

Implementation of National Safety Standards and its Effect on Maternity Nurses' Safe Performance at Fayoum Maternity Hospital

¹Hanaa Azmi Saad, ²Fatma Aboul Khair Farag, ³Rania Abd El Hak Eid Farrag

¹lecturer of Nursing Administration, Faculty of Nursing Modern University for Technology and Information

^{2,3}lecturers of Maternal and Neonatal Health Nursing, Faculty of Nursing, Fayoum University

Abstract: Safety is a universal concept that encompasses efficiency, security of care, peaceful conduction of healthcare providers that lead to patients' satisfaction. One of the causes that threat patients and nurses is the infection. Transmission of infection is a major health problem in Egypt. Meanwhile, midwives and maternity nurses are more exposed to infections during clinical practice. Therefore, improvement in the performance of health care workers is an important aspect of infection control in the health care settings. Aim: The study aimed to: (1) Assess the nurses' knowledge regarding standard precautions for infection control. (2) Assess the nurses' practices regarding implementation of standard precautions for infection control, and (3) identify the factors influencing nurses' adherence to standard precautions for infection control. Design: A quasi-experimental research design was utilized in this study. Setting: The study was carried out in Maternity Teaching Hospital Fayoum University (General Hospital and University Hospital). Sample: A convenience sample was selected from the delivery room, which consist of 71 nurses. Tools: Data collected by using three tools. (1) A *Self-administered Questionnaire Format* to assess the demographic characteristics and nurses' knowledge about infection control standards (2) An *Observational Checklist Format*, adopted and adapted by the researchers from the Egyptian Infection Control Guideline, Ministry of Health (2009) to assess nurses' practices and (3) *Staff Nurses' Opinionnaire Format developed by the researchers* to assess barriers & factors hindering implementation of infection control standards. Results: A statistical significant improvement in nurses' knowledge and practice score level after program implementation. While, in comparison with the pre program results and two months later there were a statistical significant difference regarding knowledge and practice total mean score level at $p < 0.000$. Non availability of supplies and heavy work load with no time were the strongest reasons hindering nurses' adherence to universal precaution standards. Conclusion: Application of the infection control standards precautions training program was effective for improving nurses' knowledge and practice mean score levels. Recommendation: In-service training programs should be provided to nursing staff in order to keep them updated in knowledge and practice regarding infection control standards.

Keywords: maternity nurses' adherence, infection control standards, universal precautions, maternity hospital.

1. INTRODUCTION

The National Safety and Quality Health Service Standards were developed by the Australian Commission on Safety and Quality in Health Care by technical experts to establish standards for hospital safety. Their primary aims are to protect the public from harm and to improve the quality of health service provision. The developed standards provide a nationally consistent and uniform set of safety measures for application across a wide variety of health care services. It addresses ten areas; one of them is standards 3 which is "Preventing and Controlling Healthcare Associated Infections" (*NSQHS, 2010*).

Infection considered one of the commonest causes of maternal mortality in developing country either in the community or in health facility. Nosocomial infections and hospital acquired infection caused by a wide variety of a common and unusual bacteria, fungi, and viruses during the course of receiving medical care (Alnoumas et al., 2012). Additionally, nosocomial infections, such as endometritis, postoperative pelvic infection, urinary tract infections, neonatal sepsis, etc, are serious complications in normal vaginal delivery. The incidence of postoperative infections generally represent almost 38% while, the third most common nosocomial infection is surgical site infection includes obstetrics and gynecological sources (Mawalla et al. 2011).

Women in labor rooms are exposed to invasive devices and/or procedures that are known to pose significant infection risks. While the duration of contact with the facilities is generally for short period, but the rate of infection risks is probably quite high. But fortunately, most nosocomial infections in these settings are largely preventable by the combination of both simple good hygienic practices and appropriate decontamination and equipment processing (Chan et al. 2013).

Nurses every day, are striving for providing quality nursing care for clients, while exposing themselves to dangerous and potentially lethal blood-borne pathogens such as Human Immune deficiency Virus (HIV) and hepatitis B and C as well as the modes of infection transmission include contaminated needle stick, sharps, or blood splash exposures, vaginal and cervical discharge; wound secretion, breast milk, amniotic and other body fluids. Although, these exposures often have been considered "part of the job", and easily those hazards can be preventable (Tabatabaei et al. 2015)

When attempting to understand the responses of nurses to the occupational risks of acquiring infection, it is important to realize that nurses encounter many health risks in the work environment. According to Amadu & Saka (2012), nurses working in the delivery room are particularly at risks of acquiring and transmitting the nosocomial hospital infections within the course of delivering the nursing care intervention.

Worldwide, the Centers for Disease Control (CDC, 2012) considered that Control and prevention of nosocomial infections are ongoing issue. Despite initiatives and strategies implementation to reduce the burden of infections consequences, the nurses' practice is suboptimal and the infections still persist. While, in Egypt plan of action for the year 2014-2018, the prevention care & treatment of infection stressed on lack of infection control (IC) measures which include invasive procedures, blood transfusion, and obstetric procedures for hospitalized women are among the nurses related risk factors associated with infection transmission.

