

## Nursing management about Neonatal Total Parenteral Nutrition

Aseel Ali sakran<sup>1</sup>, khatam M. Hattab<sup>2</sup>

<sup>1</sup>MSN, Pediatric Nursing Department, College of Nursing, University of Baghdad, Baghdad, Iraq.

[aseel.ali2104m@conursing.uobaghdad.edu.iq](mailto:aseel.ali2104m@conursing.uobaghdad.edu.iq)

<sup>2</sup>Ph.D., Professor, Pediatric Nursing Department, College of Nursing, University of Baghdad, Baghdad, Iraq.

[dr.khatam@conursing.uobaghdad.edu.iq](mailto:dr.khatam@conursing.uobaghdad.edu.iq)

### ABSTRACT

The expertise and techniques that nurses employ in the administration of neonatal total parenteral nutrition (TPN) have a significant impact on the patients' health as well as their overall well-being. TPN stands for total parenteral nutrition and is an advanced and specialized kind of intravenous nutrition that calls for a high level of knowledge in addition to careful attention to detail. This study aims to evaluate nursing management about neonatal Total Parenteral Nutrition. A quasi-experimental design of the study has been used in the present study during the period from 12th November 2022 to 1st of May 2023. The result show that the overall assessment of nurses' practices; the findings reveals that nurses in the study group are showing poor level of practices during the pre-test time (92%,  $M \pm SD = 46.72 \pm 1.882$ ) while they are showing good level of practices during the post-test 1 (96%,  $M \pm SD = 119.04 \pm 1.904$ ) and post-test 2 (92%,  $M \pm SD = 117.16 \pm 3.223$ ) that indicate the significant changes in level of practices among nurses after applying the program. The study concluded that nurses demonstrated a low level of practice during the pre-test phase. However, the post-test 1 and post-test 2 results indicated a significant improvement in the level of practice among the nurses after the implementation of the program. The study recommended to establish regular training programs aiming to improve nurses' knowledge and practice about TPN.

**Keywords:** Nursing, management, Neonatal, Total Parenteral Nutrition.

### INTRODUCTION

The expertise and techniques that nurses employ in the administration of neonatal total parenteral nutrition (TPN) have a significant impact on the patients' health as well as their overall well-being. TPN stands for total parenteral nutrition and is an advanced and specialized kind of intravenous nutrition that calls for a high level of knowledge in addition to careful attention to detail [1]. The indications for the use of TPN, as well as the potential dangers and issues connected with its administration, are something that registered nurses need to be familiar with. Essential skills for nurses include the capability of performing accurate calculations and mixing of TPN solutions, as well as vigilant monitoring for symptoms of adverse reactions or problems [2].

When patients' intake and output are accurately tracked, as well as any adverse events that may occur, it is possible to intervene in a timely manner and change their TPN regimens as necessary. This is of utmost importance for neonatal children, since even slight shifts in the nutrients they take in can have a substantial impact on their growth and their general health [3].

In order to offer neonatal patients with the highest possible level of care, nurses need to ensure that they are always up to date on the latest medical knowledge and technologies. This involves keeping up to date on any novel TPN formulations and procedures that have been developed, as well as any revisions that have been made to protocols and recommendations [4].

In order to effectively coordinate TPN care with the activities of the other members of the healthcare team, nurses need to possess, in addition to the technical abilities necessary, good communication and teamwork skills. In order to accomplish this, you will need to collaborate closely with medical professionals, pharmacists, and other nurses to ensure that TPN regimens are individualized to meet the requirements of each specific patient [5,9,10,11].

### MATERIALS AND METHODS

**Study Design:** A quasi-experimental design of the study has been used in the present study to assess the effectiveness of an educational program on nurse's knowledge and practices toward neonatal total parenteral nutrition during the period from 12<sup>th</sup> November 2022 to 1<sup>st</sup> of May 2023.

**Setting of the Study:** The study was conducted at medical City Hospitals including Baghdad Teaching Hospital, Privat Nursing Home, Pediatric Teaching Hospital.

