



## Original Research

# Effectiveness of an Instructional Program on Nurses' Knowledge Toward Supine and Prone Positions on Physiological Parameters in Premature Infant Undergoing Nasal Cannula

فاعلية البرنامج الإرشادي في معرفة الممرضين تجاه وضعيات الاستلقاء والانبطاح على المعايير الفسيولوجية عند الأطفال الخدج الذين يخضعون للقتية الأنفية

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**Key-wards:** Educational  
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## Abstract

**Objectives:** This study aims to determine the effectiveness of an educational program about nurses' knowledge of supine and prone positions on physiological parameters in premature infants undergoing nasal cannulation.

**Method:** A quasi-experimental study was conducted in private nursing homes and child protection hospitals in the city of Baghdad for the period from October 1<sup>st</sup>, 2023 to March 8<sup>th</sup>, 2024. The study sample consisted of 50 nurses who were divided into two groups, the experimental group and the other the control group. Data were collected through pretests, educational sessions, and posttests two weeks and one month after the implementation of the educational program. The control group underwent identical procedures to the intervention group except for the educational program. The data was analyzed by applying descriptive and inferential statistics.

**Results:** The results indicate that, initially, there was no statistically significant difference in nurses' knowledge between the study and control groups during the pretest phase ( $t = 0.148$ ;  $p = 0.883$ ). However, a significant shift occurred at the first posttest, revealing significant differences in knowledge scores between the study and control groups ( $t = 9.002$ ;  $p = 0.000$ ). Furthermore, these observed disparities in knowledge scores between the study and control groups persisted at the second posttest ( $t=6.919$ ;  $p=0.000$ ), indicating a significant effect of the educational program.

**Conclusions:** An educational program focusing on these conditions and their impact on premature infants receiving nasal cannula therapy resulted in a significant increase in the intervention group's knowledge scores during posttest. The high scores obtained by the intervention group on the final knowledge test showed that the program was sustainable and that its benefits would last longer.

**Recommendations:** Integrate similar educational programs into nursing training to enhance nurses' understanding and performance in caring for premature infants in different positions were highly recommended.

## Introduction:

Premature newborns often use respiratory support like a ventilator because the lungs and respiratory systems of the babies are underdeveloped. There is a common way of applying this support system, and it is by using the nasal cannula device which is usually placed on the infant's nose thus delivering a continuous flow of oxygen into their system (1). One of the key physical indicators is reflecting the health conditions of premature infants who are subjected to this treatment (2). Studies have revealed that the oxygen concentration must be appropriately maintained in order to prevent the effects of severe prematurity such as ROP and BPD (3,4). Moreover, the respiratory rate, the heart rate and the blood pressure should also be monitored closely as these parameters can be used to identify the early signs of respiratory trouble or other complications. Monitoring and correcting physiological data of these premature infants by healthcare professionals is so important to adapt respiratory support to the special demands of each of the newborns and consequently increase their chance of having a healthy growth (6).

In the last few years, the role of optimal positioning while dealing with the neonatal care has got more importance because of its possible effects on the lung and the cardiac system in preterm infants (7). The two most widely used positions are the prone position in which the infant is lying on tummy and the supine position in which the infant is lying on the back. Besides their different effects on respiratory mechanics and oxygenation, they also have various advantages and disadvantages (8). Since preterm baby frequently demands nasal cannula therapy for respiratory support, a good knowledge of the different positions of the infant as a nursing professional becomes a must (8).

Nurses become the core of the care on premature infants and their knowledge and adherence of the best practices are the key elements of the positive outcomes for patients (10). Medical research in the domain of neonatal care is known to have a positive effect on the education of healthcare professionals with regard to their knowledge and practices. It exemplifies that instructional programs focused on

the application of theoretical knowledge in actual practice may contribute to the advancement in the level of nurses' understanding and implementation of best practice in neonatal nursing (11). The results of this study prove the power of a structured educational program devoted to the prone and supine positions and their impact on physiological parameters of premature babies who are receiving a nasal cannula therapy. Therefore, this study aimed to determine the effectiveness of an instructional program on nurse's knowledge toward supine and prone positions on physiological parameters in premature infant undergoing nasal cannula.

## Methodology:

### Study Design

A quasi-experimental research design was employed, utilizing an adopted pre-post-test I and II approach for both the study and control groups was conducted during the period from October 1<sup>st</sup>, 2023 to March 8<sup>th</sup>, 2024.

