

Evaluate the Effectiveness of Sterilization Process Educational Program on Operating Room Nurses Knowledge at Al- Hilla City

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Abstract

Background: Sterile technique becomes a foundation of modern surgical procedure and thus rigid adherence to a prescribed sterile technique procedure is essential for the patient's protection as well as for operating room complicated staff.

Objective: To evaluate the effectiveness of sterilization educational programs on the operating room nurse's knowledge.

Methodology: Quasi-experimental design selected to carried out this quantitative study to evaluate the effectiveness of sterilization process educational program on operating room nurses knowledge. Non-probability purposive sample choose which consist of (55) operating room nurses. The validity of the program and the prepared questionnaire was assessed by expert panel, Correlation coefficient method used, to calculate the reliability which recorded about (0.81) which is statistically accepted.

Results: tabulated data shows that most of the study sample among two groups were with (24- 27) years age group, 20(66%) and 15(60%) were female, while bachelor holder appear as a dominant education level for the participant 21(70%) for control group and 14(56%) for the interventional group. Both groups recorded low responses related to their knowledge about sterilization in during pre- test.

Conclusion: the educational program which directed to sterilization process act as an effective factor on the operating room

Recommendation: to enhance quality of care which provided to the patients who operating room nurses to improve their knowledge and update their information related to sterilization process.

Key words: educational

1. Introduction

Adequate sterilization of reusable medical tools, equipment and device and protection sterility of such devices until that time when they are used are important elements for controlling infection in order to minimize the risk of infections, healthcare facilities will perform comprehensive sterilization checks to ensure protection for patients and health care staff (Hughes, 2008).

Reusable surgical instruments offer potential route for pathogenic agent transmission among patients in the healthcare facilities. As being such, the process of decontamination between uses is an essential element in preventing healthcare-related infections (Southworth, 2014).

Employees of the operating theater reports that essential factors are: strong coordination using highly developed expertise and skills and care in emergency situations as well as the likelihood of improving one's practice. The theater nurse has traditionally been more focused towards the physical rather than the psychological aspects of care-giving, with the main emphasis of the practices of the theater nurses being on technology to ensure health in the practice environment. In communication with patients, nurses strive to incorporate conventional treatment and technical

capabilities into their nursing practice (Bostrom, 2008).

For this cause, and to ensure patient health it is important in apply continuing education in health services that reach out to all professionals working in this field, to demand changes in the work process through awareness-raising, interaction and the sharing and application of scientific expertise in professional practice; the essential factor in the appreciation and respect of professionals in the combat of infection, because health has been affected by technical developments and quality metrics of operations, with workers having to keep up with these changes and be better educated, backed up by political, cultural and moral values. (Ouriques & Machado, 2013).

1.2. Objectives of the study

To evaluate the effectiveness of sterilization process educational programs on the operating room nurse's knowledge.

To find out the relationship between demographic and employment characteristics such as (age, educational status and years of experience).

2. Methodology

Quantitative study quasi-experimental design selected to evaluate the effectiveness of sterilization educational program on operating room nurse's knowledge from the period (24. Sep. 2019 to 1. Sep 2020)

The setting

Operating room in Babil educational hospital for maternity and children, Al-Imam Al- Sadeq teaching hospital operating unit, Al- Hilla surgical teaching hospital used as a rich field to collect the data

Sampling:

Non-probability purposive sample choose from the nurses who work in the operating room of the teaching hospitals in Al-Hilla city, were selected to participate in the study which directed to evaluate the effectiveness of an educational program on the operating room nurses knowledge related to sterilization process, the nurses distributed as: (15) Nurses selected to assess the needs of the educational program related to sterilization, a group of (11) nurses selected to participate in the pilot study those (26) nurses were excluded from the original groups. While the study sample who assigned to reach the study, objective was distributed as (30) nurses included in the control group and (25) nurses were included in the interventional group who attended the educational sessions. While (51) nurses refuse to participate in the study and about (10) nurses shifted to work in the isolation Covid 19 units to cover the nursing shortage. The nurse was selected according to special criteria such as:

- 1.** Nurses who work in the operating room.
- 2.** Nurses who agree to participate in the study.
- 3.** Have not less than 6-month experience in the operating room.
- 4.** Who are less than 40 years old?

