Effectiveness of infection control standers on practice among Health care Personnel working in MCH centers at Quena Governorate

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Abstract: *Infection control within a health care facility reduces the risk of nosocomial infectious, thus decreases morbidity and mortality. It is associated, as well, with a decreased need to stay in the hospital for an extra-day to many weeks. Therefore, the aim of study was to assess the effectiveness of infection control standers on practice among health care personnel working in MCH centers at Qena Governorate. Design: Descriptive research design was utilized to meet the aim of the study Setting: This study was conducted in all maternal and child health their number four centers at Qena Governorate named Seidy Abd Elrehim center, Seidy Awlad Omer center, Oropy Project center and worker city center . Sample: All nurses working in four MCH center were included in the study include (75) nurses. Tools of data collection: It included two tools an interviewing questioners to assess socio demographic characteristics of the nurses and nurses knowledge about universal precautions and infection control precautions before, during and after normal vaginal labor and observational checklist to assess nurses performance related to application of universal precautions before, during and after normal vaginal delivery . Results: The nurses aged between 20 -30 years 53 %. Also, the majority nurses having secondary nursing diploma education. while the minority having technical institute of nursing. As regarding to attendance in job training program about infection control, more than half of nurses were not attended in job training program about infection control.*
Nurses having Bachelor of Science in nursing had significantly higher scores than those having Technical Institute of nursing, and those having secondary nursing Diploma. Conclusion :The scores of nurses' knowledge and performance having Bachelor of Science in nursing were significantly higher than those who having Technical Institute of nursing Diploma, and those who having secondary nursing Diploma. The scores of nurses' knowledge and performance having work years' experience ranged from 5 to 10 years were better than those who having worked experience less than 5 years, and those who having work experiences exceeds 10 years. Recommendation: Periodic training program should be provided to nurses at MCH centers to update their knowledge and practices regarding universal infection control precautions .It contain the following items policies, procedure standard in related to universal precautions. Also, further studies needed to be performed with different variables, subjects and different settings.
Key words: *universal precautions; infection control; normal vaginal delivery; nosocomial infections; health care personnel.*

I. Introduction

Infection control is the processes and activities that identify and reduce the risks of acquiring and transmitting endemic or epidemic infections among individuals. (Block, 2006). Nosocomial infections are defined as Infections acquired in the maternal and child health center. There must be no evidence that the infection was present or incubating at the time of admission. Surgical procedures, such as (episiotomy) interfere with the normal protective skin barrier and expose the patient to microorganism from both endogenous and exogenous sources. Prevention of Normal Vaginal Labor site infections is therefore of primary concern to health care personnel (Urbani , et al., 2008).

The World Health Organization ranks maternal sepsis as the sixth leading cause of disease burden for women aged 15-44 years, after depression, HIV/AIDs, tuberculosis, abortion and schizophrenia. As many as 5.2 million new cases of maternal sepsis are thought to occur annually and an estimated 62,000 maternal deaths will result from the condition (WHO, 2008). Labor and delivery are especially hazardous times of pregnancy. Apart from the risks of severe bleeding and obstructed labour, life threatening infections can be introduced into the mother and baby's organs and bloodstream. 'Maternal sepsis' is a general term which has been used to include various obstetric and genito-urinary tract infections introduced into the mother (WHO,2008). Health care associated infection or nosocomial are the most frequent adverse event in health care deliveryworldwide. Universal Precautions are the basic levels of infection control precautions which are to be used, as a minimum, in the care of all patients, which become an integral part of the accreditation program for all medical settings in

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Egypt, these include certain measures such as performing hand washing, wearing personal protective equipment, respiratory hygiene and cough etiquette, sharps safety, equipment safety, waste management and environmental cleaning. Many infection control measures are simple and of low-cost, but require staff accountability and behavioral change, in addition to improving staff education (Ibrahim, et al., 2011; Bouallègue, et al, 2013).

Infection is generally used to refer to the deposition and multiplication of bacteria and other micro-organisms in tissues or on surfaces of the body with an associated tissue reaction. Infection occurs when an invading micro-organism causes ill health. Organisms include (Viruses, Bacteria, Fungi, Protozoa, (Wargo, 2007).

