Original Article *Egyptian Journal of Health Care, 2018 EJHC Vol.9 No.2*

Quality of Nurses' Performance Regarding Parenteral Nutrition at Neonatal Intensive Care Units

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Abstract

Background: Nurses play a crucial role at neonatal intensive care, as they are responsible for administering parenteral nutrition to critically ill neonates**. Aim of the study** was to assess quality of nurses' performance regarding parenteral nutrition at neonatal intensive care units. **Settings**: The study was conducted at neonatal. Intensive care units at Benha city in Benha University Hospital, Teaching Hospital and Specialized Pediatric Hospital. **Design**: A descriptive research design was utilized in the current study. **Sample**: A convenient sample of 70 nurses was participated in the current study. **The tools of data collection** were; a structured interviewing questionnaire and an observational checklist. **Results**: The present study revealed that more than three quarters of studied nurses had unsatisfactory level of total knowledge scores and more than two thirds of the studied nurses had incompetent in their total performance scores also, there was a statically significant relation between of the studied nurses' total knowledge scores and their personal data, there was a statically significant relation between of the studied nurses' total performance scores and their personal data. **Conclusion**: The present study revealed that there was statically significant relation between of the studied nurses' total knowledge and their personal data; there was statically significant relation between of the studied nurses' total performance scores and their personal data. **Recommendation** Developing training: programs recommended for the nurses working at regarding parenteral nutrition are neonatal intensive care units to improve their knowledge and performance.

Key words: Parenteral nutrition, Neonatal Intensive Care Units,Quality of nurses performance

Introduction

Neonatal period extends from birth through the first month of life and that is possibly the most tenuous in human's lifetime. During this time, the newborn undergoes physiological and anatomical changes as it adapts the new environment **(Adewale, 2016).**

The key success factors for health care quality improvement include; strong administrative and performance improvement leadership, effective oversight, involvement of expert quality improvement staff, physician involvement and accountability, active staff involvement. Moreover, effective use of data for decision making, and effective communication strategy should be achieved. The culture of the organization implementing the practice changes is also important **(Shan et al., 2013).**

Aim of study

This study aimed to assess quality of nurses' performance regarding parenteral nutrition at neonatal intensive care units.

The aim of this study is to:

Assess quality of nurses' performance regarding parenteral nutrition at neonatal intensive care units through:

- •Assessing nurses' knowledge regarding parenteral nutrition
- •Assessing quality of nurses' performance toward parenteral nutrition.

Research questions:

- Do nurses' knowledge regarding care of parenteral nutrition are satisfied?

- Do nurses have a competent performance regarding parenteral nutrition?

Subjects and method

Study design:

A descriptive design was used to fulfill the aim of this study

Settings:

This study was carried out at Neonatal Intensive Care Units of Benha University Hospital, Teaching Hospital and Specialized Pediatric Hospital at Benha city.

Study Sample:

Sample type:

A convenient sample of all the available: (70) nurses working at the previously mentioned settings with the following criteria

Inclusion criteria:

- Nurses working at neonatal intensive care units were included in the study

-Nurses had more than one year of experience Direct care provider (giving care to neonates)

Tools of data collection: Data were collected through the following tools:

Tool I: A structured interviewing questionnaire Sheets:
It was designed by the researcher after reviewing related literatures and under supervision of supervisors. It was written in Arabic language and it composed of multiple choice questions and consists of six parts:
Part I- Personal data of nurses, it consists of (10) questions such as; age, qualification level, years of experience, gender and attendance of training programs related to parenteral nutrition**.**

Part II- Knowledge of the studied nurses regarding quality and its related concepts, it consists of (11) questions such as; definition of quality, definition of quality in nursing care, quality standards, the level of quality in any therapeutic unit and assessment of nursing performance.

Part III - Knowledge of the studied nurses regarding parenteral nutrition, it consists of(19) questions such as; definition of parenteral nutrition, indication of parenteral nutrition, types of infusion devices,
complications of cannula and advantages of using parenteral nutrition.

