

## Effectiveness of an Instructional Program on Nurses' Knowledge about Change Position Effect of Preterm with Respiratory Disorders

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### Abstract

*Background: Positioning is one of the most important elements of developmental care that helps maintain the infant flexible, aligned, confined and comfortable, to reduce the number of days spent on ventilation, to shorten hospital stays and to encourage self-regulation and sleep. Therefore, this study aims to examine the effectiveness of an instructional program on nurses' knowledge about the effect of positioning of preterm infants with respiratory disorders.*

*Materials & Methods: A quasi-experimental design was used to guide this study. This study was initiated from December 20th, 2022 to May 22th, 2023. The study was conducted in Maysan Hospital for Child and Birth. A non-probability "convenience" sample was selected and consisting of 50 Nurses. The data was obtained by a constructive self-report questionnaire. Descriptive and inferential statistics were used to analyze the data by using SPSS (version 26.0)*

*Results: The study results revealed that there were statistically significant differences in nurses' general knowledge about the effect of positioning of preterm infant, knowledge about the benefits of the position change of preterm infant, knowledge about the complications of improper positioning of preterm infant, and the overall knowledge about the effect of positioning of preterm infant over time.*

*Conclusion: The administered instructional program enhanced general knowledge about the effect of positioning of preterm infant, knowledge about the benefits of changing the position of preterm infant, knowledge about the complications of improper position of preterm infant, and the overall knowledge about effect of positioning of preterm infant over time.*

**Keywords:** *Instructional program; Nurses' Knowledge; Position; Preterm; Respiratory Disorders.*

### Introduction

Preterm infants represent a particularly vulnerable population that demands highly specialized nursing care and advanced medical interventions to achieve optimal survival and growth outcomes.<sup>1</sup> A neonate who is born with a gestational age of less than 37 weeks and a birth weight that is usually below 2500 grams is referred to as a preterm infant.<sup>2</sup> The neonatal period is a critical phase in human development due to the

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increased likelihood of encountering life-threatening illnesses and the intricate nature of the neonate's adaptive mechanisms.<sup>3</sup> Prematurity is still the major cause of newborn morbidity and mortality in neonatal intensive care unit (NICU) all over the world. It is considered as the second most common cause of infant fatalities, after congenital abnormalities.<sup>4</sup> Preterm infants are more susceptible to systemic issues in general, particularly respiratory. Breathing is challenging for preterm babies because of their underdeveloped lungs, weak cough reflex, and constrained airways. Many preterm infants have unstable breathing, hypoventilation, and frequent apnea due to their flexible thorax, immature regulatory center, and underdeveloped lung tissue. As a result, they might develop conditions such as decreased breathing, irregular heartbeat, low oxygen saturation, apnea, and excess gastric residue.<sup>5</sup> One of the most frequent causes of an infant's admission to the neonatal intensive care unit is respiratory distress; 29% of preterm infants and 15% of term infants referred to the unit experience considerable respiratory morbidity.<sup>6</sup> In preterm infants, it is characterized by shallow or deep breathing, grunting, retractions, nasal flaring, chest in drawn, wheezing, and cyanosis.<sup>7</sup> The preterm infant's medical care should be holistic in the NICU, which is responsible for all aspects of care.<sup>8</sup> There are numerous respiratory care techniques for enhancing and sustaining optimal oxygenation and heart rate range.<sup>9</sup> In this context, proper position is seen as a crucial non-pharmacological intervention in premature neonates admitted to NICUs.<sup>10</sup> The positioning of preterm infants is a critical component of developmental care in NICU.<sup>11</sup> Proper positioning techniques can enhance the comfort level of infants and facilitate their posture and movements. It facilitates the process of gas exchange while reducing the occurrence of pathological conditions. According to investigations, certain infants having respiratory problems tend to assume a specific position that facilitates their breathing.<sup>12</sup> The optimal care for preterm babies in the NICU involves a diverse range of positions, such as supine, prone and side-lying. In the case of preterm neonates, it is noteworthy that varying positions may cause disparate outcomes.<sup>8</sup> On the other hand, holding preterm babies in a single position for an extended period of time and placing them on inappropriate positions can result in medical concerns such as increased stress and agitation, decreased physiological stability, disrupted sleep, chronic pain, and long-term position issues.<sup>13</sup> Body deformity caused by improper position maintenance impacts preterm infants' midline alignment and motor development, including sitting, crawling, walking, and moving.<sup>12</sup> Therefore, inappropriately placing babies may create short and long-term position related developmental issues.<sup>14</sup> So, therapeutic positioning of preterm newborns is an essential technique that a nurse can start using right away and integrate successfully into care to have a favorable impact on the preterm infant's future development.<sup>15</sup> NICU nurses consider the medical staff who spend most of their time in contacting with preterm babies and providing them with treatment and nursing care when they are in the hospital.<sup>16</sup> They must pay more attention to nursing treatments, bedside monitoring, and a unique action plan are required for reducing problems.<sup>17</sup> Because significance of the nurse's role in neonatal care cannot be overstated, as they are often the first healthcare provider to attend to the neonate so, the purpose of this study is to determine the effectiveness of an instructional program in enhancing nurses' knowledge about the effect of changing position of preterm infants with respiratory disorders.