The importance of a strong health system as the essential route to achieving improvements in maternal health and reductions in maternal mortality is widely accepted. Effective coverage of maternity services requires timely and affordable access, by all sectors of the population, to appropriate care of sufficient quality and safety to help assure positive health outcomes. Good access, safety and quality are the overriding aims of all health systems and such factors are crucial when considering the problem of infections resulting from childbirth. Improving and maintaining infection control as part of delivery care requires an efficiently functioning health system (Task Force, 2005).

Universal precautions minimize the risk of nosocomial infections, and other blood borne pathogens. If Health care Personnel take care to prevent injuries when using needles, scalpels and other sharp instrument or devices and use the protective barriers to reduce the risk of exposure to blood and body fluids containing visible blood to which universal precautions apply, of protective barriers include,(gloves, gowns, masks and protective eye wear)(Decastro, et al., 2006).

The costs of infection control and staffing are less when compared to that of patients or nurse acquired infection. Therefore, Health care Personnel should have professional and ethical responsibilities to make sure that their knowledge and skills regarding infection control are up-to-date and they practice safely and competently at all times (Royal College of Nursing, 2012). The Health care Personnel play a critical role in controlling infection that begins with early detection and surveillance technique, so effective training is essential to ensure that these concepts are understood and put into practice wherever health care is provided. Health care Personnel must be educated in the basic principles of infection control and acquire new knowledge and skills because the quality of nursing care depends to a large degree on the knowledge, skills, attitudes and activities of the practicing Health care Personnel (Ahmed, et al., 2012).

1.1. Significance of the Study
Several studies reported that lack of appropriate knowledge of Universal Precautions and infection control was the main predictor for poor compliance, thus, knowledge related to primary preventive strategies of Universal Precautions could play a pivotal role in the reduction of exposure incidents among these nurses. (Saleh, et. al. 2009). Many women still deliver at home, making prevention of infection at home and in the community important, especially if family members and traditional birth attendants are unaware of the need for infection prevention. The provision of delivery care by health professionals and in health facilities is expected, and indeed, likely to decrease infection rates because of use of clean practices, sterile gloves and instruments (Loudon, 2000).

Aim of the Study
The aim of the study is to assess the effectiveness of infection control standers on practice among Health care Personnel working in MCH centers at Qena Governorate through:
1. Assessing nurse's knowledge related to universal Precautions and infection control?
2. Assessing nurse's performance as regard application of universal precaution?

Research Questions
1) Is there relationship between nurses knowledge about universal precautions and their level of education?
2) Is there relationship between nurses knowledge about universal precautions and their years of experience?
3) Is there relationship between nurses knowledge about universal precautions and their training courses?
4) Is there relationship between nurses performance about universal precautions and their qualifications?
5) Is there relationship between nursing performance and years of experience?
6) Is there relationship between nurses performance about universal precautions and their training courses?

II.   Material & Method's

2.1. Research design: Descriptive research design was utilized to meet the aim of the study.

2.2. Setting of the study: This study was conducted in four Maternal and Child Health centers at Qena Governorate named Seidy Abd Elrehim center, Seidy Awlad Omer center, Oropy Project center and worker city center. This all centers in Qena city.

2.3. Sample: All nurses working in four Maternal and Child Health centers were included in the study included (75) nurses.

2.4. Tools of data collection: Two tools used for data collection,

i.   First tool: an interviewing questioners to assess:

Socio demographic characteristics of the nurses about: (age, level of education, years of experiences, and attendance in job training program about infection control).

Nurses knowledge about universal precautions and infection control precautions before, during and after normal vaginal labour. Interview questionnaire developed by researchers after reviewing of the related literature (Elizabeth, et al., 2008; Marion,& Moss ,2005) .

Questions covered the following items:

Definition, types, and principle of infection, (7) items. hand washing, wearing and removing sterile gloves, wearing mask, wearing gown (10) items. Safe injection for health care personnel and recipient, (7) items. Cleaning and disinfection, (7) items. Sterilization and its types, (9) items. Universal precautions in delivery room at MCH, (3) items.

This part contains 43 questions, the questions coded as following:

Correct   = 1: The nurses choose true answers.

Incorrect = zero: The nurses choose wrong answers.