Part IV- Knowledge of the studied nurses regarding infusion devices, it consists of (7) questions such as; importance of nursing training on this device before using it, regulation of volume to neonates by syringe pump and precautions to be take using when using pump device.

Part V- Knowledge of the studied nurses regarding infection control related to neonates' feeding parenterally, it consists of(5) questions such as; actions to prevent infection, steps to give parenteral nutrition, important steps of infusion or solution preparation.

Part VI - Knowledge of the studied nurses regarding nursing care of neonates receiving parenteral nutrition, it consists of(14) questions such as; nursing care of umbilical catheter, time for calling physician, precautions of parenteral nutrition, time of changing intravenous device (alsalaust) and complications of inadequate provision of solution orinfusion. Total questions consist of 56 questions each one scored as the following:

Scoring system: Scoring system for each knowledge item (56questions)

Scoringsystem	Score
Correct& complete	2
Correct&incomplete	1
Incorrect	0

Scoring system for level of total knowledge.

Scoringitem	Percent %
Satisfactory	≥80%
Unsatisfactory	<80%

Tool II: An observational check list: it was adopted from **Kalia &walia, (2012 and Moran & Leguna, (2015)** and not modified by the researcher to assess performance of the studied nurses related to parenteral nutrition.

Scoring system for each performance.

Scoringsystem	score
Correctlydone	2
Incorrectlydone	1
Notdone	0

Each previous mentioned nursing performance was scored to calculate for total level as follow:

Scoringitem	Percent %
Competent	≥80%
Incompetent	<80%

Field work:

An official permission was obtained from the dean of Benha Faculty of Nursing and directed to hospitals' administrators of the previously mentioned settings with full explanation of the study purpose and methods of data collection.

- Tools validity and reliability: For validity assurance purpose, tools were submitted to jury of five experts in the field of pediatric nursing to be sure for questionnaire item (content validity). The reliability of tools was done to determine the extent to which items in the questionnaire were related each other by using Cronbach's co-efficiency alpha for the questionnaires (0.325).

Ethical considerations:-

The researcher explained the aim of the study to the nurses. They were informed that the study is harmless. The researcher secured that all the gathered data are confidential and are used for the research purpose only. The nurses were informed that they are optionally allowed either

participate or not in the study and they have the right to withdraw at any time.

Pilot study:

A pilot study was carried out on 10% (n=7) of the expected sample size to test the applicability of study tools and to estimate the time needed to fill the questionnaire. The required modifications of tools were done by adding of some questions about nursing care of umbilical catheter or omission of some questions about parenteral nutrition, as; nurses' performance that lead to parenteral nutrition and method to prevent infection of parenteral nutrition according results of the pilot study.

Data collection procedure:

At first, the researcher assessed nurses' knowledge about (quality and parenteral nutrition) then the researcher observed performance about parenteral nutrition during their actual nursing care. The tools were filled individually by the researcher. Data were collected for a period of 6months starting from first of November2015 to end of April 2016, along four days per week and six hour per day which divided two day in specialized pediatric hospital during morning shift because this hospital have the most number of sample and another two-hospital divided two days according time of procedures were observed. In detailed teaching hospital starting working in 7.30 am finish 10.30 then university hospital starting procedure am observed in 11am to 1pm. Approximatily12 hour in specialized hospital in week and six hours in week other hospital.

Statistical analysis

Data were coded and transformed into specially designed form to be suitable for computer data entry process. Data were manipulated and graphics were done by using SPSS version 20.

Results

As illustrated in **table 1** nearly three quarters of the studied nurses working at Benha specialized hospital (70.0%). In addition, slightly more than half of the studied nurses (54.3%) had diploma of nursing. In addition, half of the studied nurses (50.0%) had attendance training program related to parenteral nutrition.