## Methodology

**Study Design:** A quasi-experimental study design is carried out to evaluate effectiveness of an instructional program on nurse's knowledge about effect of positioning of preterm with respiratory disorders. The period of the study was beginning from December 20th, 2022 to May 22nd, 2023.

**Ethical Considerations:** All nurses provided their permission to the researcher. In addition, the researcher describes the research and its objectives to all nurses. Therefore, fully informed about their mission was obtained. The researcher informed all participants

that the questionnaire data would be used exclusively for research purposes. Also told them that all participants are autonomous individuals have the right to refuse involvement.

**Setting of the Study:** The study was conducted in Maysan Hospital for Child and Birth in Al-Amarah City.

**Study Sample:** A non-probability "convenience" sample of 50 nurses who were selected from Maysan Hospital for Child and Birth in Al-Amarah City. The study participants were divided into two groups (25 nurses in the study group and 25 nurses in the control group). Participants in the study group were exposed to the instructional program while the control group was not exposed to the program.

**Measures:** The study instrument was constructed after an extensive review of the literature relevant to positioning of preterm infants which includes nurses' sociodemographic characteristics of age, gender, educational level besides their years of career in the nursing and in NICU. It also includes 30 items about General knowledge about respiratory disorders of preterm infants and positions (12 items), benefits and importance of changing preterm infants' positions (10 items), and complications of improper positions (8 items). These items are measured on a 3-point Likert scale and rated as 3 for (I know), 2 for (Not sure) and 1 for (I do not know). The final form of the study instrument was translated into Arabic by two bilingual faculty members. Data were collected using a self-reported tool. Each nurse was given about (15-25) minutes to answer the questionnaire.

The study instrument reliability was examined on a pilot sample of 6 nurses using Cronbach's alpha (General knowledge about respiratory disorders of preterm infants and positions 0.88, benefits and importance of changing preterm infants' positions 0.86, and complications of improper positions 0.90).

## **Study Procedure**

### **Instructional Program**

The instructional program was designed based on the results of the preliminary nurses' need assessment and reviewing the literature relevant to preterm infants' positioning who experience respiratory disorders. The teaching materials that were used during the instructional program sessions included (Data show presentation and interactive discussion).

