Impact of an Educational Program on Improving Nurses Knowledge and Practice Concerning Caring for Neonates with Respiratory Distress Syndrome

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Abstract

Respiratory distress syndrome in neonates reported with 60% -70% mortality rates. Aim of the study was to develop, apply and evaluate an educational program for nurses to improve their knowledge and practice about care of neonates with respiratory distress syndrome. Study design a quasi- experimental study design was used to conduct this study. Subjects and methods: the study was carried out in the neonatal intensive care unit at Assuit police hospital. Sample composed of 50nurses. Two tools were used to collect necessary data .1. A structured interview questionnaire was used to assess nurses' knowledge regarding respiratory distress syndrome. 2. An observational checklist to assess nurses' practice regarding their care provided for neonates. Results: This study revealed that mean knowledge and practice score were much higher in the post program implementation 9.58 ± 1.43 , 293.64 ± 7.51 respectively compared to preprogram 6 ± 1.88 , 166.1 ± 29.22 respectively. At follow up phase the mean knowledge and practice. These scores were much higher in the post program implementation improvement was revealed in total knowledge and practice. These scores were much higher in the post program implementation: Educational program is needed for updating nurses' knowledge and improving their practice.

Keyword: Educational Program, Nurses Knowledge And Practice & Neonatal Respiratory Distress Syndrome (NRDS)

Introduction

Respiratory distress syndrome appears immediately after birth or within 4 hours. It is characterized by tachypnea (>60 breaths/min), intercostal and subcostal retractions, nasal flaring, grunting, and cyanosis in room air. Tachypnea is due to an attempt to increase minute ventilation to compensate for a decreased tidal volume and increased dead space. Retractions occur as the infant is forced to generate a high intrathoracic pressure to expand the poorly compliant lungs. Grunting results from the partial closure of the glottis during forced expiration Other clinical features may include hypotension, acidosis and hyperkalemia (**Aversa, et al., 2016**).

Neonatal respiratory distress syndrome affects about 1% of newborn infants and is the leading cause of death in preterm infants. The incidence decreases with advancing gestational age, from about 50% in babies born at 26–28 weeks, to about 25% at 30–31 weeks. Newborn respiratory distress occurs in about 7% of deliveries. (Schraufnagel, 2010)

The most common causes of respiratory distress in newborns are transient tachypnea of the newborn, respiratory distress syndrome, meconium aspiration syndrome, pneumonia, sepsis, pneumothorax, and delayed transition. Rare causes include choanal atresia; diaphragmatic hernia; trachea-esophageal fistula, congenital heart disease, neurologic, metabolic, and hematologic disorders (Edward, et al., 2013).

Acute complications include air leaks and intracranial hemorrhage. Long-term complications: respiratory distress syndrome has been associated with an increased incidence of chronic lung disease, and neurologic impairment (**poggi & Dani, 2014**).

Treatment of neonatal respiratory distress should be both generalized and disease-specific, and follow resuscitation protocols. updated neonatal Oxygenation can be maintained by delivering oxygen via bag/mask, nasal cannula, oxygen hood, nasal continuous positive airway pressure, or ventilator support. Resuscitation with 100% oxygen may increase neonatal mortality compared with ambient air. Blended oxygen, with the fraction of inspired oxygen ranging from 21% to 50% oxygen, stabilizes premature newborns, and pulse oximetry monitors are used to maintain saturations around 90%. (Wong, 2015)

Adequate fluid and electrolyte balance should be maintained. Oral feedings are withheld if the respiratory rate exceeds 60 respirations per minute to prevent aspiration. A neutral thermal environment reduces the newborn's energy requirements and oxygen consumption. If the illness exceeds the clinician's expertise and comfort level or the diagnosis is unclear in a critically ill newborn, neonatologist should be consulted (**Huybrechts, et al., 2015**).

