Effect of Training Program on Nurses' Performance Regarding Infection Control Measures in Caring For Patient with Post-Operative Wound

Prof. Dr. Magda Abd El- Aziz Mohamed, Prof. El-Hoseny Mostafa El-Hoseny, Dr. Dena El-Tabey Sobeh, Engi Ebrahim El-Ghareb El-soudany

Professor – Faculty of Nursing - Ain -Shams University, Professor of Orthopedic Surgery , Faculty of Medicine Banha University, Lecturer - in Medical surgical Nursing Faculty of Nursing, Port Said University. Faculty of Nursing, Clinical instructor, Elnasr nursing school, port-said.

ABSTRACT

Background: **N**ow adays wound infection is one of the most challenging aspects of wound management. It is a major contributor to healthcare costs around the world, and causes significant distress to patients and careers. ***Aim: to*** evaluate the effect of training program on nurses' performance regarding infection control measures in caring for patient with post operative wound. ***Setting:*** The study was conducted in surgical units and out-patient surgical clinics of three general hospitals in Port-Said City. ***Sampling:*** The study was applied on 40 nurses working in the previously mentioned setting. ***Data was collected through a*** "questionnaire sheet" to assess nurses' knowledge and "observational checklists" to assess nurses' practice in caring for patients with post-operative wounds. ***Results:*** the study resulted that, there were statistically significant relations between total knowledge of nurses' pre, post 1, and post 2, and between nurses' practice pre, post 1 and post 2. The results showed marked improvement in nurses' knowledge and skills related to the care of wounds after surgery after the program. ***Conclusion*****:** The study concluded that there was statistically significant relation between nurses' total score of knowledge and total score of practice related to post-operative wound care. ***Recommendations:*** The study recommended that further programs with continues follow up for nurses in all general hospitals in Port-Said City to help them to improve their performance regarding postoperative wound care through applying infection control measures and monitoring periodically the nurses' performance**.**

Key Words: wound infection, postoperative, infection control measures

INTRODUCTION

Wound is a breach in the skin, and exposure of subcutaneous tissue following loss of skin integrity, which provides a moist, warm, nutritive environment conducive to microbial colonization and proliferation. Infection in a wound delays healing and may cause wound breakdown. In caring for the patient with a wound the nurse carries out intervention to enhance wound healing, prevent infection and promote physical and psychological comfort *(Shittu et al., 2009; Howard and Steinmann, 2010).*

The goal of wound care is to cleanse and debride the area of necrotic tissue and debris that would promote bacterial growth and promote wound re-epithelization and successful skin grafting. Wound care consists of daily observation, cleansing, debridement and dressing changes *(Lewis et al., 2007).*

Surgical site infection is one of the leading contributors to all nosocomial infections, and among surgical patients, it accounts for an even higher percentage of all nosocomial infection (*Devadason, 2010).* Furthermore, to prevent infections, aseptic technique should be practiced. Specific nursing activities are described that interfere in the chain of infection to prevent and control transmission of infectious organisms and that promote care of infected patient *(Lewis et al., 2007; Berman et al., 2008).*

AIM OF STUDY:

The present study aimed to evaluate the effect of training program on nurses' performance regarding infection control measures in caring for patient with post-operative wound through:

a. Assess nurses' knowledge regarding post-operative wound care.

b. Assess nurses' practice regarding infection control measures in caring for patient with post-operative wound

c. Develop and Implement the training program for nurses' performance.

d. Evaluate the effect of implemented training program on nurses' performance immediately and after 3 months regarding infection control measures in caring for patient with post-operative wound.

Research Questions

To achieve these aims, the following research questions were formulated:

1. What is the nurses' knowledge regarding post-operative wound care?

2. What is the nurses' practice regarding infection control measure in caring for patient with post-operative wound?

3. What is the effect of implemented training program on nurses' performance immediately and after 3 months regarding infection control measures in caring for patient with post-operative wound?

SUBJECTS AND METHOD:

Research Design:

A Quasi experimental research design was utilized in this study

-TECHNICAL DESIGN:

Setting:

- The present study was conducted at surgical units and Outpatient clinics in general hospitals that include three hospitals in Port Said City: El-Zohor, Port-Foad, and Port Said general Hospital

Subjects:

All available nurses working in the previous mentioned settings. Their total number was 40 nurses; 35 nurses working in surgical department and 5 nurses working in outpatient clinics.

Tools for Data Collection:

The data collection tools for this study included a structured questionnaire sheet and an evaluation checklist

Structured Questionnaire Sheet

This tool was developed by the researcher after reviewing and utilizing the most recent and relevant literature ***(Garden et al., 2007; Taylor et al., 2008; Timby, 2009; Potter &Perry, 2010; El-Soudany, 2012),*** to assess nurses' knowledge regarding post-operative wound infection and infection control measures. It included two parts:

Part 1: Socio-demographic Data

This part contained information related to socio-demographic characteristics of the studied nurses' regarding sex, age, social status, degree of education, total experience in nursing field, and any previous attending training program courses in infection control measures and wound care. It composed of (7 multiple choice questions).

Part 2: Nurses' knowledge regarding post-operative wound infection and infection control measures:

It included (21open questions), these items covered questions related to nurses' knowledge about post-operative wounds; wound healing, dressing, sterilization, and infection control measures.

Scoring System:

Nurses' knowledge sheet consisted of (21 open questions) was calculated to be 79. The respondent was given "One" point for each correct answer and "Zero" for the incorrect one. Total score below 75% was considered unsatisfactory, while those equal to or above 75% was considered satisfactory.

An evaluation checklist This tool was developed by the researcher after reviewing and utilizing the most recent and relevant literature ***(Garden et al., 2007; Taylor et al., 2008; Timby, 2009; WHO, 2009; Potter & Perry, 2010).***

It included three observational checklists:

- Dressing technique checklist: Contains 40 steps.
- Hand washing checklist: Contains 20 steps.
- Putting on sterile gloves and taken off soiled gloves checklist: Contains 22 steps.

