ASSESSMENT OF NURSES' PERFORMANCE REGARDING CARE OF NEONATES UNDERGOING CONTINUOUS POSITIVE AIRWAY PRESSURE

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Abstract

Background: Neonatal nurse has a critical role in caring for neonates undergoing Continuous Positive Airway Pressure such as, monitor neonates receiving continuous positive airway pressure by performing continuous assessment of the neonate clinical state and response to therapeutic measures, thus minimizing CPAP failure and complications.

Aim of the study: This study aimed to assess nurses' performance regarding care of neonates undergoing continuous positive airway pressure.

Design: A descriptive design was utilize for conducting this study. **Subject:** A purposive sample (60) nurses' working at Neonatal Intensive Care Unit affiliated to Health Insurance Organizations (Cairo branch Masr Children Hospital).

Tools: Two tools used an interviewing questionnaire sheet, Neonates' assessment sheet and Observational checklists.

Results: The study finding revealed that the more than two third of studied nurses' had unsatisfactory level of knowledge while, two third of nurses' had competent practice level. **Conclusion:** Based on finding of the current study, it can be concluded that the more than two third of the studied nurses' had unsatisfactory level of knowledge while as regard practices two third of them had competent level about care of neonates' undergoing continuous positive airway pressure. Also there was significant relation between nurses' total level of knowledge and total practices level regarding care of neonates undergoing continuous positive airway pressure at (p-value<0.05).

Recommendations: Periodical educational programs for nurses are necessary to improve nurses' performance regarding care of neonates undergoing continuous positive airway pressure.

Keywords: Continuous Positive Airway Pressure, Neonates, Nurses, Performance.

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1. Introduction

The neonatal period is the interval from birth to 28 days of age. A newborn during this phase is referred to as a neonate. It denotes the period when newborns are most at risk. Whether a newborn was delivered prematurely or at term, the neonatal phase lasts during the first four weeks of a neonate's life. Patterns for infancy, such as eating and bonding, are established throughout this period of fast change and development [1].

Respiratory distress syndrome (RDS) is a typical issue upon admission to the neonatal critical care unit (NICU). The main causes of respiratory distress in newborns include Hyaline Membrane Disease, Meconium Aspiration Syndrome (MAS), Septicemia, Congenital Pneumonia, and Transient Tachypnea of Neonatal (TTN). To keep the lung capacity during expiration constant in a newborn who is breathing on their own, continuous positive airway pressure (CPAP) is a noninvasive respiratory assistance [2].

Oxygenation in neonates with RDS is improved by continuous positive airway pressure. Furthermore, gas exchange, respiratory effort, and functional residual capacity may also benefit with CPAP. Positive pressure has a greater impact on lung volume when the chest wall is elastic, which is inversely related to gestational age (GA), and less so when the lung is elastic, which is directly connected to GA. Because GA is more portable and the surface tension is lower, the amount of pressure needed to rupture the lungs lowers [3].

The nurse plays a critical role in providing care for neonates receiving CPAP. Neonatal CPAP monitoring reduces the likelihood of nasal damage and improves the newborn's posture. Monitoring charts, caring for parameters, and keeping an eye on breathing settings are all crucial. The circuit must be examined for adequate heating and humidification, for any circuit leakage, and for condensation on the inspiratory or expiratory limbs [4].

Significance of the Study:

Worldwide, 2.4 million neonatal died in the first month of life, in 2019. In Egypt, the neonatal mortality rate was estimated as 11.1 deaths per 1,000 live births. Where 80% from neonatal deaths occur due to complications associated with newborn birth, respiratory distress, asphyxia, infection and pneumonia **(United Nations International Children`s Emergency Fund (UNICEF) [5]**. According to study done at Masr Children Hospital affiliated to Health Insurance Organization at Cairo branch to determine CPAP incidence in the NICU, revealed that the rate of CPAP varied from 18.6 % per 1000 CPAP days in Egypt [6]. So it important to assess nurses' performance regarding care of neonates undergoing continuous positive airway pressure

Aim of the Study

This study aimed to assess nurses' performance regarding care of neonates undergoing continuous positive airway pressure.

