Full Length Research Paper

Effect of Health Educational Program On Nurses Knowledge & practice Regarding Infection Control in Neonatal Intensive Care Unit at Pediatric Hospitals in Khartoum State, Sudan 2015

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Abstract

The pathogenic organism and various form of illness they are produce can easily spread in an environment such as neonatal intensive care unit. All newborn infants are especially liable to nosocomial infection because of their intrinsic susceptibility to infection as well as the invasive procedures. The study aimed to evaluate the effect of educational program for nurses knowledge &practice regarding infection control in neonatal intensive care unit in pediatric hospital in Khartoum state in order to reducing morbidity and mortality of newborns by improving the quality of nursing care in neonatal intensive care unit. This was an Intervention study (Quasi-experimental: pre and posttest design). The study was conducted in two pediatric hospitals in Khartoum state, Gaffer Ibn Ouf specialized pediatric hospital and Omdurman Maternity Hospital. The study sample consisted of 61 nurses. Data was collected using a questionnaire (to measure knowledge) and checklist (to measure practice). Data was analyzed using Statistical Packages for Social Sciences (SPSS). There were Significant differences were found in knowledge of nurses between the pre test and posttest (P < 0.05) regarding definition of sterilization (36.1% of the nurses gave correct answer about the definition of sterilization before attendance of the program, while, correct answer was mentioned by 95.1% of them after attendance), disinfectant (29.5% of the nurses gave correct answer about the definition of disinfectant before attendance of the program, while, correct answer was mentioned by 78.7% of them after attendance) and the standard precaution, use of PPE at NICU care the nurses who correctly answered the statements about the standard precaution, use of PPE at NICU care were lower percentages before the program compared to the higher percentages of their answers after the program. The mean value of nurses answers regarding their first statement was (0.64±0.48) at pretest measurement, which increased at posttest measurement to (0.87±0.34), with improved knowledge. Also there is significant differences were found regarding correct practices on prevention of infection at NICU care (P < 0.05), with improved practices at posttest than at pretest. Finally educational program had a significant impact related to the improvement of the nurse's knowledge and practical skills post application of the program.

Keywords: Neonatal intensive care unit, infection control, questionnaire, Sudan.

INTRODUCTION

The pathogenic organism and various form of illness they produce can easily spread in an environment such as neonatal intensive care unit. First of all newborn infants are especially liable to nosocomial infection because of their intrinsic susceptibility to infection as well as the invasive procedure to which they are subjected this is particularly so for those born prematurely or low birth weight, Schoenstudt, 2009. Secondly gaffer Ibn Ouf hospital and maternity hospital admitted about 600 newborn every month generally there is feeling among health worker that the rate of infection in the hospital is high health personal require education continuous reminding and feedback if compliance is to be maintained. Finally because the nurses has a major role to infection control in intensive care so educational programs is needed theoretically and practically, this might lead to control of infection and reduce the mortality and morbidity of neonate who admitted in neonatal intensive care unit, WHO, 2011.

Infection control is known to be the most important issue in caring for the newborn infants their immunity is limited for the first week. After birth the infant needs protection from infection. Protecting infant from infection is a major responsibility of nurses who care for them Montanholi and Merighi, 2011. Neonatal infection currently cases about 106million deaths annually in developing countries sepsis and meningitis are responsible for most of those deaths. Resistance to the commonly used antibiotic is emerging and constitutes an unimportant problem worldwide to reduce global neonatal death strategies of proven efficacy. Such as hand washing .barriers restriction to neonatal units need to be implemented hand washing has been shown to be effective even since 19th century. .For this reasons the researcher want to make educational program regarding infection control for those nurses who work in this very sensitive area prevent all neonate admitted in neonatal intensive care unit from nosocomial infection, WHO, 2011.