### **The Study Instrument Validity**

The content validity of the study instrument was examined using the content validity index (CVI) Lynn (1986) recommended standardizing the options on this scale to read as follows: "1 = not relevant; 2 = unable to assess relevance without item revision or item is in need of such revision that it would no longer be relevant; 3 = relevant but needs minor alteration; 4 = very relevant and succinct" (p. 384).<sup>18</sup> Prior to the collection of data, the study instrument was presented to a panel of 5 experts who have experience that ranges from 10-40-years in the field of specialization. The yielded CVI for the General Knowledge was 0.92, the CVI for the Benefits of Changing the preterm infants' position was 0.90, the CVI for the Complications of Changing the preterm infants' position was 0.88, and the CVI for the overall knowledge was 0.90.

**Data Analysis:** The Statistical Package for Social Sciences (SPSS) version (26) was used to analyses the data. The descriptive statistical measures of frequency and percent were utilized, as well as the arithmetic mean and standard deviation. The repeated measurements analysis of variance (RM-ANOVA) is an inferential statistical measure.

## Results

Table 1. Participants' socio-demographic characteristics

Variable	Study Group (N = 25)		Control Group (N = 25)	
	Frequency	Percent	Frequency	Percent
<b>Age (Years): Mean (Std. Dev.)</b> Study: 26.4 ± 4.18 Control: 26.28 ± 2.62				
<b>Gender</b>				
Male	3	12.0	3	12.0
Female	22	88.0	22	88.0
<b>Educational Qualification</b>				
Nursing School	10	40.0	10	40.0
Associate degree	9	36.0	12	48.0
Bachelor's degree	6	24.0	3	12.0
<b>Years of Experience in nursing: Mean (Std. Dev.)</b> Study: 4.96 ± 4.34 Control: 3.08 ± 2.27				
<b>Years of Experience in NICU: Mean (Std. Dev.)</b> Study: 3.034± 2.54 Control: 2.08 ± 1.55				

Std. Dev.: Standard Deviation

The study results display the mean age of participants in the study group is 26.4 ± 4.18 compared to their counterparts in the control group which is 26.28 ± 2.62.

Concerning gender, the majority in both groups were females (n = 22; 88.0%) compared to males (n = 3; 12.0%).

Regarding the educational qualification, two-fifths in the study group are nursing school graduates (n = 10; 40.0%), followed by those who hold an associate degree (n = 9; 36.0%), and those who hold a bachelor's degree (n = 6; 24.0%). For the control group, two-fifth are nursing school graduates (n = 10; 40.0%), followed by those who hold an associate degree (n = 12; 48.0%), and those who hold a bachelor's degree (n = 3; 12.0%).

With respect to the years of experience in nursing, the mean duration for participants in the study group is 4.96 ± 4.34 compared to their counterparts in the control group 3.08 ± 2.27.

As per the years of experience in NICU, the mean duration for participants in the study group is 3.034± 2.54 compared to their counterparts in the control group 2.08 ± 1.55.

Table 2. Tests of Within-Subjects Effects for the general knowledge

Measure: MEASURE_1							
Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
General Study	Sphericity Assumed	1305.307	2	652.653	172.736	.000	.878
	Greenhouse-Geisser	1305.307	1.799	725.492	172.736	.000	.878
	Huynh-Feldt	1305.307	1.936	674.239	172.736	.000	.878
	Lower-bound	1305.307	1.000	1305.307	172.736	.000	.878
Error (General Study)	Sphericity Assumed	181.360	48	3.778			
	Greenhouse-Geisser	181.360	43.181	4.200			
	Huynh-Feldt	181.360	46.463	3.903			
	Lower-bound	181.360	24.000	7.557			
Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
General Control	Sphericity Assumed	192.027	2	96.013	31.428	.000	.567
	Greenhouse-Geisser	192.027	1.382	138.998	31.428	.000	.567
	Huynh-Feldt	192.027	1.439	133.487	31.428	.000	.567
	Lower-bound	192.027	1.000	192.027	31.428	.000	.567
Error (General Control)	Sphericity Assumed	146.640	48	3.055			
	Greenhouse-Geisser	146.640	33.156	4.423			
	Huynh-Feldt	146.640	34.525	4.247			
	Lower-bound	146.640	24.000	6.110			

df: Degree of freedom; F: F-Statistics; Sig: Significance

There was a (a priori  $p = 0.01$ ) significant difference ( $F(1.799, 1.382) = 172.736, p = 0.01$ ) in the general knowledge about changing the preterm infants' position over time for participants in the study group. The omnibus effect (measure of association) for this analysis is .878, which indicates that approximately 87% of the total variance in the general knowledge about changing the preterm infants' position values is accounted for by the variance in the administered intervention.