### Study Setting and Sample:

The research was conducted only at Private Nursing Home and Child Protection Hospitals in Baghdad Province, where that hospital was decided to be a primary place for collecting data. Non-probability "purposive" sampling which is the type of sampling method purposefully considering the accuracy and the representativeness of the data to be collected was employed. The nurses' sample was taken, and there was a total of 50 participants, where 25 for each groups. The research activity involved forming one group as the study group and forming the other as the control group.

### Procedure:

Investigation, which was carried out at Private Nursing Home and Child Protection Hospitals, focused on assessed nurses knowledge toward s prone positions on physiological parameters in premature infant undergoing nasal cannula. A questionnaire was used in an answer-close form, and upon interrogating a group of 10 nurses, it was discovered that 80% of them had suboptimal knowledge. While indicating to the targeted interventions the urgency is also indicated. The

program is then be instigated after a careful study of the needs and review of relevant literature, including expert suggestions. The program went through a series of revisions resulting in best practice the expert group considered that the program was a perfect fit for nurses about prone positions on physiological parameters in premature infant undergoing nasal cannula. The program's deliberate targeted approach of defining areas for improvement, as well as improvements of the nurses knowledge, is very critical for the nursing system in this specialized field.

**Study Instruments:**

This questionnaire consists of two part include the followings.

Part I: Socio-demographic characteristics include nurses age, gender, education level, years of experiences, training courses and sources of information.

Part II: A constructed questionnaire composed of 43-items measured on a MCQ, yielding a potential score range of 0-43. A higher average indicates a good knowledge. The questionnaire was validated by experts and then its reliability was verified through a pilot study.

**Data Collection:**

The nurses in the present investigation were split into both experimental and control groups so as to gather the needed information. Demographic data was entered, and a pre-test was conducted to be able to analyze individual routines. The experimental group started an intervention

program in 60-90 minutes lesson sessions, each in a class room. The group of nurses that participated in the experiment was administrated a comprehensive test about the safety measures for children with acute lymphocytic leukemia. At two weeks and one month it was conducted to make sure that the short-term and permanent effects of education program were evaluated (posttest I and II). The control group went through the same steps as the experimental group except that they did not receive the program that they tested. This was accomplished through various teaching methods for example, lectures, a whiteboard, a computer, data show, booklets, and demonstrations.

**Statistical Analysis:**

Data collection from the sample was carried out using SPSS-24 and MS Excel (2010), which were later analyzed using the statistical analysis tool. The presentation was descriptive and was done through tables, averages and standard deviation whereby data was presented and analyzed. To determine the average scores, the researcher also created categories using the mean as the foundation and used such terms as poor, moderate, and good. The inferential strategy entailed performance of the statistical analysis tools including the independent sample t-test, chi square, post hoc test, Pearson's correlation coefficients, and eta square ( $\eta^2$ ). Using these tests, the researchers initiated the analysis of the relation between variables, determining differences in statistical values, checking against nominal standards, and calculating effect size. The most common significance level most tests were set to be 0.05.

**Results:**

**Table (1): Socio-Demographic Characteristics**

SDVs	Classification	Study Group		Control Group		$\chi^2$ Sig.
		No.	%	No.	%	
Age/ years	20 to less than 29	15	60.0	12	48.0	14.000 .062
	30 to less than 39	5	20.0	5	20.0	
	40 to less than 49	5	20.0	3	12.0	

	50 to less than 60	0	0.0	5	20.0	
	<i>M ± SD</i>	<b>29.69 ± 8.44</b>		<b>34.56 ± 10.75</b>		
Gender	Male	10	40.0	11	44.0	.442
	Female	15	60.0	14	56.0	.622
Education level	School Nursing	9	36.0	8	32.0	.27.936 .001
	Diploma Nursing	8	32.0	8	32.0	
	B.Sc Nursing	5	20.0	6	24.0	
	Postgraduate	3	12.0	3	12.0	
Years of Experience	1 less than 5	16	64.0	16	64.0	49.000 .001
	5 less than 10	5	20.0	5	20.0	
	10 less than 15	4	16.0	4	16.0	
Number of training sessions	No	18	72.0	16	64.0	39.815 .000
	1	3	12.0	3	12.0	
	2	4	16.0	6	24.0	
Sources of information	No	12	48.0	6	24.0	14.297 .026
	Health personal	8	32.0	6	24.0	
	Internet	5	20.0	8	32.0	
	Medical journals	0	0.0	5	20.0	