NICU patients are at high risk for infection because of their illnesses, immature immune systems, and exposure to invasive procedures and devices. The way NICU is designed can enhance (or interfere with) infection control precautions, such as hand washing and disposal of soiled items Consultation with an infection control specialist during the planning stages of a new NICU with regard to both the design itself and the care practices that will be utilized can positively affect outcomes for babies and functionality for staff, Jarvis, 1996. Everyone who is in contact with infant, including parent and personnel must assume this responsibility. Infection control refers to policies and procedures used to minimize risk of infection in the nursery or in the community. Neonatal infection currently causes about 106 million deaths annually in developing countries sepsis and meningitis is responsible for most of those deaths. Resistance to the commonly used antibiotics is emerging and constitutes an important problem worldwide to reduce global neonatal death strategies of proven efficacy. Such as hand washing, barriers restriction to neonate, Soaean, 2010.

METHODOLOGY

Definition of the study design

A Quasi-experimental study: pretest and posttest for the same group was used to evaluate the effect of an educational program on nurses Knowledge &practice regarding the infection control in neonatal intensive care unit. The study was conducted from the period from June/2013 to June 2016.

Study setting

The study was conducted in two pediatric hospitals in Khartoum state. Khartoum is the capital and the second largest city of the Republic of Sudan and of Khartoum State. It is located at the confluence of the White Nile flowing north from Lake Victoria and the Blue Nile flowing west from Ethiopia. The location where the two Niles meet is known as "Almogran", meaning the Confluence. The main Nile continues to flow north towards Egypt and the Sea. Divided by the Niles, Khartoum is a tripartite metropolis with an estimated overall population of over five million people consisting of Khartoum proper and linked by bridges to Khartoum North called AlKhartūm Bahrī and Omdurman to the west.

Gaffer Ibn Ouf specialized pediatric hospital:

The largest pediatric hospital in Khartoum state is located near the Mk Nemer Street behind nursing college Khartoum University formed 4 floors. The NICU located on the 4th floor containing 25 incubators. Omdurman Maternity Hospital
This hospital located in Omdurman west .It is biggest Maternity Hospital in Sudan. The daily admission rate About 400 delivery, and had biggest NICU which contain 65 incubators.

Study population

Samples of 61 of nurses from previously mentioned setting. All nurses (either diploma nurses or faculty of nursing graduates, regardless to experience year, age, qualification level and previous training program) who were caring for neonate that admitted in a neonatal intensive care unit at a pediatric hospital (total number of nurses who agreed to participate).

Data collection tools

Two tools were used to collect the needed data to achieve the aim of the study, they were:

Structured Interview Questionnaire

This tool is developed by researcher after reviewing the literature to assess the nurses' knowledge regarding infection control in a neonatal intensive care unit. This tool was divided to two parts, one demographic data include (age, educational level, experience years) the second part included the knowledge of nurses about infection control (use of protective equipments, definitions of sterilization and disinflation).

Observational Checklist

It was developed by the researcher to assess the nurses performance regarding infection control in neonatal intensive care unit .it was include (hand washing, using of protective equipments).

METHOD

The study was designed to be accomplished as the following:

An official letters that were obtained from faculty of nursing and sent to the directors of Gaffer Ibn Ouf hospital and Maternity hospital to take the permission and facilitate the research implementation. The tools of study were developed by the researcher after review of literature. The pilot study was done on 10% of the study sample (who were excluded from participation) to test the visibility and reliability of study tools and modification was done and the tools were found to be understandable and applicable.

Phase One

Pre interventional phase, the nursing staff's base line level of knowledge, and the practice concerning infection-control measures were tested by using a self-administered pre-test questionnaire and an observation checklist.

Phase Two

Include orientation about the Health Educational Program. An educational program to study group designed by the researcher based on actual assessment. Different teaching methodologies as lectures, discussion, demonstration, and re demonstration, and used. different assisting learning methods were used in the program as small books, show pictures, posters, and real equipments. The intervention was implemented to nurses in small groups (not more than 5 nurses).