Scoring system:

Scoring system for data collection from interview questionnaire: a score of one was given for correct answer and a zero for incorrect answer

ii.   The second tool:- Observational checklist to assess nurses performance related to application of universal precautions before, during and after normal vaginal delivery, it was developed by the researchers with guided of (Vicky, and Cindy, 2003; Patricia and Anne, 2005) to assess hand washing steps, wearing and removing sterile gloves, wearing mask and apron, collection of blood specimens, I.V cannulation, and insertion of urinary catheter, changing gloves, cleaning, disinfection and sterilization of instruments.

Scoring system was coded as follows:

No = 0: if the observed item was not done.

Yes = 1: if the observed item was done correctly

2.5. 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. It was done before the pilot study.

2.6. 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 two times 15 days apart. Cranach's Alpha reliability was 0.850.

2.7. Pilot study: After developing the tools, a pilot study was conducted on 10 nurses' in the MCH centers and included in this study. A pilot study was conducted for purpose to testing clarity, completeness, and to determine the time involvement. According to the results of pilot, the needed modification, omissions, and/or additions were done. Some details that not required were omitted, either to advance or reduce the tool lengthy test.

2.8. Ethical consideration: A formal consent was obtained orally from nurse before being involved in the study. The nature and purpose of the study were explained. The researchers informed the women that there is no risk or cost for participation, and the participation is voluntary.

2.9. Field work: A review of the current and past available literature on the various aspects of the problem using textbooks, articles and magazines were done. This review was helpful in developing the tools used in the study. Tools were constructed by the researchers and revised by the supervisors and experts in the field of research.

Observation was done during routine work of the units. The method of data collection for the tools every nurse will be met in the morning and afternoon shifts to assess their knowledge and performance. Data were collected during the period from the beginning. March 2014-till the end of October y 2014. The researchers introduced themselves to the eligible women and briefly explained the nature of the study.

Before starting this study, it was necessary to secure the approval of authorities in the setting of the study. Therefore, permission was obtained from the directors of MCH center at Quena Governorate. Confidentiality of the data will be asserted. Explanation of the aim and methodology of the study was done by the researchers.

2.10. Statistical analysis: Data entry was done using compatible personal computer. The statistically analysis was done using SPSS-16 statistical software package and Excel for figures. The content of each tool was analyzed, categorized and then coded. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables, and means and standard deviations for quantitative variables. For multiple groups F-test or (ANOVA) was used. Qualitative studied variables were compared using Chi-square test. Pearson correlation analysis was used for assessment of the inter-relationships between the total scores of nurses' knowledge and performances about infection control. Statistical significance was used at (P. value<0.05).

III.   Results

Table (1) showed that the majority of nurses aged between   20 -30 years 53 %. Only, 4 % of nurses aged between 41 -50 years. As regarding to years of experience, 41% of nurses were relatively new in the career and having work experience less than 5 years.

Table (2) showed that 74% of nurses having secondary nursing diploma education. While, 9 % having technical institute of nursing and 53 % were not attended in job training program about infection control.

Table (3) shows the mean scores of nurses' knowledge about universal precautions according to their level of education. The significant difference was illustrated in only item of universal precautions infection. While the mean score of nurses' who having Technical Bachelor of Science in nursing (5.3±1.1) was higher than those who having Technical Institute of Nursing (5± 0.9), and those who having secondary nursing Diploma (3.5±1.5), and statistical significant difference was (P.=0.01). While, there was no significant differences regarding the other items, cleaning and disinfection, sterilization, hand washing, wearing and removing gloves, changing gloves, wearing mask, gown, and safe injection , and total scores of nurses' knowledge.

Table (4) shows the mean scores of nurses' knowledge about infection control according to their years of experience. The significant difference was illustrated only in item of universal precautions while the mean score of nurses' who having work experience less than 5 years (4.9±1.3) was the higher than those who having work experience from 5 to 10 years (4± 1.1), and those who having 10 years and more of experience (3.4±1.6), and statistically significant difference was illustrated (P.= 0.04). While, insignificant differences were shown regarding the other items, cleaning and disinfection, sterilization, universal precaution, hand washing, wearing and removing gloves, changing gloves, wearing mask, gown and eye protection, and total scores of nurses' knowledge.

Table (5) shows the mean scores of nurses' knowledge about universal precautions according to their training courses. Insignificant difference was illustrated regarding nurses' knowledge and nurses who either attended training courses about infection control.

