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Improving Nurses' Performance to Use Infection Control Standard Precautions in Emergency Unit

[(1)] Warda Abdelmoaty Azab, [(2)] Nawal Mahmoud Soliman, [(3)] Ferial Fouad Melika

[1.] M.Sc.N., Community Health Nursing, Faculty of Nursing, Ain Shams University, Egypt

[2.] Professor of Community Health Nursing Faculty of Nursing - Ain Shams University, Egyp

[3.] Assistant professor of Community Health Nursing Faculty of Nursing - Ain Shams University, Egypt

Abstract: **Emergency unit provide initial treatment for a broad spectrum of illnesses and injuries, some of which may be life-threatening and require immediate attention, the aim The aim of this study is to evaluate the effect of training program for improving nurses' performance to use infection control standard precautions in emergency unit Setting The study was conducted in emergency units at Ain Shams University specialized hospital, Cairo Governorate, Sampling A convenience sample, all nurses was taken, The total number (80) of nurses. (65 diploma nurses and 15 bachelor nurses) working in emergency unit. Tools Three tools were used in this study for data collection, First An interviewing questionnaire divided into three parts: Part 1 nurses socio- demographic, Part 2 Nurses knowledge& Part 3 The barriers hindering the application of infection control standard precaution .Second Observation checklist for assessing nursing performance regarding infection control standard precautions Third Inventory checklist, for assessment of the environment of the emergency unit. Results Reveals that 46.1% had correct knowledge about infection control pre-program, improved to 84.4% post program implementation, there were statistically significant differences between nurse's total knowledge scales and subscales in Pre and Post program. Also Reveals that there were highly statistically significant differences related to nurses correct performance score level pre and post program.Conclusion educational training program reported remarkable improvement in emergency unit nurses knowledge and performance toward infection control standard precautions. Recommendations the study recommended that Continuing training for nurses to demonstrate their compliance/ performance/ utilization of standard precautions of infection**

Keywords: **Emergency Unit, Infection Control, Nurses Performance.**

1. INTRODUCTION

Emergency unit is an essential component of the health care system, and its potential impact continues to grow as more individuals seek care and are admitted to the hospital through the emergency. Invasive procedures such as central lines are placed with increased frequency in certain unit, but adherence to best practices (eg maximum barrier precautions) , clinicians also face numerous workflow challenges that may foster the spread of infections including crowding, frequent interruptions to care delivery**, *(Sahiledengle et al.,2018).***

Infection prevention and control (IPC) is a scientific approach and practical solution designed to prevent harm caused by infection to patients and health workers. It is grounded in infectious diseases, epidemiology, social science and health system strengthening. IPC occupies a unique position in the field of patient safety and quality universal health coverage since it is relevant to health workers and patients at every single health-care encounter**,(World Health Organization, 2018).** Standard precautions are a set of infection control practices used to prevent transmission of diseases that can be acquired by contact with blood, body fluids, non-intact skin (including rashes), and mucous membranes. These measures

are to be used when providing care to all individuals, whether or not they appear infectious or symptomatic**,(Powers et al., 2016).**

Healthcare workers in the emergency department and receiving areas need to be aware of the risks posed by blood and airborne infections, and take measures to limit exposure through early identification and isolation of high risk patients. It is mandatory to identify and isolate patients with highly contagious infections (e.g., tuberculosis) or when exposure to a bioterror agent is known or suspected, **(Carter et al., 2016).**

These are precautions take with **EVERY** patient at **ALL** times because don't know if they have an infectious disease. By implementing these practices, it help prevent transmission of infectious diseases from one to another (ex: patient to nurse, nurse to patient, or patient to patient), **(Cha et al., 2017).**

Standard Precautions are the minimum infection prevention practices that apply to all patient care, regardless of suspected or confirmed infection status of the patient, in any setting where health care is delivered. These practices are designed to both protect HCW and prevent HCW from spreading infections among patients. Standard Precautions include hand hygiene, Use of personal protective equipment (e.g., gloves, masks, and eyewear), Respiratory hygiene / cough etiquette, sharps safety (engineering and work practice controls), safe injection practices), sterile instruments and devices and Clean and disinfected environmental surfaces, **(Cha et al., 2017).**