Research questions:

1- What are the level of nurses' knowledge and practices regarding care of neonates undergoing continuous positive airway pressure?

2- Are there relations between the nurses' level of knowledge, and practices regarding care of neonates undergoing continuous positive airway pressure and their characteristics?

2. Subject and Methods

Research design: A descriptive research design was used to achieved aim of the study.

Research setting: The neonatal intensive care unit consists of (3) partitions the large area is called clean area, the medium area is called septic area and the small area is called isolation, NICU containing (25) incubator. There were (15) ventilator machine and(6) CPAP machine. NICU it provide care for preterm, full term, and post term neonates needed close observation, medical treatment or surgical interventions.

Research Subjects:

A purposive sample the study sample consists of 60 nurses working at the neonatal intensive care unit during six month through the period of the beginning of April 2022 until the end of September 2022. Nurses have been selected according to the following inclusion criteria; both nurses' gender, all educational degrees of nursing, age more than (20) years old and at least one year of experience at NICU.

Tools for data collection:

First Tool: Structured Questionnaire Sheet.

The researcher designed an interview questionnaire form to collect the data required. The questionnaire was based on up dated review of related literature it was written in a simple Arabic language. It was consist of the following parts:

Part I: Characteristics of the studied nurses' includes (nurses' age, level of education, years of experience and attendance of previous training courses regarding CPAP.

Part II: Neonates' characteristics (Age, gender, type of labor, date of admission, diagnosis, duration on CPAP.

Part III: Nurses' knowledge regarding continuous positive airway Pressure such as; definition, types of CPAP, component, purpose of CPAP machine, indication, contraindications of CPAP, suction, nursing care undergoing CPAP

Scoring system: Nurses' knowledge was checked with a model key answer where correct answer scored (1) and wrong answer scored (0). According to the nurses' answer, their level of knowledge was categorized as the following: >85% (Satisfactory) < 85% (Unsatisfactory).

Second Tool: Observational Checklist:
The checklists were adopted from **Berman et al. [7]**, to assess nurses' practices in care of neonates undergoing continuous positive airway. This tool included 9 procedures about nursing practices (as: vital signs (Apical pulse and Respiratory rate), preparation and initiation of CPAP, care of CPAP machine, taking arterial blood gases, maintenance and ongoing care for neonates on CPAP, suctioning (nasal- oral), facial and nasal skin care, gavage feeding.

The scoring system of nurses' practices:
Check list was composed of steps with two categories of nurse response were divided into done correctly with (2) degree or done incorrectly with (1) degree, or not done with (0) degree. Practices level was categorized as the following: >85% (competent) < 85% (incompetent).

II- Operational Item:
The operational design was include: the preparatory phase, content validation, pilot study, ethical consideration, and field work.

Preparatory phase:
It included reviewing of past, current, national and international related literature and theoretical knowledge of various aspects of the study using books, articles, internet, periodicals and magazines to develop tools for data collection.

Validity:
Once prepared in their preliminary from the developed tool was formulated and submitted to three experts in pediatric nursing reviewed the tool and content validation through assessing its relevance, clarity, comprehensiveness and understandability modification were done according to their comments and suggestions.

Reliability:
The tool was done by using the questions to collect data from group similar to the studied sample (test, re-test) and applied different of time to be sure the consistency of answer.

Ethical considerations:
An official approval was obtained from the Scientific Research Ethics Committee in Faculty of Nursing- Helwan University to conduct the study. Before giving their informed consent, subjects were fully told about the study and their role in it. Participation in the study is completely voluntary. Ethics, values, culture, and beliefs will be respected. The ethical considerations included outlining the goal and nature of the study, outlining the option to

withdraw at any time, and ensuring that the information was confidential and could not be accessed by anyone else without the participants' consent.

Pilot study:
The pilot study was carried out from May, 2022 on 10% (6 nurses) of the total study sample (N- 60 nurses') to examine the clarity of questions and time needed to complete the study tools. The nurses who were included in the pilot study were not excluded where no major modification was done after conducting pilot study.