For the control group, there was a (a priori  $p = 0.01$ ) significant difference ( $F(1.382, 33.156) = 31.4280, p = 0.01$ ) in the general knowledge about changing the preterm infants' position over time. The omnibus effect (measure of association) for this analysis is .567, which indicates that approximately 56% of the total variance in the general knowledge about changing the preterm infants' position values is accounted for by the chance.

Table 3. Tests of Within-Subjects Effects for the knowledge about the benefits of changing the preterm infants' position

Tests of Within-Subjects Effects							
Measure: MEASURE_1							
Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Benefits Study	Sphericity Assumed	864.240	2	432.120	108.165	.000	.818
	Greenhouse-Geisser	864.240	1.666	518.880	108.165	.000	.818
	Huynh-Feldt	864.240	1.775	486.943	108.165	.000	.818
	Lower-bound	864.240	1.000	864.240	108.165	.000	.818
Error (Benefits Study)	Sphericity Assumed	191.760	48	3.995			
	Greenhouse-Geisser	191.760	39.974	4.797			
	Huynh-Feldt	191.760	42.596	4.502			
	Lower-bound	191.760	24.000	7.990			
Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Benefits Control	Sphericity Assumed	16.507	2	8.253	1.897	.161	.073
	Greenhouse-Geisser	16.507	1.584	10.418	1.897	.171	.073
	Huynh-Feldt	16.507	1.678	9.838	1.897	.169	.073
	Lower-bound	16.507	1.000	16.507	1.897	.181	.073
Error (Benefits Control)	Sphericity Assumed	208.827	48	4.351			
	Greenhouse-Geisser	208.827	38.026	5.492			
	Huynh-Feldt	208.827	40.269	5.186			
	Lower-bound	208.827	24.000	8.701			

df: Degree of freedom; F: F-Statistics; Sig: Significance

There was a (a priori  $p = 0.01$ ) significant difference ( $F(1.666, 39.974) = 108.165, p = 0.01$ ) in the knowledge about the benefits of changing the preterm infants' position over time for participants in the study group. The omnibus effect (measure of association) for this analysis is .818, showing that the variance in the administered intervention accounts for around 81% of the total variance in knowledge about the benefits of changing the position values of preterm babies.

For the control group, there was no significant difference ( $F(1.584, 38.026) = 1.897, p = 0.171$ ) in the knowledge about the benefits of changing the preterm infants' position over time. The omnibus effect (measure of association) for this study is .037, indicating that chance accounts for approximately 3% of the entire variance in knowledge about the benefits of changing the position values of preterm babies.

Table 4. Tests of Within-Subjects Effects for the knowledge about the complications of changing the preterm infants' position

Tests of Within-Subjects Effects							
Measure: MEASURE_1							
Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Complications Study	Sphericity Assumed	291.120	2	145.560	36.099	.000	.601
	Greenhouse-Geisser	291.120	1.407	206.917	36.099	.000	.601