*No.* = Number; % = Percentage;  $\chi^2$  = Chi-square

The results delineate the demographic characteristics of the nurses. In the study group, the average age is  $29.69 \pm 8.44$  years, whereas in the control group, it is  $34.56 \pm 10.75$  years. Gender distribution reveals a predominance of females in both groups, constituting 60% in the study group and 56% in the control group. Regarding educational levels, school nursing dominates in both groups, accounting for 36% in the study group and 32% in the control group. In terms of professional experience, more than half of the

participants in both groups reported 1–5 years of experience (64% each). Analysis of training courses highlights a noteworthy observation; the majority of nurses in both the study (72%) and control (64%) groups did not undergo any specific training. Examining the sources of knowledge, it is evident from the study findings that a substantial portion of the study group (48%) lacked identifiable sources of knowledge. In comparison, 32% of the control group attributed the internet as a significant source of information.

**Table (2): Overall nurses knowledge in Study and Control Groups**

Periods Scale =9 Q	Study Group							Control Group						
	Low		Fair		High		Mean	Low		Fair		High		Mean
	N	%	N	%	N	%		N	%	N	%	N	%	
Pre test	14	56.0	9	36.0	2	8.0	12.28	14	56.0	8	32.0	3	12.0	11.76
Post test I	0	0.0	1	4.0	24	96.0	37.48	13	52.0	10	40	2	8.0	12.96
Post test II	1	4.0	1	4.0	23	92.0	35.92	12	48.0	10	40.0	3	12.0	14.08

*Level of Assessment [Low=0-14.33, Fair=14.34-28.66, High=28.67-43]*

In the study group, it was observed that prior to the instructional program (pre-test period), 56% of nurses exhibited a limited knowledge regarding supine and prone positions on physiological parameters in premature infant, with a mean rank of 12.28. Following the instructional intervention (post-test I), there was a notable improvement, as 96% of nurses demonstrated a heightened knowledge level, reflected by a mean rank of 37.48. Upon reevaluation after one month (post-test II), it was found that 92% of nurses maintained the enhanced knowledge levels observed in post-test I, with a mean rank of 35.92. Contrastingly, in the control group, the pretest results unveiled that 56% of nurses possessed a low level of knowledge regarding supine and prone positions on physiological parameters in premature infant (mean rank= 11.76). Post-test, 52% of participants still exhibited low knowledge levels (mean rank= 12.96), and after one month, 48% continued to have low knowledge responses with a mean rank of 14.08.

**Table (3): Comparison overall nurses knowledge in Study and Control Groups**

Periods	Groups	M	SD	t-value	d.f	$\eta^2$	Sig.
Pre-test	Study	.28	.280	0.148	48	.00	.883
	Control	.27	.295				
Post-test I	Study	.87	.112	9.002	48	.62	.000
	Control	.30	.296				
Post-test II	Study	.83	.197	6.919	48	.50	.000
	Control	.32	.309				

*M: Mean, SD: Standard deviation, t: t-test, d.f: Degree of freedom,  $\eta^2$ = Eta squared; Sig: Significance level at 0.05.*

The results suggest that, initially, there was no statistically significant distinction in the overall nurses' knowledge between the study and control groups during the pretest phase (t=0.148; p=0.883), with the absence of a considerable effect size ( $\eta^2$ =

0.00). However, a notable shift occurred in the posttest I, revealing significant differences in overall knowledge between the study and control groups (t=9.002; p=0.000), accompanied by a large effect size attributed to the instructional program

( $\eta^2 = 0.62$ ). Furthermore, these marked disparities in knowledge persisted between the study and control groups at post-test II ( $t=6.919$ ;  $p=0.000$ ),

demonstrating a large effect size ( $\eta^2 = 0.50$ ) associated with the instructional program.