The Adherence of the nurses to the Universal precautions (UP) has been recognized as an efficient means to prevent and control infections in patients and nurses. There are great evidences showing that proper adherence with (UPs) can protect nurses from various kinds of Occupational risks such as blood Exposure (Ahmed, 2015).

According to Tavalacci et al., (2008), universal precautions are defined as a set of guidelines designed to reduce the risk of acquiring occupational infection from both known and unexpected sources in the healthcare setting. It is intended to protect health care workers from percutaneous injuries and prevent transmission of nosocomial infection that to be applied to the care of all patients in all health care setting regardless of the suspected or confirmed presence of an infectious agent.

Regarding to Amadu and Saka, (2012), adherence in utilizing measures for prevention of infection transmission is considered a significant component of nursing care. In this context, nurses play a key role in infection prevention by demonstrating leadership by using their knowledge, skill and judgment to initiate appropriate and immediate infection control procedures to keep all patients safe (Amoran, et al. 2013). Therefore, the lack of adhesion to these measures needs the nurse manager's understanding the mean of infection for effective and efficient intervention together with her team.

Acceptance of the nursing staff to the CDC's guidelines for prevention of work place infections is of paramount importance. The related knowledge can be utilized in constructing and designing administrative policy and strategy to implement in service education/on job training programs to minimize the risk of both nosocomial and occupational transmission of infectious diseases to patients and nurses (Valim et al. 2014).

Significance of the study:

Nosocomial infection is a major cause of childbirth-related mortality. There is no direct evidence of increasing the incidence of infection rates in Fayoum University Maternity Hospital. However, results of two months observation for

nurses' adherence to infection control measures through daily routine work indicated that, the majority didn't practice sepsis rules of universal precautions to prevent and control of infection. The main problems include technique breaks, inadequate sterilization, wound infection, as well as, repeated exposure to blood and vaginal secretions, in addition to limited supplies or even not always available or used appropriately. Therefore, an observational needs assessment was a necessity to plan for the nurses' practical measures and specific interventions in the form of in-service education and on job training program to improve nurses' adherence to infection control standards precaution. In this context this current study aimed to implement the National Safety Standards for improving nurses' safe performance at Fayoum University, Maternity Hospital in Egypt.

The aim of this study is to:

Implement the National Safety Standards for improving nurses' safe performance through:

1. Assess the outcomes of nurses' knowledge and practice regarding implementation of Universal Precautions for infection control.
2. Identify the factors and barriers influencing nurses' adherence to infection control Universal Precautions at Fayoum Maternity Hospital.

2. SUBJECTS AND METHODS

Research design:

A quasi-experimental research design was utilized in this study. It is based on pre-post test model and involves the manipulation of an independent variable but there is no control group.

Research hypothesis:

- The nurses' adherence to infection control training program will improve their knowledge and practice scores post intervention and will be higher than those of pre intervention.

Research settings:

The study was conducted in the Maternity Hospital at Fayoum University (General Hospital and University Hospital). Those hospitals are affiliated to the Ministry of Health and Ministry of Higher Education, Egypt. The average number of normal delivery per year is 7,000 where the caesarean section's rate represents 40% (unpublished official records). Those settings are selected because of a higher rate of women admission that represents different social classes from urban and rural areas, in addition to the selection of the Nursing Syndicate to implement the infection control program in those places with collaboration with Faculties of Nursing at Fayoum Hospitals.

Sample:

Convenience sample technique, all nurses from the aforementioned settings were included in the present study. The total numbers of nurses were 71 working in the Maternity Hospitals.

Tools for Data Collection:

Three tools were used for data collection in the present study:

1. The First Tool:***A Self-Administered Questionnaire Format:***

This tool was developed in Arabic language by the researchers based on literature review consists of two parts:

- a. **The first part:** It included nurses' demographic data regarding age, educational level, job position, experience, source of information for universal precaution and previous training about infection control.
- b. **The second part:** It consisted of (9) questions covering a pre/post test to assess nurses' knowledge regarding definition, types of infection control, hand washing, wearing and removing gloves, wearing mask and gown, safe injection, cleaning and disinfection. This part was conducted before and after training program.

Scoring System:

Regarding knowledge items, the correct answer was scored as 3, while the incomplete answer was scored as 2 and score 1 for either wrong or no answer. The total scores of nurses' knowledge were 27 grades.

2. The Second Tool:

An Observational Checklist Format: This format was adopted and adapted by the researchers from Egyptian Infection Control Guideline, Ministry of Health (2009), the observational checklist format was used three times; once before conducting a training program, the second time after its implementation, while, the third time was two months later in order to assess nurses' performance regarding proper application of infection control standards precaution in various nursing intervention. The tool consisted of (10) items related to: hand washing, masking, gowning/capping, gloving, de-gloving, sharp disposal, preparing client, preparing equipment for delivery or surgery and assurance of clean delivery room. Observation checklist was conducted during daily routine work.