Phase Three

The post interventional phase a post the implementation of the education program, the same questionnaire was administered to reassess the nurse's knowledge regarding infection control. It was made mandatory that all the fields should be filled. Each of the fields was given a score 0=poor 1= fair, 2= good. The knowledge score according to WHO category of knowledge 75% as good 50-75 as fair less than 50% as poor all the subjects in the study were graded based on scores as, good, fair and poor. The practice performance reassesses using similar checklist.

Data Management and Analysis:

Data was collected by researcher herself, coded manually and tabulated before analysis. The collected data as pretest and post test organized, categorized, tabulated using numbers and percentage, Chi-square (x^2) test used. The statistical package for social sciences (SPSS version 20) used for statistical analysis.

Ethical Considerations:

They were considered before study phases as the following:

Approval from the National Al Ribat University Graduate College was taken.
Permission was taken from hospital health authority and verbal from participant.

The study participants were informed about the research and their rights to withdraw is considered and their information was treated confidentially.

RESULTS

Comparison of knowledge of the study sample regarding the definition of sterilization

Answers of the nurses question about their knowledge regarding sterilization at ICU care: 36.1% of the nurses gave correct answer about the definition of sterilization before attendance of the program, while, correct answer was mentioned by 95.1% of them after attendance, the nurses who correctly answered the method of sterilization were 14.8% before the program compared to 93.4% of them after the program. The mean value of nurses answers regarding the definition of sterilization was (0.69±0.47) at pretest measurement, which increased at posttest measurement to (0.89±0.32), T value was (-2.7), indicating significant differences (P=0.005 < 0.05) in their knowledge between pretest and posttest period (Table 1).

Table 1. Comparison of knowledge of the study sample regarding the definition of sterilization

Variables	Pre		Post		SE	CI 95%		t	Df	P
	Mean	SD	Mean	SD		Lower	Upper			
Definition of sterilization	0.69	0.47	0.89	0.32	0.07	-0.34	-0.05	-2.7	60	0.005
The method of sterilization	0.57	0.50	0.93	0.25	0.07	-0.50	-0.22	-5.1	60	0.002

Comparison of knowledge of the study sample regarding the definition of disinfectant

Answers of the nurses question about their knowledge regarding disinfectant at ICU care: 29.5% of the nurses gave correct answer about the definition of disinfectant before attendance of the program, while, correct answer was mentioned by 78.7% of them after attendance, the nurses who correctly answered that some microorganisms may live in disinfectants were 8.2% before the program compared to 93.4% of them after the program, the nurses who correctly answered that baby breastfeeding may serve as disinfectants were 13.1% before the program compared to 95.1% of them after the program. The mean value of nurses answers regarding their definition of disinfectant was (0.51±0.50) at pretest measurement, which increased at posttest measurement to (0.97±0.18), T value was (-6.7), indicating significant differences (P=0.001 < 0.05) in their knowledge between pretest and posttest period (Table 2)

Table 2. Comparison of knowledge of the study sample regarding the definition of disinfectant

Variables	Pre		Post		SE	CI 95%		t	Df	P
	Mean	SD	Mean	SD		Lower	Upper			
Definition of disinfection	0.51	0.50	0.97	0.18	0.07	-0.59	-0.32	-6.7	60	0.001
Some microorganism live in disinfectant fluid	0.64	0.48	0.95	0.22	0.07	-0.45	-0.18	-4.6	60	0.002
Baby breastfeeding as disinfectant	0.54	0.50	0.85	0.36	0.08	-0.47	-0.16	-3.9	60	0.001

Comparison of knowledge of the study sample regarding standard precaution, use of PPE

Answers of the nurses question about their knowledge regarding standard precaution, use of PPE at NICU care: 14.8% of the nurses gave correct answer about the investigation that will be done when detecting infection before attendance of the program, while, correct answer was mentioned by 91.8% of them after attendance, the nurses who correctly answered the when the incubator to be sterilized were 16.4% before the program compared to 85.2% of them after the program, the nurses who correctly answered the statements about the standard precaution, use of PPE at NICU care were lower percentages before the program compared to the higher percentages of their answers after the program. The mean value of nurses answers regarding their first statement was (0.64±0.48) at pretest measurement, which increased at posttest measurement to (0.87±0.34), T value was (-3.0), indicating significant differences (P=0.003 < 0.05) in their knowledge between pretest and posttest period (Table 3.3).