Nurses play an important role in caring for neonates with respiratory distress syndrome including physical examination, count respiratory rate and watch for grunting, assess the severity of respiratory distress syndrome. The nurse carefully assess the infant's respiratory status to determine the degree of respiratory distress, assess the infant's cardiac rate & rhythm; count the apical pulse for one minute, note if irregularities in the rate or bounding pulses, also observing the infant's general activity and promoting adequate gas exchange, additionally the nurse should prepare emergency equipments available for use in the event of cardiac or respiratory arrest (**Kliegman**, et al., 2011).

Nurses also have a key role in the care of neonate with respiratory distress syndrome to decrease mortality and morbidity. neonatal Nursing management for neonates with respiratory distress syndrome through assist in newborn's endotracial intubation, maintain mechanical ventilation as indicated, measure oxygen concentration, continuous monitoring of the SaO2, observe the infant's response to oxygen. Suctioning as needed because the gag reflex is weak and cough is ineffective. Moreover, promoting adequate nutrition and hydration is important (Osadnik,et al, 2017).

Significance of the study

Respiratory distress syndrome in neonates reported with 60% -70% mortality rates, this condition makes infant difficult to breathe. (**Luis, et al, 2012**). So that, this study would be done to assess nurses' knowledge ,practice and design , implement and evaluate an educational program regarding care of neonates with respiratory distress syndrome in the neonatal intensive care unit (NICU) at Assuit police hospital.

Aim of the study

The aim of this study was to:

- Assess nurses' knowledge and practice regarding their care provided for neonates with respiratory distress syndrome in the neonatal intensive care unit of Assiut police hospital.
- Develop, apply and evaluate an educational program for nurses based on their needs to improve their knowledge and practice about

care of neonates with respiratory distress syndrome.

Research hypothesis

Nurses' knowledge and practice concerning care of neonates with respiratory distress syndrome will be improved after applying the educational program.

2.Subjects & Method

Research design

A quasi-experimental research design was used in this study.

Setting

The study was conducted at the neonatal intensive care unit in Assuit police hospital, Egypt.

C-Sampling

All nurses working at the neonatal intensive care unit in Assiut police hospital were included in the study. Total number was (50) nurses regardless of their age, years of experience or qualification. They divided into baccalaureate (17) diploma of nursing (23) and technical of nursing (10).

3- Tools of the study

Two tools were designed to collect the necessary data as follow

Tool I: Structured interview questionnaire sheet.

This tool was developed by the researcher based on relevant literature and it consisted of two parts:

Part one: Socio-demographic characteristics of studied participants

It included socio-demographic characteristics of the studied participants as (age, sex, marital status, level of education, occupation, years of experiences, and attending training courses about care of neonates with respiratory distress syndrome.

Part two: Knowledge of studied participants regarding respiratory distress syndrome. Nurses knowledge about care given to the neonates with respiratory distress syndrome at the neonatal intensive care unit in Assiut police hospital. This part includes 7 questions about definition of neonatal respiratory distress syndrome, causes, risk factors, signs and symptoms, treatment and nursing care plan for neonatal respiratory distress syndrome.

Scoring system of nurses' knowledge was developed by the researcher. The total grade of knowledge equal 14 grades, each correct answer took 2 grades, incorrect answer took zero (Bowden & Greenberg, 2012). The total knowledge score was classified as:

Satisfactory: 60% and more

Unsatisfactory <60% Tool II: Observation check list

Observational checklist which was developed by the researcher after revised extensive literature to assess the practice of studied participants through direct observation. They included the following procedures: hand washing (12) steps, , taking vital signs, taking an axillary temperature(14) steps, taking an apical pulse(10) steps, taking respiratory rate(9) steps, suctioning(21) steps, mouth care (6) steps, positioning (7) steps, oxygen therapy (10) steps, intravenous therapy (34) steps, naso gastric tube feeding (24) steps, oral feeding (21) steps. Two grades were given for the item which done correctly, one for done incorrectly and zero for not doing, so total grades of practices were (336) for (168) observational steps.

Scoring system of nurses' practice was developed by the researcher. The total grade of practice equal 366 grades. Each step done correctly scored 2, done incorrectly scored 1 grade and not done scored zero grade. (Ball, et al., 2012)

The total score was classified as

Competent 60% and more

Incompetent less than 60% Methods

Methods

An official letter was obtained from the dean of the faculty of nursing, Assiut university to directorate of Assuit police hospital for approval to collect data and apply for a particular educational program, after an explanation of the aim of the study.