Scoring System:

Each activity was assessed by using the observation checklist which is classified into; correct done, incorrect done and not done. Total score of performance test was (30 marks). The scoring system for observational checklist: (3) marks were given for done correct, (2) mark was given for incorrect done and (1) mark for not done.

3. The Third Tool:

1. **An Opinionnaire Staff Nurses' format:** This tool was developed by the researchers based on researchers' experience and expert opinions to solicit staff nurses' opinion regarding barriers of adherence for implementing infection control universal precautions.

Pilot Study:

A pilot study was conducted on 10% of the study sample representing 7 nurses, from the aforementioned setting to measure the practicability, feasibility and applicability of the study tools, as well as, time required for completion of each tool. Results obtained were useful in appraisal & modification of the tools. These subjects were excluded from the study sample.

Field Work/Procedure:

At first an official letter was issued to the hospital directors of the pre-mentioned hospital to get the permission for the data collection after explaining the nature and the purpose of the study. Data collection spent time of six months started from August, 2014 to January 2015 to assess the nurses' knowledge and their performance in applying infection control measures in order to determine their need (the pre program intervention). The methods of teaching within the training program exploited included lectures, audiovisual materials and demonstrations for various nursing procedure. The content details of the program are included in the distributed booklet. The research was carried out on three phases (preparatory, implementation and evaluation phases):

First: The Preparatory Phase: this phase included:

Tools were developed and tested for content validity by 5 expertises from medical surgical and maternity nursing department Fayoum University and Modern University for Technology and Information (MTI) as well as medical staff members specialized in infection control practices, in addition checking the reliability; where every question in each study tool was tested for reliability. This was performed by asking the same question twice so as to compare the consistency of answers produced for the same question by the same respondent. This step took one month.

Second and Third Phase: Implementation and Evaluation Phase:

a. A structured interview questionnaire was utilized in order to fulfill the first study tool. The interview was conducted by giving the nurses under study simple explanation about the aim of the study and assured them that the collected data will be confidential and will only be used for the purpose of study. An oral agreement was obtained to participate in the study.

International Journal of Novel Research in Healthcare and Nursing

Vol. 4, Issue 1, pp: (234-246), Month: January - April 2017, Available at: www.noveltyjournals.com

- b. An observation technique was utilized to complete the second tools (the interview and observation checklist). Task spend one month to assess the nurses' knowledge and their actual adherence in applying the infection control measures in order to determine their need (pre-program intervention).
- c. The researchers trained the nurses under study of the national Universal precautions for infection control program, which was adopted from the Central Department for Preventive Affairs, Ministry of Health Egypt, the study sample consisted of 64 nurses were divided into 8 groups; each one consisted of 8 nurses to avoid escaping a lot numbers from the delivery room. It provided for nurses through four days 2 sessions per day to improve their knowledge, this step took one month.
- d. The researchers observed each nurse for practice twice weekly to reinforce her adherence to infection control universal precaution and its measures. This step took one month.
- e. An immediate post-test was carried out after providing the needed interventions. Each nurse was evaluated using tool I, the second part to estimate the improvement of nurses' knowledge and actual practice in applying infection control measures. This took one month.
- f. Then each nurse was evaluated after 2 month (follow up) using tool I second part, II and III). This took one month.

Validity: The validity was tasted for content validity by jury of five experts in the field of Obstetrics' and Community Health Nursing. Specialty to ascertain relevance and completeness; reviewed the questionnaire and the intervention for content and face validity (r = 0. 89). Their comments were reviewed and the necessary modifications were done before the conduction of the pilot study.

Reliability: Reliability was applied by the researchers for testing the internal consistency of the tool, by administration of the same tools to the same subjects under similar conditions twice for 15 days apart. Cranach's Alpha reliability was 0.850.

Ethical considerations:

The research proposal was sent to the hospital managers for approval in order to gain access to the staff and permission was obtained from Fayoum Maternity Hospital. Distributors provided information about the study to the participants and the anonymity and confidentiality of the responses, voluntary participation and the right to refuse participation were emphasized. The purpose, procedure, risks and benefits of the study were explained to nurses and obtained a verbal informed consent.

Statistical Analysis:

Upon completion of data collection, each variable in the study tools was manually scored. Computerized data entry and statistical analysis were fulfilled using the statistical package for social sciences (SPSS 18). Descriptive statistics were first applied (e.g., frequency, percentage, mean and standard deviation). Tests of significance were used to compare study group using chi square test for qualitative variables. Statistically significant was considered at p- value < 0.05.