Comparison of practices of the study sample infection control according to their practices regarding incubators care (hand washing)

The mean value of nurses correct practices scores regarding the first procedure was (0.26±0.44) at pretest measurement, which increased at posttest measurement to (0.97±0.18), *t* value was (-11.51), indicating significant differences (P=0.005 < 0.05) in their practices between pretest and posttest period (Table 4).

Table 3. Comparison of knowledge of the study sample regarding standard precaution, use of PPE

Variables	Pre Mean	SD	Post Mean	SD	SE	CI 95% Lower	Upper	t	Df	P
Investigation that will be done when detect infection	0.64	0.48	0.87	0.34	0.08	-0.38	-0.08	-3.0	60	0.003
when incubator should be sterilized	0.67	0.47	0.92	0.28	0.07	-0.38	-0.11	-3.5	60	0.008
when incubator should be disinfected	0.67	0.47	0.98	0.13	0.06	-0.44	-0.19	-5.0	60	0.001
The space between incubators in NICU	0.59	0.50	0.98	0.13	0.07	-0.52	-0.26	-6.0	60	0.006
Umblical cord care for newborn baby is important	0.84	0.37	0.97	0.18	0.05	-0.24	-0.03	-2.5	60	0.003
Eye care for newborn is important	0.75	0.43	0.98	0.13	0.06	-0.34	-0.11	-4.0	60	0.001
prephral IV cannula should be replace	0.36	0.48	0.98	0.13	0.06	-0.75	-0.50	-9.7	60	0.002
disposable of the west product should be replaced	0.25	0.43	0.89	0.32	0.07	-0.78	-0.50	-9.2	60	0.001
After replace the baby diaper advice the mother about	0.67	0.47	0.98	0.13	0.08	-0.44	-0.19	-5.0	60	0.003

Table 4. Comparison of practices of the study sample infection control according to their practices regarding incubators care (hand washing) N = 61

Variables	Pre Mean	SD	Post Mean	SD	SE	CI 95% Lower	Upper	t	Df	P
1_ wash hand before any procedure	0.26	0.44	0.97	0.18	0.06	-0.83	-0.58	-11.51	60	0.005
.2.Wash hand after procedure	0.25	0.43	0.93	0.25	0.06	-0.82	-0.56	-10.74	60	0.006
3.Use aseptic technique during vein puncture and taking sample-	0.16	0.37	0.92	0.28	0.06	-0.87	-0.64	-12.68	60	0.005

Table 5. Comparison of the statistical significance of the study sample according to their practices regarding incubators care (equipment) N = 61

Variables	Pre		Post		SE	CI 95%		t	Df	P
	Mean	SD	Mean	SD		Lower	Upper			
1.Wearing gloves when suctioning neonate	0.21	0.41	0.95	0.22	0.06	-0.86	-0.62	-12.34	60	0.001
2.Wear gloves when replaced diaper	0.26	0.44	0.97	0.18	0.06	-0.83	-0.58	-11.51	60	0.005
3.Use Protective equipment when handling newborn baby	0.20	0.40	0.95	0.22	0.06	-0.87	-0.64	-12.91	60	0.002
4.Using correct technique in sterilization after finish procedure	0.20	0.40	0.92	0.28	0.06	-0.84	-0.60	-11.57	60	0.001
5.Adequate spacing between cote and incubator	0.15	0.36	0.95	0.22	0.05	-0.91	-0.70	-14.98	60	0.002
6.Use special equipment for each infant	0.16	0.37	0.92	0.28	0.06	-0.87	-0.64	-12.68	60	0.005
7.Proper disposable of sharp instruments	0.39	0.49	0.97	0.18	0.07	-0.71	-0.44	-8.55	60	0.003
8.Disinfected oxygen mask	0.38	0.49	0.93	0.25	0.07	-0.70	-0.42	-7.93	60	0.009

