Original Article

Determination of the Knowledge Levels of Nursing Students on Oxygen Administration in Newborn Intensive Care Units

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Abstract

Background: The study was carried out to determine the knowledge level of nursing students about oxygen therapy in neonatal intensive care units.

Material and Methods: This study was carried out with 89 students who agreed to participate in the study between January-March 2019. The data were collected by using the questionnaire which were prepared by the researchers to determine the knowledge level of the participants about oxygen application in neonatal intensive care units. The statistical analyses were performed by using Shapiro Wilk test, Mann Whitney U test and descriptive statistical methods.

Result: The mean total knowledge level of the students about oxygen application in neonatal intensive care units was determined as 25.75 ± 3.56. The mean score of female students was 26.47 ± 3.10 while the mean score of male students was 23.42 ± 4.03. In terms of groups there was a statistically significant difference between the knowledge level about oxygen application in newborn intensive care units.

Conclusion: In the study, the level of knowledge of the nursing students about oxygen administration in neonatal intensive care units was found as high.

Keywords: Newborn, Oxygen Application, Nursing Students

Introduction

Providing oxygen to the body and removing carbon dioxide from the body are the main functions of the respiratory system. There is a balance between the intake of oxygen and the use of oxygen. Providing oxygen to vital organs is very important to sustain life (Birol, 2011). Oxygen therapy having a definition as oxygen administration at a concentration higher than the oxygen concentration in the atmosphere, provides adequate oxygen transport, makes breathing easier and reduces the load on the heart (Birol, 2011).

Oxygen is one of the most common elements in nature and is also one of the most widely used medicines in neonatology (Maltepe & Saugstad,

2009). Oxygen can also cause harmful effects when used incorrectly and can even be fatal. Inadequate use of oxygen can expose critically ill patients to a risk of hypoxic organ damage. The level and activity of antioxidant enzymes protecting the newborn from the harmful effects of oxygen have a dynamic change during the development. Antioxidant enzymes mature in the last week of pregnancy, prepare the fetus for pulmonary respiration. Therefore, premature babies are especially prone to the injuries caused by oxidants (Frank & Sosenko 1987; Friel et al., 2004; Tiina et al., 1998). Oxygen therapy and it's follow-up are very important (Dhruve et al., 2015). Preterm neonates often receive oxygen therapy in neonatal intensive care units because of the reasons such as resuscitation, pulmonary hypertension and respiratory distress (Institute of Medicine (US) Committee on Understanding Premature Birth and Assuring Healthy Outcomes, 2007). In the neonatal period, oxygen should be administered carefully in the clinic, taking into account the beneficial and harmful effects (Perrone et al., 2017).

Nurses involve in health services to maintain and improve the health of individuals, families and the community and to heal in a case of illness. Nurses fulfill their nursing responsibilities according to the relevant laws and regulations and in particular to the nursing regulations (Asti & Acaroglu 2000). The nurses are held responsible for the clinical signs and symptoms of oxygen therapy in neonates by the statement as "Neonatal nurses should be able to compherensively assess the clinical signs and symptoms of infants being under the responsibility of them" in the nursing regulations (Nursıng Regulation, 2011). Therefore, student nurses should be aware of the effects of oxygen administration on newborns. This study was conducted to measure the knowledge level of nursing students about oxygen application in neonatal intensive care units.

Materials and Methods

The study was conducted as descriptive. The universe of the study consisted of the 3rd year students in the Nursing Department of Bursa Uludağ University Faculty of Health Sciences. In our study, sample selection was not appliep, the whole universe was included in the sample. The sample consisted of a total of 89 students who agreed to participate in the study.

Data Collection Tool: The data in this descriptive study were collected through a two-section questionnaire. In the first section of the questionnaire, 6 questions about the socio-demographic characteristics of the participants were included. In the second section of the questionnaire, 30 items were prepared by the researchers to determine the knowledge level of the student nurses about oxygen therapy in neonatal intensive care units after literature review. In the assessment of the students' knowledge level, the scores between 0-10 points were considered as bad scores, the scores between 11-20 points were considered as moderate scores, the scores between 21-30 points were considered as good scores.