Table (6) showed that there were significant differences, P.< 0.05 among nurses with different level of education with regard to change of gloves, removing gloves, wearing mask and care of patient equipments. Specifically, nurses with Technical institute of nursing were more likely than nurses with secondary nursing diploma. The analysis also showed that nurses with Bachelor of sciences in nursing   P.< 0.000 were more likely than nurses with secondary nursing diploma to change of gloves, remove gloves, wear mask and care of women equipment's.

Table (7) showed that Pearson's correlation coefficient showed significant positive correlation of 0.3, p. < 0.001, (P = 0.009) between nurses number of years of experience and following hand washing steps. There was a positive correlation of 0.34, P.< 0.001, (P. = 0.003) between nurses' number of years of experience and following the process of wearing sterile gloves.

Table (8) shows the mean scores of nurses' performance about infection control according to their training courses. Insignificant difference was illustrated regarding nurses' performance and nurses' who either attended or not training courses about infection.

IV. Discussion

The health care personnel are more likely to comply with an infection control program if they understand its rationales. Clearly written policies, guidelines, and procedures ensure uniformity, efficiency, and effective coordination of activities (Askarian, et al., 2007).

As regard nurse's socio demographic characteristics (Table 1), the present study shows that the age of nurses ranged between 20 - 50 years, the highest percentage of them were between the ages of 20- 30 years. This finding agreed with Amoran, & Onwube, (2013) who studied Infection control and practice of standard precautions among healthcare workers in northern Nigeria and they found that the majority of the participants were aged ranged from 20-39 years. Additionally, Abdulraheem, et al., (2012) who studied knowledge, awareness, and compliance with standard precaution among health care workers in North Eastern Nigeria. They found that the age range of respondents was 21-53 years while the mean age was 26.4 years. These results are in line with other study done in Egypt by Ahmed, et al., (2012) who found that the mean age of the sample was 23 years old. This might be the majority of nurse's diploma nurse which in Egypt diploma nurse graduate at age18 year & this could reflect the young age of the studied sample and so the ability to acquire knowledge and change their behaviors based on submission of up to date knowledge.

Regarding nurse's qualification, the current study found that the majority of them their experiences less than 5 years and most of them had nursing diploma (Table1). These results come in accordance with the studies done by Maheswari1, & Muthamilselvi, (2014) who studied assess the Effectiveness of Structured Teaching Programme on Universal Precaution among Class IV Employees Working at Aarupadai Veedu Medical College and Hospital, Puducherry, India. Also, they found that the most of the nurses 64% have experience of 6 years and above. These results in line with Ahmed, et al., (2012) revealed that the great majority of nurses had nursing secondary school. However the vast minority represented technical institute.

Regards to previous training programs about infection control, the present study showed that, the majority of them didn't attend any training courses about infection control (Table 2). These results supported by Gajić , et al., (2013) who studied Knowledge of health care workers from primary health care centers in India, they found that 49 % of the participants have never had any education on this topic, while 22 % had been educated during the last five years. In same line, Alkandari, et al., (2013) stated that many surveys showed that health care workers such as nurses, physicians, medical students and nursing students receive incomplete and variable training in infection control. These may be attributed to the shorting in nursing staff, so these MCH centers can't let them attend any training courses to prevent interruption of work due to their absenteeism

The present study revealed that total scores of knowledge and performance of nurses having Bachelor of Science in nursing had significantly higher scores than those having secondary nursing Diploma, (P.= 0.001). And, total scores of knowledge and performance of nurses having Technical institute of nursing in nursing had significantly higher scores than those having secondary nursing Diploma, (P.= 0.04) (Table 3&4). The finding didn't accordance with the results of the study conducted by Cokendolpher, et al., (2006) who studied the practical application of disinfection and sterilization in health care facilities in Chicago. They found that nurse's knowledge and performance scores related to infection control measures in delivery room were significantly better for more senior nurses than junior nurses. They attributed this result to the absence of infection control orientation programs. Also, stated that the highest mean scores of knowledge was found among nurses having Bachelor of Science of nursing, and also found that there were improvement of nurse's knowledge related to infection control measures.