Lack of compliance with infection prevention and control among health care workers has a number of consequences including increased bed occupancy and straining the scarce hospital resources. Furthermore, nosocomial infections present a serious cause for concern due to attendant morbidity and potential mortality. Therefore, preventing nosocomial infections among hospitalized patients is of critical importance for all health care workers, **(Houghton et al., 2020).**

Nurses play an important role in health delivery service worldwide, their role is critical in prevention and control of infection spread. Nurses are at the fore front of patient care hence facilitating the spread of infection. This is particularly so for junior nurses who are doing most of the work in the wards because of acute shortage of experienced qualified nurses in the country. The nurses may do the work hurriedly and in the process, fail to follow correct measures of preventing infection, thereby putting the patient at risk of acquiring nosocomial infection, **(Banaser et al., 2019).**

Emergency unit nurse play one of the most critical roles in a hospital setting - the frontline of triage and treatment for patients with everything from mild colds to extreme injuries. When it comes to an emergency room nurse, consider the ace of hearts in a deck stacked with a whole team of medical professionals, **(Innes et al., 2017).**

Nurses play a pivotal role in preventing hospital-acquired infections (HAI) through the application of standard precautions, not only by ensuring that all aspects of their nursing practice is evidence based, but also through nursing research and patient education**,(Donati et al,2019).**

Aim of the Study

The aim of this study is to evaluate the effect of training program for improving nurses' performance to use infection control standard precautions in emergency unit through:

- Assessing nurses' knowledge regarding infection control standard preca utions and barriers in emergency unit.
- Assessing nurses' performance regarding infection control standard precautions.
- Designing and implementing training programs for improving the nurses' performance toward infection control standard precautions in emergency unit.
- Evaluating the effect of training program for improving the nurses' performance toward infection control standard precautions in emergency unit.

Research Hypothesis

The training program about infection control will improve the nurses' performance on applying standard precautions and detection of barriers to apply it in emergency units.

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2. SUBJECTS AND METHODS

I-Research design: A Quasi-experimental research design was utilized to fulfill the aim of this study

II-Technical Design:

Setting: The study was conducted in emergency units at University Ain Shams specialized hospital, Cairo Governorate.

Sampling: A convenience sample, all nurses was taken, the total number (80) of nurses. (65 diploma nurses and 15 bachelor nurses) working in emergency unit, at the Ain Shams specialized hospital and all of them agree to participate in the study.

Data collection tools:

Three tools were used in this study, designed after reading related literature and taking expert's and supervisors' opinion, and written in Arabic language.

First tool: Was prepared by the researcher after reviewing the related literature it was include the following parts:

First tool: A self-administered questionnaire .This tool contains three parts as follow.

Part 1: Socio demographic characteristic data as age, sex, qualification and years of experience, job, number of working/hours, training and vaccination. This data were collected before the program only

Part II: Nurses' knowledge regarding: infection control standard precautions. The questions were to assess the areas of cleaning disinfection, general infection, hand hygiene, needle stick injury, personal protective equipment, safe injection, and safe waste disposal.

Scoring system

Related to nurses knowledge assessment a correct answer scored one and incorrect answer scored zero. Except for questions (No. 1, 2, 3, 19, 21&29) give 1 mark for more than50% correct answer and less than50% scored zero. The whole knowledge questions scored 43 points for each area of knowledge, a total of 70% and above were considered correct and less than 70% were considered incorrect.

Part III: The barriers hindering the application of infection control standard precaution. It included three categories of barriers; (1) barriers related to facility such as lack of guidelines for the nurse to apply standard, lack of infection control team and inefficiency of infection control team. (2) Barriers related to nurses such as work load, shortage of nurses, and increased numbers of patients. (3) And barriers related to patients such as false beliefs about infection and economic reasons.