Statistical Analysis: For statistical analysis, SPSS software (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0 Armonk, NY: IBM Corp.) was used and $p<0.05$ was considered as statistically significant. The conformity of continuous variables to normal distribution was analyzed by Shapiro Wilk test. Mann Whitney U test was used to compare the groups according to the normality test results. Frequency and percentage were used for categorical data while arithmetic mean ± standard deviation was used for quantitative data.

Ethical Statement

The study was carried out after obtaining the approval of the Health Research and Publication Ethics Committee of Bursa Uludag University and verbal permissions of the students.

Results

According to the socio-demographic characteristics of the students, 76.4% of the students were female and the mean age was 21 ± 1.65. It was determined that 83.1% of the students did not have any experience in neonatal intensive care units; 93.3% of them felt inadequate in neonatal care. 40.4% of the students answered the question of "Would you like to work in neonatal intensive care units in your professional life?" as yes (Table 1).

When the students' knowledge level about oxygen administration in neonatal intensive care units was analyzed, their mean total score was 25.75 ± 3.56. The highest number of wrong answers was observed for the statements of "Oxygen therapy should be applied routinely in pre-term deliveries" and "Oxygen therapy is

useful regardless of it's necessity for pre-term infants". The highest number of right answers was observed for the statement of "Hypoxia is a condition that needs to be intervened quickly" and "The density of oxygen applied in pre-term delivery is not important" (Table 2).

Table 1. Socio-demographic characteristics of the students and their opinions on newborn care

Age (mean ± standard deviation)	21 ±1.65
	n (%)
Gender	
Female	68 (76.4)
Male	21 (23.6)
Have you ever practiced in neonatal intensive care units?	
Yes	15 (16.9)
No	74 (83.1)
Would you like to work in neonatal intensive care units in your professional life?	
Yes	36 (40.4)
No	53 (59.6)
Do you consider yourself adequate to care for newborns?	
Yes	6 (6.7)
No	83 (93.3)

Table 2. The students' answer rates for the expressions related to oxygen administration in newborn intensive care units

STATEMENTS	**n (%)**
Hypoxia is a condition that needs to be intervened quickly.	87 (97.8)
The density of oxygen applied in pre-term delivery is not important.	86 (96.6)
Oxygen therapy is useful regardless of it's necessity for pre-term infants.	50 (56.2)
Oxygen therapy should be routinely administered in pre-term deliveries.	39 (43.8)
Total mean score (mean ± standard deviation)	25.75±3.56

Table 3. The Students' Knowledge Level about Oxygen Administration in Newborn Intensive Care Units According to Their Introductory Characteristics

	Mean±SD	p
		0.000*
Gender		
Female	26.47±3.10	
Male	23.42±4.03	
Have you ever practiced in newborn intensive care units?		0.740
Yes	24.86±5.33	
No	25.93±3.11	
Would you like to work in newborn intensive care units in your professional life?		0.555
Yes	25.88±3.79	
No	25.66±3.4	
Do you consider yourself adequate to care for neonates?		0.165
Yes	27.33±2.73	
No	25.63±3.60	

* p<0.05

The students' mean knowledge level about oxygen administration in newborn intensive care units were analyzed according to their descriptive characteristics. The mean score of female students was found as 26.47 ± 3.10 when there was a statistically significant difference between the knowledge level about oxygen application in newborn intensive care units. No statistically significant difference was found between the students' practice status in neonatal intensive care units, their working status in neonatal intensive care units, their self competency about neonatal care and their knowledge level about oxygen administration in neonatal intensive care units (Table 3).

Discussion

The planning, implementing and evaluating of appropriate nursing activities for basic interventional practices such as oxygen therapy are among the authority and responsibilities of the intensive care nurse in the nursing regulations. In addition, nurses are responsible for monitoring oxygen saturation (Pulse oximetry) and administrating oxygen therapy (mask, nasal cannula) (Nursing Regulation, 2011).

The aim of the study is to determine the knowledge level of the nursing students about oxygen administration in neonatal intensive care units. When the students' knowledge about oxygen administration in neonatal intensive care units is assessed; The mean total score of them was 25.75 ± 3.56. In a study conducted with healthcare providers, approximately 70% of caregivers stated that they did not get comprehensive education about neonatal oxygenation (Sola & Lee, 2007).