As illustrated in **table 2** the majority of the studied nurses had correct and complete answer (80.0%, 98.6%, 95.7%) regarding the time of starting parenteral nutrition, the time consumed to regulate drop insertion to neonate and complications of cannula**.** Rather than three quarters (71.4%, 75.7%**)** of the studied nurses correct and complete answer regarding calculation of infusion and the cannula sizes used for all neonates**.** The majority of had the studied nurses (82.9%) had correct and complete answer regarding the size of cannula used according vein of neonate. More than three quarter of the studied nurse(77.1%) had correct and incomplete answer regarding the colors of cannula used in neonates.

As illustrated in **table 3** all of the studied nurses (100.0%) had correct and complete answer regarding complications of take large amount of solution or infusion and release air from line of normal solution device or alsalaust. Rather than, the majority of the studied nurses (87.1%) had correct and complete answer regarding time for calling physician and nursing care of umbilical catheter. the majority of the studied nurses (90.0%) had correct and complete answer regarding precautions of parenteral nutrition **Figure 1** illustrated that, more than three quarter (78.6%) of the studied nurses had unsatisfactory total knowledge scores, while the rest (21.4%) of them had satisfactory total knowledge scores.

Table 4 revealed that, the majority of the studied nurses (98.6%, 82.9%, 82.9%) had incorrectly done regarding connect the

I.V line to I.V access (cannula /scalp vein), wash hands, remove the bottle seal from the top, clean the top with spirit swab and holding the bottle upright, insert the drip set and air went into bottle. The majority of the studied nurses (95,7%, 90.0%, 85.8%) had correctly done regarding open the clamp to let the fluid run, insert the I.V cannula into the vein at 15-30 angle and once it enters the vein, make it parallel with the skin and follow the course of the vein and immobilize with splint and . In addition, the majority of the studied nurses (87.1%,87.1%, 82.9%) had incorrectly done regarding connect the needle to the I.V tubing, clamp the tubing again and clean the area with aspirate swab.

Figure 2 revealed that more than two thirds (64.3%) of the studied nurses had incompetent in their total performance scores regarding parenteral nutrition at neonatal intensive care units

Table 5 demonstrates that, there was a statistically significant relation between of the studied nurses' total performance scores and their personal data (age, qualification level, years of experience and training programe).

Table(1): Distribution of the studied nurses regarding their personal data (n=70).

Personaldata	Frequency	%
Workingsetting		
Benha university hospital	12	17.1
Benha teaching hospital	9	12.9
Benha specialized pediatric hospital	49	70.0
Age in years		
≤20year	13	18.6
20<25year	24	34.3
25<30years	20	28.5
≥30years	13	18.6
X±SD	30.98±5.09	
Gender		
Male	4	5.7
Female	66	94.3
Qualification level		
Diploma of nursing	38	54.3
Diploma of technical institute	17	24.3
Bachelor degree in nursing	13	18.6
Master degree in nursing	2	2.9
Job		
Nurse	64	91.4
Head of department	4	5.7
Unit supervisor	2	2.9
Attendance of training programs related to Parenteral nutrition		
Yes	35	50.0
No	35	50.0

Table (2): Distribution of the studied nurses' knowledge regarding parenteral nutrition

Parenteralnutritionto neonates	In correct		Correct & incomplete answer		Correct& complete answer	
	No	%	No	%	No	%
Definition of parenteral nutrition in NICU	13	18.6	45	64.3	12	17.1
Indications of parenteral nutrition	6	8.6	44	62.9	20	28.6
Advantages of using parenteral nutrition	8	11.4	41	58.6	21	30.0
Types of infusion	12	17.1	29	41.4	29	41.4
Calculation of infusion	7	10.0	13	18.6	50	71.4
Regulation of number of drops in minute	0	.0	51	72.9	19	27.1
The time of starting parenteral nutrition	0	.0	14	20.0	56	80.0
The time consumed to regulate drop insertion to neonate	0	.0	1	1.4	69	98.6
The time of cannula insertion	13	18.6	43	61.4	14	20.0
The route of infusion regulation	28	40.0	1	1.4	41	58.6
Calculation of number of drops for insertion to neonates	11	15.7	0	.0	59	84.3
The cannula sizes used for all neonates	17	24.3	0	.0	53	75.7
The size of cannula used according vein of Neonate	12	17.1	0	.0	58	82.9
The preferred sites to insert cannula in Neonates	8	11.4	15	21.4	47	67.1
Syringe pump ensuring to regulate infusion Accurately	16	22.9	51	72.9	3	4.3
The colors of cannula used in neonates	16	22.9	54	77.1	0	.0
Types of infusion devices	10	14.3	32	45.7	28	40.0
Complications of cannula	0	.0	3	4.3	67	95.7