Field work:
Data collection of the study started at the beginning of April 2022 until the end of September 2022.The researcher attended to the previous mentioned setting from 9:00 am to 2:00 pm 2 days/week (Sunday and Tuesday) within 6 months. The researcher contacted with the studied nurses before collecting data of the actual study and introduced herself to nurses. The researcher provided a simple explanation of the purpose and objectives of the study to gain their cooperation, and how to fill in knowledge questionnaire and to assure the nurses about the anonymity of their answers and that the information was used for scientific research only and was strictly confidential. Each nurse was interviewed and assessed individually using the study tool. The questionnaire sheet took about 10- 25minutes to complete. As regards the nurses' practice, they were observed in previously mentioned setting during their actual work in the shift. Time consumed for assessing the procedure took 40- 50 minutes according to check list.

III- Administrative Item:
A written approval letter was being issued from Dean of Faculty of Nursing- Helwan University. The letter was being directed to the general manager of Masr children hospital asking for cooperation and permission to conduct the study. After explanation of the study aim and objectives, an official permission was obtained from the Dean of faculty of nursing and the general manager Masr Children Hospital. Consent was obtained orally from nurses' ensuring complete privacy and total confidentiality.

IV-tatistical Analysis:
Data was computed and analyzed using Statistical Package for the Social Science (SPSS), version 24 for analysis. The P value was set at 0.05. Descriptive statistics tests as numbers, percentage, mean ± standard deviation ($\pm$ SD), were used to describe the results. Appropriate inferential statistics such as "F" test or "t" test were used as well.
Significance of the results:
- When p-value < 0.05, was considered significant.
- When p-value < 0.001, was considered highly significant.
- When p-value > 0.05, was considered insignificant difference.

3. Results
Socio-Demographic characteristics:

Table (1): Distribution of the studied nurses' according to their characteristics (n=60).

Characteristics	No.	%
Age years		
20-<30 years	**27**	**45.0**
30-<40 years	21	35.0
≥40 years	12	20.0
Mean±SD	32.50±7.52	
Gender		
Female	**44**	**73.3**
Male	16	26.7
Marital status		
Single	23	38.3
Married	**31**	**51.7**
Divorce	3	5.0
Widow	3	5.0
Academic qualification		
Diploma in Nursing	21	35.0
A health technical institute	**31**	**51.7**
Bachelor of Nursing	8	13.3
Previous training courses for nurses about CPAP		
Yes	**53**	**88.3**
No	7	11.7
Years of experience		
<1 year	6	10.0
1-<5 years	20	33.3
5-<10 years	**27**	**45.0**
≥10 years	7	11.7

Neonatal characteristics:

Table (2) Distribution of the studied neonates' patients according to their characteristics and duration on Continuous positive airway pressure (n=60).

Items	No	%
Age		
<1 week	**23**	**38**
2 Weeks	21	35
3 weeks	16	27
x ±SD	**3.76± 1.09**	
Gender		
Male	28	47
Female	**32**	**53**
Duration on CPAP/days		
1-3	**42**	**70**
3-5	18	30
5-7	0	0
7-9	0	0
Type of Labor		
Normal delivery	**43**	**72**
Caesarean	17	28

Table (3) Distribution of the studied nurses' domains of knowledge regarding care of neonates undergoing continuous positive airway pressure (n=60).