The present study revealed that total scores of nurses' knowledge and performance having work experience ranged from 5 to 10 years were higher than those who having worked experience less than 5 years, and those who having work experiences exceeds 10 years (Table 4). This finding was in accordance with the results of the study conducted by Gamal, et al., (2006) who found that the highest mean scores of knowledge and performance among younger nurses', those who have the least experience and those who having Bachelor of Science in nursing. This might be due to nurses' maturity which plays a role in gaining and integrating knowledge. Moreover, nurses' who have more experience will be responsible for administrative and managerial activities, while younger ones have more practical work in direct patient care.

The present study revealed that total scores of knowledge and performance of nurses who had attended training courses about infection control didn't differ from those who didn't attend training courses about infection control (Table 5&6). The finding is didn't accordance with the results of the study conducted by Emam, et al., (2009) who studied Effect of Educational Program of Paramedical Knowledge and Attitude toward Infection Control in El-Minia City and they found that nurses who had attended training courses differ statistically significant from those who didn't attend training courses (P.=0.06). Tantawy, (2008) who studied Nurses Knowledge and practice related to infection in delivery room in Zagazige and stated that nurse's performance and skills were done adequately to prevent nosocomial infection in operating room. In additional to, the CDC., (2009), professional nurses need to have accurate information about infection control measures and mode of transmission, to decrease the transmission of the microorganisms in health care and community

settings, and also to promote care for women after labor .Thus, the majority of nurses had incorrect answers about the factors for poor adherence with hand washing, personal protective clothes, disinfection and sterilization of instruments. These findings are in agreement with those of (Hassan and Aboulazm, (2007) who has shown that nurses' knowledge about universal precautions was poor in studied about Infection Control Education in Egypt. However, the sample seemed to have knowledge in some items such as using protective clothes when dealing with sharps and waste disposal and when dealing with women secretions, hand washing, places of entry and exit of microorganisms, types of infection. This may attribute to lack of nurses knowledge about infection control precautions.

In the present study, it was found that scores of nurses' performance of changing gloves steps had statistical significant (P.=0.02). While, scores of nurses performance of removing gloves steps statistically significant (P.=0.000).While scores of wearing mask, wear gown and care of women equipment steps statistically significance .Nurses having Bachelor of Science in nursing had significantly higher scores than those having Technical Institute of nursing, and those having secondary nursing Diploma (Table 6). The finding is in accordance with the results of the study conducted by Hassan, et al., (2009) found that the majority of nurses practices of hand washing weren't adequately performed by nurses having Bachelor of Science in nursing, those having secondary nursing Diploma and those having Technical Institute of nursing.

In the present study it was found that performance of changing gloves steps of nurses having Bachelor of Science in nursing had statistical significantly difference score than those having secondary nursing Diploma and those having Technical Institute of nursing (P.=0.023). In the present study it was found that the scores of the nurse's performance of wearing mask steps, wearing gown steps, removing contaminate gown steps, and care of women equipments total scores of nurse's checklist steps related to their qualifications were statistically significant. Hassan, and Aboulazm , (2007) stated that the minority of nurses wear mask, and goggle during delivery especially when the risk of being contamination present. there were some constraints to compliance it related to lack of adequate resources to provide good quality of personal protective clothing particularly mask, and protective eye wears during labor.

In the present study it was found that the scores of the nurse's performance of blood sample extraction, insertion of urinary catheter steps , wearing sterile gloves and removing of gloves steps related to their qualifications had no statistical significantly difference between nurses having Bachelor of Science in nursing, those having Technical Institute of nursing and those having secondary nursing Diploma (Table 8). This finding supported by Hassan, et al., (2009) who also found that performance of the majority of the nurses didn't carry out or perform certain procedures in relation to infection control precaution obstetric unit such as use of protective barriers e.g., gloves, mask, blood sample extraction , insertion of urinary catheter and correct disposal of needles and sharp instrument. Kim , et al., (2007) who studied Improved Compliance with Universal Precautions in the delivery room following an educational intervention also found that minority of nurses wearing personal protective clothing as mask, protective eye were in the operating room. The cases to lack of performance e.g., wearing gloves, mask and hand washing, before and after labor increase number of nosocomial infection. These have a results agreed with finding , Hassan, et al., (2009) has found great lack of knowledge related to universal precautions and infection control among nurses. These findings go in the same line with Amoran, & Onwube , (2013) who reported that the incorrect practices which include failure to use safe cleaning procedures were predominant among healthcare provider.