Scoring System:

The possible choice for each item was done and not done. Each nurse was given one score for a done step and zero for the not done one. These scores were converted into a percent score. The practice was considered "satisfactory" if the percent score was 75% or more and "unsatisfactory" if less than 75%.

Educational Program Based on the results of nurses' knowledge and practice about post-operative wound care and infection control measures, the program developed and covered the following :

- Types of wound, wound healing, dressing, and sterilization.
- Infection control measures that used to reduce the incidence of post-operative wound infection.
- Nurses' practice related to post-operative wound care, hand washing techniques and putting on sterile gloves and taken off soiled gloves.

- Pre and post test immediately and 3 months post program for checking nurses' knowledge and practice before and after the implementation of program for nurses' performance regarding infection control measures when caring for patient with post-operative wound.
- The questionnaire sheet was filled in by nurses' participated in the study. Then the training program was implemented in 6 months, nurses' was trained twice weekly, two hours per day in each hospital , nurses' had the chance to tell her own experience and the investigator answered the questions and explained unknown issues.
- Evaluation of the program, whereas nurses' performance regarding infection control measures in caring for patient with post-operative wound was reassessed immediately after implementation of the program, and after three months throughout post test.

Operational Design:

Preparatory Phase:

It includes reviewing of literature, different studies and theoretical knowledge of various aspects of the problems using books, articles, internet, periodicals and magazines to develop the study tools for data collection and designing the training program.

Content Validity:

It was done by 11 experts of medical surgical nursing department and faculty of nursing, in order to check the relevancy, coverage content and clarity of the questions, and the appropriate modifications were done accordingly.

Reliability:

In order to determine the reliability for observational checklist for wound care and application of infection control measures a pilot study is carried out on (5) nurses.

Pilot Study:

A pilot study was carried out on 10% of nurses'. It was done to test the clarity and practicability of the tools. The results obtained from the pilot study and the opinion of expertise helped in modification of the tools. Accordingly, modifications were done and the final form was developed. Those subjects were not included in the main study sample.

Field Work:

- The study was conducted from the beginning of February 2013 to the end of April 2014. Data was collected twice weekly at the surgical department and the outpatient clinics in general hospitals in Port Said City.
- Data was collected from the selecting settings by the researcher using the pre-constructed tools.
- Each nurse was individually interviewed by the researcher and the questionnaire filled by the nurses' while they were on-duty.
- The purpose of the study was explained prior to get the questionnaire sheet, and it was distributed and answered within 30-45 minutes then collected.
- An observation checklist carried out by the researcher it took about (45- 60minutes).

Ethical Considerations:

- Explain the aim of the study to the director of the unit to take his permission to do this study.
- Explain the aim of the study to each nurse to be familiar with the importance of his\ her participation.
- A brief explanation of the study will be given assured to the nurses' that the information obtained will be confidential and used only for the purpose of the study.

IV. Statistical Design

All collected data were organized, categorized, tabulated and analyzed according to the type of each data.

Statistical analysis of the data

- Data were fed to the computer and analyzed using IBM SPSS software package version 20.0.
- Qualitative data were described using number and percent. Quantitative data were described using minimum and maximum, mean and standard deviation.
- Comparison between different pre, post1 and post 2 regarding categorical variables was tested using Chi-square test.
- Correlations between ordinal variables (age, qualified degree and total years' experience) with knowledge and practice scores were assessed using spearman coefficients.

- Significance of the obtained results was judged at the 5% level.

Non-significant (NS) $P > 0.05$

Significant (S) $P < 0.05$

Limitations of the study:

- Lack of sinks for washing hands.
- The limited number of nurses' in surgical departments.
- Lack of stability for nurses' in dressing room in the outpatient clinics or surgical units.
- Unavailability of equipment (sterile gloves, alcohol, sterile towels and disinfected solutions).
- The presence of some of the tools which damaged by rust in some clinics and departments, which leads to lack of sterilization properly and the patients' exposure to wound infection.

RESULTS:

Table (1): Percentage distribution of nurses according to their socio-demographic characteristics (n=40). This table reveals that more than three quarters of nurses (77.5%) were females while 22.5% of them were male. Regarding age three fifth of nurses (60%) were at age group >30 years old while 40 % of them at age group 20-30 years old.

Table (2): Percentage distribution of nurses' level of knowledge regarding post-operative wounds before and after (post1&post2) implementation of the educational program. This table shows that less than half of the study samples (47.5%) had satisfactory answer related to types of wound in the pre-test, 95% of them her satisfactory answer regarding causes of post-operative wound infection in post- test 1. Regarding, relation to total nurses' knowledge regarding post-operative wounds, there was statistically significance relation between pre, post1 and post 2 test whereas ($p< 0.001$*).

Table (3): Percentage distribution of nurses' level of knowledge related wound healing before and after ((post1&post2) implementation of the educational program. This table illustrates that, in relation to level of knowledge about wound healing, less than half of the study nurses' (40%) had satisfactory answers regarding factors affecting wound healing in pre-test, the majority of them (95%) had satisfactory answers related to definition of wound healing in post-test1. In relation to total nurses' level of knowledge regarding wound

healing, there was statistically significance relation between pre, post1and post 2 test whereas (p< 0.001*)

Table (4): Percentage distribution of nurses' level of knowledge about infection control measures before and after (post-test 1&2) implementation of the educational program (n= 40). In relation to total nurses' level of knowledge regarding infection control measures, there was statistically significance relation between pre, post1and post 2 test whereas (p< 0.001*).

Table (5): Percentage distribution of nurses' level of practice before, during and after wound dressing technique before and after implementation of the educational program (n= 40). This Table presents that, in relation to satisfactory practical level regarding preparation before wound dressing, less than three quarters of nurses' in the study (72.5%) in pre-test, the majority of them (95%) in post-test 1, and 90% of them in post-test 2 concerning keep the patient in a comfortable position. Moreover, in relation to total nurses' level of practice during wound dressing technique, there was statistically significance relation between pre, post1and post 2 test whereas (p< 0.001*).