Table (3): Distribution of the studied nurses regarding their knowledge about nursing care of neonates receiving parenteral nutrition

Nursing care of neonates receiving parenteral nutrition	In correct		Correct& incomplete answer		Correct & complete answer	
	No	%	No	%	No	%
Ensuring patent cannula or catheter to neonate's feeding parenteral nutrition	8	11.4	25	35.7	37	52.9
Change dressing on centraline catheter	1	1.4	39	55.7	30	42.9
Change dressing on cannula	16	22.9	24	34.3	30	42.9
Fill half of drip chamber of the solution Device before regulate solution	2	2.9	67	95.7	1	1.4
Release air from line of normal solution device or alsalaust	0.0	0.0	0.0	0.0	60	100.0
Precautions during infusion	1	1.4	68	97.1	1	1.4
Changing cannula every 3 days regularity	1	1.4	63	90.0	6	8.6
Time of changing intravenous device (alsalaust)	0.0	0.0	38	54.3	32	45.7
Complications of large amount of solution or infusion	0.0	0.0	0.0	0.0	70	100.0
Complications of inadequate provision of solution or infusion	48	68.6	22	31.4	0.0	0.0
Time for calling physician	2	2.9	7	10.0	61	87.1
Nursing care of umbilical catheter	0.0	0.0	9	12.9	61	87.1
Precautions of parenteral nutrition	0.0	0.0	7	10.0	63	90.0

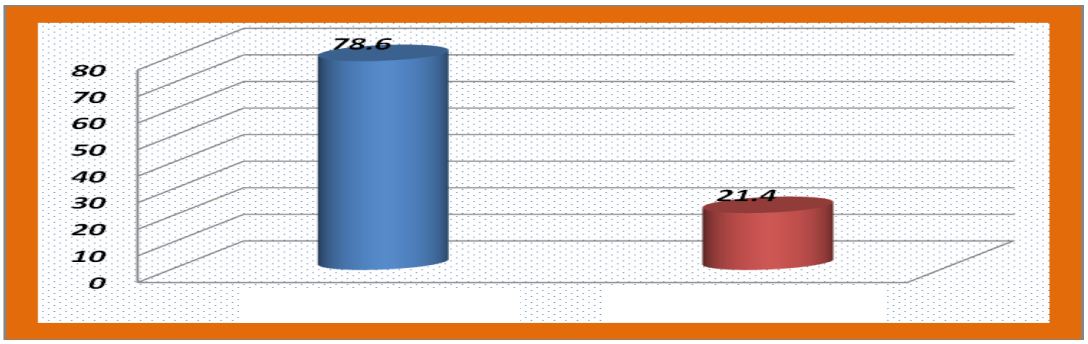

Figure (1): Percentage distribution of total knowledge scores of the studied nurses regarding parental nutrition at neonatal intensive care units.

Table (4): Distribution of the studied nurses' performance regarding cannula insertion for parenteral nutrition (n=70).