**Table (4): Multiple comparison of the overall nurses knowledge in groups periods**

Groups	Knowledge (I)	Knowledge (J)	Mean Differences (I-J)	Std. Error	Sig.
Study Group	Pre-test	Post-test I	-.58605-*	.05893	.000
		Post-test II	-.54977-*	.05893	.000
	Post-test I	Pre-test	.58605*	.05893	.000
		Post-test II	.03628	.05893	.540
	Post-test II	Pre-test	.54977*	.05893	.000
		Post-test I	-.03628-	.05893	.540
Control Group	Pre-test	Post-test I	-.02791-	.08497	.744
		Post-test II	-.05395-	.08497	.527
	Post-test I	Pre-test	.02791	.08497	.744
		Post-test II	-.02605-	.08497	.760
	Post-test II	Pre-test	.05395	.08497	.527
		Post-test I	.02605	.08497	.760

\*. The mean difference is significant at the 0.05 level.

In the study, participants in the study group demonstrated a significant improvement in their overall knowledge, as indicated by substantial statistical differences between pretest and posttest I ( $p = .000$ ) and between pretest and posttest II ( $p = .000$ ). Notably, such knowledge in posttest I significantly differed from that in the pretest ( $p = .000$ ) and showed no significant difference from posttest II ( $p = .540$ ). Similarly, such knowledge in posttest II significantly differed from the pretest ( $p = .000$ ) and did not differ significantly from

posttest I ( $p = .540$ ). On the other hand, the control group participants did not show significant statistical differences in their overall knowledge between pretest and posttest I ( $p = .744$ ) or between pretest and posttest II ( $p = .527$ ). Specifically, such knowledge in posttest I did not significantly differ from the pretest ( $p = .744$ ) or posttest II ( $p = .760$ ). Likewise, such knowledge in posttest II did not differ significantly from the pretest ( $p = .527$ ) or posttest I ( $p = .760$ ).

**Discussion:**

**Socio-Demographic Characteristics of the Study Sample:**

The study featured in this article is concerned with nurses' demographic profiles and their knowledge

of supine and prone position changes in physiological parameters of premature infants undergoing nasal cannula therapy. The study revealed a significant difference in age between the study group (mean age  $29.69 \pm 8.44$  years) and the

control group (mean age  $34.56 \pm 10.75$  years) which may have been caused by the difference in recruitment strategies, organizational policies or geographical distribution of nurses. Older nurses are the classic example of diverse perspectives, and these nurses are more likely to draw on their extensive experience, while the younger generation of nurses embrace new methods and technologies. The findings combine with other studies that have shown the large numbers of young nurses committed to pediatric nursing in some hospitals (12, 13).

The gender distribution between the two groups is consistent with the current trends in the nursing profession, whereby 60% of the students in the intervention group are females and 56% in the non-intervention group are also females. This serves for the purpose of highlighting the fact that the world-wide trend is the higher number of females in nursing (14). This phenomenon, indeed, stresses the value of taking into account the gender sensitivity when developing and organizing training courses and programs, which should be of great help in solving the problems that female nurses may face within the healthcare sector.

The analysis suggests a high proportion of nurse education in both groups. The most common type of nurse education in the study group was school nurse (36%), while not far behind was the control group with nurses (32%). The findings illustrate the role of the nursing process as a dynamic collaborative effort involving wide nursing knowledge other than the expertise in caring for newborns. There is a great shortage in educational programs so that parents learn how to care for low birth weight babies, especially in supine and prone positions. The research emphasized the fact that more advanced knowledge about neonatal care should be introduced to nursing education programs to prepare nurses to deliver the most professional care. The case of differing educational ground of the nursing staff is one of the key issues to be taken into account in the process of planning tailored interventions and training facilities. This is consistent with studies done in Mosul and Anbar, which make us understand that such approaches

should be considered and overcome if nursing interventions and training are to be efficiently implemented in neonatal care (15, 16).

The investigation finds that between 64% of respondents who have not been in the profession longer than 5 years from the newly graduated nurses to the ones with up to 5 years of experience. The fact that the students are in the delivery room raises questions of their exposure to neonatal care work. Therefore, it is vital to have a detailed curriculum and preserve traditions of nursing. The same result of work, but this time from a study conducted at Al-Diwaniyah Pediatrics Teaching Hospital in Iraq, underlines the need of continuous training because the largest share of the nurses have short-term job experiences. It also reiterates the role of developing the educational capacity and skill development for nursing workforce, with a specific mention of specialized areas like neonatal care (17).