Scoring system

The rating scale was consisted of three points scale, it has a score ranging from zero to two distributed as the following; totally agree =2, agree = 1, disagree = 0, the scale included 14 statements as the highest score is two then the total scale scored 28 points. The nurse was considered to have a high perception of barriers if the total score obtained was 60 %or higher and a low perception if the total score was less than 60%.

Second tool: Observation checklists: This tool about nurses' performance toward standard precautions. It contained the nurses' practices in eight procedures; hand washing, gloving, masking, gowning, safe injection, waste management, sharps waste management and vaccination.

Scoring system

The items observed to be done were scored one and the items not done were zero .For each area the scores of the item were summed-up and the total divided by the number of the items, giving a mean score for the part. These scores were converted into percent scores. The practice was considered correct if the percent score was 60%or more and incorrect if less than 60%.

Third tool: Inventory checklist: for assessment of the environment of the emergency unit. To assess the presence of environmental sanitation conditions such as examination rooms and safe waste disposal, these were checked as either present or absent. The unit fulfilling all the items was considered as having adequate environment.

Scoring system

The tool, consisted of two points scale, it had a score ranging from zero to one distributed as; present =1, absent =0 the scores of the item were summed-up and the total divided by the number of the items, giving a mean score for the part. These scores were converted into percent scores, the environment was considered adequate if the percent score was 60%or more and inadequate if less than 60%.

Operational design:

The study to be completed passed through different phases included: preparatory phase, pilot study and field work phase.

A-Preparatory phase:

A review of recent, current, national and international related literature in various aspects of the problems to design the study tools, then assessment was done to determine the nurse's needs by using pretest based on the collecting data on the nurses knowledge and their performance toward infection control in emergency unit. Then tools of data collection were tested for content validity through pilot study

B-Pilot study:

It was conducted on 8 nurses representing 10% of the total study sample, the aim of the pilot study was to evaluate clarity, visibility, applicability, as well as the time required to fulfill the developed tools. According to the obtained results, modifications such as omission, addition and rewording were done. The number of the pilot study was excluded from the study sample.

Content validity

Content validity was done for the tools by 5 experts from staff in community health nursing and infection control, Ain Shams University for face and content validation.

C- Field Work:

An official permission including the title and purpose of the study were submitted from the Dean of Faculty of Nursing Ain Shams University and directed to the director of Ain Shams specialized hospital, to get an approval for data collection to conduct the study that forwarded to the director of emergency unit where the study was conducted.

- After obtaining a permit the researcher started to visit emergency unit, meet the director and explain the aim and program content.
- The study started from mid-January to mid-October 2020 the actual duration was ten months & a half, "as periods of examination and holidays were excluded". The assessment phase (pretest) was done for (80) of nurses. (65 diploma nurses and 15 bachelor nurses) and took one month to be fulfilled.
- Implementation of the program took two months divided as one days/week, half hours/day from (8.30am- 9.00 am) and sometimes from (1.30pm- 2pm) "this was determined by nursing supervisor to fill it after taking oral approval consent from them.
- The evaluation phase was delayed duo to COVID-19 pandemic and start to receive COVID-19 patients in emergency unit and return to start training to health care worker on emergency unit on hand hygiene ,personal protective equipment, keeping social distance and how to dealing with COVID-19 patient . This period took four months.
- The evaluation phase of the program lasted for two months to determine the level of improvement.

Ethical consideration

Approval was taken from the Ethical Research committee of faculty of nursing, Ain Shams University before starting the study. Agreement of nurses to participate in the study after explaining the aim of the study. Anonymity and confidentiality & freedom to withdraw from the study at any time were assured. Then oral approval obtained from nurses to apply the study. Also a supervisor from the infection control units attended each session and obtained a copy of the data collection tools and the program booklet.

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III.Administrative Design

An official permission including the title and purpose of the study were submitted from the Dean of faculty of nursing Ain Shams University and forwarded to the director of Ain Shams specialized hospital, to get an approval for data collection to conduct the study that forwarded to the director of emergency unit where the study was conducted. After that the investigator was start to communicate with the study subjects and explain the aim of the study.

IV.Statistical Analysis:

Percentage, mean value, standard Deviation, chi-square (X2), T paired test, correlation test (r) and proportion probability (P-value).