The result of the present study showed that more than half of nurses reported that they did not sterilize instruments, had not correct answered about sterilization time (Table 8). This finding is in agreement with that of Amoran , & Onwube, (2013) who assessed that 14.3% reported that they do not sterilize instruments before use and 39.7% could not disinfect working surfaces when necessary. Only 3.3% of respondents reported reuse of needles and blades and 5.7% reuse disposable items regularly. This may be attributing to there is no availability of the equipments. And, un-functioning auto clave.

V.   Conclusion

Based on the results of the study finding and research questions , it could be concluded that the scores of nurses' knowledge and performance having Bachelor of Science in nursing were significantly higher than those who having Technical Institute of nursing Diploma, and those who having secondary nursing Diploma. The scores of nurses' knowledge and performance having work years experience ranged from 5 to 10 years were better than those who having worked experience less than 5 years, and those who having work experiences exceeds 10 years.

In conclusion, the knowledge and performance of nurses in relation to universal precautions before and after labor were evaluated. It found that there is statistical significant in nurse's knowledge and performance compared to their qualifications. In addition, the scores of nurses' who attended training courses about infection control were more than nurses' who didn't attend the training courses.

Recommendations

Based on results of the present study it was recommended that; periodic training program should be provided to nurses at MCH centers to update their knowledge and practices regarding universal infection control precautions .It contain the following items sterilization, hand washing, universal precaution, cleaning and disinfection. Further studies needed to be performed with different variables, subjects and different settings.

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Table (1) Distribution of Nurses' Characteristics According to Their Age and Years of Experience

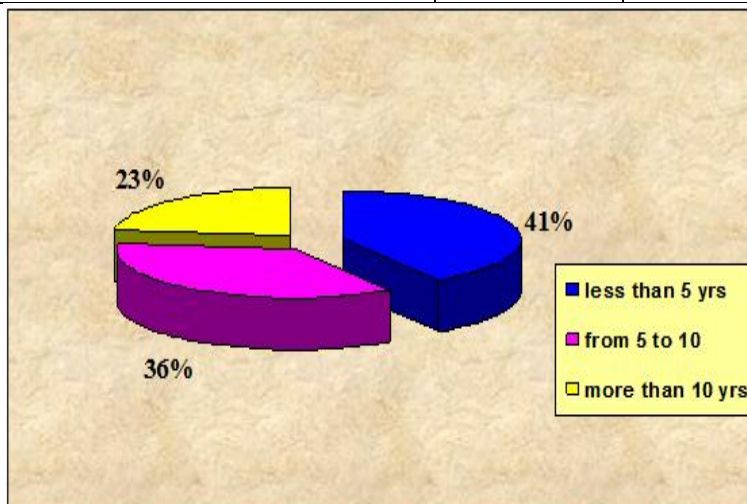| Items	No = 75	%
Age of nurses':		
Less than 20 years	8	17 %
From 20 to 30 years	40	53%
From 31 to 40 years	20	27 %
From 41 to 50 years	3	4 %
More than 50 years	4	5 %
Years of experience:		
Less than 5 years	31	41 %
From 5 to 10 years	27	36 %
More than 10 years	17	23 %
Total	75	100 %

Fig.1. Distribution of Nurses' According to Years of Working Experience.

Table (2) Distribution of Nurses' According to Their Levels of Education, and Attendance of Training Program.

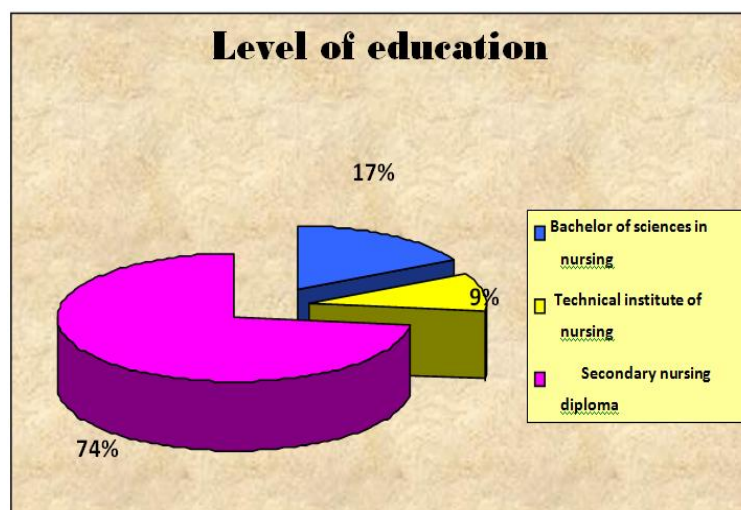| Items	No = 75	%
Level of education.		
Bachelor of sciences in nursing	**13**	**17 %**
Technical institute of nursing	**7**	**9 %**
Secondary nursing diploma	**55**	**74 %**
Training courses about infection control:		
No courses	**40**	**53 %**
One course	**16**	**21 %**
Two courses	**12**	**16 %**
Three courses	**7**	**10 %**
Total	**75**	**100 %**