**Study Sample:** A convenience sample of 55 nurses was chosen: 25 nurses were exposed to the instructional program as the study group, and another 25 nurses were not exposed to the program as control group. 5 nurses were excluded from the study sample as part of a pilot study.

**Data Collection Methods:** The data was obtained by the researcher utilizing a constructive knowledge

questionnaire, which was then responded to through interviews with closed-ended structured questions. The always response was given a score of (3), the sometimes answer was given a score of (2), and the never answer was given a score of (1). During the morning shifts, the nurses were tested on his or her knowledge. Each nurse was given about (10-15) minutes to complete the test.

**Data Analysis:** The data were analyzed and interpreted through use of the application of Statistical Package for Social Sciences (SPSS), version 26.

## RESULTS

Table 1

Assessment of Nurses' Practices related to "Discontinuing Neonatal Total Parenteral Nutrition" among Study and Control Group

List	Discontinuing Neonatal Total Parenteral Nutrition	Study Group (N=25)						Control Group (N=25)					
		Pre-test		Post-test 1		Post-test 2		Pre-test		Post-test 1		Post-test 2	
		M	Ass.	M	Ass.	M	Ass.	M	Ass.	M	Ass.	M	Ass.
1	Monitoring the nutritional status of the infant, including the ability to benefit from the food given by tube feeding as a supplement.	1.08	Poor	2.92	Good	2.76	Good	1.84	Fair	2.04	Fair	1.84	Fair
2	Monitoring the infant's ability to breastfeed and the response of the digestive system.	1.12	Poor	2.92	Good	2.68	Good	1.72	Fair	1.80	Fair	1.72	Fair
3	Measuring the amount of milk given via tube feeding, if the amount of milk consumed is equal to 120 ml per day, it is possible to stop full parenteral nutrition for the infant and gradually rely on enteral nutrition or breastfeeding.	1.24	Poor	3.00	Good	2.76	Good	1.64	Poor	2.00	Fair	1.80	Fair
4	If there is a package of ready-made parenteral nutrition to be	1.08	Poor	2.84	Good	2.80	Good	1.52	Poor	1.92	Fair	1.84	Fair

	given, I administer it fully and according to the administration schedule before discontinuing parenteral nutrition.												
5	After checking the child's nutritional status, I proceed with the removal of the venous tube designated for feeding.	1.16	Poor	3.00	Good	2.80	Good	1.80	Fair	1.96	Fair	2.04	Fair
6	Discuss the process of discontinuing parenteral nutrition with a specialist consultant in detail before transitioning to another method.	1.24	Poor	2.80	Good	2.72	Good	1.80	Fair	2.04	Fair	2.12	Fair
7	Continuing to administer a 10% concentration of glucose solution via the vein after discontinuing parenteral nutrition for a specified duration as advised by the consultant.	1.08	Poor	3.00	Good	2.80	Good	1.56	Poor	1.64	Poor	2.04	Fair
8	Continuing with tube feeding until the child is able to fully rely on breastfeeding.	1.12	Poor	3.00	Good	3.00	Good	1.48	Poor	1.80	Fair	1.96	Fair
9	Carefully monitoring the child's progress in regards to the food intake over a period of 24 hours.	1.16	Poor	2.88	Good	2.80	Good	1.72	Fair	1.70	Fair	1.96	Fair
10	Regularly measuring the child's weight, length, head	1.16	Poor	2.92	Good	2.76	Good	1.56	Poor	1.58	Poor	1.80	Fair

	circumference, chest circumference, and abdominal circumference.												
<b>Total</b>		<b>1.14</b>	<b>Poor</b>	<b>2.93</b>	<b>Good</b>	<b>2.79</b>	<b>Good</b>	<b>1.66</b>	<b>Poor</b>	<b>1.85</b>	<b>Fair</b>	<b>1.91</b>	<b>Fair</b>

M: Mean, Poor= 1 – 1.66, Fair= 1.67– 2.33, Good= 2.34 – 3

The table 1 presents the assessment of nurses' practices about "Discontinuing Neonatal Total Parenteral Nutrition"; the findings among the study group reveal that nurses are showing poor level of practices during the pre-test time (Mean= 1.14), while they show good level of practices during the post-test 1 (Mean= 2.93) and post-test 2 (Mean= 2.79).

