EFFECT OF DESGINED GUIDLINES ABOUT OXYGEN THERAPY FOR NEONATES ON NURSES' KNOWLEDGE AND SKILLS

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Abstract:

Oxygen is life essential so it is important for nurses who are responsible for oxygen administration to be familiar with its indications and potential hazards. Past studies have shown that healthcare professionals may lack awareness and knowledge regarding oxygen therapy, and its implementation often has several obstacles. Aim : To evaluate the effect of designed guidelines about oxygen therapy for neonates on nurse's knowledge and skills. Design: A quasi experimental one group pre/ post test research design was used. Setting: The current study was conducted in NICUs that allocated on the fourth floor of El Manial University Hospital (Kaser Al Aini) , Sample: sixty seven bedside nurses were recruited from May 2020 to May 2021. Tools: I: Nurses' characteristic; II: Pre- post-test: about nurses' knowledge regarding oxygen therapy and III: Observational checklist regarding nurses' skills for caring neonates on oxygen therapy . Results: Most participants were males , more than half had Bachelor degree. Their mean age was twenty six years old, and more than third quarter of them had less than five years experience in NICUs, there were statistically significant differences regarding the total mean score of nurses' knowledge and skills throughout the intervention phases. The lowest number of nurses who got a satisfactory level of knowledge and skills were at the pre intervention phase while all of them got a satisfactory level in post-and follow-up phases. Study intervention was the main statistically significant independent positive predictor of the skills score. Also, experience years, age and knowledge scores were a significant predictor of the skills score. Conclusion: The findings of this study strongly support the effectiveness of the designed guidelines about oxygen therapy for neonates in improving nurses' knowledge and skills. Recommendation: Integrate the designed guidelines of oxygen therapy for neonates in NICUs protocol for nurses.

Keywords: Oxygen therapy, neonates , nurses knowledge and skills .

Introduction

Oxygen therapy (OT) is a vital form of medical treatment in many different scenarios and is one of the primary treatments for patients with chronic respiratory distress (Aloushan et al,2019). Despite the significance of oxygen therapy, past studies have suggested that there may be a need for more awareness and knowledge among healthcare professionals concerning oxygen therapy and several obstacles in its implementation (sman , Kin Cooper & Champion, 2021).The use of oxygen as a

therapeutic drug in critically ill patients has been in practice for many decades, regardless of the environment in which it was delivered (Bunkenborg, Bundgaard, 2019). The calculated OT required amount for patients with hypoxemia is often underestimated, and incorrect calculations may lead to fatal conditions (Siwach , Yadav &Kumar 2022). In critically ill patients, oxygen should be administered safely and appropriately, which depends on a complete understanding of the purpose and benefits of its delivery method. The most

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common harmful effect due to oxygen delivery is the toxicity that can occur in cases where oxygen is delivered at a concentration above 50% for more than 24 hours (Foley & Dowling 2019).Mainly the eyes, respiratory system, and central nervous system are affected by oxygen toxicity in the human body, with high-risk populations including deep-sea divers, premature infants, hyperbaric operation theater patients, and patients exposed to high levels of oxygen (Kim & Choi, 2019). Therefore, efforts should be made to warn against the toxic effects of OT under continuous use. Furthermore, pulse oximetry and arterial blood gases (ABGs) should be monitored continuously, as harmful pulmonary changes can be irreversible (Graham et al., 2020). care -Nurses are the most responsible health providers, closely monitoring oxygen therapy and minimizing the risk of supplemental oxygen as quickly as possible (Zeleke, & Kefal,2021 Nurses . nspect the mucous membrane and should routinely i skin of the mouth to assess signs of any physical damage due to the tubing or oxygen toxicity (Lee et al. 2020). This inspection could involve the detection of color changes, inflammation, tential issues. It is ulceration, secretions, and other po essential to detect problems early, as this can prevent further complications and ensure that necessary treatments are given promptly. Regular inspections are critical for achieving optimal health and being-well (Desalu et al .2022).