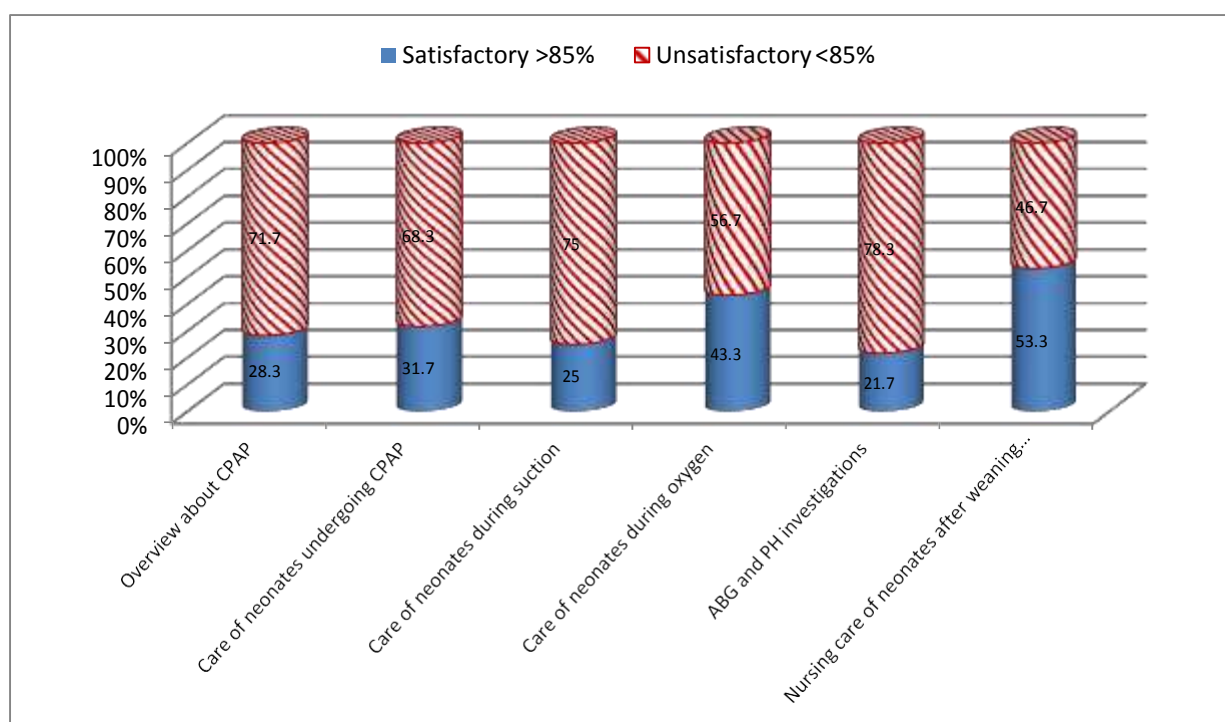| Domains	Satisfactory >85%		Unsatisfactory <85%	
	No.	%	No.	%
Overview about CPAP	17	28.3	**43**	**71.7**
Care of neonates undergoing CPAP	19	31.7	**41**	**68.3**
Care of neonates during suction	15	25.0	**45**	**75.0**
Care of neonates during oxygen	26	43.3	**34**	**56.7**
ABG and PH investigations	13	21.7	**47**	**78.3**
Nursing care of neonates after weaning CPAP	**32**	**53.3**	28	46.7

Fig. (1): Percentage distribution of the studied nurses' domains of knowledge regarding care of neonates undergoing continuous positive airway pressure.

Table (4): Distribution of the studied nurses' domains of practices regarding care of neonates undergoing continuous positive airway pressure (n=60).