3. RESULTS

Table (1): Distribution of the Demographic Characteristics of the Study Sample (n=64)

Items	N=64	%
Age:	28.8±4.6	
Educational level:		
– Secondary nursing diploma	40	62.5
– Technical institute	14	21.9
– Bachelor	10	15.6
Job position:		
– Head nurses	10	15.6
– Staff nurse	54	84.4

Experience years	8.9±3.8	
Source of information about *UP:		
– Posters	22	34.3
– Training	16	25.0
– lectures	14	21.9
– Nursing officers	6	9.4
– More than one source	6	9.4
Training courses		
– Yes	16	25.0
– No	48	75.0

* UP. Universal precautions for infection control

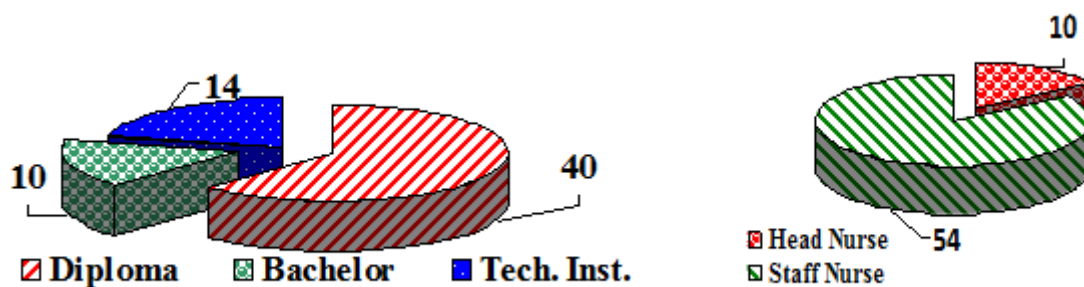


Figure (1): Distribution of the Study Sample According to their Educational Level and Job Position (n=64)

Figure 1, It illustrated the distribution of the study sample (64) by educational level. It demonstrated that the secondary nursing diploma nurse were higher (20) than technical institute and bachelor (7 & 5, respectively). Regarding job position head nurses (5) was slightly less than staff nurses (27).

Table (2): Knowledge Mean Scores among Studied Nurses before, after and two months later implementation of Infection Control Training Program (n=64)

Items	Before (n=64)	After (n=64)	Follow up (n=64)	F ratio	p value
1. Definition of infection control:					
a. Correct	10	22	16	27.3	0.000
b. Incomplete	14	32	36		
c. wrong	40	10	12		
	30.0±6.6	75.7±9.9	69. ±4.9		
2. Definition of standard precaution:					
a. Correct	8	16	12	22.8	0.000
b. Incomplete	12	30	34		
c. wrong	44	18	18		
	43.0±14.6	72.2±11.0	59.2±7.0		
3. Elements to universal/standard precautions:					
a. Correct	12	24	20	31.0	0.000
b. Incomplete	12	30	34		
c. wrong	40	10	10		
	28.6±7.8	79.0±11.4	72.0±5.4		
4. Elements don't require application of universal precautions:					
a. Correct	12	20	20	10.9	0.004

Items	Before (n=64)	After (n=64)	Follow up (n=64)	F ratio	p value
b. Incomplete c. wrong	16 36 31.6±8.0	34 10 83.8±7.2	34 10 83.8±7.2		
5. Indication of hand washing:					
a. Correct	14	32	28	0.874	0.655
b. Incomplete	22	20	24		
c. wrong	28 44.7±8.1	12 88.2±6.2	12 83.2±3.2		
6. The ideal duration of hand washing:					
a. Correct	12	34	24	19.3	0.000
b. Incomplete	16	24	34		
c. wrong	36 35.9±7.6	6 79.0±11.4	6 71.0±4.4		
7. Changing the gloves:					
a. Correct	18	20	16	0.770	0.680
b. Incomplete	26	34	38		
c. wrong	20 37.1±8.1	10 79.6±11.7	10 74.6±11.1		
8. Potentially infected substances:					
a. Correct	16	20	14	15.2	0.000
b. Incomplete	20	32	34		
c. wrong	28 30.0±6.6	12 72.2±11.0	16 68.2±5.0		
9. Wearing face shield:					
a. Correct	16	24	20	11.8	0.003
b. Incomplete	22	34	38		
c. wrong	26 36.4±6.5	6 77.8±11.4	6 72.8±4.4		
Total mean score Satisfactory (≥60%)	41.0±5.7	78.9±6.6	72.3±5.6	19.3	0.000

Table 2, elaborates that a statistical significant difference was found regarding the total mean of the knowledge scores among studied nurses before , after and follow up infection control training program (41.0±5.7 , 78.9±6.6 & 72.3±5.6 respectively). Meanwhile, a highly statistical significant difference was found in items related to definition of infection control, standard precaution, elements of universal/ standard precautions, ideal duration of hand washing and potentially infected substances at p=0.000. While, there is no significant statistical difference in item related to changing the gloves at p= 0.680.