Comparison of the statistical significance of the study sample according to their practices regarding incubators care (equipment)

The mean value of nurses correct practices scores regarding the first procedure was (0.21±0.41) at pretest measurement, which increased at posttest measurement to (0.95±0.22), *t* value was (-12.34), indicating significant differences (P=0.001 < 0.05) in their practices between pretest and posttest period (Table 5).

Comparison of the study sample according to their practices regarding infection control   (sharp tools)

The mean value of nurses correct practices scores regarding replaced disposable west product was (0.41±0.50) at pretest measurement, which increased at posttest measurement to (0.93±0.25), *t* value was (-7.38), indicating significant differences (P=0.002< 0.05) in their practices between pretest and posttest period (Table 6).

Comparison of the study sample according to their practices regarding infection control (daily routine practice)

The mean value of nurses correct practices scores regarding health education of mother about infection control was (0.36±0.48) at pretest measurement, which increased at posttest measurement to (0.97±0.18), *t* value was (-8.68), indicating significant differences (P=0.002< 0.05) in their practices between pretest and posttest period (Table 7).

Table 6. Comparison of the study sample according to their practices regarding infection control   (sharp tools) N = 61

Variables	Pre		Post		SE	CI 95%		t	Df	P
	Mean	SD	Mean	SD		Lower	Upper			
1.Recapped needle after use	0.26	0.44	0.97	0.18	0.06	-0.83	-0.58	-11.51	60	0.005
2.Proper handling of sharp needle	0.36	0.48	0.87	0.34	0.08	-0.66	-0.36	-6.71	60	0.003
3.Replaced disposable west product every 8 hour	0.41	0.50	0.93	0.25	0.07	-0.67	-0.38	-7.38	60	0.002
4.Proper disposable of sharp instruments	0.39	0.49	0.97	0.18	0.07	-0.71	-0.44	-8.55	60	0.003

Table (7. Comparison of the study sample according to their practices regarding infection control (daily routine practice) N = 61

Variables	Pre Mean	SD	Post Mean	SD	SE	CI 95% Lower	Upper	t	Df	P
1.Health education of mother about infection control	0.36	0.48	0.95	0.22	0.07	-0.72	-0.46	-8.68	60	0.002
2.Doing eye care	0.43	0.50	0.97	0.18	0.07	-0.68	-0.41	-7.97	60	0.003
3.Doing umbilical care	0.62	0.49	0.95	0.22	0.07	-0.46	-0.19	-4.79	60	0.004
4.Enough clean linen available	0.56	0.50	0.95	0.22	0.07	-0.53	-0.25	-5.63	60	0.007
5.Restricted visitor	0.54	0.50	0.95	0.22	0.07	-0.55	-0.27	-5.84	60	0.008

DISCUSSION

Routine Practices are based on the premise that all patients are potentially infectious, even when asymptomatic, and that the same safe standards of practice should be used routinely with all patients to prevent exposure to blood, body fluids, secretions, excretions, mucous membranes, non-intact skin or soiled items and to prevent the spread of microorganisms. Routine Practices refer to the infection prevention and control practices that are to be used with all patients during all care, to prevent and control transmission of microorganisms in all health care settings. A study conducted at two pediatric hospitals in Khartoum state to evaluate the effect of an educational program regarding infection control for nurses.