Aim of the study

The current study aims to evaluate the effect of designed guidelines about oxygen therapy for neonates on nurses' knowledge and skills

Research Hypothesis

To fulfill the aim of this study, the following research hypotheses are formulated:

HI: Nurses' knowledge total mean scores are higher after receiving the designed guidelines about oxygen therapy for neonates than before.

HII: Nurses' skills total mean scores are higher after receiving the designed guidelines about oxygen therapy for neonates than before.

Research design:

A quasi-experimental one-group pre/post-test research design was utilized in the current study. This pre/post one group quasi experimental research resembles experimental research but is not true experimental research. It is very similar to the true experimental design except there is lose one criterion (Grove and Cipher, 2022).

Setting:

The current study was conducted in NICUs that allocated on the fourth floor of El Manial University Hospital (Kaser AL Aini). The capacity of this units includes 52 incubators well equipped to provide care for neonates delivered in El Manial University Hospital (Kaser AL Aini) only.

Sample:

All bedside nurses (67) working in the previous mentioned sitting were included in the current study.from May 2020 tell May2021.

Data Collection Tools:

After reviewing the related literature, data were collected through three tools that developed by the researches investigators :

I: Nurses' characteristic: age, level of education, years of experience in NICUs .

II: Pre- post-test: about nurses knowledge regarding oxygen therapy. It consists of 38 multiple choice questions about respiratory system anatomy and physiology, oxygen therapy (definition, indications, approaches, methods complications, precautions, side-effects and nursing role before, during and after administration).

Knowledge Scoring System:

A correct response was scored one and zero for incorrect response. For each area of knowledge and the total questionnaire, the scores of the items were

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summed up, and the total was divided by the number of items. Knowledge was considered satisfactory if the percent score was ≥60% (22.8) and unsatisfactory if < 60%.(22.8).

III: Observational checklist:

This tool was used to assess the actual nurses' skills for caring for neonates on oxygen therapy, it consists of 129 item regarding cardiopulmonary monitoring, admission of oxygen therapy, care of neonate in nasal (CPAP), suctioning the neonate's airway, application of chest physiotherapy, taking capillary blood gases and care of neonate on a mechanical ventilator.

Skills Scoring system:

In the observation checklists, the items "not done" and "done" were scored "0" and "1", respectively. For each area and the total checklist, the scores of the items were summed up, and the totals were divided by the number of the items, giving mean scores. The practice was considered satisfactory if the percent score was ≥ 95% (122.5) and unsatisfactory if < 95%.(122.5).

Validity and Reliability

Tools (II) and tool (III) were given to five experts in high-risk neonates and pediatric nursing to examine the content validity. Reliability of tools (II&III) was performed to confirm its consistency using the Alpha-Coefficient test , it was 0.932 and 0.980 respectively.

The designed guideline of neonatal oxygen therapy :

The designed guidelines for the care of neonates on oxygen therapy were previously formulated by the American Association of Respiratory Care (AARC) project science team in 2010. They were implemented and evaluated over one year period at 51 sites throughout the united states. It was modified by (the MOHP) Ministry of Health and Population Training Department for nurses in the Arabic language (2019). The researchers were implemented and evaluated the designed guidelines for the care of neonates with oxygen therapy according to the nurses' deficit needs.

Procedures of data collection: The current study was conducted through four phases; preparatory, assessment, implementation, and evaluation**.**

1. **Preparatory phase**: Administrative approval was obtained from the Faculty of Nursing -Cairo University research ethics committee. Official permission was obtained from the concerned hospital and NICU authorities to conduct the study. The study's aim, methodology, and nature were explained to the administrators and nurses.

2. **Assessment phase:** Once official permission and ethical approval were granted to carry out the current study. Then, before starting the protocol, the researchers have a pretest sheet to assess the nurse's knowledge about oxygen therapy to obtain a baseline assessment (pretest) tool (II). It takes about 15-20 minutes. This tool was used in Arabic and documented the answer in the tools utilized. Nurses' skills were assessed threw observing each nurse while caring for neonates on oxygen therapy (pretest) tool (III).