Nurses' performance regardingcannula insertion for parenteralnutrition	Not done		Incorrectly done		Correctly done	
	No	%	No	%	No	%
Wash hands	2	2.9	58	82.9	10	14.3
Remove thebottle seal from thetop	2	2.9	58	82.9	10	14.3
Clean the top with spirit swab	2	2.9	58	82.9	10	14.3
Holdingthebottle upright,insert thedrip setand air went into bottle	2	2.9	58	82.9	10	14.3
Close the clamp and hangthebottle on theI.V stand about 18 -25"high	1	1.4	18	25.7	51	72.9
Connect theneedle to theI.V tubing.	0	.0	61	87.1	9	12.9
Open the clampand flush theI.V fluid through the tubingand needle into kidneytrayuntil air removed	0	.0	61	87.1	9	12.9
Clamp the tubingagain,applyprotectivecap over the needle	0	.0	61	87.1	9	12.9
Preparefew strips ofadhesive tapes	58	82.9	0	.0	12	17.1
Site preparation: applytourniquets firmly6 to8" proximal to the site	49	70.0	3	4.3	18	25.7
Clean the areawithaspiritswab.	2	2.9	58	82.9	10	14.3
Insert theI.Vcannula into the vein at 15-30 angle and onceit enters thevein, makeit parallel with the skin and follow thecourseof thevein	0	.0	7	10.0	63	90.0
When back flowof bloodoccur into theneedle and its hub, insert theneedlefurtherinto the vein about 3/4to 1"	0	.0	42	60.0	28	40.0
Cap theI.V access toprevent bloodloss	0	.0	37	52.9	33	47.1
Releasethe tourniquet	50	71.4	0	.0	20	28.6
SecuretheI.V cannula with adhesive strips	0	.0	41	58.6	29	41.4
Immobilizewith splint	5	7.1	5	7.1	60	85.8
Connect theI.V line toI.V access (cannula/scalp vein)	0	.0	69	98.6	1	1.4
Open the clamp to let thefluid run	1	1.4	2	2.9	67	95.7
Set theflow rateand recheck it, onceor twice	8	11.4	36	51.4	26	37.1
Record in nurses' note and intake – output chart	28	40.0	3	4.3	39	55.7
Dissemble the articles	0	.0	42	60.0	28	40.0

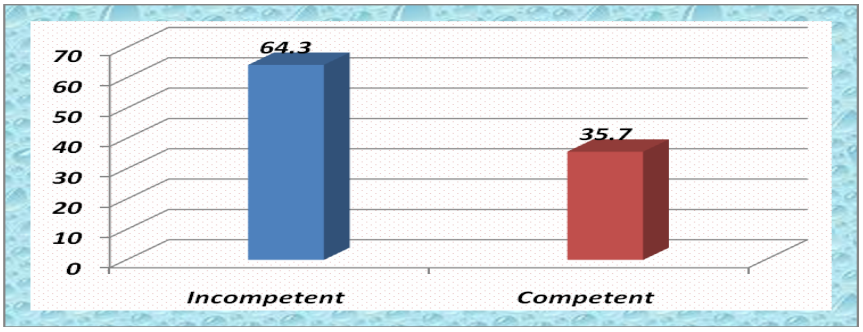

Figure (2): Percentage distribution of total performance scores of the studied nurses regarding parental nutrition at neonatal intensive care units.

Table (5): Relation between of the studied nurses' total knowledge scores and their personal data (n=70)

Items	Total knowledge scores				X2	Pvalue
	Unsatisfactory		Satisfactory			
	No	%	No	%		
Workingsetting						
Benhauniversityhospital	12	21.8%	0	0.0%		
Benhateachinghospital	3	5.5%	6	40.0%		
Benhaspecializedpediatrichospital	40	72.7%	9	60.0%	14.48	<0.001**
Age inyears						
<20year	10	18.2%	3	20.0%		
20<25year	20	36.4%	4	26.7%		
25<30years	16	28.2%	4	26.7%	0.449	<0.001
≥30	9	16%	4	26.7%		
Gender						
Male	2	3.6%	2	13.3%		
Female	53	96.4%	13	86.7%	2.05	<0.001
Qualificationlevel						
Diploma of nursing	29	52.7%	9	60.0%		
Diploma of technical institute	13	23.6%	4	26.7%		
Bachelor degree innursing	12	21.8%	1	6.7%		
Masterdegree innursing	1	1.8%	1	6.7%	2.58	<0.001
Job						
Nurse	50	90.9%	14	93.3%		
Headofdepartment	4	7.3%	0	0.0%		
Unite supervisor	1	1.8%	1	6.7%	2.06	<0.001
Yearsof experience						
≤3year	7	12.7%	3	20.0%		
3 < 6year	6	10.9%	0	0.0%		
6<9year	11	20.0%	2	13.3%		
≥9 year	31	56.4%	10	66.7%	2.56	<0.001
Attendance of training programs related toparenteralnutrition						
Yes	32	58.2%	10	66.7%		
No	23	41.8%	5	33.3%	0.354	<0.001