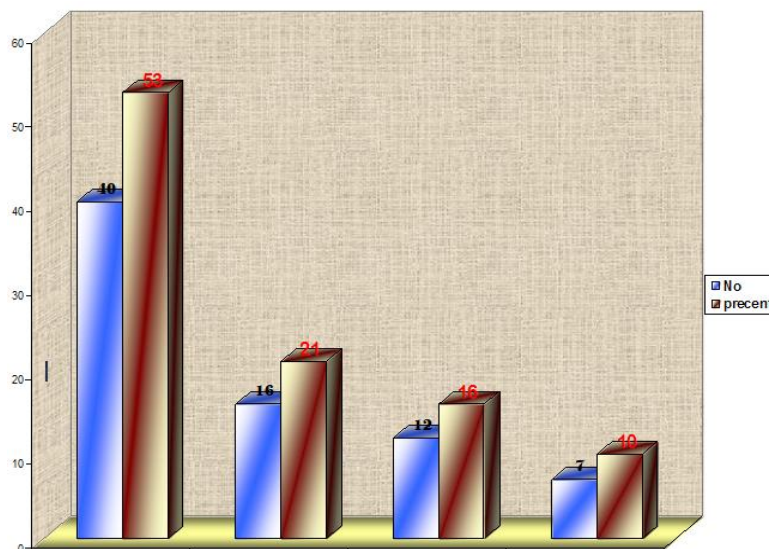**Fig.2.** Distribution of Nurses According to Their Levels of Education

Fig.3. Distribution of Nurses' According to Their Attendance in Job Training Program
Second part: Nurses' Knowledge Concerning the Universal Precautions in MCH

**Table (3) Distribution of Nurses' Knowledge about Universal Precautions
According to Their Level of Education. (N = 75)**

Mean scores of nurses' knowledge	Bachelor of Sciences in Nursing n= 13	Technical Institute of Nursing Diploma n=7	Secondary Nursing Diploma n= 55	F. test	P. value
	(X`± SD)				
Infection.	8.8 ± 1.1	8.6 ± 0.5	7.6 ± 2.8	0.81	0.45
Cleaning and disinfection.	5.1 ± 1.2	3.4 ± 0.5	4.9± 1.6	0.26	0.76
Sterilization.	5.0 ± 0.7	4.3± 0.5	4.0 ± 1.9	1.31	0.27
Universal precaution.	5.3±1.1	5± 0.9	3.5 ± 1.5	4.56	0.01*
Hand washing, wearing and removing gloves, changing gloves, wearing mask, gown					
	5.2±0.7	5.0±1.0	4.1±1.6	1.88	0.16
Total scores of nurses' knowledge.	29.1 ± 1.5	26.6 ± 3.2	24.1 ±8.8	1.36	0.26

*= Significant.   X` = Qui square

**Table (4) Distribution of Nurses' Knowledge about Universal Precautions
According to Their Years of Experience (N =75)**

Nurses' knowledge	Less than 5 years n=31	From 5 to 10 years n=27	10 years and more n=17		P. value
	(X`± SD)				
Infection.	8.2±1.8	9.7±0.5	7.4±3.0	1.66	0.20
Cleaning and disinfection.	4.5±1.3	6.2±0.9	4.7±1.7	1.73	0.18
Sterilization.	4.4±1.8	4.00±0.8	3.8±2.1	0.93	0.39
Universal precaution.	4.9±1.3	4.0±1.1	3.4±1.6	3.30	0.04*
Hand washing, wearing and removing gloves, changing gloves, wearing mask, and gown.	4.7±1.3	5.1±0.8	4.0±1.7	1.75	0.18
Total scores of nurses' knowledge.	26.7±5.6	29.00±1.4	23.3±9.6	1.56	0.22

