25.43 ± 14.70	27.17 ± 9.95	26.44 ± 8.79
9	Afternoon shift	**14**	41.96 ± 20.57	25.97 ± 12.79	32.71 ± 10.15
	Night shift	**38**	39.47 ± 15.52	31.10 ± 9.83	34.63 ± 10.50
	Idon't like any time in my work	**1**	37.50	18.18	26.32
	F(p)		9.827*(<0.001*)	1.847(0.142)	7.374*(<0.001*)
	How many patients				
	One patient	**8**	43.75 ± 16.37	21.59 ± 6.76	30.92 ± 8.64
10	Two patient	**10**	36.25 ± 24.62	30.91 ± 11.50	33.16 ± 9.63
	From 2 to 4	**6**	27.08 ± 12.29	31.82 ± 11.13	29.82 ± 4.30
	More than 5 patient	**116**	29.85 ± 16.22	28.06 ± 10.28	28.81 ± 10.38
	F(p)		2.155(0.096)	1.588 (0.195)	0.653 (0.582)
	How many nurse assistant you in your work				
	One nurse	**35**	34.29 ± 15.26	31.69 ± 8.64	32.78 ± 9.21
11	3 nurse	**15**	42.50 ± 14.79	27.88 ± 9.39	34.04 ± 8.41
	4 nurse	**90**	27.78 ± 17.05	26.67 ± 10.80	27.13 ± 10.04
	F(p)		6.127*(0.003*)	3.078*(0.049*)	6.307*(0.002*)
	Is there an infection control program in the hospital				
12	Yes	**79**	30.85 ± 15.99	30.49 ± 11.09	30.65 ± 10.35
	No	**24**	31.77 ± 19.84	22.73 ± 9.29	26.54 ± 11.03
	Idon't know	**37**	30.74 ± 17.58	26.29 ± 7.36	28.17 ± 8.34
	F(p)		0.031 (0.969)	6.416*(0.002*)	1.878(0.157)
	If yes; are you familiar with the contents of the infection control protocol?				
13	Yes	**47**	33.51 ± 13.32	32.69 ± 8.62	33.03 ± 7.97
	No	**93**	29.70 ± 18.51	25.71 ± 10.35	27.39 ± 10.49
	t(p)		1.394(0.166)	3.977*(<0.001*)	3.546*(0.001*)
	Have you ever attended an infection control workshop?				
14	Yes	**93**	31.45 ± 17.05	29.33 ± 11.22	30.22 ± 10.38
	No	**47**	30.05 ± 17.02	25.53 ± 7.73	27.44 ± 9.18
	t(p)		0.458 (0.647)	2.341*(0.021*)	1.557 (0.122)

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

p: p value for association between different categories *: Statistically significant at $p \leq 0.05$

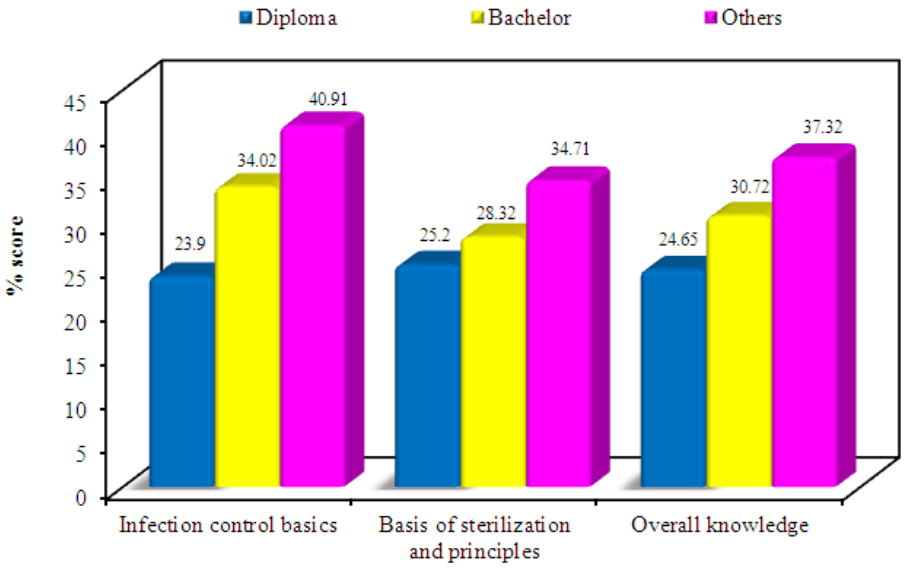

Figure (1): Relation between Nurses 'overall knowledge regarding infection control measures in operation room with their level of education