To reach the objective of the study non-probability purposive sample choose which consist of (55) operating room nurses, they divided in to two groups, (30) nurse in control group and (25) nurse act as interventional group, planned to attend two educational sessions about sterilization process, to facilitate data collection comprehensive review of related literature take place, special questionnaire form consist of multiple choice question were prepared, it divided to two parts, first part include demographical characteristics, second part consist sub-titled with sterilization process domains. The validity of the program and the prepared questionnaire was assessed by expert panel, Correlation coefficient method used, to calculate the reliability which recorded about

Ethical principle

ethical concept focused on one purpose that involves respect for human dignity, beneficence, non-maleficence functions as a starting point when collection of data began, consent form was designed to obtain permission from

nurses who work on operating room as to how they wanted to engage in the study consisting of (3) things.

Methods of data collection

Self-report method used for collecting the study data between the periods (17 May. to 25 July. 2020). Pre-test collection by distributing questionnaire among study sample which include (65) nurses who work in the operating room after obtaining their agreement to participate in the study. Which take about (14) days, the study sample divided to two group, the first group assigned as control group (30) nurses, the first post-test of this group were collected after (2) weeks later from the first post, this group remain without any intervention. On the other hand the second group were named as interventional group which consist of (25) nurses, after pre-test this group member started to attend planned educational sessions in Al-Hilla surgical teaching hospital in one of the side room in the operating unite. Small group sessions presented which consist (3-5) participant according to the safety and precaution measures of the hospital related to Covid 19 pandemic. After finishing the educational sessions, first post-test obtained, which the second post-test acquired after (14) days from the first post one actually, the number of the interventional group were (35) nurses at start point, while when reach the end point (10) nurses werewithdraw.

3. Results of the study

Table (1) Allocation of Participants Related to Their Characteristics

Variables		Groups				Total (N=55)	
		Control (N=30)		Intervention (N=25)			
		F	%	F	%	F	%
Age groups	20-23 years	3	10	5	20	8	14.5
	24-27 years	21	70	16	64	37	67.3
	28-31 years	6	20	4	16	10	18.2
Gender	male	10	33.3	10	40	20	36.6
	female	20	66.7	15	60	35	63.4
Residency	Rural	10	33.3	5	20	15	27.2
	Urban	20	66.7	20	80	40	72.8
Level of Educational	College	21	70	14	56	35	63.7
	Institute	6	20	6	24	12	21.8
	Secondary School	3	10	5	20	8	14.5

Table (2) Comparison through the control and interventional group responses related to central sterilization supply department knowledge

No.	Items	Control			P	Interventional			P
		Pre-test	1st Post	2nd Post		Pre-test	1st Post	2nd Post	

		M± SD	M± SD	M± SD		M± SD	M± SD	M± SD	
1	What is the purpose of CSSD?	1.87± 0.346	1.77± 0.430	1.80± 0.430	0.840	1.80± 0.408	1.96± 0.2	1.76± 0.436	0.011
2	Dirty instruments with other items were received in the assigned area of the CSSD.--	1.27± 0.450	1.23± 0.430	1.30± 0.430		1.20± 0.408	1.80± 0.408	1.68± 0.476	
3	Technicians who work in the CSSD should wear special uniform to decrease the risk of exposure to blood and other contaminated pathogens ----	1.63± 0.490	1.53± 0.507	1.57± 0.507		1.80± 0.408	2± 0.000	1.84± 0.374	
4	In Central Service, the concept of "one-way flow of materials" refers to the movement of products-----	1.43± 0.504	1.27± 0.450	1.27± 0.450		1.16± 0.374	1.96± 0.2	1.72± 0.458	
5	Mainly the CSSD commonly divided to _____ areas.	1.20± 0.407	1.10± 0.305	1.13± 0.305		1.04± 0.2	1.80± 0.408	1.72± 0.458	
General means		1.48± 0.273	1.38± 0.268	1.41± 0.268		1.4± 0.369	1.9± 0.096	1.74± 0.060	