Discussion:

Parenteral nutrition (PN) is indicated for initiation of nutritional support for premature and high-risk neonates, as it provides nutritional support when enteral intake is not possible or does not provide sufficient caloric requirements. The initial goal of PN is to minimize losses and preserve existing body stores; and progresses for provision of nutrition in order to promote growth and development **(Ameri et al., 2016).**

The present study was a descriptive study included a convenient sample of 70 nurses from Benha university hospital, specialized pediatric hospital and Benha teaching hospital. Worked at neonatal intensive care units aimed to assess quality of

nurses' performance regarding parenteral nutrition at neonatal intensive care unit.

Regarding personal data of the studied nurses, the results of the present study revealed that, less than half of the studied nurses, were between 25<30years with mean age of 30.98±5.09 year. This result was similar to the results of a study **Ahmed,(2013)** in a study entitled " Quality of Nursing Care for Neonates with Tracheoesophageal Fistula (Pre-&postoperative)", who found that, the age group of nurses were between 20>30years.

This finding disagreed with **Mohamed, (2012)** in a study entitled" Quality of Nursing Care for Neonates Undergoing Mechanical Ventilation at Benha City" who found that, less than half of the study nurses were between 20<25 year. This may be indicated that the nursing care delivered to neonates received parenteral nutrition have high years of experience.

Concerning qualification level of the studied nurses, the present study viewed that, more than half of the studied nurses had diploma of nursing (secondary school), this may be due to the fact that secondary school in nursing provide the community with large number of graduate diploma nurses than other agencies such as faculties of nursing and institutes of nursing. These findings were supported by finding of **Ahmed, (2013)** in a study entitled "Quality of Nursing Care to Neonates Pre-Post Operation with Tracheotomy", who reported that, more than half of nurses had nursing diploma but **Loutfy, (2014)** in a study entitled "Quality of Nursing Care Provided for Preterm Infants Suffering from Respiratory DistressSyndrome", who found that, the majority of the studied nurses had bachelor of nursing.

The present study revealed that, more than half of the studied nurses had ≥9 years of experience with a mean age 6.45±5.79 years, which may be due to the nurses who provide care for parenteral nutrition in Benha hospitals were highly experienced nurses. This finding supported by **Ahmed, (2013)** who found that, more than half of the nurses attended training courses in NICU. **Aemri et al., (2016)** in a study entitled "Effect of a Comprehensive Total Parenteral Nutrition Training Program on Knowledge and Practice of Nurses in NICU", stated that the training courses plays an important role in enhancing and updating nurses' knowledge and performance beside improving the quality of care given to neonate receive parenteral nutrition regarding the nurse's attendance training courses for caring neonates in NICU.

Regarding nurses' knowledge regarding parenteral nutrition to neonates. The findings of the present study revealed that, more than two thirds of the studied nurses had correct and incomplete answers about definition of parenteral nutrition, less than two third of the nurses had correct and incomplete answer about indication of parenteral nutrition in neonates. This result may be due to training programmer not emphasis the point.