| Domains	Competent >85%		Incompetent <85%	
	No.	%	No.	%
Apical pulse	11	18.3	**49**	**81.7**
Respiration rate	**49**	**81.7**	11	18.3
Preparation and initiation of CPAP	**42**	**70.0**	18	30.0
Care of CPAP machine	**48**	**80.0**	12	20.0
Taking arterial blood gases sample	**45**	**75.0**	15	25.0
Maintenance and ongoing care for neonates on CPAP	24	40.0	**36**	**60.0**
Nasal suctioning	28	46.7	**32**	**53.3**
Oral suctioning	21	35.0	**39**	**65.0**
Facial and nasal skin care	27	45.0	**33**	**55.0**
Gavage feeding	**53**	**88.3**	7	11.7
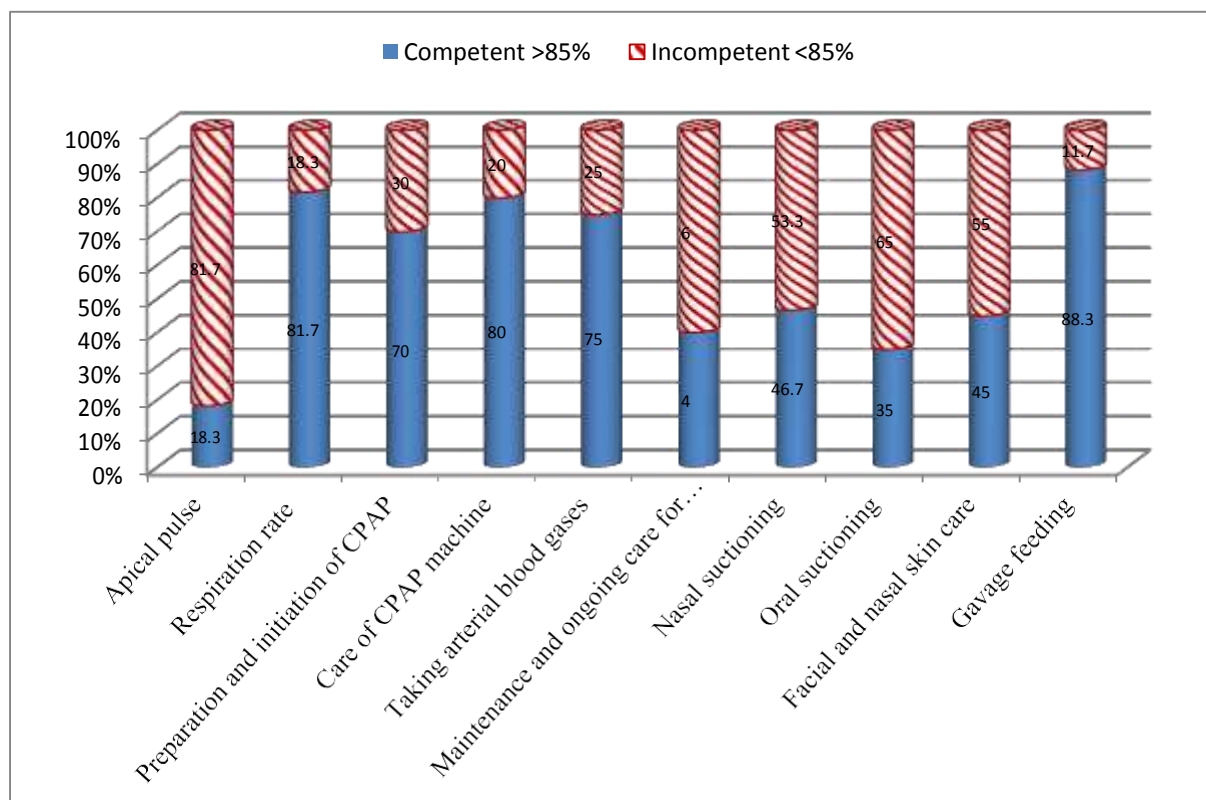
Fig. (2): Percentage distribution of the studied nurses domains of practices regarding care of neonates undergoing continuous positive airway pressure (n=60).

Relation and correlation between the study variables

Table (5): Relation between level of studied nurses' knowledge regarding care of neonates undergoing continuous positive airway pressure according to their characteristics (n=60).

Characteristics of studied nurses	Level of knowledge				Chi-square test	
	Satisfactory (n=14)		Unsatisfactory (n=46)			
	No.	%	No.	%	x2	p-value
Age years						
20-<30 years	10	71.4	17	37.0	5.371	0.068
30-<40 years	2	14.3	19	41.3		
≥40 years	2	14.3	10	21.7		
Gender						
Female	9	64.3	35	76.1	0.280	0.597
Male	5	35.7	11	23.9		
Marital status						
Single	8	57.1	15	32.6	3.666	0.300
Married	5	35.7	26	56.5		
Divorce	1	7.1	2	4.3		
Widow	0	0.0	3	6.5		
Academic qualification						
Diploma in Nursing	0	0.0	21	45.7	32.951	**<0.001****
A health technical institute	6	42.9	25	54.3		
Bachelor of Nursing	8	57.1	0	0.0		
Previous training courses						
Yes	7	50.0	46	100.0	26.038	**<0.001****
No	7	50.0	0	0.0		
Years of experience						
<1 year	0	0.0	6	13.0	11.566	**0.009***
1-<5 years	1	7.1	19	41.3		