P= 0.05 (P= probability, SD= Standard Deviation, M= mean), Df=2

Table (3) Comparison through the control and interventional group responses related to cleaning knowledge

No.	Items	Control			P	Interventional			P
		Pre-test	1st Post	2nd Post		Pre-test	1st Post	2nd Post	
		M± SD	M± SD	M± SD		M± SD	M± SD	M± SD	
1	The preference instrument which used during cleaning is _____	1.77± 0.430	1.70± 0.466	1.87± 0.346	0.861	1.88± 0.332	2.00± 0.000	2.00± 0.000	0.048
2	Materials which used for cleaning surgical instrument is _____	1.60± 0.498	1.37± 0.490	1.33± 0.479		1.32± 0.476	1.96± 0.200	1.88± 0.332	
3	During cleaning of solid instrument, used water should be _____	1.33± 0.479	1.43± 0.504	1.47± 0.507		1.60± 0.5	2.00± 0.000	2.00± 0.000	
4	When manual cleaning, recommended items should be washed below the water level to avoid:	1.37± 0.490	1.20± 0.407	1.1± 0.305		1.24± 0.436	1.68± 0.476	1.64± 0.490	
General means		1.52± 0.206	1.43± 0.208	1.44± 0.323		1.51± 0.290	1.91± 0.154	1.88± 0.169	

P= 0.05 (P= probability, SD= Standard Deviation, M= mean), Df=2

Table (4) Comparison through the control and interventional group responses related to disinfection knowledge

No.	Items	Control			P	Interventional			P
		Pre-test	1 st Post	2 nd Post		Pre-test	1 st Post	2 nd Post	
		M±	M±	M±		M±	M±	M±	
		SD	SD	SD		SD	SD	SD	
1	Which of the following is a chemical method of disinfection?	1.33± 0.479	1.60± 0.498	1.5± 0.509	0.588	1.56± 0.507	1.84± 0.374	1.72± 0.458	0.050
2	High level disinfectants used on immersible items such as flexible and rigid endoscopes. The most formulation in use today is Cidex. Formulation are intended for use in the high level disinfection of semi critical and critical medical devices they should never be used as environmental disinfectants	1.07± 0.254	1.27± 0.450	1.2± 0.407		1.36± 0.490	1.92± 0.277	1.84± 0.374	
General means		1.20± 0.183	1.43± 0.233	1.35± 0.212		1.46± 0.141	1.88± 0.056	1.78± 0.084	

P = 0.05 (*P* = probability, SD = Standard Deviation, M = mean), Df = 2

Table (5) Comparison through the control and interventional group responses related to packaging knowledge

No.	Items	Control			P	Interventional			P
		Pre-test	1 st Post	2 nd Post		Pre-test	1 st Post	2 nd Post	
		M±	M±	M±		M±	M±	M±	
		SD	SD	SD		SD	SD	SD	
1	When preparing a package containing heavy and delicate instruments, for heavier instruments should be placed at?	1.50± 0.509	1.57± 0.504	1.50± 0.509	0.993	1.84± 0.374	1.96± 0.200	1.96± 0.200	0.004
2	Which of the following should be used to write on packaged instrument?	1.43± 0.504	1.43± 0.504	1.53± 0.507		1.48± 0.510	1.88± 0.332	1.84± 0.374	
3	Where should the chemical indicator be place in a wrapped set of instruments?	1.47± 0.507	1.50± 0.509	1.47± 0.507		1.64± 0.490	1.84± 0.374	1.68± 0.476	
4	What is the maximum size and weight of a textile pack?	1.27± 0.450	1.20± 0.407	1.13± 0.346		1.12± 0.332	1.80± 0.408	1.72± 0.458	
5	Sterile packs can be adversely affected if the humidity level in the preparation	1.27±	1.23±	1.27±		1.08±	1.64±	1.64±	