Table (3): Performance mean Scores among Studied Nurses before, after and two months later implementation of Infection Control Training Program (n= 64)

Items	Before (n=64)	After (n=64)	Follow up (n=64)	F ratio	p value
Procedures and/or protocols in implementing the following standards:					
1. Hand washing.	31.3±6.0	71.7±21.2	69. ±4.9	27.3	0.000
2. Masking.	34.7±8.3	59.2±7.0	60.6±7.3	22.8	0.000
3. Gowning/capping.	40.0±7.1	73.3±7.4	72.0±5.4	31.0	0.000
4. Gloving.	22.0±5.0	76.8±7.2	73.9±13.3	10.9	0.004
5. De-gloving.	18.0±2.8	63.9±11.3	83.2±3.2	0.874	0.655
6. Using aseptic technique in handling woman in labor.	26.0±5.0	79.9±11.3	71.0±4.4	19.3	0.000

7. Processing of re-usable medical devices.	21.0±5.0	74.6±11.1	71.9±6.3	0.770	0.680
8. Exposure prone procedure.	19.0±3.5	73.9±5.3	68.2±5.0	15.2	0.000
9. Safe handling and disposal of sharps.	42.0±5.0	68.9±8.0	62.8±4.4	10.9	0.004
10. Occupational exposure to blood/body substances.	21.0±2.0	81.9±6.3	72.3±5.6	0.874	0.355
Total practice: Satisfactory (≥60%)	26.5±1.4	69.9±10.7	64.9± 6.7	19.3	0.000

Table 3 shows that there was a statistical significant difference at (26.5±1.4, 69.9±10.7 & 64.9±6.7, respectively) regarding the total mean of the performance scores among studied nurses before, after and follow up infection control training program in relation to universal precaution measures among studied nurses except de-gloving or equipment processing p=0.655& P=0.680

Table (4): Barriers regarding the use of Safe Performance among Studied Nurses (n=64)

Items	N= 64	%
1. Hand washing:		
▪ Lack of knowledge	6	9.4
▪ Not used to	34	53.1
▪ Lack of equipment/resources	18	28.1
▪ Lack of training	6	9.4
2. Masking:		
▪ Lack of knowledge	14	21.9
▪ Not used to	42	65.6
▪ Lack of equipment/resources	8	12.5
3. Gowning/Capping:		
▪ Lack of knowledge	6	9.4
▪ Not used to	36	56.3
▪ Lack of equipment/resources	6	9.4
▪ Lack of training	8	12.5
▪ Lack of time	8	12.5
4. Gloving:		
▪ Lack of knowledge	8	12.5
▪ Not used to	28	43.8
▪ Lack of equipment/resources	14	21.9
▪ Lack of time	14	21.9
5. De- gloving:		
▪ Lack of knowledge	8	12.5
▪ Not used to	34	53.1
▪ Lack of equipment/resources	10	15.6
▪ Lack of time	12	18.8
6. Sharp disposal:		
▪ Lack of knowledge	8	12.5
▪ Not used to	30	46.9
▪ Lack of equipment/resources	12	18.8
▪ Lack of training	14	21.9
7. Handling laboring woman:		
▪ Lack of knowledge	6	9.4
▪ Not used to	26	40.6
▪ Lack of equipment/resources	16	25.0
▪ Lack of training	8	12.5
▪ Others	8	12.5
8. Equipment processing:		
▪ Lack of knowledge	10	15.6
▪ Not used to	24	37.5

Items	N= 64	%
▪ Lack of equipment/resources	18	28.1
▪ Lack of training	12	18.8
9. Environmental cleaning and disinfection:		
▪ Lack of knowledge	4	6.3
▪ Not used to	30	46.9
▪ Lack of equipment/resources	20	31.3
▪ Lack of training	4	6.3
▪ Room crowding	6	9.4

Table 4 summarizes the barriers for application of infection control procedures as reported by studied nurses, for the about 50% of nurses stated that not used to is the behind cause for un-applying the standard precautions, and lack of resources is considered the second cause .Meanwhile, lack of training and knowledge is considered the least cause regarding infection control standard precaution (9.4%).

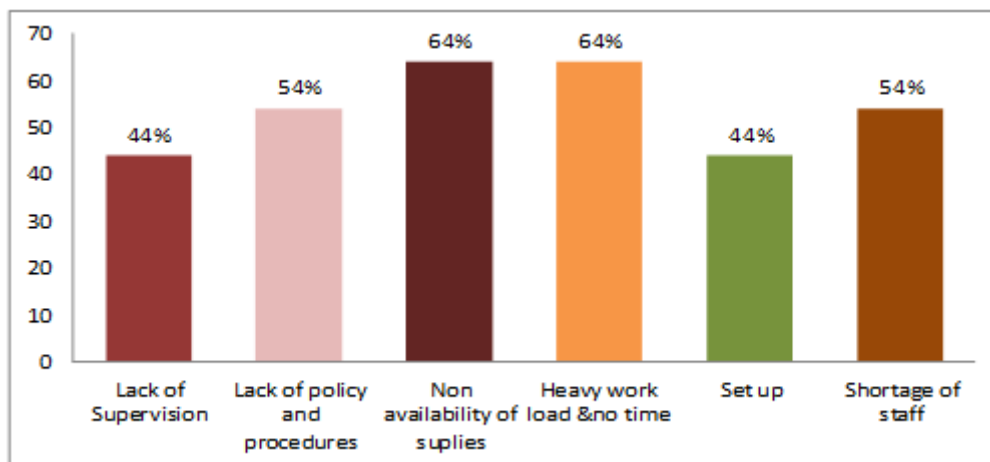


Figure (2): Factors Hindering Adherence to Infection Control Standard Precaution among Studied Nurses (n=64)

Figure 2 demonstrates that all study subjects are in congruent that the items related to non availability of supplies and heavy work load & no time was the strongest reasons for non compliance with universal precaution (64 %). While items related to lack of supervision and setup are the least score (44%).