5-<10 years	9	64.3	18	39.1		
≥10 years	4	28.6	3	6.5		

Using: Chi-square test

p-value >0.05 NS; *p-value <0.05 S; **p-value <0.001 HS

Table (6): Relation between level of studied nurses' practices regarding care of neonates undergoing continuous positive airway pressure according to their characteristics (n=60).

Characteristics of studied nurses	Level of practice				Chi-square test	
	Competent (n=39)		Incompetent (n=21)			
	No.	%	No.	%	x2	p-value
Age years						
20-<30 years	16	41.0	11	52.4	2.252	0.324
30-<40 years	13	33.3	8	38.1		
≥40 years	10	25.6	2	9.5		
Gender						
Female	28	71.8	16	76.2	0.135	0.713
Male	11	28.2	5	23.8		
Marital status						
Single	12	30.8	11	52.4	3.767	0.288
Married	22	56.4	9	42.9		
Divorce	2	5.1	1	4.8		
Widow	3	7.7	0	0.0		
Academic qualification						
Diploma in Nursing	15	38.5	6	28.6	7.131	0.028*
A health technical institute	16	41.0	15	71.4		
Bachelor of Nursing	8	20.5	0	0.0		
Previous training courses						
Yes	32	82.1	21	100.0	4.267	0.039*
No	7	17.9	0	0.0		
Years of experience						
<1 year	2	5.1	4	19.0	8.635	0.034*
1-<5 years	11	28.2	9	42.9		
5-<10 years	19	48.7	8	38.1		
≥10 years	7	17.9	0	0.0		

Using: Chi-square test

p-value >0.05 NS; *p-value <0.05 S; **p-value <0.001 HS

Table (7): Correlation between total score of nurses' knowledge and total score of practices regarding care of neonates undergoing continuous positive airway pressure (n=60).

		Total score of knowledge	Total score of practices
Total score of nurses' knowledge	r		0.271
	p-value		0.036*
	N		60
Total score of nurses' practice	r	0.271	
	p-value	0.036*	
	N	60	

r-Pearson Correlation Coefficient;

*p-value <0.05 significant correlation; **p-value <0.001 highly significant

4. Discussion

Neonatal respiratory distress syndrome, or RDS, commonly manifests within hours of birth, most

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frequently right after delivery, and is a major cause of respiratory distress in neonates. Term newborns are rarely affected with RDS and are typically preterm neonates. With more severe disease in the smaller and more preterm neonates, the incidence of RDS is inversely correlated with gestational age of the neonates. Although the outcomes for neonatal patients with RDS have improved because to therapeutic options such prenatal corticosteroids, surfactants, and sophisticated respiratory care for the neonate, the condition still ranks as one of the major causes of morbidity and mortality in preterm infants [8].

The current study aimed to assess nurses' performance regarding care of neonates undergoing continuous positive airway pressure.

Research Questions:
What are the level of nurses' knowledge and practices regarding care of neonates undergoing continuous positive airway pressure?

Are there relations between the nurses' level of knowledge, and practices regarding care of neonates undergoing continuous positive airway pressure and their characteristics?

In relation to characteristics of the studied nurses' it reveals that, slightly less than half were (45%), among studied nurses in the age group between 20 - <30 years with mean age 32.50±7.52, this result was similar to a study by **Aziz & Abdul-Hamza** [9] who carried study entitled "Assessment of nursing care in neonatal respiratory distress" and founded that the age group of nurses' were between 20 > 30 years.