	Huynh-Feldt	291.120	1.468	198.269	36.099	.000	.601
	Lower-bound	291.120	1.000	291.120	36.099	.000	.601
Error (Complications Study)	Sphericity Assumed	193.547	48	4.032			
	Greenhouse- Geisser	193.547	33.767	5.732			
	Huynh-Feldt	193.547	35.239	5.492			
	Lower-bound	193.547	24.000	8.064			
Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Complications Control	Sphericity Assumed	5.787	2	2.893	.941	.397	.038
	Greenhouse- Geisser	5.787	1.516	3.816	.941	.376	.038
	Huynh-Feldt	5.787	1.597	3.623	.941	.380	.038
	Lower-bound	5.787	1.000	5.787	.941	.342	.038
Error (Complications Control)	Sphericity Assumed	147.547	48	3.074			
	Greenhouse- Geisser	147.547	36.395	4.054			
	Huynh-Feldt	147.547	38.333	3.849			
	Lower-bound	147.547	24.000	6.148			

df: Degree of freedom; F: F-Statistics; Sig: Significance

Participants in the study group had a (a priori  $p = 0.01$ ) significant difference in knowledge about the complications of changing positions of preterm infants with time ( $F(1.407, 33.767) = 36.099, p = 0.01$ ). The omnibus effect (measure of association) for this analysis is .818, indicating that the variance in the administered intervention accounts for about 81% of the total variance in knowledge about the complications of changing the preterm infants' position values.

For the control group, there was no significant difference in knowledge regarding the complications of changing the preterm infants' position over time ( $F(1.516, 36.395) = .941, p = 0.376$ ). The omnibus effect (measure of association) for this study is .038, indicating that chance accounts for nearly 3% of the total variance in knowledge about the complications of changing the position values of preterm babies.

Table 5. Tests of Within-Subjects Effects for the overall knowledge about changing the preterm infants' position

Tests of Within-Subjects Effects							
Measure: MEASURE_1							
Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Overall Study	Sphericity Assumed	6770.347	2	3385.173	210.208	.000	.898
	Greenhouse- Geisser	6770.347	1.716	3944.732	210.208	.000	.898
	Huynh-Feldt	6770.347	1.836	3688.035	210.208	.000	.898
	Lower-bound	6770.347	1.000	6770.347	210.208	.000	.898
Error (Overall Study)	Sphericity Assumed	772.987	48	16.104			
	Greenhouse- Geisser	772.987	41.191	18.766			
	Huynh-Feldt	772.987	44.058	17.545			
	Lower-bound	772.987	24.000	32.208			

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Overall Control	Sphericity Assumed	394.427	2	197.213	20.688	.000	.463
	Greenhouse-Geisser	394.427	1.721	229.128	20.688	.000	.463
	Huynh-Feldt	394.427	1.842	214.138	20.688	.000	.463
	Lower-bound	394.427	1.000	394.427	20.688	.000	.463
Error (Overall Control)	Sphericity Assumed	457.573	48	9.533			
	Greenhouse-Geisser	457.573	41.314	11.075			
	Huynh-Feldt	457.573	44.206	10.351			
	Lower-bound	457.573	24.000	19.066			

df: Degree of freedom; F: F-Statistics; Sig: Significance

There was a (a priori  $p = 0.01$ ) significant difference ( $F(1.716, 41.191) = 210.208, p = 0.01$ ) in the overall knowledge about changing the preterm infants' position over time for participants in the study group. The omnibus effect (measure of association) for this analysis is .898, indicating that the variance in the administered intervention accounts for approximately 89% of the total variance in overall knowledge regarding changing the infants' position values.

For the control group, there was a (a priori  $p = 0.01$ ) significant difference in total knowledge concerning changing the position of preterm newborns with time ( $F(1.721, 41.314) = 20.688, p = 0.01$ ). The omnibus effect (measure of association) for this study is .463, indicating that chance accounts for about 46% of the entire variance in overall knowledge regarding changing the position values of preterm infants.