Significance of results

- ✓ When P> 0.05 it is statistically not significant difference.
- ✓ When P< 0.05 it is statistically significant difference.
- ✓ When P< 0.01or P< 0.001 it is high statistically significant difference.

3. RESULTS

Table (1): shows that 46.4% of the study nurse's age was ranged from 30 to 39 years old, 71.3% were female, 76.2 % of them were married and 52.5% of them were nursing diploma, while 17.5% were Bachelor of nursing.

Table (2): Illustrates that86.2% of the study working nurses, 77.5% of the study nurses have >10 years of work experience, 95% were received training courses in infection control &52.5 were received three doses of hepatitis B virus vaccine.

Table (3) reveals that 100% of nurses disagree with lack of infection control team ,46.2% agree with insufficient supplies (PPE - hand washing requirements then 65% totally agree with increase the workload &60% totally agree with decrease the number of nursing and increase the number of patients.

Table (4) reveals that there were statistically significant differences between nurse's total knowledge scales and subscales in Pre and Post program.

Figure (1): Reveals that there were highly statistically significant differences related to nurses correct performance score level pre and post program.

Table (5): Reveals that there were highly statistically significant differences related to nurses total knowledge scale & total practice scale post program.

Table (1): Distribution of study nurses according to their characteristics (n= 80).

Items	Frequency	Percent
Age		
< 20 years	5	6.2
20 –	21	26.2
30 –	37	46.4
40 –	14	17.5
≥ 50	3	3.7
Gender		
Male	23	28.7
Female	57	71.3
Social Status		
Married	61	76.2

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Single	17	21.2
Divorced	0	0
Widowed	2	2.6
Academic qualification		
Nursing Diploma	42	52.5
Technician nursing Institute	24	30
Bachelor of nursing	14	17.5

Table (2): Distribution of study nurses according to their work Characteristics (n= 80)

Items	NO	%
Job		
Nurse	69	86.3
Head Nurse	11	13.7
Years of work experience		
From 1 to 5 years	4	5
from 5 to < 10 years	14	17.5
>10 years	62	77.5
Number of working / hours		
8-12 hours	80	100
> 12 hours	0	0
Attended training sessions about infection control precautions		
Yes	76	95
NO	4	5
Have been vaccinated against virus (B)		
One does	14	17.5
Two does	17	21.3
Three does	42	52.5
No vaccination	7	8.7

Table (3): Frequency distribution of nurses according to the barriers hindering the application of infection control standard precaution (N=80)

Items	disagree		agree		totally agree	
	No	%	No	%	No	%
A) Barriers related to the facility						
Lack of infection control team	80	100	0	0	0	0
The lack of infection control policies and instructions on	31	38.7	25	31.2	24	30
Insufficient supplies (PPE - hand washing requirements	17	21.2	37	46.2	26	32.5
NO infection control team round	57	71.2	14	17.5	9	11.2
Lack of punishment for non-compliance with infection control measures	33	41.2	30	37.5	17	21.2
Lack of explanatory methods for infection control measures, such as a poster.	35	43.7	22	27.5	23	28.7
B) Barriers related to nursing						
Increase the workload	9	11.2	19	23.7	52	65
Decrease the number of nursing and increase the number of patients	14	17.5	18	22.5	48	60
Lack of training in infection control measures	39	48.7	23	28.7	18	22.5
Forget about adhering to infection control procedures	53	66.2	15	18.7	12	15
Lack of supervision of application of standard precautions from superior	39	48.7	28	35	13	16.2
C) Barriers related to the patient						
Misconceptions about infection control measures	38	47.5	24	30	18	22.5
refuse to deal with him by wearing PPE such as masks	44	55	20	25	16	20
Increase the cost of health care	44	55	30	37.5	6	7.5

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Table (4): Mean differences of nurses according to their values of knowledge scales and subscales in Pre and Post program (N=80)