4. DISCUSSION

Nosocomial infection is a common problem all over the world especially in highly risk areas as delivery rooms in maternity hospital where the nurses expose to multiple invasive procedures. Up to date knowledge and refined practical nursing skills can play an important roles in preventing infection. Therefore, nurses at maternity hospital should have the opportunity to practice infection control on a day-to-day basis as an integral part of patients’ care. In this context, this study aimed to implement the National Safety Standards for improving nurses' safe performance at Fayoum Maternity Hospital in Egypt.

Regarding the demographic characteristics of the study nurses, their mean age was less than thirty years old. This result was in agreement with *Abolwafa et al. (2013)*, who reported that the majority of the studied sample was in the age group from 20-30 years old. As for nurses' qualification, the majority had nursing secondary school, while the minority had Bachelor degree in Nursing. Their mean years of experience was less than ten years, these results is in line with *Ahmed, et al., (2012)*, who revealed that the majority of nurses had nursing secondary school. One-third of the present study sample got information about universal precaution practices from posters lifted on the hospital walls, this could be due to the absence of mentor interpretations or explanations and follow up such as hand washing, while the minority of the sample got their knowledge from the nursing officers and more than one source.

Findings of the present study showed that sample had various educational backgrounds as more than half of them were diploma nurses and the years of experiences were away of academic education, in addition to more than eight years

dealing with client from rural areas with low socioeconomic and poor cleanness of environment. This could direct the attention toward continuing education of obstetrics' nurses about methods of utilizing infection control standard precautions. This is in agreement with *Rasslan (2011)*, who emphasized the importance of frequent updating nurses knowledge coupled with regular follow up will help them to acquire the most recent infection control information.

Although, the study sample were positively willing to attend and share in the present training program, three-fourth of them reported that no one had chance to attend any training course about the infection control practices. This finding was in agreement with *Abolwafa et al. (2013)*, who concluded in his study that nurses working in the same infectious areas should be trained to know how to be adhered to universal precaution standards.

Concerning nurses' knowledge and adherence to the infection control standards, finding revealed that a significant improvement was observed immediate post training included: Universal Precautions' definition, elements, potentially infected substances, ideal time for changing gloves and reasons for wearing face shield, compared to the unsatisfactory nurses' knowledge score levels before program implementation. This may be attributed to nurses' willingness and interest in that time to participate in educational programs that can improve their knowledge and skills. This result is in congruent with *Sessa et al., (2011)*, who reported that the respondents had an extremely positive attitude toward the utility of guidelines and protocol for infection control procedures.

Actually, the study also showed that the level of knowledge was slightly decreased and the retention of knowledge affected two months later, but still the mean score level was high than the pre program, this could be due to the absence of observation and follow up which in turn affects negatively on attaining adequate performance of universal precautions. Therefore, supervisors and head nurses have a crucial role in motivating and empowering nurses towards independent adherence to the universal precaution guidelines, where consecutively the incidence of infectious diseases outbreaks and the risks of occupational exposures by this way could be minimized. These findings are supported by *Eskander, Morsy, & Elfeky (2013)*, who revealed that, the majority of their studied nurses had unsatisfactory knowledge regarding universal precautions before their program training. In the same line *Ahmad E., Khamis M. & Younis S (2012) and Al-Hussami and Darawad (2012)* stressed and suggested that training program is more effective in improving nurses' knowledge and practice regarding infection control.

Concerning the nurses' practices adherence to the universal precaution, findings of post-program implementation revealed that a highly significant improvement found in the total performance post training about all of infection control measures included; proper technique of hand hygiene, giving infusion, using personal protective equipment, handling sharp instruments, body fluids, preparing delivery room, discarding placenta and contaminated linen, environmental hygiene and safe injection practices with $p \leq 0.05$. This could be due to the correct information and satisfactory level of knowledge received that enhanced their practices compared with of pre-program performance. This result is supported by *Baja et al, (2014)*, who is in a similar study got the same result and suggested that training programs and nurses' education levels were effective in improving nurses' knowledge and practice regarding infection control. While *Luo et al., (2013)* was in contrast and stated that training alone is not sufficient and adherence with good practice remains variable. In addition to the availability of materials and supplies will reduce the risk of infection transmission emphasized verbally by nurses.