Ethical consideration

- 1. The research was approved from the dean of the faculty of nursing.
- 2. There was no risk for studied participants during application of the research.
- 3. Witten consents were obtained from the studied participants that were willing to participate in the study, after explaining the nature and aim of the study.
- 4. The studied participants were assured that the data of this research was used only for the research purpose.
- 5. Confidentiality and anonymity assured.

Pilot study

A pilot study was carried out on (10%) of studied participants to assess tools clarity, applicability and to estimate the time needed to fulfill each sheet. **Validity**

The validity of the study tool was assessed to check the revalence, coverage, and clarity of questions by a jury panel of professors from five experts in nursing and medicine to ascertain their content validity. The validity was 95%.

Reliability

Reliability analysis was done for each tool; Tool I (**0**. **789**) and tool II (**0.810**) by using Cronbach s' Alpha test.

The program development

On the basis of the results of pilot study, the program was designed and prepared by the researcher after reviewing of related literature.

Field work

- The field work was carried out through a period of 8 months starting from March 2016 to October 2016, with approximately 280 hours divided in 80 hours theoretical and 200 hours practical, nurses were divided into 10 small groups each group has 1-5 nurses.
- Before the application of the program, the researcher introduced herself to participants in order to establish the necessary rapport and gain their attention and interest, and to explain the purpose of the program, its objectives and benefits.
- A pretest was conducted to the nurses at the neonatal intensive care unit in Assuit police hospital for their knowledge using tool I. Each nurse was observed separately to complete the observational checklist using tool II.

Implementation of the program

The actual work started by meeting the nurses throughout the morning shift, the researcher first introduced herself to nurses and gave them a complete background about the study and its aim, then the pretest format, pre- designed by the researchers in Arabic language, was distributed in order to collect the required data.

An educational program about care of neonate with respiratory distress syndrome was implemented for nurses in the form of scheduled session as well as on the teaching during their official working hours. There was a total of 10 sessions. These were repeated ten times to each subgroup of 1-5 nurses. The duration of each session was variable, and ranged between 60 and 90 minutes, including 15 minutes for discussion and feedback, and 15 minutes for break. Each subgroup was given the freedom to choose their optimal time for receiving the program whenever they have minimal workload. Each participant obtained a copy of the program booklet that included all training material and procedures such as hand washing, vital signs, oxygen therapy, suctioning, nasogastric tube feeding and intravenous therapy. Each session usually started by a summary of what has been taught during the preceding sessions, and the objectives of the new one. Reinforcement techniques, such as giving praise to the interested nurses, were used for motivation during program implementation.

Evaluation of the program

The researcher used a questionnaire and observational check lists to evaluate the outcomes of the program which used to evaluate knowledge and practice respectively through pre and posttests immediately after implementation of the program and after three months as follow up test for each studied participant.

Difficulties of the study

- It was difficult to recruit all nurses at the same time to attend the program sessions. So, nurses were divided into subgroups that could attend the program by choosing the time of least workloads. In cases of missing a subject by a nurse, the researcher resorted to repeating what had been missed to that nurse separately prior to the following session.
- Increased number of admission to the unit with decrease number of nurses so a lot of time was lost at the neonatal intensive care unit without training any nurse.

Administration Design

Meeting with nursing supervisors and physicians of the neonatal intensive care unit to explain the objectives and contents of the program and the methods for applying the program helped to gain their cooperation and to allow the release of nurses to attend the program during minimal workload activities.

Complete confidentiality of any obtained information was ensured.

Statistical analysis

The data were tested for normality using the Anderson-Darling test and for homogeneity variances prior to further statistical analysis. Categorical variables were described by **number and percent** (N, %), where continuous variables described by mean and standard deviation (**Mean**, **SD**). **Chi-square test** and fisher exact test used to compare between categorical variables where compare between continuous variables by **t-test** \and **ANOVA TEST. A two-tailed p** < **0.05** was considered statistically significant. We are Used person Correlation to Appear the Association between scores .All analyses were performed with the **IBM SPSS 20.0** software.