General knowledge regarding sterilization at NICU, the program increased knowledge of the study sample (nurses), where the mean value of nurses answers regarding the definition of sterilization was (0.69±0.47) at pretest measurement, which increased at posttest measurement to (0.89±0.32), indicating significant

differences (P=0.005) in their knowledge between pretest and posttest period. This was compared with the findings of previous studies, showed that there is scope for improvement in knowledge and attitude after educational program was offered to the nursing staff sterilization in NICU care (P<0.001) Dawn,1997. Other study done in Mysore University, Mysore - 570 006, Karnataka, India proved that early education program on nosocomial infections and its prevention will help in the retention of knowledge, attitudes and practices among the various categories of HCWs.

In this study, it is clear from the findings that knowledge of the nurses was significantly improved after attendance of the program, where the mean value of nurses answers regarding their definition of disinfectant was (0.51±0.50) at pretest measurement, which increased at posttest measurement to (0.97±0.18), t value was (-6.7), indicating significant differences (P =0.001) in their knowledge between pretest and posttest period. This is similar to a study conducted on Hacettepe University Ihsan Dogramaci Children Hospital, Infection Control Unit showed that improvement of nurses in their knowledge regarding disinfectant was significantly high (p=0.001), Yildirim et al., 2008.

Concerning the knowledge of the nurses regarding the standard precaution, use of PPE at NICU care, it was found to be clearly increased after attendance of the program, where the mean value of nurses answers regarding their first statement was (0.64±0.48) at pretest measurement, which increased at posttest measurement to (0.87±0.34), t value was (-3.0), indicating significant differences (P=0.003) in their knowledge between pretest and posttest period. This is similar to previous study USA showed that pre intervention central line-associated bloodstream infection rate was significantly higher than the median rate of 3.5 infections per 1000 catheter-days for multidisciplinary PICUs reporting to the National Healthcare Safety Network, Bennett and Brown, 1999.

In this study, correct practices of the nurses was significantly improved due to application of the program, where the mean value of nurses correct practices scores regarding the first procedure was (0.26±0.44) at pretest measurement, which increased at posttest measurement to (0.97±0.18), t value was (-11.51), indicating significant differences (P=0.005) in their practices between pretest and posttest period. This similar to previous studies showed that Nurses and other staff when compared with physicians had more positive attitudes (P < .001). toward guidelines in general but not toward the specific Hand Hygiene Guideline.

Those with more positive attitudes were significantly more likely to report that they had implemented recommendations of the Guideline (P < .001) and used an alcohol product for hand hygiene (P = .002). This study concluded the majority of staff members were familiar with the Centers for Disease Control and toward practice guidelines varied by type of ICU and by prevention Hand Hygiene Guideline. Staff attitudes profession, and more positive attitudes were associated with significantly better self-reported guideline implementation. Because differences in staff attitudes might hinder or facilitate their acceptance and adoption of evidence-based practice guidelines, these results may have important implications for the education and/or socialization of ICU Staff Quiros et al., 2007. Another study across Australia and New Zealand, found an enormous level of variation among and between nurses' reported practices and local policies. This variation extended across all aspects of hand washing practices - duration and extent of hand wash, type of solution and drying method used before and after training program, Morritt et al., 2006.

CONCLUSIONS

There was significant statistical improvement in knowledge and practical skills after the educational program was offered to the nursing staff. Also the researcher concluded that the importance of education regarding infection control held in neonatal intensive care unit enhance the nurses knowledge. There was a statistically significant difference between pre and post test after the application of the educational program in all aspects. In addition, there was a scope of improvement in the performance of practical skills of nurses post application of the program among all participants. Hospitals administrators should strive to create organizational atmosphere in which adherence to recommended all infection control practice is considered an integral part of providing high-quality care in NICU in order to decrease the mortality and morbidity of neonate that was increased in last few years, In Order to reach a successful goal, hospitals must provide visible support and sufficient resources for continuous educational programs to grant the importance of basic infection-control measures in reducing pediatric morbidity and mortality and improving the quality of care.

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