3. **Implementation phase:** In this phase,-designed guidelines about oxygen therapy for neonates were carried out for all nurses in the study setting. In this phase, all participating nurses' attended the designed guidelines sessions. The researchers provided a designed guidelines training program; under the title of designed guidelines about neonatal oxygen therapy. It contains six instructional sessions "cardiopulmonary monitoring, types of admission of oxygen therapy, care of neonates in nasal (CPAP), suctioning the neonate's airway, application of chest physiotherapy, taking capillary blood gases and care of neonate on a mechanical ventilator". Each session takes 30-45 minutes. The teaching materials of booklets,

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videos, posters, and power point presentations were developed by the researchers.

4. Evaluation phase:

Nurses' knowledge and skills were retested (tools II&III)immediately after implementation of the designed guidelines and one month later. The post-test assessment took about 15-20 min..

Results:

Table (1) shows that,70.1% of nurses were male, 57.5% had Bachelor degree, their mean age was 26 years old, 76.1 % had less than five years experience in NICUs and only 18 nurses out of 67attended training courses about oxygen therapy.

The stacked line chart in Fig.1 depicts the changes in nurses' knowledge and practice levels, the lowest number of nurses who got a satisfactory level of knowledge and skills scores was at the per-intervention 68.4%, and 69.8% respectively. While 100% of nurses got a satisfactory level of knowledge and skills scores in post-intervention. The number of nurses have a satisfactory level

knowledge and skills scores declined in follow up to 94.7%, and 96.9% respectively.

Table (2) illustrates that the lowest total mean score was among nurses in pre-intervention phase in knowledge and skills (22.79±7.51, and 38.0±0.00) respectively, it increased significantly to (26.75±3.02, and 122.13±6.40) respectively with p<0.001.

Table (3) illustrates that statistical significant differences was found between nurses' knowledge and skills scores throughout the pre and post intervention phases p<0.001while there was no differences between post and flow-up scores.

Table (4) shows that the nurses' knowledge has strong positive correlation with the skills score (r= .807**). A strong negative correlation was detected between skills score and nurses' age also experience years (r= -.320**, -.326** respectively).

Table1: Distribution of nurses characteristics. (n=67)

	Frequency	Percent	
Gender:			
Male	47	70.1	
Female	20	29.9	
Age:			
<25	45	67.2	
25+	22	32.8	
Mean±SD	26.0±6.0		
Nursing qualification:			
Diploma	8	11.9	
Technical institute	22	32.8	
Bachelor	37	55.2	
Experience years in NICUS:			
<5	51	76.1	
5+	16	23.9	
No. of oxygen therapy courses attended (n=18):			
1		15	83.3
2		2	11.1
3		1	5.6

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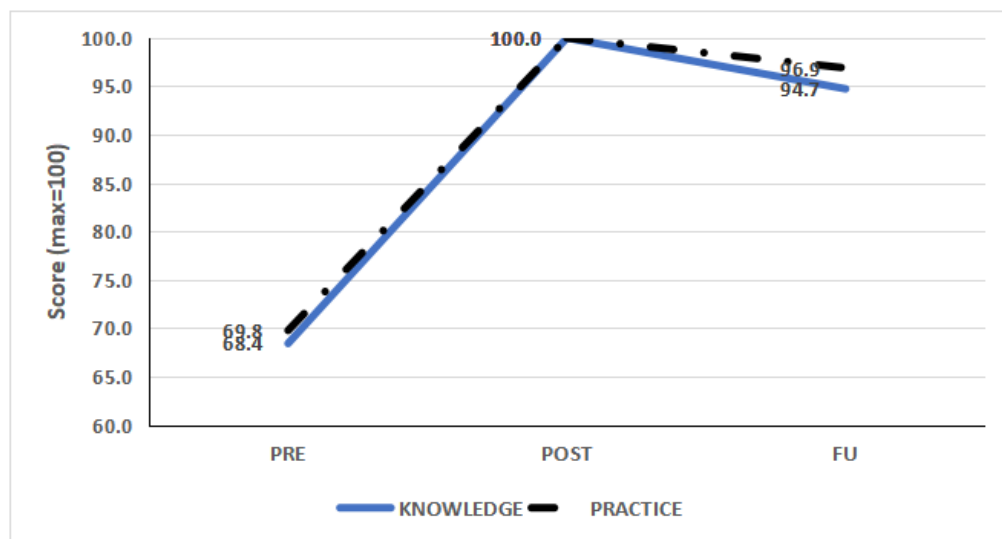Eur. Chem. Bull. 2023, 12(Regular Issue 7), 3707 –3718