Table (6): Relationship between total nurses' level of knowledge &level of practice before and after program implementation (n=40). This Table shows that, there were statistically significant relations between total level of knowledge of nurse's per, post 1, and post 2 whereas (<0.001*), and between nurse's level of practice pre, post 1 and post 2 whereas (<0.001*).

Table (7): Correlations between total nurses' total level of practice and their socio-demographic characteristics before and after implementation of the educational program (n=40). This table illustrates that there were not statistically significant relations between total nurses' level of practice in pre, post 1 and post 2 and socio-demographic characteristics.

Table (8): Relationship between total nurses' level of knowledge &level of practice before and after program implementation (n=40)

Table (1): Percentage distribution of nurses' according to their socio-demographic characteristics (n=40)

Items	**No**	**(%)**
Sex		
Female	**31**	**77.5**
Male	**9**	**22.5**
Age (Years)		
<20	**0**	**0.0**
20-30	**16**	**40**
>30	**24**	**60**
Marital status		
Single	**3**	**7.5**
Married	**37**	**92.5**
Divorced	**0**	**0.0**
Widow	**0**	**0.0**
Qualified Degree		
Bachelor of nursing	**2**	**5**
Diploma degree in nursing	**38**	**95**
Technical health institute	**0**	**0.0**
Total Years of experience in nursing field		
> 1	**0**	**0.0**
1- < 5	**7**	**17.5**
5- <10	**3**	**7.5**
+ 10	**30**	**75**
Attendance training programs /courses in infection control measures	**36**	**90**
Yes	**4**	**10**
No		
Attendance training programs in wound care		
Yes	**1**	**2.5**
No	**39**	**97.5**

Table (2): Percentage distribution of nurses' level of knowledge regarding post-operative wounds before and after (post1&post2) implementation of the educational program

Knowledge Assessment Variables		**Studied Nurses' (n=40)**					
		Level of Knowledge					
		Satisfactory			**Unsatisfactory**		
		Pre	**Post 1**	**Post 2**	**Pre**	**Post 1**	**Post 2**
1- Definition of wounds	**No**	**7**	**31**	**28**	**33**	**9**	**12**
	%	**17.5**	**77.5**	**70**	**82.5**	**22.5**	**30**
2- Types of wounds	**No**	**19**	**34**	**30**	**21**	**6**	**10**
	%	**47.5**	**85**	**75**	**52.5**	**15**	**25**
3-Complications of post-operative wounds.	**No**	**12**	**30**	**25**	**28**	**10**	**15**
	%	**30**	**75**	**62.5**	**70**	**25**	**37.5**
4- Causes of post-operative wound infection.	**No**	**17**	**38**	**36**	**23**	**2**	**4**
	%	**42.5**	**95**	**90**	**57.5**	**5**	**10**
5- Signs and symptoms of post-operative wound infection.	**No**	**9**	**30**	**24**	**31**	**10**	**16**
	%	**22.5**	**75**	**60**	**77.5**	**25**	**40**
6- Purpose of wound care.	**No**	**18**	**35**	**28**	**22**	**5**	**12**
	%	**45**	**87.5**	**70**	**55**	**12.5**	**30**
Post-operative wounds	**No**	**0**	**27**	**20**	**40**	**13**	**20**
	%	**0.0**	**67.5**	**50.0**	**100.0**	**32.5**	**50.0**
χ^2_1(p)		**40.755*(<0.001*)**					
χ^2_2 (p)		**26.667*(<0.001*)**					

Table (3): Percentage distribution of nurses' level of knowledge related wound healing before and after ((post1&post2) implementation of the educational program

Knowledge Assessment Variables		**Studied Nurses' (n=40)** **Level of Knowledge**					
		Satisfactory			**Unsatisfactory**		
		Pre	**Post 1**	**Post 2**	**Pre**	**Post 1**	**Post 2**
1- Definition of wound healing	**No**	**11**	**38**	**32**	**29**	**2**	**8**
	%	**27.5**	**95**	**80**	**72.5**	**5**	**20**
2- Phases of wound healing	**No**	**0**	**31**	**17**	**40**	**9**	**23**
	%	**0**	**77.5**	**42.5**	**100**	**22.5**	**57.5**
3-Signs of post-operative wound healing	**No**	**7**	**35**	**28**	**33**	**5**	**12**
	%	**17.5**	**87.5**	**70**	**82.5**	**12.5**	**30**
4- Factors affecting wound healing	**No**	**16**	**30**	**28**	**24**	**10**	**12**
	%	**40**	**75**	**70**	**60**	**25**	**30**
Wound healing	**No**	**0**	**26**	**14**	**40**	**14**	**26**
	%	**0.0**	**65.0**	**35.0**	**100.0**	**35.0**	**65.0**
χ^2_1(p)		**38.519*(<0.001*)**					
χ^2_2 (p)		**16.970*(<0.001*)**					

Table (4): Percentage distribution of nurses' level of knowledge about infection control measures before and after (post-test 1&2) implementation of the educational program.

Knowledge Assessment Variables		**Studied Nurses' (n=40)**					
		Level of Knowledge					
		Satisfactory			**Unsatisfactory**		
		Pre	**Post 1**	**Post 2**	**Pre**	**Post 1**	**Post 2**
1- Purpose of hand washing.	**No**	32	38	34	8	2	6
	%	80	95	85	20	5	15
2- Purpose of putting on gloves.	**No**	26	37	31	14	3	9
	%	65	92.5	77.5	35	7.5	22.5
3- Purpose of putting on gown.	**No**	22	29	25	18	11	15
	%	55	72.5	62.5	45	27.5	37.5
4- Purpose of putting on mask.	**No**	23	32	29	17	8	11
	%	57.5	80	72.5	42.5	20	27.5
5- Purpose of sterile field.	**No**	15	24	21	25	16	19
	%	37.5	60	52.5	62.5	40	47.5
	No	7	39	34	33	1	6
Infection control measures	**%**	17.5	97.5	85.0	82.5	2.5	15.0
χ^2_1(p)		52.379*(<0.001*)					
χ^2_2 (p)		36.473*(<0.001*)					