	and packaging area falls below ____	0.450	0.430	0.450		0.277	0.490	0.490	
6	The acceptable temperature range for the preparation and packaging area is _	1.17± 0.379	1.27± 0.450	1.20± 0.407		1.20± 0.408	1.64± 0.490	1.64± 0.490	
7	The packaging system is chosen according to the size and weight of the tools, as well as ____	1.70± 0.466	1.60± 0.498	1.70± 0.466		1.92± 0.277	2.00± 0.000	1.92± 0.277	
8	Which of the following can occur if packages are moist at the end of the steam sterilization cycle?	1.40± 0.498	1.37± 0.490	1.33± 0.479		1.12± 0.332	1.88± 0.332	1.64± 0.490	
General means		1.40± 0.165	1.39± 0.154	1.39± 0.191		1.42± 0.342	1.83± 0.133	1.75± 0.132	

$P = 0.05$ ($P =$ probability, $SD =$ Standard Deviation, $M =$ mean), $Df = 2$

Table (6) Comparison through the control and interventional group responses related to Storage knowledge

No.	Items	Control			P	Interventional			P
		Pre-test	1 st Post	2 nd Post		Pre-test	1 st Post	2 nd Post	
		M±	M±	M±		M±	M±	M±	
		SD	SD	SD		SD	SD	SD	
1	The maximum humidity level for sterile storage is ____	1.23± 0.430	1.23± 0.430	1.3± 0.466	0.650	1.44± 0.507	1.72± 0.458	1.64± 0.490	0.016
2	The bottom shelf of any sterile storage system should be ____	1.30± 0.466	1.20± 0.407	1.2± 0.407		1.52± 0.510	1.76± 0.436	1.68± 0.476	
General means		1.26± 0.049	1.21± 0.021	1.25± 0.070		1.48± 0.056	1.74± 0.028	1.66± 0.028	

$P = 0.05$ ($P =$ probability, $SD =$ Standard Deviation, $M =$ mean), $Df = 2$

4. Discussion:

The demographic characteristics of the study sample which presented in table (1), shows that (63.4%) of the study sample were female, (67.3%) were with (24-27) years age group, (63.7%) were graduated from college, this result goes along with a study carried out by Woldegioris and others, (2018) on nurses who work in surgical area caring for post-operative patients to prevent surgical site infection, the finding recorded that (71%) of the nurses were between (20-29) age group, (65%) were female and (73.5%) were bachelor holders Table (2):

this table content the items focused on CSSD such as function, working policies and environment. The result of the control group which consist (30) nurse shows no change in general means among their pre-test related to two post-test which obtained in different time (1.48±, 1.38±, 1.41±), on the other hand the responses of the interventional group members which consist (25) nurse show positive change in their general mean in pre-test and two post-test (1.4±,

1.9±, 1.74±). this findings go along with a study conducted in (2015) by Shriyan & Shriyan discussed that, Through CSSD phase has a direct impact on infection control, patient care and health. Hence lack of consistency may have drastic effects on the health and security of patients and staff. Sterilization procedure requires effective operation and cooperation among four main areas in order to keep a proper workflow: dirty area called washing area, assembly / packing area, sterile area and sterile products storage area. And conclude CSSD is an autonomous agency with facilities for collecting, washing, packing, disinfecting, sterilizing, storing and distributing instruments according to well-delineated procedures. Therefore this provides all hospital departments with assured sterile equipment primed and ready for immediate use of patient safety a step against preventing hospital-acquired infections (HAI's). Adoption of new technologies will minimize the loss of surgical tools, reduce tool destruction and decrease repair costs, automate several routine training and monitoring activities, and reduce costs expended on infectious disease investigations. This transformation of procedure with technology is not only something for companies to aspire for, but is the center of any decision that results in a dramatic organizational success (Shriyan & Shriyan, 2015).