Knowledge item	Pre		Post		T	P value
	Mean	SD	Mean	SD		
A - General	40.83	10.46	86.74	8.17	30.92	0.00000
B- Hand hygiene	49.00	23.15	82.50	18.66	10.08	0.00000
C- Personal protective equipment	57.50	25.28	85.31	18.53	7.94	0.00000
D-Safe injection	46.25	32.04	85.00	19.77	9.21	0.00000
E- Sharp injury:-	45.00	16.16	80.31	10.71	16.29	0.00000
F- Waste management	46.67	27.86	81.67	23.06	8.66	0.00000
G- cleaning and disinfection	65.00	25.93	66.67	20.54	0.45	0.65286
H- Isolation	35.42	18.63	81.25	15.09	17.10	0.00000
I - cleaning disinfection	40.00	28.26	84.17	21.20	11.18	0.00000
J - Preparation medication and IV fluid	50.00	28.06	85.42	21.11	9.02	0.00000
K-Linen management	51.46	22.06	83.96	17.28	10.37	0.00000
Total Knowledge Scale	45.68	5.81	83.01	5.15	43.01	0.00000

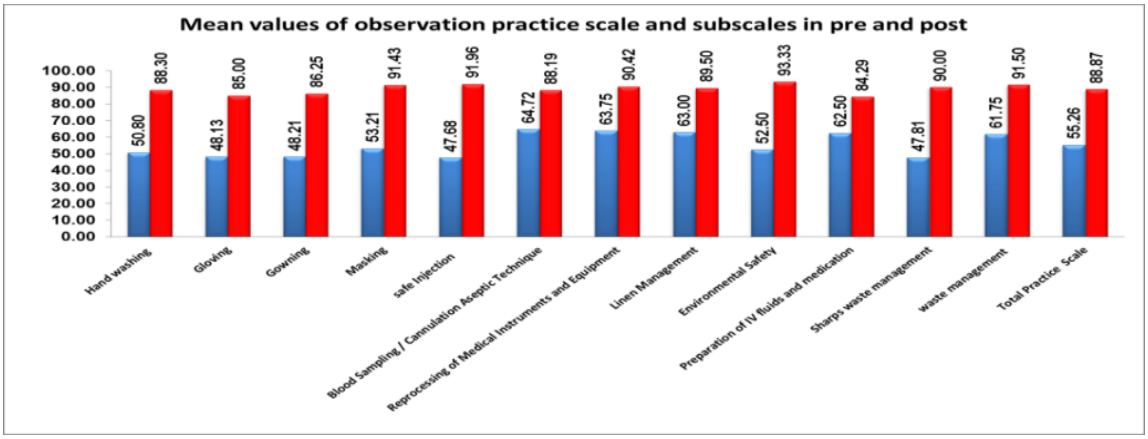

Figure (1): Mean differences according to nurses correct performance related to infection control in emergency unit pre and post program (N=80)

Table (5): Correlation between nurses correct knowledge, Total Factors Scale and Total Performance done score level (N=80)

Correlation of Total Scales	Pearson Correlation Coefficient r	P value
Total Knowledge scale & Total Practice scale (Pre)	-0.08	0.46847
Total Knowledge scale & Total Practice scale (Post)	0.23	0.04302
Total Barrier scale & Total Knowledge scale Pre	-0.15	0.18562
Total Barrier scale & Total Knowledge scale Post	-0.15	0.18237
Total Barrier scale & Total Practice scale Pre	0.08	0.46952
Total Barrier scale & Total Practicescale Post	-0.18	0.11436

4. DISCUSSION

Emergency unit nurses' socio demographic characteristics the results of this study revealed that less than half of study nurses were in the age group 30 – < 39 years, regarding the majority of nurses gender were female, this result is agreement with, **(Mohamed et al.,2016)**, who study nurse knowledge attitude and practices regarding infection control , in Port Said Hospital, report that the majority of the nurses were females this result may be due to female were the majority of nursing staff in this hospital.