Table (5): Percentage distribution of nurses' level of practice before wound dressing Technique before and after implementation of the educational program

Practice Assessment Variables		**Studied Nurses' (n=40)**					
		Level of Practice					
		Satisfactory			**Unsatisfactory**		
		Pre	**Post 1**	**Post 2**	**Pre**	**Post 1**	**Post 2**
9- Performing hand washing.	**No**	0	31	23	40	9	17
	%	0	77.5	57.5	100	22.5	42.5
10-Preparing a sterile field.	**No**	0	18	11	40	22	29
	%	0	45	27.5	100	55	72.5
11-Opening the needed supplies using aseptic technique.	**No**	0	19	12	40	21	28
	%	0	47.5	30	100	52.5	70
12-Avoiding coughing, sneezing or excessive talking over sterile field or the wound.	**No**	12	29	18	28	11	22
	%	30	72.5	45	70	27.5	55
13- Putting on the gown.	**No**	0	22	16	40	18	24
	%	0	55	40	100	45	60
14- Putting on the mask (covers mouth and nose).	**No**	0	22	16	40	18	24
	%	0	55	40	100	45	60
15- Apply clean disposable gloves.	**No**	3	40	40	9	-	-
	%	77.5	100	100	22.5	-	-
16- Loosening tape of the old dressing.	**No**	24	32	29	16	8	11
	%	60	80	72.5	40	20	27.5
17-Pouring a small amount of sterile saline if the dressing adheres.	**No**	7	18	11	33	22	29
	%	17.5	45	27.5	82.5	55	72.5
18-Puting the soiled dressing in appropriate waste receptacle.	**No**	19	37	31	21	3	9
	%	47.5	92.5	77.5	52.5	7.5	22.5
19-Observing and assessing the wound condition.	**No**	12	26	17	28	14	23
	%	30	65	42.5	70	35	57.5
20-Taken off disposable gloves with pull off glove inside out and drop it in appropriate waste receptacle.	**No**	-	35	31	40	5	9
	%	-	87.5	77.5	100	12.5	22.5
Practice during wound dressing technique	**No**	0	20	40	40	20	0
	%	0.0	50.0	100.0	100.0	50.0	0.0
χ^2_1(p)		26.667* (<0.001*)					
χ^2_2 (p)		80.000* (<0.001*)					

Table (5): Continue

Practice Assessment Variables		**Studied Nurses' (n=40)**					
		Level of Practice					
		Satisfactory			**Unsatisfactory**		
		Pre	**Post 1**	**Post 2**	**Pre**	**Post 1**	**Post 2**
21- Clean hands with soap and water or alcohol gel.	**No**	-	21	16	40	19	24
	%	-	52.5	40	100	47.5	60
22- Using sterile technique when opening sterile cleaning solution.	**No**	-	24	11	40	16	29
	%	-	60	27.5	100	40	72.5
23- Putting on sterile gloves in aseptic technique way.	**No**	-	27	19	40	13	21
	%	-	67.5	47.5	100	32.5	52.5
24- Cleaning the wound, using sterile forceps.	**No**	13	35	29	27	5	11
	%	32.5	87.5	72.5	67.5	12.5	27.5
25- Cleaning the wound from top to bottom if it linear wound or from the center toward the outside if it an open wound.	**No**	-	31	24	40	9	16
	%	-	77.5	60	100	22.5	40
26- Using the gauze a single time for each wipes or circle and then dispose of it in the waste bag.	**No**	-	33	27	40	7	13
	%	-	82.5	67.5	100	17.5	32.5
27- Don't touch any surface with the gloves or forceps.	**No**	-	17	12	40	23	28
	%	-	42.5	30	100	57.5	70
28 -Drying the wound using gauze sponge in the same manner.	**No**	-	28	17	40	12	23
	%	-	70	42.5	100	30	57.5
29- Applying the layer of dry sterile dressing over the wound.	**No**	31	40	36	9	-	4
	%	77.5	100	90	22.5	-	10
Practice during wound dressing technique	**No**	0	21	40	40	19	0
	%	0.0	52.5	100.0	100.0	47.5	0.0
χ^2_1(p)		28.475*(<0.001*)					
χ^2_2 (p)		80.000*(<0.001*)					

Table (5): Continue

Practice Assessment Variables		**Studied Nurses' (n=40)**					
		Level of Practice					
		Satisfactory			**Unsatisfactory**		
		Pre	**Post 1**	**Post 2**	**Pre**	**Post 1**	**Post 2**
30-Taken off the gloves by pulling them off, inverting them as they're pulled and dropping them in appropriate waste receptacle.	**No**	21	33	27	19	7	13
	%	52.5	82.5	67.5	47.5	17.5	32.5
31- Taken off personal protective equipment (gown & mask) and drop it in appropriate waste receptacle.	**No**	-	22	16	40	18	24
	%	-	55	40	100	45	60
32-Using enough amount of adhesive tape to secure the dressing	**No**	28	36	33	12	4	7
	%	70	90	82.5	30	10	17.5
33-Removing waterproof pad.	**No**	-	23	14	40	17	26
	%	-	57.5	35	100	42.5	65
34-Assessing the patient condition.	**No**	-	13	7	40	27	33
	%	-	32.5	17.5	100	67.5	82.5
35-Keeping the patient in a comfortable position.	**No**	23	31	28	17	9	12
	%	57.5	77.5	70	42.5	22.5	30
36-Removing and disposing soiled objects and all used items into the waste bag.	**No**	31	38	37	9	2	3
	%	77.5	95	92.5	22.5	5	7.5
37- Immediate cleanup of soiled or moist area.	**No**	-	22	13	40	18	27
	%	-	55	32.5	100	45	67.5
38- Performing hand washing.	**No**	7	31	26	33	9	14
	%	17.5	77.5	65	82.5	22.5	35
39-Providing adequate health education to the patient.	**No**	-	18	10	40	22	30
	%	-	45	25	100	55	75
40-Reporting and recording information in a significant chart, including (time/ date), wound, patient, and healing condition.	**No**	4	16	9	36	24	31
	%	10	40	22.5	90	60	77.5
Practice after wound dressing technique	**No**	0	8	40	40	32	0
	%	0.0	20.0	100.0	100.0	80.0	0.0
χ^2_1(p)		8.889* (0.005*)					
χ^2_2 (p)		80.000* (<0.001*)					