Results

Table (1): Socio demographic characteristics of the studied nurses (n=50).

Variable	(n=50)	%
Age in years		
20 -	29	58.0
30 -	18	36.0
≥40	3	6.0
Mean±SD(range)	29.2±6.2(210-43)	
Gender		
Male	9	18.0
Female	41	82.0
Educational Level		
Bachelor of Nursing	17	34.0
Nursing Health and Nursing institute	11	22.0
Nursing Diploma	22	44.0
Years of experience:		
<5	17	34.0
5 < 10	11	22.0
≥10	22	44.0
Mean±SD(range)	10.3±6.9(1-23)	
Attending training courses:		
Yes	15	30.0
No	35	70.0

Variable	Pre		Post		Follow up		D voluo
	No	%	No	%	No	%	P. value
Definition of neonatal respiratory distress syndrome	44	88.0	50	100.0	47	94.0	0.041*
Causes of neonatal respiratory distress syndrome	26	52.0	49	98.0	37	74.0	<0.001**
Signs and symptoms of neonatal respiratory distress syndrome	19	38.0	34	68.0	31	62.0	0.006**
Complication of neonatal respiratory distress syndrome	27	54.0	39	78.0	32	64.0	0.040*
Treatment of neonatal respiratory distress syndrome	37	74.0	48	96.0	40	80.0	0.010*
Nursing care of neonate with respiratory distress syndrome	9	18.0	25	50.0	23	46.0	0.002**

Table (2): Nurses' correct knowledge about neonatal respiratory distress syndrome through the program phases (pre, post and follow up (n=50)

- Chi-square test, * Significant difference at p. value<0.05, **Significant difference at p. value<0.01



Figure (1) knowledge level about neonatal respiratory distress syndrome during program phases pre-post and follow up.



Figure (2) Total nurses' Practice about neonatal respiratory distress syndrome throughout intervention program phases (pre, post and follow-up)

Table (3): Comparison between mean score of nurses' practice about care of neonates with respiratory	
distress syndrome throughout intervention program phases (pre, post and follow-up).	

Variable	Pre	Post	Follow up	P. value
Hand washing	15.26±2.83	21.28±1.5	17.14±2.26	< 0.001**
Vital signs	31.86±5.88	59±2.21	50.58 ± 4.15	< 0.001**
Suctioning	19.46±4.34	35.16±2.1	30.78±1.52	< 0.001**
Mouth care	5.96±1.56	11.3±0.95	9.88 ± 0.98	< 0.001**
Positioning/ Semi-setting position	5.68 ± 1.48	12.72±1.23	10.56±1.25	< 0.001**
Oxygen therapy	8.46±2.64	16.74±1.7	13.72±1.63	< 0.001**
Intravenous Therapy	34.12±4.42	59.68±2.61	51.36±1.37	< 0.001**
Nasogastric tube feeding	24.18±5.8	40.98±2.02	34.72±2.19	< 0.001**
Oral Feeding	21.12±5.5	36.78±2.15	32.3±3.3	< 0.0 01**
Total Practice score	166.1±29.22	293.64±7.51	251.04±10.36	<0.001**

- ANOVA TEST, ** Significant difference at p. value<0.01

 Table (4): Relation between mean scores of nurses' knowledge and practices throughout intervention program phases.

Group	Knowledge Mean ± SD	Practice score Mean ± SD	T-test	P. value
Pre	6±1.88	166.1±29.22	-0.183	0.203
Post	9.58±1.43	293.64±7.51	0.103	0.475
Follow up	8.1±1.95	251.04±10.36	0.295	0.038*

* Statistically significant relation at p. value<0.05

* Statistically significant relation at p. value<0.05

In relations to socio-demographic characteristics **Table (1)**: Clarified that more than half (58.0%) their ages ranged from 20 years to less than 30 years and only (6%) of them were 40 years and more . According to their gender. It was found that the majority 82% of them were female regarding the educational level it was reported that about (44%) of them had diploma and 34% of them had bachelor degree. This table also illustrated that 44% of the studied nurses their years of experiences were more than 10 years. Regarding their attendance for training program. It was observed that 70% of nurses had not attended any training program.