This finding was agreed with **Ameri et al., (2016)** who found that, the nurses had poor total knowledge including objectives, methods, prescriptive step, complications, prescription precautions, solutions to parenteral nutrition. In addition, **Al-Rafay& Al-Sharkawy, (2012)** who emphasized that, NICUs' nurses play an important role in nutrition of premature children and infants. So, nurses should be knowledgeable about many treatment procedures and interventions such as; monitoring and caring the neonates during enteral or parenteral nutrition. Regarding nurses' knowledge about nursing care of neonates receiving parenteral nutrition. The findings of the present study found that, the majority of the studied nurses had correct and complete answers about precautions of parenteral nutrition and complications of large amount of infusion

This result may be due to the most of nurses not attending any parenteral nutrition training programs. This finding was agreed with **Ameri et al., (2016)** in a study entitled "Effect of a Comprehensive Total Parenteral Nutrition Training Program on Knowledge and Practice of Nurses in NICU", who found that, follow relating parenteral nutrition administration The current study found that, the majority of the studied nurses had correct and complete answer about important steps of infusion or solution preparation. This may be due to most of training programs emphasized in infection control. This supported by **Keogh et al., (2015)** in a study entitled "Awareness of Health Workers of Total Parenteral Feeding in Neonatal Units". This study revealed that, each hospital follows different regulatory guidelines; hence location for PN preparation within the hospitals varies. PN was prepared by nursing staff in the ward, under aseptic technique during compounding and transferring as stated in the ASPEN guidelines. However, prepared TPN by a registered pharmacist under sterile conditions following ESPEN guidelines. Staff attitudes appeared to be driven by the need for optimal safety procedures. It has been reported that TPN mixtures made by nurses were more likely to be contaminated than commercial preparations The present study found that, more than two thirds of the studied nurses had incompetent of total performance scores. This result may be due to lack of attending programs about nursing care for neonates receiving parenteral nutrition. These findings in agreement with **Shahin, (2012)** in a study entitled " Nurses' Knowledge and Practices Regarding Enteral Nutrition at the Critical Care Department of Al- Manial University Hospital in Egypt: Impact of a Designed Instructional Program". Stated that, the studied nurses had incompetent andunsafe practices of nurses.

According to relation between of the studied nurses' total knowledge scores and their qualification level. This finding study reflected that, there was a positive relation between of the studied nurses' total knowledge scores and their qualification level ($p>0.01$). This result may be due to more than half of the studied nurses had diploma of nursing. This finding was consistent with the finding of the study done by **Loutfy, (2014)** who found that, there was high statically significant relation between nurse's academic qualification and total nurses' knowledge scores ($p>0.01$ The current study's results revealed that, three quarters of the studied nurses had unsatisfactory total knowledge scores. This result may be nurses keep themselves from updating knowledge. This finding contracted with **Daniel et al., (2013)** in a study entitled" A study to Assess The Effectiveness of Structured Teaching Program on Care of Patient with Central Venous Access Device Among Staff Nurses in Selected Oncology Hospital of Bangalore", who stated that, more than two thirds of the studied nurses had good knowledge but this result not satisfied researcher who emphasize the nurses must have high knowledge scores.

Conclusion

Results of the present study concluded that; more than three quarters of studied nurses had unsatisfactory total knowledge scores and more than two thirds had incompetent total performance scores. Also, there was a statistically significant relation between of the studied nurses' total knowledge scores and their personal data. Moreover, there was a statistically significant positive relation between of the studied nurses' total performance scores and their personal data.

Recommendations

Based on the results of the current study, the following recommendations can be suggested:

1. Developing periodical training programs regarding parenteral nutrition by faculty of nursing, department of pediatric nursing for the nurses working at neonatal intensive care units to improve their knowledge and performance.

2. Designing nursing protocol to ensure safe nursing practices.

3. Designing monitory system to continuously evaluate nurses' practical skills related to parenteral nutrition care in the neonatal intensive care units.

Summary

Nurses have an important responsibility in the care of neonates who are receiving PN, including maintaining the catheter and delivery system, preparation and administration of PN solutions, replacing the dressings at the catheter insertion site and changing the infusion set at periodicintervals. Moreover, nursing practices, which reduce the risk factors for catheter related infection, include hand washing between neonate contacts, before and after touching the catheter or care delivery systems.

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