Table (6): Correlations between total nurses' total level of knowledge and their socio-demographic characteristics before and after implementation of the educational program

Socio-demographic characteristics	Total Knowledge												χ^2_1	p_1	χ^2_2	p_2
	Satisfactory						Unsatisfactory									
	Pre (n= 0)		Post1 (n= 38)		Post2 (n = 24)		Pre (n= 40)		Post1 (n= 2)		Post2 (n = 16)					
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%				
Sex																
Male	0	0.0	9	23.7	6	25.0	9	22.5	0	0.0	3	18.8	0.611	0.434	0.215	0.643
Female	0	0.0	29	76.3	18	75.0	31	77.5	2	100.0	13	81.3				
Age (years)																
20 – 30	0	0.0	15	39.5	9	37.5	16	40.0	1	50.0	7	43.8	0.088	0.767	0.156	0.963
>30	0	0.0	23	60.5	15	62.5	24	60.0	1	50.0	9	56.3				
Marital status																
Single	0	0.0	3	7.9	2	8.3	3	7.5	0	0.0	1	6.3	0.171	0.679	0.060	0.806
Married	0	0.0	35	92.1	22	91.7	37	92.5	2	100.0	15	93.8				
Qualified Degree																
Diploma degree in nursing	0	0.0	37	97.4	24	100.0	38	95.0	1	50.0	14	87.5	8.975*	0.003*	3.158	0.076
Technical health institute	0	0.0	1	2.6	0	0.0	2	5.0	1	50.0	2	12.5				
Total experience in nursing field																
1 - <5	0	0.0	7	18.4	3	12.5	7	17.5	0	0.0	4	25.0				
5 - <10	0	0.0	2	5.3	1	4.2	3	7.5	1	50.0	2	12.5	5.614	0.060	2.302	0.316
+10	0	0.0	29	76.3	20	83.3	30	75.0	1	50.0	10	62.5				
Attendance training programs (courses) in infection control measures	0	0.0	34	89.5	22	91.7	36	90.0	2	100.0	14	87.5	0.234	0.629	0.185	0.667
Attendance training programs (courses) in wound care.	0	0.0	1	2.6	0	0.0	1	2.5	0	0.0	1	6.3	0.054	0.816	1.538	0.215

Table (7): Correlations between total nurses' total level of practice and their socio-demographic characteristics before and after implementation of the educational program.

Socio-demographic characteristics	Total Practice												χ^2_1	p_1	χ^2_2	p_2
	Satisfactory						Unsatisfactory									
	Pre (n= 0)		Post1 (n= 27)		Post2 (n = 5)		Pre (n= 40)		Post1 (n= 13)		Post2 (n = 35)					
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%				
Sex																
Male	0	0.0	6	22.2	2	40.0	9	22.5	3	23.1	7	20.0	0.004	0.952	1.004	0.316
Female	0	0.0	21	77.8	3	60.0	31	77.5	10	76.9	28	80.0				
Age (years)																
20 – 30	0	0.0	8	29.6	1	20.0	16	40.0	8	61.5	15	42.9	3.723	0.054	0.952	0.329
>30	0	0.0	19	70.4	4	80.0	24	60.0	5	38.5	20	57.1				
Marital status																
Single	0	0.0	1	3.7	1	20.0	3	7.5	2	15.4	2	5.7	1.726	0.189	1.287	0.257
Married	0	0.0	26	96.3	4	80.0	37	92.5	11	84.6	33	94.3				
Qualified Degree																
Diploma degree in nursing	0	0.0	26	96.3	5	100.0	38	95.0	12	92.3	33	94.3	0.294	0.588	0.301	0.583
Technical health institute	0	0.0	1	3.7	0	0.0	2	5.0	1	7.7	2	5.7				
Total experience in nursing field																
1 - <5	0	0.0	3	11.1	1	20.0	7	17.5	4	30.8	6	17.1				
5 - <10	0	0.0	2	7.4	0	0.0	3	7.5	1	7.7	3	8.6	2.404	0.301	0.468	0.791
+10	0	0.0	22	81.5	4	80.0	30	75.0	8	61.5	26	74.3				
Attendance training programs (courses) in infection control measures	0	0.0	24	88.9	4	80.0	36	90.0	12	92.3	32	91.4	0.114	0.736	0.635	0.426
Attendance training programs (courses) in wound care.	0	0.0	1	3.7	0	0.0	1	2.5	0	0.0	1	2.9	0.494	0.482	0.147	0.702

Table (8): Relationship between total nurses' level of knowledge &level of practice before and after program implementation (n=40)

	Pre		Post1		Post2		χ^2_1(p)	χ^2_2 (p)
	No.	%	No.	%	No.	%		
Knowledge								
Satisfactory	0	0.0	38	95	24	60	72.381* (<0.001*)	34.286* (<0.001*)
Unsatisfactory	40	100	2	5.0	16	40		
Practice								
Satisfactory	0	0.0	27	67.5	5	12.5	40.755* (<0.001*)	5.333* (0.021*)
Unsatisfactory	40	100	13	32.5	35	87.5		

DISCUSSION:

The present study included 40 nurses, 35 of them working at surgical units, and 5 of them working at outpatient clinics. The majority of the nurses on the study were females. As for marital status married nurses' were more than three quarters and more than half of them in the age group more than 30 years; also the majority of the nurses had a diploma degree in nursing. This attitude was supported by ***Ismail et al. (2000); Ahmed (2003); Sabara (2003); Sobeh (2005)& Abd El-Azem (2013)*** who reported that the majority of the nursing manpower in Egypt was graduated from diploma school and it expected that nowadays they are employed in all nursing service.