Nursing management contains the recognition of the factors that may cause a risk of hypoxia, the interventions for reoxygenation and the supportive care of neonates and their families (Boxwell, 2016). According to the results of a qualitative study, it was determined that the nursing care in oxygen therapy of neonates consists of the care which are given from the entrance of neaonates in neonate intensive care units. It was also found that clear understanding of all factors related with this therapy ensures better prognosis and shorter hospitalisation period (Alves et al., 2019). No other study on the administration of oxygen therapy by nursing students was found in the literature.

Nurses constitute the largest health care professional group (Health Canada, 2007). The optimal administration of oxygen to pre-term infants by nurses and other members of the multidisciplinary team may have a major impact

on the improvement of neonates' health status (Bucknall, 2003).

For the students, the highest number of wrong answers was observed for the statement of "Oxygen therapy should be applied routinely in pre-term deliveries". Fetal growth occurs under relatively hypoxic conditions (about 25 mm Hg PaO_2) in the intrauterine compared to extrauterine conditions (70 mm Hg PaO_2). During delivery, an excess of oxygen occurs as a result of the migration of neonates from hypoxic intrauterine environment to relatively hyperoxic extrauterine environment. This excess of oxygen being increased by additional oxygen administration causes hyperoxia (Buonocore et al., 2002; Vento et al., 2012). Oxygen toxicity in neonates can trigger the mechanisms damaging proteins, lipids and nucleic acids by disturbing the balance between reactive oxygen species and antioxidants in our body (Fridovich, 1999; Perrone et al., 2017). It can also cause eye, lung and brain damage (Tin & Gupta, 2007). Hypoxia causes vasoconstriction and releasing of angiogenic substances and oxygen-free radicals that are toxic to many systems of the body (Brockway & Hay 1998).

The establishment of one common type of international practice is needed to adjust oxygen therapy (Sola et al., 2007; Sola, 2008; Saugstad 2007). The target of nurses in oxygen therapy is to avoid hyperoxia or hypoxia (Walsh et al., 2009) and the fluctuations between them (Chow et al., 2003). The effectiveness and knowledge levels of nurses who are held responsible for oxygen administration by monitoring hypoxia and hyperoxia symptoms, are essential. In a study, the majority of nurses stated that they first considered the skin color of children to assess their oxygen needs, but the skin color is not a good indicator of hyperoxia. The risk of hyperoxia requires to monitor oxygen saturation; oxygen saturation in blood gases (PaO_2) should be evaluated when oxygen is adminestered to children (Hagedorn et al., 2006).

The gap between nursing theory and practice, the theoretical acquisition of nursing students is frequently documented, discussed and defined as inconsistency in the literature (Berkow et al., 2009; Casey et al., 2011; Moriarty et al., 2011). On the other hand, oral/auditory culture in nursing explains that nurses prefer to learn from colleagues rather than text-based or electronic sources (Considine & Khaw, 2011). It was aimed that the students who did not started to practice their profession followed the changing and developing medical literature and used the evidence based nursing process effectively.

Conclusion

Understanding the effects of oxygen administration is important to prevent involuntary cellular and tissue damage caused by hyperoxia in patients requiring additional oxygenation and to manage oxygen therapy in neonates. The effects of oxygen therapy and treatment options are still actively being investigated.

The importance of developing effective and practical training in monitoring neonatal oxygenation and saturation levels can not be ignored. It is also important not to rely on hearsay information without evidences. The unseen damages at the level of the cell and tissue cannot be ignored.

The information about neonatal care and practices is in the nursing department's curriculum. The student nurses should be aware of the effects of oxygen administration on newborns, take responsibility for the realization and evaluation of oxygen administration and correctly use this information in clinical practice during their education and in the institutions in which they work after graduation. Using the correct learned skills in the working environment is also very important in the prevention of malpractice having the meaning of bad, wrong application. There are scientifically faulty and even dangerous treatments in old knowledge sources. It is suggested that the nursing educational curriculum should be updated while the knowledge of working nurses should be updated with in-service trainings.

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