As regards nurses' socio-demographic characteristics the present study shows the majority of the nurses had work experience>10 years (Table 2) while all nurses working 8-12 hours. This finding disagree with **(Hammerschmidt et al., 2019),** who study Nurses' knowledge, behavior and compliance concerning hand hygiene in nursing homes, found that The majority of nurses had job tenures of ≤5 years in their institution (n = 46; 28%) and worked in day shifts (n = 104; 63%). may be due to the work in emergency units need more experience nurses.

As regard to the barriers hindering the application of infection control standard precaution, present study showed that more than half were agree with insufficient supplies, less than two third totally agree with increase the work load and decrease the number of nursing and increase number of patients .This finding is in partially agreement with **(Refeai et al., 2020)**, study about perception and barriers regarding infection control measures among healthcare workers in Minia city, Egypt. Who findings revealed the most frequent barrier of practices of standard precaution was absence of enough gloves and gowns. And agrees with **(Barker et al., 2017)**, Study about barriers and facilitators to infection control at a hospital in northern India. Reported that person, task, and organizational level factors were the primary barriers to infection control. May be due to natural of the work in emergency units was critical.

The present study reveals that there were statistically significant differences between nurse's total knowledge scales and subscales in Pre and Post program& reveals that there were highly statistically significant differences related to nurses correct performance score level pre and post program, which has been incorporated in a study by **(Xiong et al., 2017),** study effects of a mixed media education intervention program on increasing knowledge, attitude, and compliance with standard precautions among nurses was conducted in a teaching hospital in Hubei, China.Reported that knowledge with standard precautions scale and compliance with standard precautions scale were significantly improved in the intervention group compared with the control group.

And similar to **(Atalla et al., 2016),** study effect of nursing guidelines compliance to infection control among nurses reported that highly significant improvement of knowledge among study group than control group after education intervention and highly significant improvement as positive attitude among study group than control group after education intervention. The finding of the present study reflects that the training, effect on nurses to improve their knowledge and performance related to infection control standard precautions.

Related to correlation between study variables there was positive correlation between nurses total knowledge scale & total practices scale post program this is in accordance with **(Mohammed, 2016**), who study nursing guidelines and its effects on nurses' knowledge and patient safety regarding nosocomial infection control measures in burn unit there were a positive correlation between nurses' knowledge and practices with a high statistical significant difference after received intervention

Related to correlation between study variables there was positive correlation between nurses total practices scale post program & barriers related to the patient the previous results correspond with **(Powers et al., 2016)**, who study Factors influencing nurse compliance with standard precautions. There was a significant relationship between susceptibility of HCV and compliance and between barriers to SP use and compliance.

Also in line with the findings of **(Lee et al., 2012)**, Who study factors influencing compliance with standard precautions in intensive care unit and emergency room nurses in Korea.Reported that there were significant correlations of knowledge, attitude, and compliance with standard precautions attitude and work place were significant factors predicting compliance with standard precautions.

According to effect of the educational training program the present study revealed that there were no statistically significant differences between nurse's total correct knowledge & total correct Practices pre and post program and socio demographic characteristics this result partial agree with **(Ayed, 2015),** as their study showed No significant statistical differences were found between mean knowledge scores towards age, years of experience, and training course &significant statistical differences were found between mean knowledge scores towards gender and qualification.

5. CONCLUSION

On the light of the results and research hypothesis the study was concluded that:

-The study sample age ranged between 30-39 years. There was a highly statistically significant difference between nurse's total knowledge scales and subscales in Pre and Post program.

-There was a highly statistically significant differences related to nurses total knowledge scale & total practice scale post program.

-There was a highly statistically significant differences related to barriers related to the patient & Total Practice scale post program

-There was a positive correlation between knowledge and performance pre and post educational training program implementation.

-In conclusion, educational training program reported remarkable improvement in emergency unit nurses knowledge and performance toward infection control standard precautions.

6. RECOMMENDATIONS

The findings of this study highlight the following recommendations:

1. Updating knowledge and practices of nurses through continuing in-service educational programs.

2. Providing training programs for newly nurses about infection control and at regular intervals.

3. Availability of all facilities, materials and of written guidelines required for applying standard precautions of infection control.

4. Further researches about nurses performance about infection control in ambulatory care units

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