Figure 1: Nurses' knowledge and skills levels throughout the intervention phases

Table 2: Comparison of Nurses' knowledge and skills total mean scores throughout the intervention phases.

Item	TIME			p-value (pre-post)	p-value (pre-FU)
	Pre	Post	FU		
Knowledge:					
Mean±SD	22.79±7.51	38.0±0.00	36.18±1.35	<0.001*	<0.001*
Skills:					
Mean±SD	87.73±20.16	126.75±3.02	122.13±6.40	<0.001*	<0.001*

(*) Statistically significant at p<0.05

Table 3: Changes in nurses' knowledge and skills total mean scores throughout the intervention phases

Score differences	Post-pre difference			Paired t-test	p-value
	Range	Mean±SD	Median		
Knowledge:					
Post-pre	15.8-89.5	15.21±7.51	51.58	16.39	<0.001*
Post-FU	10.5-19.2	1.82±1.35	28.95	14.88	0.44
Skills:					
Post-pre	-7.8-56.6	39.02±17.14	28.68	16.44	<0.001*
Post-FU	-16.3-48.8	4.62±3.38	25.58	15.65	0.17

(*) Statistically significant at p<0.05

Table 4: Correlation between nurses' knowledge and skills levels and their characteristics

	Spear man's rank correlation coefficient	
	Knowledge levels	Practice levels
Skills scores	.807**	1.000
Characteristics:		
Age	-.113	-.320**
Qualification	.098	.216
Experience years in NICUs	-.166	-.326**
No. of courses attended	.014	.369

** p < .01

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Discussion

Oxygen therapy is a necessary treatment for various medical conditions, and nurses play an essential role in assessing its need and ways of administering it (Nievas, Fahy, Olson & Anand). However, there needs to be more evidence that nurses are provided with a regular annual training program to inform and support nursing practices related to OT. To address this knowledge gap, research is needed to better understand the needs of OT patients, identify best practices for the successful management of OT, and develop evidence-based guidelines for nurses to follow when providing OT(Henrichs, & Makic 2021). The current study aims to evaluate the effect of designed guidelines about oxygen therapy for neonates on nurses' knowledge and skills.

The current study results revealed that majority of the nurses were males, almost of them in middle-age , Bachelor degree in nursing field and had less than five years experience in NICUs. This findings is supported by a study conducted in (2012) by Eastwood et al, Who found that most nurses employed in emergency and intensive care units had bachelor's degrees in nursing, but the study findings not supported with Mostafa (2023) who studied the " effect of an educational program about oxygen therapy on nurses' knowledge and practices" and found that all nurse participants were females and the majority of participants had nursing experience totaling 5-10 years.