## Discussion

Results of study indicate that participants' ages; the majority of the nurses in the study were young adult nurses with average age of nurses in the study group is  $26.4 \pm 4$  years, whereas it is  $24 \pm 2.6$  years for nurses in the control group. These outcomes are consistent with the rise in new staff members for healthcare organizations. The results aligned with research done in Iraq which found the majority of the participants in the study in the age group of (20-25) and (26-30) years respectively (19) Regarding gender of nurses, most of them (88%) in the study and control group are female. This finding concurs with a study in Baghdad, which reported that 80% of nurses were female (20) With regard to findings related to education levels, the majority of nurses in the study group (40%) have degrees from "nursing secondary schools." This finding is consistent with research conducted in AL-Nasiriyah City Hospitals, which found that 57% of nurses there are graduates of secondary nursing schools (6). Regarding to nurses experience the average years of experience among the nurses in the study group is  $5 \pm 4$  years, and 44% of them are linked with 7-less than 10 years of experience. This finding is consistent with study conducted in Al-amarah city, who discovered that the majority of nurses had years of experience between 1-10 years (21). Concerning the years working in neonatal units, 80% of study group nurses and 92% of control group nurses have 1-5 years of experience; the average for the study group is  $3 \pm 2.5$  years and the average for the control group is  $2 \pm 1.5$  years. This is one of the things influencing their prenatal care knowledge and abilities. This result is consistent with research done in the ICU of hospitals in Baghdad's medical city (22).



This quasi-experimental study aims mainly to examine the effectiveness of an instructional program in enhancing nurses' knowledge about the effect of Positioning of preterm infants with respiratory disorders.

There was a significant variation in general knowledge about changing the infants' position over time for participants in the study group, with an omnibus effect of .878, indicating that the variance in the administered intervention constitutes approximately 87% of the total variance in general knowledge about changing the preterm infants' position values. For the control group, an omnibus effect of .567, which refers to that roughly 56% of the total variance in the general knowledge about changing the infants' position values is accounted for by chance, indicates that there was a significant difference in general knowledge about changing the infants' position over time. These outcomes demonstrate the effectiveness of the administered instructional program in improving nurses' general knowledge of positioning preterm newborns.

There was an important variation in knowledge about the benefits of positioning of preterm infants for participants in the study group over time, with an omnibus effect of .818, indicating that the variance in the administered intervention comprises approximately 81% of the total variance in knowledge about the benefits of changing the infants' position values. There was no significant difference in the nurses' knowledge regarding the benefits of changing the preterm infants' position for the control group over time. These findings reflect the effectiveness of the administered in enhancing nurses' knowledge about the benefits of changing the infants' position over time for participants in the study group.

There was a significant variation in knowledge about the complications of changing the infants' position over time for participants in the study group, with an omnibus effect of .818, indicating that the variance in the administered intervention represents approximately 81% of the total variance in knowledge about the complications of changing the preterm infants' position values. For the control group, there was no significant variance in the knowledge about the complications of changing the preterm infants' position over time. These results show the effectiveness of the administered instructional program in improving nurses' knowledge about the complications of changing the preterm infants' position over time for participants in the study group.

There was a significant difference in overall knowledge about changing the preterm infants' position over time for participants in the study group, with an omnibus effect for this analysis of .898, indicating that the variance in the administered intervention constitutes around 89% of the total variance in overall knowledge about changing the infants' position values. There was a significant variance in overall knowledge about changing the infants' position over time for the control group, with an omnibus effect of .463, indicating that chance comprises approximately 46% of the total variance in overall knowledge about changing the infants' position values. The results of this study reveal the effectiveness of the administered instructional program in enhancing nurses' overall knowledge about positioning effect of preterm infants for participants in the study group over time.

These findings are consistent with outcomes obtained by (12,23,24,25,26) who observed that after providing the education program, nurses' knowledge about changing the position of preterm infants displayed a visible rising development over time.

## **Conclusion**

The administered instructional program efficiently bettered nurses' knowledge about changing the infants' position, the benefits of changing the infants' position, the complications of changing the infants' position, and the overall knowledge about changing the infants' position.

## Recommendations

The researchers recommend that there must be a great emphasis on the educational aspects at NICU by providing educational program, workshop, posters, guidelines, pamphlets, and modern educational facilities that target enhancing nurses' knowledge about changing the position of preterm infants who experience respiratory disorders.

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