The nurses in the control group show poor level of practices during the pre-test time (Mean= 1.66) while show fair level during post-test 1 (Mean= 1.85), and post-test 2 (Mean= 1.91).

**Table (2): Assessment of Nurses' Practices related to "Psychological and Educational Support for the Parents of a Newborn with Total Parenteral Nutrition" among Study and Control Group**

List	Psychological and Educational Support for the Parents of a Newborn with Total Parenteral Nutrition	Study Group (N=25)						Control Group (N=25)					
		Pre-test		Post-test 1		Post-test 2		Pre-test		Post-test 1		Post-test 2	
		M	Ass.	M	Ass.	M	Ass.	M	Ass.	M	Ass.	M	Ass.
1	I rely on my knowledge and experience to explain the total parenteral nutrition to the mother and the newborn's family.	1.20	Poor	2.96	Good	2.76	Good	1.28	Poor	1.28	Poor	1.40	Poor
2	Explaining to the newborn's family that this type of feeding may seem initially risky because of the venous catheter and the child's condition being monitored, but it is necessary for the child's survival, health improvement, and growth within a specified time period.	1.12	Poor	2.92	Good	2.68	Good	1.52	Poor	1.52	Poor	1.68	Fair
3	Explaining the newborn's	1.08	Poor	2.88	Good	2.92	Good	1.64	Poor	1.65	Poor	1.64	Poor

	digestive system condition, and educating the family about the stages of growth and adaptation of the newborn's digestive system to advanced breastfeeding as the child grows.												
4	Explaining the key points about Total Parenteral Nutrition to the family, including the temporary nature of TPN, as it is only for a specified period of time and not for a lifetime. Explaining the content of the ready-made TPN bags and the components and importance of each component.	1.16	Poor	2.88	Good	2.92	Good	1.64	Poor	1.63	Poor	1.64	Poor
5	Collaborating with the family and providing all important information to reduce their fear and anxiety.	1.16	Poor	2.84	Good	2.92	Good	1.76	Fair	1.72	Fair	1.77	Fair
6	Providing the necessary consultation and essential advice regarding the child's condition and the comfort of the family.	1.16	Poor	2.92	Good	2.88	Good	1.72	Fair	1.80	Fair	1.79	Fair
<b>Total</b>		<b>1.15</b>	<b>Poor</b>	<b>2.90</b>	<b>Good</b>	<b>2.85</b>	<b>Good</b>	<b>1.59</b>	<b>Poor</b>	<b>1.60</b>	<b>Poor</b>	<b>1.64</b>	<b>Poor</b>

M: Mean, Poor= 1 – 1.66, Fair= 1.67– 2.33, Good= 2.34 – 3

The table 2 presents the assessment of nurses' practices "Psychological and Educational Support for the Parents of a Newborn with Total Parenteral Nutrition"; the findings among the study group reveal that nurses are showing poor level of practices during

the pre-test time (Mean= 1.15), while they show good level of practices during the post-test 1 (Mean= 2.90) and post-test 2 (Mean= 2.85).

The nurses in the control group show poor level of practices during the pre-test time (Mean= 1.59), post-

test 1 (Mean= 1.60), and post-test 2 (Mean= 1.64).

**Table (4-6): Assessment of Nurses' Practices related to "Pre-total Parenteral Nutrition Administration" among Study and Control Group**