Moreover, there was a high statistically significant difference between pre-program and the other periods of the assessment with $p \leq 0.05$. This is corresponding to *Longtin et al. (2011)* and further studies who identified why certain measures and practices are not carried out and mentioned that compliance with hand hygiene among health care providers is as low as 40%, despite the majority of nurses know its importance but the large numbers of them not performing these procedures and have misconception about its application. This finding could be due to the need for more training for the head nurses and nursing supervisor on the importance of regular follow up. *Al-Hussami & Darawad (2012) and Rosenthal et al., (2012)* were supported our study findings, they mentioned that the educational programs for nursing supervisors about the infection control precautions are significantly influenced the participants performance.

Regarding barriers to the use of infection control standard precaution, findings depicted that one-third of the study sample mentioned the term "not used to and lack of equipment/resources" which had the highest percentages. This could be due to lack of time with the shortage of nurses, and most of their perception that wearing masks and gloves causes physical discomfort as well using protective equipments interferes with the ability to perform the job. In this respect, *Tarek and*

Adel (2009) reported that lack of resources and training opportunities, time restraint, excessive workload, and adequate time to follow the guidelines becomes a challenge, even if they want to.

Concerning factors related to non adherence with infection control standard precaution, findings indicated that about all of the studied nurses agreed about the non availability of supplies and equipment e.g. masks, goggles, alcohol based hand rub, delivery packs and linen were reported as obstacles for implementing the Standard Precautions, this is in addition to heavy workload and no time for comply with infection control measures, which were the main causes. At the same time the majority of the nurses agreed about the items related to lack of policy & procedures and shortage of nurses come into the second category of the non adherence. Nurses pointed that the presence of hospital policy will empower all nurses to adhere and follow infection control guideline at the same time availability of supplies and sustainable standards related to nurses/patients ratio will minimize the overburden and load on the nurses' performance. This is in agreement with *Famakinwa (2014)*, who reported that lack of resources and excessive workload were the most frequent factors cited by health care workers for not implementing standard precautions during routine tasks. At the same line *Koren (2011)* emphasized the presence of a unified policy and procedures helped to improve nurses' performance.

Moreover, finding of the current study is in congruent with *Ibrahim et al. (2011)*, who assessed infection control practices in intensive care unit and also a study conducted by *Eskander et al. (2013)* in Egyptian Cancer Hospital who revealed that lack of nurses' adherence to standard precautions of infection control when carrying out certain tasks could reflect the gap between knowledge & practice; poor design; high work load; lack of sustainable resources and arrangements; lack of training and constructive supervision and policy

5. CONCLUSION

Application of the infection control standards precautions training program was effective for improving nurses' knowledge and practice mean score levels. Also the factors and barriers that have an impact on infection control practice as non-availability of supplies and heavy work load with no time were the strongest reasons for hindering adherence to the universal precaution practices.

6. RECOMMENDATIONS

Based upon the findings of the current study the following recommendations are:

1. On institution-wide nursing supervisors in Fayoum Maternity Hospital should develop and conduct extend education and competency based training for nurses to improve their knowledge and monitoring their adherence to safe performance for infection control standard precautions.
2. Managers should equip the hospital with the needed equipment and materials that facilitate adherence to infection control standard especially in rural areas.
3. Nursing supervisors in different maternity hospitals should apply the standard of nurse-patients' ratio to avoid staff shortage and work overload, which considered barriers for infection control standard precautions.
4. Written guidelines and unit policies related to infection control standard precautions should be available and accessible all over the maternity hospitals' unit.
5. Disseminate the developed educational program on a nation wide to achieve better nurses' knowledge and adherence to infection control practices.

REFERENCES

- [1] ACSQHC Australian Commission on Safety and Quality in Health Care (2010):.National Consensus Statement: Essential Elements for Recognising and Responding to Clinical Deterioration. Sydney:.
- [2] Alnoumas, S; Enezi, F; Isaeed, M; Makboul, G and El-Shazly, M. (2012): Knowledge, attitude and behavior of primary health care workers regarding health care-associated infections in Kuwait. Greener Journal of Medical Sciences. 2012; 2 (4): 092-098.