The present study revealed that the most of nurses' had experience for more than 10 years. This attitude was supported by ***El-soudany (2012)*** who found in her study that the majority more than half of the study nurses' had experience for more than 10 years. ***Dawson (2003)*** found that to be successful, these nurses' needed to have sufficient clinical experience and standing to have authority with managers and colleagues.

The present study revealed that nurses' performance was positively related to the years of experience. With these ideas; ***Ali (2003)*** had a special thought that nurses' experience enhances the day-to-day activities and improves their practice. She has also stated that, the level of knowledge of nurses' increases with each year of the nursing. Additionally, ***Bronsan et al. (2007)*** emphasized on that lengthy experience was necessary to reach a satisfactory level.

The present study revealed that the majority of the study nurses' 90% have a training courses related to infection control. This finding is in agreement with ***El-soudany (2012)*** who reported that 100%of the study nurses' had attended training courses and they had a brief idea about infection control measures but there is a lack of continuous supervision regarding ideal infection control measures .Related to infection control program ***Ibrahim (2014),*** reported that only one third of the studied nurses' attended training program related to infection control.

In this respect, Sobeh (2005) stated that in-service education is important and is considered as a corner stone of total quality management. Moreover, the continuous improvement is impossible without it, and the quality begins with education and ends with education. The pres ent study revealed that before the program there was lack in the basic knowledge about the wound in general and especially in postoperative wound infection between nurses' working in surgical units. These findings were supported by those of other studies performed by Ahmed (2003) & Eldosoky (2004), Sobeh (2005) and El-soudany (2012) who found that diploma nurses' who are working in the areas of surgical units had a lack of knowledge about definition, complications, causes, signs and symptoms, and purpose of nursing care related to wound infection.

The findings of the present study revealed that the majority of the studied nurses' had unsatisfactory level of knowledge in pre-test regarding wound healing. From the point view of the researcher, this result may due to that the most of the studied nurses' believed that knowledge about post-operative wound healing and its stages is the responsibilities of the physician, so it is not important for them to understand all aspects about the post-operative wound and wound healing .

This finding is similar to that of ***Smeltzer (2008); El-soudany (2012) and Satteson (2015)*** who stressed on that nurses' should be informed about the principles and process of wound healing. ***Hamlin et al. (2009)*** appointed that wound management requires not only knowledge of the properties of dressings but also an understanding of the healing process. Knowledge and understanding of the basic concepts of wound healing and wound care provide the new practitioner with confidence in caring for patients' in the surgical settings.

In this respect *El-Hosany (2003)* described supervision from day as day is commonly used to cover the training, direction, motivation, coordination, and maintenance of discipline and immediate adjustment. Supervision is a component of administration closest to persons who perform the services and do the work needed to meet formal organizational objects and the process of supervision are direction instruction, support and evaluation.

The current study revealed that there was an improvement immediately at the first follow up and after three months post program intervention in nurses' knowledge regarding

wound healing and dressing. Concerning the second follow up, there was obvious decline in nurses' knowledge related to knowledge related wound healing, but nurses' knowledge was still higher than pre-program intervention. This finding of the present study recommended that periodic refreshing courses should be planned and implemented for nurses' every three months.

The current study recommended that it is important to the nurse to understand the normal healing process. ***Martin et al. (2004)*** stated that nurses' are able to identify stages of wound healing and provide the most appropriate care required at each stage and identify abnormal signs and symptoms that are delaying the healing process. It's important that nurses' keep up to date with current research and are able to appraise it objectively. While, ***Hamlin et al. (2009)*** showed that successful wound management requires not only knowledge of the properties of dressing but also an understanding of the healing process.

All of nurses were not knowledgeable in all areas related to wound healing before the program. The improvement may be due to the present training program using adequate sessions and increased motivation, which is needed for achievement of the desired objects, motivation is one of the most important factors affecting knowledge.

The present study in pre-test revealed that most of the study nurses' had a satisfactory level of knowledge related to sterilization and infection control measures, and fairly improvement immediately after of the program and after three months of the program. From the point view of the researcher, this result may due to that most of the study nurses' had a frequent training program on infection control measures, so they had a good knowledge scores in infection control. These findings are supported by ***El-Soudany (2012)*** who reveals that highly percentage of the studied nurses' had satisfactory level of knowledge related to sterilization and infection control measures. ***Mohamed (2002)*** reported that the majority of studied nurses' had satisfactory level of knowledge related to the principles of aseptic technique.

This result is in agreement with ***Paudyal et al. (2008)***; ***Sodhi et al. (2013)*** who mentioned that the infection control knowledge among the nurses' was fairly good. ***Sherif (2005)*** stressed on that the nurse must be knowledgeable and skillful of the simple measures for controlling infection. This result is incongruent with ***El-Kazaz***

(2011); Ibrahim (2014) who indicated that the nurses' knowledge about infection control was poor before the program; it's improved immediately and after three months of the program.

The current study result revealed that the nurses rarely washed their hands before procedures and when coming on duty. This performance could be due to lack of awareness about the importance of hand washing at specific instances. Nurses might give more importance to hand washing after rather than before any interaction. This is similar to what *Bystel et al. (2001)* had reported as; they found that hands were washed when needed before an interaction in 27% and after an interaction in 63% of these cases.

The present study revealed that the majority of nurses had unsatisfactory level of practice regarding wearing sterile gloves before dressing in aseptic technique way. This finding was supported by *Youssef (2001),* who observed that wearing gloves was done properly by only (28.8%) of the studied nurses. In the same line, *Ahmed (2003)* found that most of nurses were not following glove techniques because they found it difficult to use it correctly since they did not understand the principles of the glove techniques.