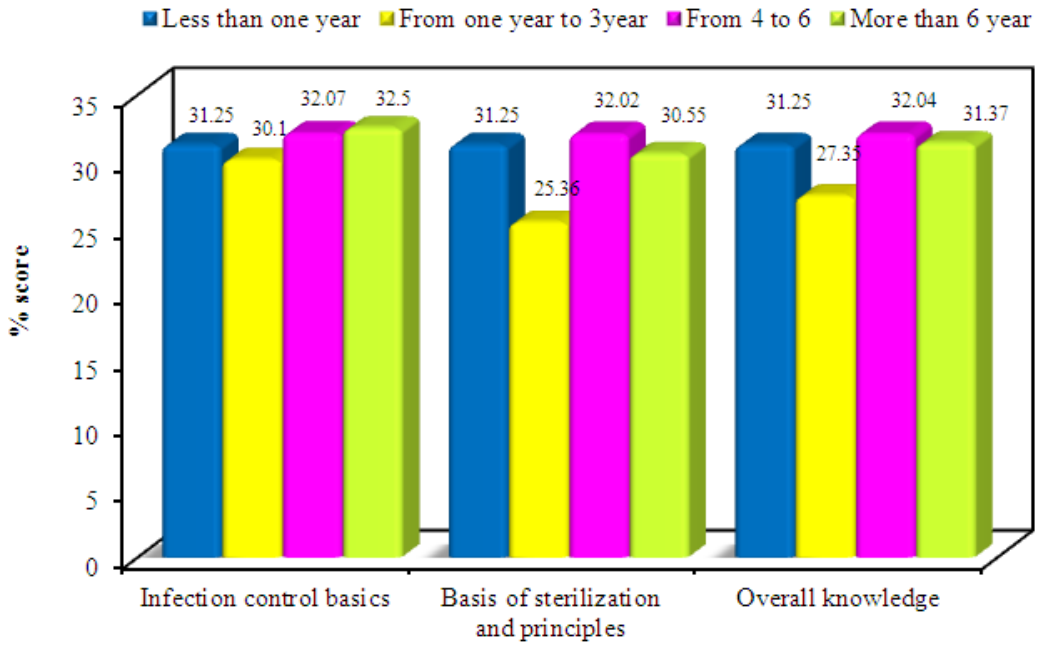

Figure (2): Relation between Nurses' knowledge regarding infection control measures in operation room with their experience years in the operating room

DISCUSSION

Hospital acquired infection is a public problem completely over the world. So, up to date information and nursing practice can show significant roles in infection control. Nurses must have the chance to perform infection control on a everyday basis as an essential part of patients' care especially in the operating room. That is why the present study was carried out. The operating room is a precise region in the hospital. This superior care setting with sophisticated methods makes numerous varieties of dangers for the patient including the incidence of infection. Numerous recommendations have been available (control of the OR environment, surgical antibiotic prophylaxis, skin preparation, and enhancements in the surgical technique) to advance the patient safety and excellence of care in the OR this achieved through training health care personnel (Birgand *et al.*,2014).

In our study that was carried out at operating room discovered from the existing study, more than one quarter of the studied sample aged between26-34 years, majority them were female, had bachelor degree of education. One quarter assisted in orthopedic operations and more half have 1-3 years working experience in operating theatre. This result is in agreement with that of (Johnson *et al.*, 2013 and Fashafsheh *et al.*, 2015and Dhakal *et al.*, 2016) stressing the essential to guard this group of workers in the major of their life from hospital infections. While, Johnson *et al.*, (2013) stressing the essential to protect this cluster of workers in the major of their life from hospital infections. Also This result in the line with (Malan, 2009 and Labrague, *et al.*, (2012) which stated that, the two third are females.

Findings showed that operating room nurses are a highly mean of nurse's overall knowledge scores regarding infection control measures were found in items related to infection control basis. This in agreement with (Labrague *et al.*, 2012) found that operating theatre nurses had high theoretical knowledge of the principles of sterile method necessary to provide their surgical patient safe and effective nursing during the intraoperative period. Also , this finding is notable as previous research suggests that one of the factors affecting compliance with standard measures in any hospital setting is clear awareness of its concepts and principles (Luo *et al.*, 2010 .However,. Melo *et al.*, 2006).In one hospital in Goiania, Brazil, nurses were investigated and found that only 75.6 percent recognized standard precautions as protective measures.

The current study showed that a highly significant relation were found between nurse's sociodemographic characteristics and their knowledge regarding basis of sterilization and principles , Infection control basics mainly in items related to marital status , educational level, years of experience worked in nursing , hospital These findings were in congruence with(Labrague *et al.*,2012)found that significant relation sociodemographic variables in terms of gender, age , number of trainings attended , length of clinical experience and, their knowledge on the principles of sterile technique. Regarding the relationship between knowledge regarding infection control measures and

level of education found that highly significant relation. This study congruent with (Fashafsheh *et al*.,2015) .

This present study showed that a highly significant relation between nurses' years of experience in nursing field, hospital, and operating room and their overall knowledge regarding infection control measures. In this regards disagree with (Fashafsheh etal.,2015) , showed that no relationship between knowledge regarding infection control and years of experience of the study In this concerns (Hamid et al 2010), designated that, factors as years of experience and age did not contribute to achievement of knowledge about infection control. As well (Gijare, 2012) stated no statistical significant difference in before and after test knowledge of many age groups and changed years of experience. While this study disagreement with (Labrague al., 2012) found that sociodemographic are not elements of the knowledge on the values of sterile technique. But this study differs with the preceding studies showed which recognized staff nurses' experience years as a pointer of better knowledge with regards to infection control measures (Taneja *et al.*, 2009).

CONCLUSION

Despite the good knowledge and awareness of infection control measures that founded in operation room than knowledge in basis of sterilization and principles. We can concluded that there are a gab in infection control measures application regarding sterilization basis and principles.

Recommendations

The present study recommends the following updating knowledge and practice of nurses through ongoing in-service educational programs with attention to principles of sterilization, Stressing the significance of following modern evidence-based practices of infection control in persistent teaching / training programs. Provided that training programs for newly nurses about infection control measures and at steady intervals. There are an obvious needs to post a manual / standardized guidelines regarding infection control measures and sterilization techniques.

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