*= Significant

Table (5) Distribution of Nurses' Knowledge about Universal Precautions According to Their Training Courses

Mean scores of nurses' knowledge	Training courses (X` ± SD)		T. test	P. value
	With N =35	Without N = 40		
Infection.	3.8 ± 1.4	4.0 ±1.8	0.37	0.71
Cleaning and disinfection.	4.9 ± 1.4	4.8 ± 1.8	0.23	0.81
Sterilization.	4.2 ± 1.6	3.9 ± 2.0	0.57	0.56
Universal precaution.	8.1± 2.3	7.6± 2.9	0.47	0.46
Hand washing, wearing and removing gloves, changing gloves, wearing mask, gown and eye protection.	4.3±1.5	4.4±1.6	0.36	0.72
Total scores of nurses' knowledge.	25.3± 7.2	24.7± 9.3	0.25	0.80

Third part: Nurses' Performance Concerning the Universal precautions in delivery room.

Table (6) Distribution of Nurses' Performance about Universal Precautions According to Their Qualifications. (N =75)

Nurses' performance	Bachelor of Sciences in Nursing N =13 (X` ± SD)	Technical Institute of Nursing Diploma N =7	Secondary Nursing Diploma N = 55	F.test	P. value
Hand washing.	15 ±3.5	13.6 ± 2.5	13.3 ± 3.1	1.5	0.23
Wearing sterile gloves.	13.8±2.3	11.4±1.7	12.0±2.2	1.19	0.31
Changing gloves.	7.3 ±2.4	8.6 ±0.9	6.2 ± 2.4	4.0	0.02*
Removing gloves	5.7 ± 1.3	6.3 ±0.5	4.1 ± 1.8	8.9	0.000*
Wearing mask.	5.8 ±0.99	6.9 ±0.37	5.6 ±1.3	3.6	0.03*
Care of women equipment's.	13.8 ±1.8	14.6 ±1.13	12.7 ±2.03	3.9	0.03*
Sterilization	5.5 ±1.2	5.1 ± 1.1	5.8 ±1.5	0.84	0.43
Blood sample extraction.	29.2 ±2.5	27.4 ± 1.9	27.5 ±3.4	1.5	0.23
Insertion of urinary catheter.	6.2 ± 1.3	5.7 ± 1.1	6.4 ±1.5	0.83	0.43
Cleaning of instruments.	2.00±0	2.00±0	2.00±0	0	0

*= Significant

Table (7) the Relation between Nursing Performance and Number of Years of Experience (N=75)

Performance	Experience	
	Correlation Coefficient (r)	P. value
Hand washing steps.	.299	.009*
Wearing sterile gloves steps.	.344	.003*
Changing gloves steps.	.242	.037*
Removing gloves steps.	.105	.369
Wearing mask, and gown steps.	.091	437
Care of women equipment steps	.329	.004*
Blood sample extraction steps.	.111	.345
Insertion of urinary catheter steps.	.017	.885
Cleaning of instruments after delivery.	.200	.086
Sterilization steps of equipment and instruments.	.249	.03*

Table (8) Distribution of Nurses' Performance about Universal Precautions According To Their Training Courses (N =75)

Mean scores of Nurses' Performance	Training courses (X` ± SD)		T. test	P. value
	With N =35	Without N =40		
Hand washing.	31.2± 4.2	29.8± 4.5	1.32	0.19
Wearing sterile gloves.	12.6± 2.0	11.8± 2.3	1.27	0.20
Changing gloves.	11.4± 1.5	11.1± 2.0	0.74	0.45
Removing gloves	3.0± 1.0	3.0±1.0	0.045	0.96
Wearing mask and gown.	2.00 ± 0	2.00± 0	0	0
Care of women equipment's.	5.3± 1.0	4.7± 0.9	0.25	0.79
Blood sample extraction.	11.9± 2.7	11.3± 2.7	0.71	0.48
Insertion of urinary catheter	77.4± 10.5	73.7± 10.4	1.23	0.22
Cleaning of instruments after delivery.	102.7±16.5	98.4±14.2	0.46	0.64
Sterilization steps of equipments and instruments.	13.6 ±3.1	13.3 ±3.4	.096	0.96

*= Significant