List	Pre-total Parenteral Nutrition Administration	Study Group (N=25)						Control Group (N=25)					
		Pre-test		Post-test 1		Post-test 2		Pre-test		Post-test 1		Post-test 2	
		M	Ass.	M	Ass.	M	Ass.	M	Ass.	M	Ass.	M	Ass.
1	Matching the physician's prescription with the label on the TPN bag.	1.28	Poor	2.88	Good	2.84	Good	1.80	Fair	1.80	Fair	1.80	Fair
2	Placing the TPN bag at room temperature for an hour before administering it.	1.00	Poor	2.96	Good	2.92	Good	2.16	Fair	2.16	Fair	2.16	Fair
3	Checking the quality of the nutrition solution for color, consistency, and expiration date.	1.28	Poor	2.92	Good	2.92	Good	1.72	Fair	1.70	Fair	1.71	Fair
4	Returning the solution to the pharmacy if there are any potential issues with the solution.	1.12	Poor	2.92	Good	2.84	Good	1.76	Fair	1.77	Fair	1.75	Fair
5	Documenting important information such as the administration rate, time of administration, and the required dosage.	1.12	Poor	2.92	Good	2.84	Good	1.52	Poor	1.53	Fair	1.51	Poor
6	Confirming the name of the neonates.	1.08	Poor	2.96	Good	3.00	Good	2.24	Fair	2.22	Fair	2.23	Fair
7	Washing hands before starting the administration process in accordance with the hospital's policy.	1.24	Poor	2.76	Good	2.96	Good	1.72	Fair	1.77	Fair	1.75	Fair
8	Ensuring the method of	1.04	Poor	3.00	Good	2.88	Good	1.44	Poor	1.50	Poor	1.46	Poor

	administering the parenteral nutrition solution, whether by peripheral or central venous route.												
9	Inserting an appropriate IV canula as specified if the child hasn't previously had one inserted.	1.16	Poor	2.88	Good	2.84	Good	1.40	Poor	1.44	Poor	1.72	Poor
10	Preparing the necessary supplies for parenteral nutrition.	1.08	Poor	2.80	Good	3.00	Good	1.64	Poor	1.60	Poor	1.61	Poor
11	Wearing sterile gloves when administering parenteral nutrition.	1.16	Poor	2.96	Good	2.64	Good	1.20	Poor	1.22	Poor	1.18	Poor
<b>Total</b>		<b>1.14</b>	<b>Poor</b>	<b>2.91</b>	<b>Good</b>	<b>2.88</b>	<b>Good</b>	<b>1.69</b>	<b>Fair</b>	<b>1.70</b>	<b>Fair</b>	<b>1.68</b>	<b>Fair</b>

M: Mean, Poor= 1 – 1.66, Fair= 1.67– 2.33, Good= 2.34 – 3

The table 3 presents the assessment of nurses' practices about "Pre-total Parenteral Nutrition Administration"; the findings among the study group reveal that nurses are showing poor level of practices during the pre-test time (Mean= 1.14), while they

show good level of practices during the post-test 1 (Mean= 2.91) and post-test 2 (Mean= 2.88).

The nurses in the control group show fair level of practices during the pre-test time (Mean= 1.69), post-test 1 (Mean= 1.70), and post-test 2 (Mean= 1.68).

**Table (4): Assessment of Nurses' Practices related to "Intra-total Parenteral Nutrition Administration" among Study and Control Group**

List	Intra-total Parenteral Nutrition Administration	Study Group (N=25)						Control Group (N=25)					
		Pre-test		Post-test 1		Post-test 2		Pre-test		Post-test 1		Post-test 2	
		M	Ass.	M	Ass.	M	Ass.	M	Ass.	M	Ass.	M	Ass.
1	Maintaining proper sterilization while connecting tubes to the catheter.	1.04	Poor	2.84	Good	3.00	Good	1.12	Poor	1.10	Poor	1.14	Poor
2	Adjusting the flow rate and starting the administration process according to the physician's prescription.	1.16	Poor	2.96	Good	2.92	Good	1.52	Poor	1.50	Poor	1.51	Poor

3	Administering the parenteral glucose solution with a 10% concentration and according to the amount prescribed by the physician, to prevent hypoglycemia.	1.16	Poor	2.88	Good	2.88	Good	1.56	Poor	1.58	Poor	1.55	Poor
4	Make sure to check the correct drip rate and monitor the administration device every 30 minutes or less as needed.	1.16	Poor	2.80	Good	2.84	Good	1.76	Fair	1.79	Fair	1.77	Fair
5	After completing the prescribed dose, I prepare the next dose while maintaining sterilization while changing between the prescribed solutions and doses.	1.04	Poor	2.92	Good	3.00	Good	1.92	Fair	1.88	Fair	1.93	Fair
6	Exchanging tubes and filters that are specified for administration each 24 hours.	1.12	Poor	2.84	Good	2.80	Good	1.68	Fair	1.65	Fair	1.66	Fair
7	Monitoring the site of the intravenous catheter every 24 hours, and change the bandages and plasters immediately if they get dirty or if they become wet.	1.16	Poor	2.88	Good	2.80	Good	1.56	Poor	1.58	Poor	1.55	Poor
8	Inspect and examine the skin around the site of the catheter to ensure the presence of redness or abnormal warmth, which	1.08	Poor	2.92	Good	2.92	Good	1.28	Poor	1.20	Poor	1.27	Poor