Table (2): Clarified that most of the studied nurses (88.0%) had satisfactory knowledge about definition of neonatal respiratory distress syndrome ,while in relation to when did suction catheter should be changed, causes and complication of neonatal respiratory distress syndrome , it was found that 50.0% , 52.0% and 54.0% of them had unsatisfactory knowledge respectively, this table also illustrated that 74.0% of the studied nurses had unsatisfactory knowledge regarding treatment of neonatal respiratory distress syndrome while only 18.0% of the studied nurses had unsatisfactory knowledge regarding to nursing care of neonates with respiratory distress syndrome and this percentage increased to become 50.0% after the educational program slightly

decline to 46% during follow up phase. 46% of the studied nurses had unsatisfactory knowledge regarding signs, symptoms and regarding suitable position should during suctioning and increased to be 100%,64% after the educational program respectively.(figure1)

Table (3): Presented comparison between mean score of nurses' practice regarding care of neonatal respiratory distress throughout intervention program phases pre-post and follow up. It indicates an increase in the practice scores post program phase. However, this increase reached statistical significance for nurses basic practice about (hand washing, vital signs , suctioning mouth care positioning – oxygen therapy, intravenous therapy , nasogastric tube feeding (p<0.01) practice scores demonstrated some declines after three months at follow up testing . Never less the scores were still higher than the preprogram baseline scores

Table (4): Demonstrated the relation between total scores of nurses' knowledge and practices throughout intervention program phases. Relation was found between total score of nurses knowledge and practice post program and follow up. The mean knowledge and practice score were much higher in the post program implementation 9.58 ± 1.43 , 293.64 ± 7.51 respectively compared to preprogram 6 ± 1.88 , 166.1 ± 29.22 respectively. At follow up phase the

mean knowledge and practice score were slightly decreased to 8.1 ± 1.95 , 251.04 ± 10.36 respectively the result was statistically significant P<0.01 for both total practice scores and total knowledge score.

Figure (2): As regards the nurses' practice for their actual care to neonates with respiratory distress syndrome figure2 reported that only 14% of the studied nurses had competent level of practice and 86% had incompetent practice pre the educational program. After the educational program the competence level of practice for studied nurses reached to 100% and this competence practice decrease slightly to reach 96% during follow up phase of the educational program.

Discussion

Respiratory distress syndrome is one of the most common reason for admission to the neonatal intensive care unit. 15% of term infants and 29% of late preterm infants admitted to the neonatal intensive care unit because of significant respiratory morbidity. (Edwards, et al., 2013). The course of illness with RDS depends on the size and gestational age of the baby, the severity of the disease, the presence of infection; whether or not the baby needs mechanical help to breathe. RDS typically worsens over the first 48 to 72 hours (Dorothy, et al., 2010). So that, the current study aimed to assess nurses' knowledge, practice and develop, apply and evaluate an educational program regarding their care provided for neonates with respiratory distress syndrome in the neonatal intensive care unit of Assuit police hospital.

As regards the sociodemographic characteristics of the studied participants. The results of the present study revealed that more than half of nurses their ages ranged from 20 years to less than 30 years and nearly half of them had diploma nursing education these findings in an agreement with (Elsayed, et al., 2013) who assessed nursing care provided for neonates with respiratory distress syndrome in the neonatal intensive care units at Makkah Al-Mukarramah in Saudi Arabia stated that more than half of nurses their ages ranged from 20 years to less than 30 years .While this result disagree with (AbdAlrhman, 2015) who assessed nurses knowledge and practice regarding infection control in operating room at main Assuit university and (Khalifa, 2011) who stated that more than half of nurses were less than twenty five years old. Regarding the attendance of nurses for training programs the present study revealed that the majority of nurses weren't attending any training program about care of neonates with respiratory distress syndrome this might be attributed to that there isn't enough time to attend educational program, another possible explanation the hospital didn't establish training program regarding neonatal