- [3] Mawalla, B.; Mshana, S.E.; Chalya, P.L.; Imirzalioglu, C.; Mahalu, W. (2011): Predictors of surgical site infections among patients undergoing major surgery at Bugando Medical Centre in Northwestern Tanzania. *BMC Surg.* 2011, 11: 21-10.1186/1471-2482-11-21.
- [4] Tabatabaei, S. M; Pour, F. B. and Azedah, H. (2015): Infection Control Practices and Program Management in Labor and Delivery Units: A Cross-Sectional Study From Iran.
- [5] Chan GJ, Baqui AH, Modak JK, Murillo-Chaves A, Mahmud AA, et al. (2013): Early-onset neonatal sepsis in Dhaka, Bangladesh: risk associated with maternal bacterial colonisation and chorioamnionitis. *Trop Med Int Health* 18(9): 1057-1064.
- [6] Amadu M.O., Saka M.J., (2012). Knowledge, Awareness and Adherence with standard precautions. *Journal Community Med Health education*, 2:131.
- [7] CDC. Centers for Disease Control and Prevention (2012): Progress toward prevention and control of hepatitis C virus infection--Egypt,. *MMWR Morb Mortal Wkly Rep*, 2012. 61(29).
- [8] Ahmed AAM (2015) Assessment of measurements of infection control in the Labor Room at Omdurman Maternity Hospital in 2014-2015: Alzaeim Alazhari University.
- [9] Tavolacci, M., J. Ladner, L. Bailly, V. Merle and I. Pitrou, (2008): Prevention of nosocomial infection and standard precautions: knowledge and source of information among healthcare students. *Infection Control & Hospital Epidemiology*, 29: 642-647.
- [10] Amoran, O. E., & Onwube, O.O., : Infection control and practice of standard precautions among healthcare workers in northern Nigeria. *Journal of global infectious disease*; 5 (4), 2013, 156-163.
- [11] Valim MD, Marziale MH, Richart-Martinez M, Sanjuan-Quiles A. Instruments for evaluating compliance with infection control practices and factors that affect it: an integrative review. *J Clin Nurs.* 2014;23(11-12):1502-19.
- [12] Abolwafa, N.F., W.E. Ouda, F.Z. Mohammed and E.S. Masoed, 2013. Developing educational program for nurses' related to infection control of invasive procedures in neonatal units at EL-Minia university and general hospitals. *Journal of American Science*, 9: 286-293.
- [13] Ahmad E., Khamis M. & Younis S (2012): Effect of a developed educational booklet about standard infection control precautions on nurses' knowledge and practices at woman's health center-Assiut university hospital, Egypt. Retrieved from [http:// www.medicaljournalofcairouniversity.com](http://www.medicaljournalofcairouniversity.com).
- [14] Sessa, A., Giuseppe G., Albano, L. and Angelillo I. (2011): An Investigation of Nurses' Knowledge, Attitudes, and Practices Regarding Disinfection Procedures in Italy, *BMC Infectious Diseases*, 11, 2011, 148-157.
- [15] Eskander, H.G., W.Y. Morsy and H.A. Elfeky, (2013): Intensive care nurses' knowledge & practices regarding infection control standard precautions at a selected Egyptian cancer hospital. *Journal of Education and Practice*, 4: 160-174.
- [16] Al-hussami M. and Darawad M. (2012): Adherence of Nursing Students with Infection Prevention Precautions: Effectiveness of a Teaching Program. *American Journal of Infection Prevention*, 2012, 1-5.
- [17] Rasslan O., (2011). Infection Prevention and Control Education in Egypt: Professional Diploma in Infection Control (PDIC). *Int J Infect Control* 2011, v7:i2 doi: 10.3396/ijic.V7i2.015.11.
- [18] Baja, J, Welker, A, Beck, G, Schleppers, A, Fischer, M, et al, (2014): Professional image of anesthetists in the general public. Influence of provision of information and previous experience with discipline. *Anesthesist* 63, 2:114-21.
- [19] Luo Y, He GP, Zhou JW, Luo Y. (2013). Factors impacting compliance with standard precautions in nursing, China. *Int. J. Infect Dis.* 14 (12):1106-1114 (Cited 2013 May 23). Available from: <http://dx.doi.org/10.1016/j.ijid.2009.03.037>.

International Journal of Novel Research in Healthcare and Nursing

Vol. 4, Issue 1, pp: (234-246), Month: January - April 2017, Available at: www.noveltyjournals.com

- [20] Longtin, Y.; Sax, H.; Allegranzi, B.; Schneider, F. and Pittet, D. (2011): "Videos in clinical medicine. Hand hygiene," *The New England Journal of Medicine*, vol. 364, article e24.
- [21] Rosenthal V., Guzman S. and Safdar N.(2012): Reduction in Nosocomial Infection With Improved Hand Hygiene in Intensive Care Units of A Tertiary Care Hospital in Argentina, *American Journal of Infection Prevention*, 33(7), 2012, 392-397.
- [22] Tarek A. and Adel W. (2009): Healthcare providers' knowledge of standard precautions at the primary healthcare level in Saudi Arabia; *Healthcare Infection*, Volume 14 (Issue 2) Pages 65-72.
- [23] Famakinwa, T. T.; Bello, B. G. ; Oyeniran, Y. A. ; Okhiah, O.; and Nwadike, R. N. (2014): "Knowledge and practice of post-operative wound infection prevention among nurses in the surgical unit of a teaching hospital in Nigeria," *International Journal of Basic, Applied and Innovative Research*, vol. 3, no. 1, pp. 23–28, 2014.
- [24] Koren, N. (2011): Hospital environmental services, policy and procedure the compendium of standards of practice for nurses available at <http://www.cno.org/paps/compendium.html>.
- [25] Ibrahim, Y.S., A.M. Said and G.K. Hamdy, (2011): Assessment of infection control practices in neonatal intensive care unit. *Egyptian Journal of Community Medicine*, 29: 27-45.