	indicates the presence of phlebitis.												
9	Monitoring and documenting the child's vital signs, as directed by the physician.	1.12	Poor	2.88	Good	2.96	Good	1.44	Poor	1.50	Poor	1.44	Poor
10	Monitor the child for signs of hypoglycemia.	1.20	Poor	2.92	Good	2.92	Good	2.12	Fair	2.16	Fair	2.12	Fair
11	While giving the intravenous solution, monitor the intake and output.	1.08	Poor	2.96	Good	3.00	Good	1.88	Fair	1.90	Fair	1.88	Fair
<b>Total</b>		<b>1.12</b>	<b>Poor</b>	<b>2.89</b>	<b>Good</b>	<b>2.91</b>	<b>Good</b>	<b>1.62</b>	<b>Poor</b>	<b>1.64</b>	<b>Poor</b>	<b>1.60</b>	<b>Poor</b>

M: Mean, Poor= 1 – 1.66, Fair= 1.67– 2.33, Good= 2.34 – 3 1.76

The table 5 presents the assessment of nurses' practices about "Intra-total Parenteral Nutrition Administration"; the findings among the study group reveal that nurses are showing poor level of practices during the pre-test time (Mean= 1.12), while they

show good level of practices during the post-test 1 (Mean= 2.89) and post-test 2 (Mean= 2.91).

The nurses in the control group show poor level of practices during the pre-test time (Mean= 1.62), post-test 1 (Mean= 1.64), and post-test 2 (Mean= 1.60).

**Table (6): Assessment of Nurses' Practices related to "Post-total Parenteral Nutrition Administration" among Study and Control Group**

List	Post-total Parenteral Nutrition Administration	Study Group (N=25)						Control Group (N=25)					
		Pre-test		Post-test 1		Post-test 2		Pre-test		Post-test 1		Post-test 2	
		M	Ass.	M	Ass.	M	Ass.	M	Ass.	M	Ass.	M	Ass.
1	After the completion of parenteral nutrition process, the tubes and administration devices are removed.	1.12	Poor	2.92	Good	2.84	Good	2.08	Fair	2.10	Fair	2.07	Fair
2	Discard used administration devices in the proper containers, according to hospital policy.	1.16	Poor	2.84	Good	2.80	Good	1.76	Fair	1.79	Fair	1.77	Fair
3	Documenting the administration process, which includes the start and end time of administration,	1.24	Poor	2.84	Good	2.84	Good	1.92	Fair	1.90	Fair	1.88	Fair

	infusion rate, time and date, the child's response during administration, and recording any nursing or medical interventions that may have occurred.												
<b>Total</b>		<b>1.17</b>	<b>Poor</b>	<b>2.87</b>	<b>Good</b>	<b>2.83</b>	<b>Good</b>	<b>1.92</b>	<b>Fair</b>	<b>1.90</b>	<b>Fair</b>	<b>1.88</b>	<b>Fair</b>

M: Mean, Poor= 1 – 1.66, Fair= 1.67– 2.33, Good= 2.34 – 3

The table 6 presents the assessment of nurses' practices about "Post-total Parenteral Nutrition Administration"; the findings among the study group reveal that nurses are showing poor level of practices during the pre-test time (Mean= 1.17), while they

show good level of practices during the post-test 1 (Mean= 2.87) and post-test 2 (Mean= 2.83).

The nurses in the control group show fair level of practices during the pre-test time (Mean= 1.92), post-test 1 (Mean= 1.90), and post-test 2 (Mean= 1.88).