distress syndrome these respiratory finding contradicted with (Aita & Goulet .2009) who assessed assessment of neonatal nurses' behaviors that prevent overstimulation in preterm infants who stated that nurses should be exposed to training programs to raise their awareness and the training programs should be regularly updated in view of changing knowledge and work practice. While these findings were agreed with (Abd Raboo, et al., 2013) and (Mohamed, 2016) who assessed Assessment of nurses knowledge and practices about suctioning in the neonatal intensive care unit Assuit university hospital who stated that the majority of the studied nurses hadn't attend any training courses. As regard years of experience it was noticed that the majority of nurses had experience of ten years and more these results agreed with (Mahmoud & Hani (2017) who found that the majority of the nurses had ten or more years of experience.

According to the present study findings before the educational program, nurses had unsatisfactory knowledge about neonatal respiratory distress syndrome this was indicated by their low scores, these findings were similar with the study findings of (Elsayed, et al., 2013) who assessed nurses' knowledge about care given to neonates with respiratory distress syndrome in Makkah Almokarramah in Saudi Arabia. This unsatisfactory baseline knowledge noticed among nurses might be attributed to that after graduation nurses stop reading and neglect updating their professional knowledge, another possible reason might be the absence of any resources or programs for continued nursing education that are essential to upgrade and improve nurses knowledge during their care for neonates with respiratory distress syndrome. The total knowledge level become satisfactory after application of the educational program. During follow up test after three months have shown. Some declines but they were still higher.

Regarding to comparison between mean score of nurses' practice regarding care of neonatal respiratory distress throughout intervention program phases prepost and follow up .Nurses practice throughout intervention program phases pre- post and follow up .It was found that level of practice was incompetent at all practices except hand washing pre intervention program and became competent after intervention program and follow up. These findings are in the same line with (**Parajulee, 2011**) who assessed the nurses knowledge and performance about care given to newborn in the NICU and concluded that there was lack in nurses practice for care given to newborn in NICU.

Concerning the total score level of nurses' practice about their actual care provided for neonates with RDS in the NICU. The present study findings points to high percentage of nurses with incompetent practice level before implementation of the program, thus the majority of nurses had incorrect actions related to the principles of infection control such as hand washing and wear gloves this might be attributed to lack of nurses knowledge about infection control precautions. These findings were agreed with the study findings of (parajulee, 2011) who assessed the nurses knowledge and practice about care given to newborn in NICU and concluded that there was lack in nurses practice for care given to newborn in NICU. And mismatched with that (Elbokharv et al., 2015) who found in their research in Khartoum teaching hospital ICU that more than two thirds of nurses had fair practice level about endotracheal suctioning.

Regarding to relation between nurses knowledge and practice throughout program phases. There is statistically significant improvement in total knowledge and practice, mean knowledge and practice score were much higher in the post program implementation at the follow up the mean knowledge and practice score were slightly decreased, this unsatisfactory baseline knowledge noticed among nurses might be attributed to that after the educational program nurses abandon reading and neglect updating their professional knowledge another possible reason might be the absence of any resources or programs for continued nursing education that are essential to improve nurses knowledge during their care for neonates with respiratory distress syndrome .The result was statistically significant at P value P<0.05 for total practice scores and total knowledge scores.

Conclusion

The current study concluded that: Statistically significant improvement was revealed in total knowledge and practice. The mean knowledge and practice scores were much higher in the post program implementation compared to pre- program and slightly decline in the follow up phase

Recommendations

Based on the findings of the current study the researchers recommended the followings:

- Nurses working in the NICUs need periodical training program to improve their knowledge and performance about care of neonates with RDS.
- Standardized nursing procedures and guidelines should be available to guide the nurses in dealing with high risk neonates in the NICUs.
- Providing updating booklets, pamphlets and boosters for nurses to upgrade their knowledge about neonatal RDS.

Further studies should be conducted to improve nurses' knowledge and performance regarding care of neonates with RDS in the NICUs in Assiut police hospital.

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