The result of the present study revealed that there was no statistically significant relationship between nurse's knowledge and practice. These findings may be due to that most of studied nurses were lacking knowledge and practice, so there was nothing to compare with. This finding was in agreement with *Kowalski (2003),* who stated that nursing is a combination of a body of knowledge and the application of that knowledge through nursing practice. In this respect, *Eldosoky (2004)* has claimed that nursing knowledge has been developed and established as a systemic and generalized knowledge base for practice. The knowledge is necessary for nurses to improve their practice. This is based on the recognition that nursing knowledge production must also be viewed in conjunction with practice itself, as practice invades not only the use of knowledge but also gaining of knowledge.

The results show an urgent need to start a regular and continuous education program of education concerning the risk of infection and the measures of its prevention to

ensure the commitment and progress of nurses' level, and assessment was carried out before and after this intervention. The results revealed that education is a successful tool in improving the knowledge and practice of the nurses'. These results are congruent with ***Stein et al., (2003)*** who stated that education, monitoring, improved availability of resources and disciplinary measures for poor compliance are necessary to improve infection control in hospitals. Guidelines and instruments should be developed and updated to improve infection control. There is an ongoing need for improvements in education and effective implementation strategies.

In this respect, ***Altier & Krsek (2006); Thompson et al. (2007)*** stressed that the in-service education should be important and considered as a cornerstone of total quality nursing care. Moreover, the continuous improvement was impossible without it. On the same line, ***Happel*** *(2005)* stated that quality should begin with education and end with education

CONCLUSION:

According to the results of the present study, some important factors could be concluded:

The study revealed that, before the program there was lack in the basic knowledge and practice of nurses', but after the implementation of the educational program observed that there was a remarkable improvement immediately at the first follow up and after three months post program intervention in nurses' knowledge and practice score.

There was significant relation between knowledge and practice scores before and after the educational program. This indicates that nurses' working in the surgical related wards lack some practice of surgical site infection.

prevention. Therefore, the hospital administrators need to conduct education and training programs to enhance practice of SSI prevention to improve the quality of nursing care in this area.

There were no statistically significant correlations between nurses' knowledge and all their socio-demographic characteristics parameters except in qualification degree.

There were no statistically significant correlations between nurses' practice and their socio-demographic characteristics.

Finally, the frame of the present study aimed at shedding some light on the reality and nature of care provided to patients' with post-operative wound.

RECOMMENDATIONS:

Nurses' who are working with postoperative wound patients' should be encouraged to attend regular formal in-service educational programs applying new hands about proper technique for caring with postoperative wound to improve their knowledge and practice.

Orientation for the newly assigned nurses' in the dressing clinics or surgical departments is needed through special preparation and training before they start their work. The orientation program can cover the specific infection control measures to decrease postoperative wound infection.

REFERENCES:

Ahmed, F.M. (2003): Assessment of nurses knowledge and practice about postoperative wound infection. Unpublished Master Thesis. Suez Canal University, Egypt, pp.54-59.

Ali, S.B.M. (2003): Developing an in service training program for nurses control hospital infection in Suez Canal University Hospital. Unpublished Doctorate Thesis, Faculty of Nursing, Suez Canal University

Altier, M. E., & Krsek, C .A. (2006): Effect of one year residency program on job satisfaction and retention of new graduate nurses'. J. Nurses – Staff- Dev; 22(2). pp. 70-77

Berman, A., Snyder, SH.J. Koizer, B., & Erb, G. (2008): Koizer & Erbs. Fundamentals of nursing concepts process and practice. (8th ed.). New Jersey: Upper Saddle River, New Jersey: pp. 967-968.

Bronsan, C. A., Upchurch, S. L., Meininger, J. C., Hester, L, E., Johnson, G,. & Eissa, M. A. (2007): Student nurses participate in public health research and practice through a school-based screening program. Public–Health-Nurs. 22(3):260.

Bystel T, Diane M., & Xillant U. (2001): Hand washing and gloves use in A long learn–care facility. Infection Control and Hospital Epidemiology; 18: 2.

Daniels, R. (2004): Nursing fundamentals, caring &clinical decision making. Thomson's. 1948.

Devadason, B. (2010): Infection control - Lack of compliance in Western Europe.

El-Azem, A. K. (2013): Assessment of nurses' performance regarding infection control measures with central venous catheter. Master Thesis. Faculty of Nursing. Port Said University. PP.109-112.

Eldosoky, H.I. (2004): Assessment of nurses' knowledge and practice about measures to prevent deep venous thrombosis among hospitalized patients in general hospitals of Port-Said City. Unpublished Master Thesis Faculty of Nursing, Suez Canal University, pp. 77-78

El-Hosany, W.A. (2003):Development of Quality Assurance Program for the Nursing Services Provided in the Surgical Unit in Suez Canal University Hospital , Unpublished Doctorate Thesis, Faculty of Nursing; Suez Canal University, Egypt, pp.102-106.

El-Kazaz, R .H. (2011): Impact of implementing infection control program for nurses' to control nosocomial infection in neonatal intensive care units in Port Said. Doctorate Thesis, Faculty of nursing, Port Said University. Egypt.

El-Soudany E, (2012)**:** Assess nurses' performance regarding infection control measures in caring for patient with post-operative wound. Un published master thesis. Faculty of Nursing. Port Said University

Garden ,O.J., Bradbury, A.W., Forsythe, J.L., & Parks, R.W. (2007)**:** Principles and practice of surgery. (5^{th} ed.). Churchill Livingstone. (71).62.

Howard, P.K. & Steinmann, R.A. (2010): Emergency nursing: Principles and practice, (6th ed.) (11), pp. 112-120.

Ibrahim, N. (2014): Impact of educational program on nurses' performance related to care of patients with chest tube. Doctorate thesis, Faculty of Nursing: Port-Said University, Egypt.

Ismail , M .F., Fakery , N., &Mousse, M. (2000):Costing out nursing services of myocardial infarction patients in the critical care unit at El-Manial University Hospital .The New Egyptian Journal of Medicine, 22(950):247-255.