**Table (7): Overall Assessment of Nurses' Practices about Neonatal Total Parenteral Nutrition among Study and Control Group**

Levels of practices	Study Group (N= 25)												Control Group (N=25)											
	Pre-test				Post-test 1				Post-test 2				Pre-test				Post-test 1				Post-test 2			
	f	%	M	S. D	f	%	M	S. D	f	%	M	S. D	f	%	M	S. D	f	%	M	S. D	f	%	M	S. D
<b>Poor</b>	23	92			0	0			0	0			16	64			11	44			14	56		
<b>Fair</b>	2	8			1	4			2	8			9	36			14	56			4	16		
<b>Good</b>	0	0			24	96			23	92			0	0			0	0			0	0		
<b>Total</b>	25	100			25	100			25	100			25	100			25	100			25	100		
			<b>46.72</b>	<b>1.882</b>			<b>119.04</b>	<b>1.904</b>			<b>117.16</b>	<b>3.223</b>			<b>68.40</b>	<b>7.280</b>			<b>70.24</b>	<b>7.327</b>			<b>71.16</b>	<b>7.967</b>

f: Frequency, %: Percentage, M: Mean of total score, SD Standard deviation of total score

Poor= 41 – 68.33, Fair= 68.33 – 95.66, Good= 95.67 – 123

This table displays the overall assessment of nurses' practices; the findings reveals that nurses in the study group are showing poor level of practices during the pre-test time (92%, M±SD= 46.72 ± 1.882) while they are showing good level of practices during the post-test 1 (96%, M±SD= 119.04 ± 1.904) and post-test 2 (92%, M±SD= 117.16 ± 3.223) that indicate the significant changes in level of practices among nurses after applying the program.

The nurses in the control group are showing poor level of practices during the pre-test time (64%, M±SD= 68.40 ± 6.275) while they show fair level of

practices during post-test 1 (56%, M±SD= 28.32±8.140) and post-test 2 (56%, M±SD= 71.16 ± 7.967) that indicate no significant change in nurses' practices.

## DISCUSSION

The study evaluated the practices of nurses and found that the nurses exhibited a low level of practice during the pre-test phase. However, the post-test 1 and post-test 2 results indicated a significant improvement in the level of practice among the nurses after the implementation of the program. The results of the

study indicate that the nurses in the control group exhibited a suboptimal level of practice during the pre-test phase. However, they demonstrated a moderate level of practice during post-test 1 and post-test 2, suggesting that there was no statistically significant change in the nurses' practices over time. These findings are presented in table (7).

Furthermore, this study evaluates the practices of nurses in regard to the discontinuation of neonatal total parenteral nutrition. The results indicate that the nurses' practices were suboptimal during the pre-test phase but improved significantly during post-test 1 and post-test 2. Table 1 indicates that the nurses in the control group exhibited a suboptimal level of practice during the pre-test phase, followed by a moderate level of practice during post-test 1 and post-test 2.

This study evaluates the practices of nurses in providing psychological and educational support to parents of newborns receiving total parenteral nutrition. The results indicate that the nurses' practices were suboptimal during the pre-test phase but improved significantly during post-test 1 and post-test 2. Table (2) indicates that the level of practice exhibited by the nurses in the control group was suboptimal during the pre-test, post-test 1, and post-test 2.

The present study reports on the evaluation of nurses' practices related to the administration of pre-total parenteral nutrition. The results indicate that the nurses' practices were suboptimal during the pre-test phase but improved significantly during the post-test 1 and post-test 2 phases. Table (3) indicates that the nurses in the control group exhibited a moderate level of practice during the pre-test period, as well as post-test 1 and post-test 2.

The present study reports on the evaluation of nurses' practices regarding the administration of "Intra-total Parenteral Nutrition". The results indicate that the nurses' practices were suboptimal during the pre-test phase but improved significantly during post-test 1 and post-test 2. Table (4) indicates that the nurses in the control group exhibited substandard levels of practice during the pre-test period, as well as post-test 1 and post-test 2.

This study evaluates the practices of nurses in administering post-total parenteral nutrition. The results indicate that the nurses' practices were suboptimal during the pre-test phase but improved significantly during post-test 1 and post-test 2. Table (6) displays the performance of nurses in the control group during the pre-test, post-test 1, and post-test 2, indicating a satisfactory level of practice.