An interesting phenomenon comes to the fore. It is that almost half of the nurses in both the studied group (72%) and the control group (64%) did not receive the specialized training. This implies that a striking knowledge gap and competence void exists among the caregivers of premature babies who are using nasal cannula for therapy. The value of skilful, individual training, which is aimed at neonatal care and all its consequences on the physiology of various positions, cannot be overstated. This observation is consistent with findings of previous studies that examine nurses' attitude towards poisoning of the child (18) and their skills in endotracheal suctioning of a neonate (19). Such consistent emergence of this conclusion as the result of their research leads to the assumption that this is a disturbing and inappropriate trend among nurses. Confronting this divide is essential, which require the reinforcement to upgrade the skill sets of the healthcare workers who are dedicated to their respective fields.

Taking into consideration the source of knowledge within study group, the percentages of information sources which were not traceable to particular sources were as high as 48%. However, the control group comprising 32% of the respondents placed

the internet in the top category as a great source of information. Across the two groups, the distinctions observed bring to mind the intriguing hypothesis of different information-seeking behaviors. The unique use of the internet in the control group is a manifestation of the digital platforms' ability to inspire a transformative culture of learning which is an essential ingredient for the continuous development of the nursing profession. Disparity in knowledge sources through the revelation is a reminder that approaches of evidence-based information dissemination should be individualized and target the nurses practicing specifically in the neonatal care practices. This finding closely reflects the findings from other healthcare institutions like Al-Basrah Hospital for Maternal and Children (20) and Maternity Hospitals in Baghdad City (21). It emphasizes the need of tailor-made programs for combating the knowledge gaps in healthcare workers and encouraging the creation of a well-informed workforce.

#### **Knowledge Level:**

The findings of the research unequivocally indicate that the expertise of nurses about supine and prone positions on physiological variables in premature infants were improved by the instructional program. The difference in rank from mean rank of 12.28 in pre-test to 37.48 in post-test I among the study group which is a great improvement. This statement, therefore, is consistent with the literature on the effectiveness of tailored educational interventions in improving healthcare experts' knowledge and skills (22, 23). In addition, the fact that the tested for knowledge of 92% nurses was still sustained in their post test II results point to the long term effect of the instructional program.

Instead, the control group's results provided a vivid contrast, where there was only a marginal increase in knowledge level. The increase of mean rank from 11.76 in the pre-test to 12.96 in the post-test may be a sign of the participants' improved ability to retain and apply the information. However, the low level of knowledge (only 52% achieved a mean rank of 14.08) after one month indicates that retention and application of the given information

is limited. This separation between the study and the control group groups emphasizes the unique effectiveness of the instructional program in leading to sustained knowledge uplift. This is the evidence of a need for personalized educational programmes for health-care workers, which aim to fill in certain knowledge gaps, and therefore to positively affect the quality of patient care outcomes (24).

#### **Statistical Differences between study and control groups:**

The finding that there was no statistic difference in knowledge in general between the study and control groups at the beginning of the study ( $t=0.148$ ;  $p=0.883$ ) shows that the level of knowledge of the two groups was the same before starting the instructional program. This result coincides with the earlier studies which gave more priority to the development of comparability in the from which the experimental group is being drawn and the control group. This is to help in the validity of the intervention effects (25). The fact that the size effect ( $\eta^2= 0.00$ ) is not considerable strengthens this argument even more and shows that the remaining observed differences were likely due to random variation.

While the test-retest score change of case and control groups is a significant difference, with an overwhelming t-value ( $t=9.002$ ) and p-value ( $p=0.000$ ), and a large effect size ( $\eta^2=0.62$ ), it is obvious that the instructional program has enhanced learning independently. It corresponds to the educational theories that advocate for targeted intervention based on the requirements of the singular individual and the prospects for learning (26). The overall difference between student groups at the post-test II ( $t=6.919$ ;  $p=0.000$ ) leads to a large effect size  $\eta^2= 0.50$ , which is the proof that the program does affect all students in the same way. This goes in agreement with the literature that point out the importance of evaluation of educational intervention that the impact of the intervention is periodically investigated and reported to check the sustainability of the intervention as well (27). These results, which clearly highlight the important role of education in

elevating the level of the nurses' knowledge, demonstrate that the influence is not only short-term but may last for a long time.