Additionally, the current study found that 51.7% of the nurses studied had technical nursing degrees. **Mohammed et al.** [10], "Intervention programme for nurses about care of preterm neonates undergoing continuous positive airway pressure," confirmed this finding, finding 52.7% of the nurses to be nursing technicians. This finding is in line with a study by **Buraihi & Mohammed** [11] entitled "Effectiveness of an Educational Program on Nurses' Knowledge Regarding Prevent of Post-Thoracic Surgery Complications at AL-Najaf Teaching Hospitals," which showed that the majority of the study sample were graduates of technical nursing institutes.

Contrarily, a study published in **2018 by Bakhshi et al.** [1], titled "Effect of Instructions on the Developmental Status of Premature Infants on the Clinical Practice of Neonatal Intensive Care Unit NICU Nurses," revealed that the majority of NICU nurses held a master's degree.

According to years of experience, the neonatal intensive care unit had the greatest percentage of nurses with more than five years of experience. This result was in agreement with **Mahmoud et al.** [12] who found that more than half of the nurses in the study had less than five years of experience. Their study was titled "The effect of endotracheal suction

intervention on oxygen saturation level in preterm newborns."

Results of the current study were in conflict with a study by **Abd-Elbaky et al.** [13] titled "Impact of Simulated Education program on Nurses' Performance of Invasive Procedure at Intensive Care Units," which showed that the majority of the studied nurses had less than 5 years of experience. According to the results of the current study, which were in agreement with **Aziz & Abdul-Hamza** [9] findings in a study titled "Effectiveness of an educational program upon nurses' knowledge toward the continuous positive airway pressure (CPAP) machine in neonatal intensive care units," the majority of the studied nurses had previously attended training courses about CPAP, while more than three quarters had attended training courses. More over two thirds of the nurses in the study had previously taken CPAP training, according to the study's findings.

This result disagreed with **Elsobkey & Amer** [14] in a study entitled "Effect of educational guidelines program about nursing care of neonates receiving Continues Positive Airway Pressure," and revealed that more than two thirds of the studied nurses did not have training course about CPAP.

From the researcher point of view, level of experience and training courses affected tremendously on the level of nurses' performance and the care neonates undergoing continuous positive airway pressure.

Concerning the total nurses' level of knowledge regarding care of neonates undergoing continuous positive airway pressure, the study revealed that, the more than two third of the studied nurses' had unsatisfactory level regarding care of neonates undergoing continuous positive airway pressure and less than one quarter of studied nurses' had satisfactory knowledge regarding care of neonates undergoing continuous positive airway pressure.

Finding of the current study were in agreement with **Lomnyack et al.** [15] whose results revealed the 69% of nurses' had unsatisfactory knowledge, 31% of nurses' had satisfactory knowledge regarding overview about continuous positive airway pressure. Concerning the relation between total score of knowledge and total score of practices regarding care of neonates undergoing continuous positive airway pressure. The study presented that there were statistically significant correlation between total mean score of knowledge and total score of practice about care of neonates undergoing continuous positives airway pressure. It reveals that there is a positive correlation between total score of knowledge and practice at (p-value<0.05).

Finding of the current study were in agreement with **Abd-Elbaky et al.** [13] who found that, there were statistically significant correlation between the total nurses' knowledge and practice. This result might be due to that nurses'correlation of knowledge with

practices to do better professional level of performance regarding care of neonates undergoing continuous positive airway pressure.

5. Conclusion

Based on finding of the current study, it can be concluded that the more than two third of the studied nurses' had unsatisfactory level of knowledge while as regard practices two third of them had competent level about care of neonates' undergoing continuous positive airway pressure. Also there was significant relation between nurses' total level of knowledge and total practices level regarding care of neonates undergoing continuous positive airway pressure at (p-value<0.05). And there were statistically significant relation between total level of knowledge regarding care of neonates undergoing continuous positive airway pressure according to their academic qualification, training courses at (p-value <0.001). Also, there were statistically significant relation between level of practices and their academic qualification, training courses at (P<0.05).

Recommendations

- Periodical educational programs for nurses are necessary to improve nurses' knowledge regarding care of neonates undergoing continuous positive airway pressure.
- A program for education and training nurses in the use of the CPAP method should be developed, with frequent updates to knowledge and practice.

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