According to the researcher the study suggest that the nurses' level of practice improved significantly over time following the implementation of the program, particularly in relation to the administration and discontinuation of total parenteral nutrition (TPN) and the provision of psychological and educational support to parents of newborns receiving TPN. These improvements were observed in both the study and control groups.

It is clear that the implementation of the program provided the nurses with additional knowledge, skills, and confidence needed to perform their duties more effectively. The program may have included educational sessions, hands-on training, and feedback from colleagues and supervisors, which have helped the nurses to identify and address areas of weakness in their practices.

It is important to note that the control group exhibited suboptimal levels of practice during the pre-test phase, suggesting that there is room for improvement in nursing practice even in the absence of a specific intervention. Nursing education and training should remain a top priority for hospitals and universities to guarantee that nurses have the skills they need to offer excellent care to their patients.

In line with the findings of the current study, research conducted in northern Africa revealed that each and every one of the subjects that were examined exhibited a poor whole practice level with regard to the treatment of patients who were receiving TPN. Even though only 83.3% of the sample was able to demonstrate a good degree of practice with the administration of TPN therapy [6,12,13,14,15], the study was successful overall. In this regard, according to the data analysis of a study that was carried out in Iran, the mean of total scores on the practice test, both before and after the conclusion of the training course for the research, were not substantially different from one another. In the examination of the numerous areas of practice that the nurses who participated in the study were responsible for, no substantial improvement was detected in the avoidance of PN prescription mistakes, the prevention of infections, the right techniques of practicing PN, or the monitoring of PN problems [7,16,17,18,19]. However, the research conducted by Al-Rafay found that there were significant disparities in several aspects of the NICU, such as the monitoring of mechanical and digestive difficulties and the safe prescription of medication [8,20].

According to the findings of another study, the PN practice score of nurses was found to be much higher than that of pediatric residents. The fact that the practice scores of the residents and nurses reached the

same level as a result of the educational intervention demonstrates the effect that such intervention had on the practice [7,21,22].

## CONCLUSION

Nurses demonstrated a low level of practice during the pre-test phase. However, the post-test 1 and post-test 2 results indicated a significant improvement in the level of practice among the nurses after the implementation of the program.

## RECOMMENDATIONS

Establish regular training programs aiming to improve nurses' knowledge and practice about TPN. Activate the role of continuing nursing education in different significant aspects of nursing practice.