### **Statistical Differences between periods of measurement:**

According to the study, the outcome provides significant support of achieving the objectives of the intervention and improving the participants' general knowledge. The study group showed statistically significant improvement that was rather substantial, as the difference between pretest and posttest one values ( $p = .000$ ) and the difference between pretest and posttest II ( $p = .000$ ) demonstrates. The similarity in posttest I and posttest II knowledge ( $p = .540$ ) signifies a stable level of knowledge retention over time, thus the intervention is retained for an extended period. They agreed with the previous publication, which highlighted the promotion of specific activities in educational environment (28). On the contrary, the control group's lack of significant differences among groups at pretest and at posttest I ( $p = .744$ ) or pretest and at posttest II ( $p = .527$ ) shows that the changes in knowledge acquisition were not noticeable without intervention. A derived

comparable outcome of knowledge levels between posttest I and posttest II ( $p = .760$ ) demonstrated that there was no continuing effect after the intervention. This finds expression in the research pinpointing active learning strategies as the basis for the accomplishment of the learning goals (29). Summarily, these findings reveal the efficacy of the intervention in promoting a firm and long-standing change in participants' understanding level.

### **Conclusions:**

An educational program focusing on these conditions and their impact on premature infants receiving nasal cannula therapy resulted in a significant increase in the intervention group's knowledge scores during posttest. The high scores obtained by the intervention group on the final knowledge test showed that the program was sustainable and that its benefits would last longer.

### **Recommendations:**

Integrate similar educational programs into nursing training to enhance nurses' understanding and performance in caring for premature infants in different positions were highly recommended.

### **References:**

1. Owen LS, Manley BJ, Davis PG, Doyle LW. The evolution of modern respiratory care for preterm infants. *The Lancet*. 2017 Apr 22;389(10079):1649-59.
2. Taheri S, Masoumpoor A, Marofi M, Nasiri M. Effect of Environmental and Behavioral Interventions on Physiological and Behavioral Responses of Premature Neonate Candidates Admitted for Intravenous Catheter Insertion in Neonatal Intensive Care Units. *Middle East Journal of Family Medicine*. 2017 Oct 1;7(10):29.
3. Ali SK, Mohammed N, Qureshi N, Gupta S. Oxygen therapy in preterm infants: Recommendations for practice. *Paediatrics and Child Health*. 2021 Jan 1;31(1):1-6.
4. Eltaky EM. Oxygen Therapy and Their Risk in The Premature Neonates. *The Egyptian Journal of Hospital Medicine*. 2022 Jan 1;86(1):447-51.
5. Saugstad OD. Oxygenation of the immature infant: a commentary and recommendations for oxygen saturation targets and alarm limits. *Neonatology*. 2018 Apr 18;114(1):69-75.
6. Stark A, Dammann C, Nielsen HC, Volpe MV. A pathogenic relationship of bronchopulmonary dysplasia and retinopathy of prematurity? A review of angiogenic mediators in both diseases. *Frontiers in pediatrics*. 2018 Jun 13;6:125.