The current study results also revealed that the minority of nurses working in NICUs attended training courses about oxygen therapy and this lack of participation in any previous annual training courses about oxygen therapy may be because hospitals usually do not have a staff development program related explicitly to oxygen therapy. This result is supported by Rochester 2017. who found that nurses working in intensive care units need additional education (like training courses and refresher courses) to provide the best possible care to patients receiving OT and prevent oxygen toxicity .A study conducted by (Chen et al, 2018) found that most nurses surveyed had never attended any training course on OT, highlighting the need for more comprehensive education programs to tackle this and other healthcare-related issues. Such programs should include detailed information on how to safely and effectively administer OT and the most up-to-date guidelines about medical protocols and standards of practice. As demonestrated by Markocic et al,(2016) , understanding the potential for oxygen toxicity is critical for nurses to properly assess and identify any issues that could arise from OT. Healthcare professionals, such as nurses, are critical in administering OT to patients in critical situations. Aloushan et al, (2019) pointed out a lack of knowledge can negatively impact patients' health outcomes. As such, nurses must be given adequate education to ensure they can adequately assess and administer OT safely and effectively. According to Urden, Lough & Kathleen (2018), nursing professionals' knowledge of OT is often only moderate. To ensure that these professionals are adequately trained, in-service educational programs are needed to improve their knowledge and practice. These programs should focus on improving nurses' understanding of OT, including oxygen delivery systems, oxygen saturation monitoring, and patient assessment; they should also cover the importance of OT in treating patients with respiratory conditions such as chronic obstructive pulmonary disease (COPD) and pneumonia, as well as OT in premature infants (Wang , Tan &Xiao et al, 2017). Furthermore, nurses should be taught how to recognize and manage the potential risks associated with OT, such as hypoxemia and hyperoxemia. Through these programs, nurses can understand OT comprehensively, enabling them to provide the best possible care to their patients (Vargas et al, 2015).

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The enhancement of NICUs nurses' knowledge and practices is crucial for ensuring the provision of high-quality Oxygen therapy care in this specialized setting. By equipping nurses with the necessary knowledge and skills, healthcare organizations can improve patient outcomes and promote a culture of patient safety within the NICUs. The findings of the current study provide compelling evidence that the designed guidelines about oxygen therapy for neonates that implemented for NICUs nurses had a significant positive impact on their knowledge and skills. The observed improvement in knowledge reflects the designed guidelines effectiveness in enhancing the nurses' understanding of key concepts and guidelines relevant to Oxygen therapy. Also, the guidelines content designation and delivery were successfully addressed the specific educational needs of the nurses, enabling them to acquire new knowledge and apply it in their daily practices.

The educational program empowered the nurses with the necessary knowledge to make informed decisions and provide evidence-based care. The improvement in skills among the nurses is equally noteworthy. It suggests that the educational program not only imparted theoretical knowledge but also facilitated the translation of that knowledge into practical skills and behaviors. This finding demonstrates the program's success in fostering critical thinking and decision-making abilities, enabling nurses to apply their knowledge effectively in real-world scenarios. The adoption of improved skills is likely to have a positive impact on patient outcomes, as it promotes standardized and evidence-based care delivery.

The current study findings were supported by Anderson, Malone, Shanahan, & Manning, (2019) who conducted a study aimed to evaluate the impact of an educational program on NICU nurses' knowledge of oxygen administration. The findings revealed a significant improvement in nurses'

knowledge following the intervention. In the same line, the study that conducted in three hospitals in northern Jordanand aimed to evaluate the effectiveness of an educational intervention in the area of nursing knowledge and practice relating to neonatal respiratory distress syndrome, and found that the educational interventions effectively enhancing nursing knowledge and practice relating to the care of neonates with respiratory distress (Ali, Obeisat & Tarawneh,2019). Also, the study which aimed to investigate the effect of educational program about oxygen therapy on the nurses' knowledge and nurses' practice, this study was carried in pediatric emergency unit at Assiut pediatric University Hospital, and found that majority of nurses had a satisfactory level of knowledge and practice toward oxygen therapy after applying educational program (Mostafa, Mehany, & Ahmed, 2019). Another study implemented an educational program to improve oxygen administration practices to newborns in a rural hospital in Haiti, the findings demonstrated significant improvements in nurses' knowledge and practices related to oxygen therapy after the educational intervention. While the study focused on a specific setting, the results are relevant to the current findings and indicate the potential benefits of educational programs in improving nurses' knowledge and practices regarding oxygen administration methods (Cantwell, Evans, & Brosseau, 2019).