## REFERENCES

- McNab S, Duke T, South M, Babl FE, Lee KJ, Arnup SJ, et al. 140 mmol/L of sodium versus 77 mmol/L of sodium in maintenance intravenous fluid therapy for children in hospital (PIMS): a randomized controlled double-blind trial. *Lancet*. 2015;385(9974):1190–7.
- Nghiem-Rao TH, Cassidy LD, Polzin EM, Calkins CM, Arca MJ, Goday PS. Risks and benefits of prophylactic cyclic parenteral nutrition in surgical neonates. *Nutr Clin Pract*. 2013;28(6):745–52.
- Morgan C, Burgess L. High protein intake does not prevent low plasma levels of conditionally essential amino acids in very preterm infants receiving parenteral nutrition. *J Parenter Enter Nutr*. 2017;41(3):455–62.
- Boullata JI, Guenter P, Mirtallo JM. A parenteral nutrition use survey with gap analysis. *J Parenter Enter Nutr*. 2013;37(2):212–22.
- Boullata JI, Holcombe B, Sacks G, Gervasio J, Adams SC, Christensen M, et al. Standardized competencies for parenteral nutrition order review and parenteral nutrition preparation, including compounding: the ASPEN model. *Nutr Clin Pract*. 2016;31(4):548–55.
- Khalefa AMLA, Sc M, Ismail MS, Sc DN, Ali FS, Sc DN. Assessment of Critical Care Nurse ' s Knowledge and Practices Regarding Care of Patients Receiving Total Parenteral Nutrition. 2018;86(5):2763–73.
- Ameri ZD, Vafae A, Sadeghi T, Mirlashari Z, Ghoddoosi-Nejad D, Kalhor F. Effect of a comprehensive total parenteral nutrition training program on knowledge and practice of nurses in NICU. *Glob J Health Sci*. 2016;8(10):135.
- Al-Rafay SS, Al-Sharkawy SS. Educational outcomes associated with providing a comprehensive guidelines program about nursing care of preterm neonates receiving total parenteral nutrition. *Clin Nurs Res*. 2012;21(2):142–58.
- Jabbar HA, Hattab KM. Effectiveness of the Interventional Program on Nurses' Practices about Enteral Feeding Tube for Premature Neonates in the Neonatal Intensive Care Unit. *Pakistan Journal of Medical & Health Sciences*. 2022 Jun 17;16(05):544–.
- Al-Jubouri MB. Assessment of Nurse's Knowledge about Nosocomial Infection at Hospitals in Baghdad City. *Journal of Kufa for nursing science*. 2014 Feb 19;4(1).
- Obaid BK, Hussein A, Noori KA. Nurses' knowledge concerning neonatal sepsis in neonatal intensive care units at pediatric teaching hospitals in Baghdad city. *Asian academic research journal of multidisciplinary*. 2016;3(7):56–65.
- Atiyah SA, Khudhair SH, Hameed NN. Effectiveness of Education Health Program on Nurses' Practices toward Neonates Care with Sepsis in Incubator in Neonatal Intensive Care Unit in Teaching Hospitals Baghdad City. *Indian Journal of Public Health Research & Development*. 2018 Aug 1;9(8).
- Jawad Kadhim A, Hassan AF, Isam SR. Evaluation of Nurses' Skills on Changing the Central Venous Catheter Dressing for Patients in Baghdad Teaching Hospitals.
- Nashwan AJ, Yassin MA, Mohamed Ibrahim MI, Abdul Rahim HF, Shraim M. Iron overload in chronic kidney disease: less ferritin, more T2\* MRI. *Frontiers in Medicine*. 2022 Mar 21;9:865669.
- Shauq AH, Obaid KB, Zaid W, Summer K, Ulaa N, Sabeh O, et al. Nurses Knowledge about Universal Precautions in Neonatal Intensive Care Unit at Pediatric Teaching Hospitals in Baghdad City: Descriptive Study. *kerbala J Pharm Sci*. 2014;(8).
- Shauq HA, Mualaa GE. Assessment Of The Pediatric Nurses Knowledge about the Nosocomial Infection in the Neonatal Intensive Care Unit of Baghdad Pediatric Teaching Hospitals. *ResearchGate*; 2008.
- Obaid BK, Hussein A, Noori KA. Nurses' knowledge concerning neonatal sepsis in neonatal intensive care units at pediatric teaching hospitals in Baghdad city. *Asian Acad Res J Multidiscip*. 2016;3(7):56–65.
- Obaid H, Mohammed S. Effectiveness of Educational Program on Nurses Knowledge toward

- Nursing Management for Patients Undergoing Percutaneous Coronary Intervention in Cardiac Center at Al-Dewaniyah City. *Iraqi Natl J Nurs Spec.* 2020;33(1):12–20.
19. Aziz AR. Nurses' Knowledge about Asthmatic Attacks in Children at Pediatric Teaching Hospitals in Baghdad City. *J Nurs Heal Sci.* 2018;7(3):67–74.
20. Mousa AN, Aziz AR. Impact of an Intervention Program on Nurses Knowledge towards Infection Control Measures in Pediatric Surgical Wards. *Mosul J Nurs.* 2022;10(3):39–45.
21. Ahmed SA, Jasim AH, Katea MJ, Foaad AS, Hashim HA, Noori DA. Assessment of Nurses' knowledge concerning Prevention of Central Venous Catheter Infection in Intensive Care Units at Baghdad Teaching Hospitals. *kufa J Nurs Sci.* 2019;9(1):1–7.
22. Thamer H. Assessment of Nurses' Knowledge regarding oxytocin administration during Labor at maternity hospitals in Al-Kut City. *Iraqi Natl J Nurs Spec.* 2014;1(27):1–10.