7. Singh Y, Tissot C, Fraga MV, Yousef N, Cortes RG, Lopez J, Sanchez-de-Toledo J, Brierley J, Colunga JM, Raffaj D, Da Cruz E. International evidence-based guidelines on Point of Care Ultrasound (POCUS) for critically ill neonates and children issued by the POCUS Working Group of the European Society of Paediatric and Neonatal Intensive Care (ESPNIC). *Critical Care*. 2020 Dec;24:1-6.
8. Bhandari AP, Nnate DA, Vasanthan L, Konstantinidis M, Thompson J. Positioning for acute respiratory distress in hospitalised infants and children. *Cochrane Database of Systematic Reviews*. 2022(6).
9. Siddicky SF, Bumpass DB, Krishnan A, Tackett SA, McCarthy RE, Mannen EM. Positioning and baby devices impact infant spinal muscle activity. *Journal of biomechanics*. 2020 May 7;104:109741.
10. Purdy IB, Melwak MA, Smith JR, Kenner C, Chuffo-Siewert R, Ryan DJ, Geller PA, Hall S. Neonatal nurses NICU quality improvement: embracing EBP recommendations to provide parent psychosocial support. *Advances in Neonatal Care*. 2017 Feb 1;17(1):33-44.
11. Al-Bahadli NQ, Al-Mosawi KM. Effectiveness of an Instructional Program on Nurses' Practices toward Change Position Effect of Preterm Babies with Respiratory Disorders. *Kufa Journal for Nursing Sciences*. 2023 Aug 9;13(2):161-70.
12. Hussein WA, Abbas IM. Effectiveness of Education Program on Nurse-Midwife's Knowledge Regarding Immediate Newborn Care in Delivery Rooms at Maternity Hospitals in Baghdad City/Iraq. *Indian Journal of Forensic Medicine & Toxicology*. 2021 Jun 2;15(3):5069-74.
13. Saeed M, Khatam AM. Effectiveness of Health Education Program on Nurses' Knowledge toward Hemodialysis at Pediatric Teaching Hospitals in Baghdad City. *Iraqi National Journal of Nursing Specialties*. 2020 Jun 30;33(1):73-84.
14. Mohammed AR, Ghafel HH. Effectiveness of Educational Program on Nurse's Knowledge and Practices Regarding Management of Pregnancy with Danger Signs. *Pakistan Journal of Medical & Health Sciences*. 2022 May 11;16(03):1074-.
15. Majeed HM. Assessment of knowledge and practices of intensive care unit nurses about endotracheal suctioning for adult patients in Baghdad teaching hospitals, Iraq. *Int J Res Med Sci*. 2017 Apr;5(4):1396-404.
16. Mahmood WA, Khudur KM. Effectiveness of an Educational Program on Nurses' Knowledge and Practices Concerning Nursing Management of patients' with Vascular Access in Dialysis Centers at Baghdad Teaching Hospitals. *Indian Journal of Forensic Medicine & Toxicology*. 2020 Jul 1;14(3).
17. Kadhim NS, Shawq AH. The Effects of Constructed Program on Nurses Practices of Poisoned Children. *Journal of Research in Medical and Dental Science*. 2023 May;11(5):39-41.
18. Jassm A, Aziz A. Effectiveness of Health Educational Program on Nurses' Knowledge toward Children Pneumonia in Al-Amara City Hospitals. *Iraqi National Journal of Nursing Specialties*. 2020 Jun 30;33(1):44-52.
19. Khudhayer HF, Adulwahhab MM. The Evaluation of Nurses' Practices regarding Electronic Nursing Documentation. *Iraqi National Journal of Nursing Specialties*. 2023 Jul 5;36(1):1-7
20. Hussein ZA. Evaluation of Nurses' Practices toward Caring of Children with Febrile Convulsion. *Iraqi National Journal of Nursing Specialties*. 2022;35(2).
21. Ahmed M, Radha A. Nurses' Knowledge and Skills regarding Oxygen Administration Methods at Pediatric Teaching Hospitals in Mosul City. *Iraqi*

- National Journal of Nursing Specialties. 2020 Dec 30;33(2):40-50.
22. Ahmed AT, Hassan HB. Assessment of Nurses' knowledge about Enteral Feeding at Critical Care Units in Hospitals of Al-Anbar Governorate. *Iraqi National Journal of Nursing Specialties*. 2021;34(2):66-73.
23. Khanjari S, Bordbar A, Haghani S, Khani M. Effect of Training Nurses in the Process of Weaning Premature Infants from Mechanical Ventilation on Infection Incidence in Neonatal Intensive Care Units. *Iranian Journal of Neonatology*. 2022 Jul 1;13(3).
24. Reis N, Gaspar LJ, Paiva A, Pereira F, Sousa P, Machado N. Strategy nursing in children with compromised ventilation: Umbrella review. *Journal of Pediatric Nursing*. 2023 Nov 1;73:137-56.
25. Bianco F, Salomone F, Milesi I, Murgia X, Bonelli S, Pasini E, Dellacà R, Ventura ML, Pillow J. Aerosol drug delivery to spontaneously-breathing preterm neonates: lessons learned. *Respiratory Research*. 2021 Dec;22:1-31.
26. Maroungkas A, Troussas C, Krouska A, Sgouropoulou C. Virtual reality in education: a review of learning theories, approaches and methodologies for the last decade. *Electronics*. 2023 Jun 26;12(13):2832.
27. Kraft MA. Interpreting effect sizes of education interventions. *Educational Researcher*. 2020 May;49(4):241-53.
28. Liu JJ, Ein N, Gervasio J, Battaion M, Reed M, Vickers K. Comprehensive meta-analysis of resilience interventions. *Clinical psychology review*. 2020 Dec 1;82:101919.
29. Beck J, Greenwood DA, Blanton L, Bollinger ST, Butcher MK, Condon JE, Cypress M, Faulkner P, Fischl AH, Francis T, Kolb LE. 2017 National standards for diabetes self-management education and support. *The Diabetes Educator*. 2018 Feb;44(1):35-50.