Moreover, the findings of the current study revealed that there was no significant statistical different between post and flow-up scores of nurses' knowledge and practices. This may be due to effectiveness of educational program content and methods of teaching, also may be as a result of highly motivation of nurses to improve their performance. In addition the follow-up was administrated after a short period. This finding matched with the study of Abd-Elrahman, Mostafa, & Hasanin, (2022) that aimed to evaluate effect of

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an educational program for nurses about high alert medications on their competence and the study concluded that the educational program was successful and lead to improvement in nurses" knowledge, performance, and competence regarding high alert medications at immediate post program and follow up program after three months. In the same line, the study that aimed to define the efficacy of a nursing care educational workshop on nurses' knowledge and attitude until three months after in educational hospitals in Isfahan, this study found an educational sessions notably affected the promotion of nurses' knowledge. immediately after and three months after.

On the other hand, the follow-up performance may be decreased by the time as the finding of the study that aimed to identify the impact of an educational intervention on compliance of health professionals and found that the total healthcare professionals' compliance increased from 31.8% in the baseline period to 51.5% immediately after the first educational intervention, and decreased six months later, (Charalampia. et al.,2019). Also, Ali, Obeisat & Tarawneh, (2019) found that the mean scores for knowledge and practice were significantly higher after the intervention, although there was a slight drop in the follow-up 4 weeks after the intervention. However, the difference between the baseline knowledge and nursing practice scores and the follow-up scores is still significant. It may be that the drop in the follow-up knowledge score is due to the tendency for some knowledge to slip from memory.

Another study implemented an educational program to improve oxygen administration practices to newborns in a rural hospital in Haiti. The findings demonstrated significant improvements in nurses' knowledge and practices related to oxygen therapy after the educational intervention. While the study focused on a specific setting, the results are relevant to your findings and indicate the potential benefits of educational programs in improving nurses' knowledge and practices regarding oxygen administration methods (Cantwell, Evans, & Brosseau, 2019).

The finding of the current study demonstrates that the nurses' knowledge has strong positive correlation with their skills. It suggests that nurses who possess higher levels of knowledge in neonatal care are more likely to demonstrate better practice in their clinical work. This finding highlights the importance of knowledge acquisition and its impact on nurses' ability to translate that knowledge into effective skills. It is important to note that the correlation does not imply causation. Other factors, such as experience, skills, and external factors, may also influence nurses' skills. However, the positive correlation between knowledge and skills emphasizes the fundamental role of knowledge in guiding and informing nursing skills. These findings underscore the significance of continuing education programs, professional development opportunities, and regular knowledge updates for nurses working in the neonatal ICU. By investing in these initiatives, healthcare organizations can promote a culture of lifelong learning and support nurses in maintaining and expanding their knowledge base. This, in turn, can positively impact the quality of care provided to neonatal patients.

The previous researches supporting this finding such as; Johansson & Pilhammar, (2019), who examined the association between nurses' theoretical knowledge and their practical skills in NICU setting. The findings revealed a positive correlation between knowledge and practice, suggesting that nurses with higher theoretical knowledge scores also demonstrated better practical skills. Although the study was conducted in a surgical context, the results provide support for the positive correlation between knowledge and practice among healthcare professionals. Consistently, Olaniyan, & Odetunde, (2019), this

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study explored the relationship between nurses' knowledge of Oxygen therapy and their practice in a Nigerian teaching hospital. The results demonstrated a significant positive correlation between nurses' knowledge scores and their practice in Oxygen therapy. These findings align with the current researches findings and support the notion that higher knowledge levels are associated with improved nursing practice in specific domains of care.

The current study demonstrate illustrates that there was strong positive correlation between nurses' skills score and their age and years of experience in NICUs . It suggests that nurses' age and experience play a role in influencing their practice in the neonatal ICU. The positive correlation between nurses' age and practice score implies that as nurses grow older and accumulate more experience, their practice tends to improve. This may be attributed to the accumulation of knowledge, skills, and expertise over time, as well as the development of critical thinking abilities and clinical judgment. Experienced nurses often possess a deeper understanding of the complexities and nuances of neonatal care, enabling them to make more informed decisions and deliver high-quality care.