Kowalski, M.T. (2003): Text Book of basic nursing. Respiratory intervention, (8th ed.), Philadelphia; Lippincott Williams and Wilkins, p.1202.

Lewis, S. M., Hitkemper, M.M., Dirksen, S.R., O'Brien, P. G., & Bucher, L. (2007): Medical surgical nursing: Assessment and Management of Clinical Problems, (ed. 7). St. Louis: Mosby, pp. 247-501.

Martin, J., Lucas, J., Fletcher, M., & Sawyer, J. (2004): Handbook of practice nursing. (3rd ed).Churchill Livingstone. (25).pp, 346-347-446.

Mohamed, SM. (2002). An epidemiology study of operative rooms' hospital acquired infection at Alexandria hospitals. PhD. Thesis of epidemiology, Alexandria University, pp.62.

Paudyal, P., Simkhada, P., & Bruce, J. (2008): Infection control knowledge, attitude, and practice among Nepalese health care workers. American Journal of Infection Control. Volume 36, Issue 8, October 2008, Pages 595–597.

Potter, P.A., &Perry, A, G. (2010): Clinical nursing skills &techniques (7th ed).Mosby. pp.173, 188, 980-981.

Sabara, H.T. (2003): Assessment Nursing Care Circulation Association Operating Room, (1st ed) Philadelphia: W.B. Saunders Co, p.341.

Satteson, E. S. (2015): Materials for wound closure. Medscape reference. Feb 13, Retrieved from .http://www.medscape.com/.

Sherif, Sh. (2005): The role of the nurse toward the critically ill patients. Unpublished Master Thesis, Suez Canal University, Egypt.

Shittu, A.O., Kolawole, D.O., & Oyedepo, E.A.R. (2009): Wound infections in two health institutions in Ile-Ife, Nigeria; 49:5.

Sobeh, D.S. (2005)*:* Assessment of nurses knowledge and practice related to the care of the mechanically ventilated patient. Unpublished Master Thesis, Suez Canal University, Egypt .p.47.

Sodhi , K. Shrivastava, A. Arya, M. Kumar M. (2013): Knowledge of infection control practices among intensive care nurses in a tertiary care hospital. Journal of infection and public health. Volume 6, Issue 4. May 22. Pages 269–275. Retrieved from http://www.jiph.org/home

Stein , A.D., Makarawo, T.P., & Ahmad, M.F.R. (2003): A survey of doctors' and nurses' knowledge, attitudes and compliance with infection control guidelines in Birmingham teaching hospitals. Journal of hospital infection. Volume 54, Issue 1, May. Pages 68–73.

Taylor, C.R., Lemone, P.L., Lillis, C., & Lynn, P. (2008): Fundamental of nursing. The art and the science of nursing care. Lippincott Williams &Wilkins. (6^{th} ed.). (38) pp, 706, 707, 898, 1186, 1189

Timby, B.K. (2009): Fundamental nursing skills and concepts. (9^{th}ed.). Lippincott Williams &Wilkins. pp, 138-145-640-641

Youssef, F. (2001): Standards of infection control in cardio surgical units as perceived by nurses. Unpublished Master Thesis, Faculty of Nursing, Ain Shams University. p. 75.

تـأثيـر بـرنـامــج تـدريـبـي عـلـى أداء الـمـمـرضـات تـجـاه إجـراءات الـتـحـكـم فـي الـعـدوى للـعـنـايـة بـالـجـروح بـعـد إجـراء الـعـمـلـيـات الـجـراحـيـه

أ.د/ ماجدة عبد العزيز محمد ، ا.د/ الحسيني مصطفى الحسيني ، د/ دينا التابعي صبيح انجي إبراهيم الغريب السوداني

استاذ التمريض الباطنى والجراحى كلية التمريض- جامعة عين شمس - أستاذ جراحة العظام -كلية الطب جامعة بنها- مدرس تمريض الباطني والجراحي -كلية التمريض-جامعة بورسعيد- اخصائية تمريض فى مدرسة النصر الثانوية الفنية للتمريض ببورسعيد

الـخلاصة

يعتبر تلوث الجروح في الوقت الحاضر أحد أكثر السمات الصعبة للعناية بالجروح فهو مساهم الى حد كبير في زيادة تكلفة الرعاية الصحية حول العالمِ، ويسبب صعوبات للمرضى وللممرضات . إن هدف الدراسة هو تقييم تأثير برنامج تدريبي على أداء الممرضات تجاه إجراءات التحكم في العدوى للعناية بالجروح بعد إجراء العمليات الجراحية . الدراسة أجريت في ثلاث مستشفيات عامة في مدينة بورسعيد، شملت العينة **40** ممرضة تعملن في أقسام الجراحة وعيادات الجراحة الخارجية. تم جمع البيانات باستخدام أداتين؛ "استمارة استبيانِ" لتَقييم مستوى معلومات الممرضة و"استمارة ملاحظات" لتَقييم مستوى مهارات الممرضة. خلصت نتائج الدراسة إلى وجود علاقة ذات دلالة إحصائية بين المعرفة الكلية للممرضات قبل وبعد البرنامج ، وبين مهارات الممرضات كما أظهرت النتائج التحسن الملحوظ والمرضى لمعلومات و مهارات الممرضات ذات الصله بالعناية بالجروح ما بعد الجراحة بعد البرنامج. استنتجت الدراسة بأن هناك دلالة إحصائية بين نتيجة الممرضات الكلية للمعرفة والنتيجة الكلية للمهارة الخاصة بالعناية بالجروحِ ما بعد الجراحة. وأوصت الدراسة بأن المزيد من البرامج مع استمرار متابعة للممرضين والممرضات في جميع المستشفيات العامة في مدينة بورسعيد يساعد على تحسين أدائهم أثناء العناية بالجروح فيما بعد العملية الجراحية من خلال تطبيق تدابير مكافحة العدوى مع مراقبة أداء الممرضين والممرضات بشكل دوري.

الكلمات المرشدة: *الجرح، تلوث الجروحِ، ما بعد الجراحة، إجراءات التحكم فى العدوى*