Table (3) demonstrate the results or operating room (OR) nurses knowledge about cleaning products. Control group nurses shows low responses in their pre and post-test, while the interventional group members show developing in their general mean between their pre and post- test. The essential work on processing the surgical tools is proper cleaning to maintain patient safety. This findings go along with the study published in 2008, which stated that washing has been the most significant step in the processing of instruments. Advanced cleaning practices are important towards the next steps of sterilizing. Instrument surfaces should be washed before the equipment can be used. Cleaning involves removing all soil, dirty and organic materials. This can be achieved by using cleaning products or enzymatic products with water. Must remove debris and bioburden to ensure machine sterilization and disinfection. Whenever sterilizer actually works, debris remains on equipment surfaces may impact the efficacy of the processes of sterilization and disinfection. Once the debris is dried and baked onto equipment, debris removal is impossible, and the process of sterilization and disinfection is affected (Mullaney, 2008).

Table (4): in this table the statistical outcome shows low responses of the general means of the control group regarding disinfection process in the pre and post- test (1.20±, 1.43±, 1.35±), also this table shows positive change in general means of the interventional group members in their pre and post- test (1.46±, 1.88±, 1.78±). This finding agree with the study conducted by (Sessa et al., 2011), and Conclusion from The survey observed that the effect of awareness , especially of the most popular HAIs, was not adequate and a small proportion of nurses indicated that the disinfection was done adequately in their work. In addition, the analysis also showed an exceptionally optimistic attitude towards the effectiveness of the disinfection procedures guidelines and protocols. HAI's training and education monitoring systems to overcome these deficiencies and strengthen awareness and adherence to protocols and HAI's prophylaxis and management are important strategies for patient safety and the elimination of HAIs.

Table (5): this table show statistical difference between the general mean of the pre and post- test of the control group (1.40±, 1.39±, 1.39±), compared with the pre and post- test means of the interventional group member responses regarding packaging of sterilize sets (1.42±, 1.83±, 1.75±). This result indicated the effectiveness of the education program on the operating nurse's knowledge about packaging instrument and how to prepare instrument for sterilization. Packaging consider one of the crucial element of sterilization act as effecting role to maintain the medical devices sterility during the sterilization process and in avoiding microbial contamination from the outside setting. Because of its ease of use, content accessibility, and effectiveness, post used packaging materials such as paper, plastic pouches are commonly used for steam (autoclave) sterilization. The both side paper made of different materials, the first side is consists of complex fibers, but the other side consists of clear polypropylene and laminated polyester. During heat sealing, each side is fused together. Usually pouches checked before and after sterilization to make sure the package is fully closed (Jantaratnota et al., 2018).

Table (6) this table show the knowledge of operating room nurses about storage of surgical instrument. The interventional group nurse's shows clear change in their general means (1.48±, 1.74±, 1.66±) related to pre and post-test, compared with the general mean which indicated low mean without any change regarding their pre and post-test (1.26±, 1.21±, 1.25±). This finding agree with the information which documented by CDC, 2016, that revealed that health workers who work in the CSSD, should welly trained to avoid contamination, diagnostic and surgical instruments havetobetreatedusingaseptictechnique.Processed(sterile)packageshouldawayfromfloorsurface about (8 - 10) inches, from ceiling about (5) inches, and not less than (18) inches from the sprinkler head and about (2) inches from exterior wall to maintain proper air circulation. Sterile products that are wet are considered polluted because humidity carries pathogen from air and surrounding surfaces. Coated and closed boxes are ideal for use to store in open shelving. Every box or package which fall on the floor must be checked form any damage for content product or the pack itself. Unless the package in impermeable plastic is heat-sealed and the lock is still intact, the package should be deemed uncontaminated. When undamaged, plastic-packaged goods need not be reprocessed (CDC,2016)

5. Conclusion

The nurses in the control group have knowledge deficit related to sterilization process in their pre and two post-test. The operating room nurses who participate in the interventional group and attend the educational program sessions recorded improvement in their knowledge regarding sterilization process (cleaning, disinfecting, lubrication, packing, and storing). The results offered that the educational program which directed to sterilization act as an effective factor on the operating room nurses.

6. Recommendation

1. Establish planned structure education program directed to the operating room nurses to improve their knowledge and update their information in order to enhance quality of care which provided to the patients who underwent surgical procedures explain the impact of the improper handling and management for surgicalinstrument.
2. Prepare booklet which act as guideline for the nurses focused on the sterilization process to maintain proper management for the surgicalinstrument.

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