Similarly, the positive correlation between years of experience and practice score indicates that as nurses gain more years of experience working in the NICU, their practice tends to become more proficient. This suggests that with increasing exposure to a variety of clinical scenarios, nurses develop a better grasp of the specific challenges and requirements of neonatal care. They become more adept at recognizing patterns,

However, it is important to consider that while age and years of experience are correlated with practice, they are not the sole determinants of nursing competence. Other factors such as ongoing education, professional development opportunities,

and exposure to new research and best practices also contribute to nurses' growth and improvement in practice. Consistently, Roshanghalb, Bagheri, & Abbasi, (2017) examined therelationship between nurses' professional competency, including their practice, and organizational commitment. The findings demonstrated a positive correlation between years of experience and nurses' professional competency, indicating that nurses with more years of experience tended to exhibit higher levels of competency. The results suggest that experience plays a significant role in influencing nurses' practice and overall professional competency.

Another study supporting the finding Brooks, & Anderson, (2018) this study explored the relationship between nurses' work-life experiences and their overall work performance, including practice. The findings revealed that nurses with more years of experience reported higher levels of work performance. While the study did not specifically focus on the NICU, the results provide support for the positive correlation between years of experience and nursing practice in acute care settings.

Also previous research examined the relationship between nurses' presenteeism (the act of working while unwell) and its effects on the quality of care provided. The findings indicated that more experienced nurses were less likely to engage in presenteeism and reported higher quality of care. While the study focused on overall nursing practice and not specifically in the NICU, the results support the concept that years of experience can positively influence nurses' practice and their ability to deliver high-quality care (Letvak, Ruhm, & Gupta, 2019).

The current study findings found that nurses' knowledge scores have no significant correlation with their demographic characteristics is an another observation in research. It suggests that factors such as age, gender, years of experience, and educational

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level may not have a direct influence on nurses' knowledge in the neonatal ICU.It is important to note that the correlation does not imply causation. Other factors, such as experience, skills, and external factors, may also influence nurses' skills.

However, the positive correlation between knowledge and skills emphasizes the fundamental role of knowledge in guiding and informing nursing skills. These findings underscore the significance of continuing education programs, professional development opportunities, and regular knowledge updates for nurses working in the neonatal ICU. By investing in these initiatives, healthcare organizations can promote a culture of lifelong learning and support nurses in maintaining and expanding their knowledge base. This, in turn, can positively impact the quality of care provided to neonatal patients.

Conclusion:

In conclusion, the findings of this study strongly support the effectiveness of the designed guidelines educational program in improving nurses' knowledge and skills. According to the findings of the current study we are accepting the study hypotheses that assumed Nurses knowledge total mean score is higher after receiving the designed guidelines about oxygen therapy for neonates than before, Also, nurses' skills total mean score is higher after receiving the designed guidelines about oxygen therapy for neonates than before. Nurses' knowledge has strong positive correlation with the their practice. nurses practice score has a significant correlation with nurses' age and experience years while nurses' knowledge scores have a no significant correlation with nurses' demographic characteristics.

Recommendations:

- Integrate the designed guidelines of oxygen therapy for neonates in the NICUs protocol for nurses.

- An orientation designed guidelines about oxygen therapy should be applied for newly nurses to prepare them before working at the neonatal intensive care units.

- Continuous in-service educational program to motivate nursing staff to achieve high level of care .

- On job training program about oxygen therapy that can be formal or informal for nurses while working with their neonates .

- Replication of this study with a larger sample at different neonatal intensive care units with longitudinal follow -up is recommended, so that the results could be generalized and compared for differences between Egypt and other countries

- Further studies should be conducted to improve nurses' knowledge and skills regarding to care of neonates .

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