

## Assessment of Critical Care Nurse's Knowledge and Practices Regarding Care of Patients Receiving Total Parenteral Nutrition

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### Abstract

**Background:** Total Parenteral Nutrition (TPN) is indicated to prevent the adverse effects of malnutrition in patients who are unable to obtain adequate nutrition by oral or enteral routes. However, it may cause many life threatening complications. Therefore, critical care nurses not only required to know how to assess nutritional status, but also monitor patients for any adverse effects in general condition, provide interventions, and develop a plan of care.

**Aim of the Study:** To assess critical care nurse's knowledge and practices regarding care of patients receiving TPN at Cairo University Hospitals.

**Material and Methods:**

**Research design:** A descriptive exploratory design was utilized in the current study.

**Research questions:**

- A- What is the level of critical care nurse's knowledge regarding care of patients receiving TPN at Cairo University Hospitals?
- B- What is the level of critical care nurse's practices regarding care of patients receiving TPN at Cairo University Hospitals?

**Sample:** A purposeful sample of 60 critical care nurses from different critical care units with a minimum one year of experience, different educational categories was included in the present study.

**Setting:** The study was carried out at different Critical Care Units at Cairo University Hospitals.

**Tools of Data Collection:** Tool 1: Nurse's personnel and background data sheet that included gender, age, marital status, place of work, educational level, years of experience in nursing and ICU and training courses concerning TPN. Tool 2: Nurse's knowledge assessment questionnaire about TPN to assess nurse's knowledge regarding indication, complication and nursing care of patients receiving TPN and, Tool 3: Critical care nurse's observational check list about TPN regarding care of patients receiving TPN.

**Results:** The majority (92%) of the studied sample had unsatisfactory knowledge with a mean of  $20.22 \pm 4.99$ , and the

entire studied sample (100%) had unsatisfactory practice level with a mean of  $91.22 \pm 6.72$ , respectively. High significant statistical differences were found in the mean knowledge scores in relation to gender, attended courses, age category, and department. High significant statistical differences were found in the mean practice score in relation to marital status, attended courses, department, and years of experiences in nursing. A high significant statistical strong correlation were found between total mean knowledge scores and total mean practice scores ( $r=0.46$ ,  $p=0.00$ ). However, no significant correlations were found between years of experience, age and their level of knowledge and practice regarding total parenteral nutrition.

**Conclusion:** In spite of having vital role by critical care nurses in assessment and management of critically ill patients receiving TPN, results of the present study indicated that critical care nurses have inadequate knowledge and practice regarding care of patients receiving TPN.

**Recommendation:** Updating knowledge and practice of critical care nurses through carrying out continuing educational programs about nursing management of TPN and its complications, strict observation of CCN practice when caring for patients receiving TPN, Provision of guidance to correct of poor practices, ensure patient safety and provide cost effective care and finally, replication of this study on larger probability sample selected from different geographical locations.

**Key Words:** Total parenteral nutrition – Critically Ill patient – Nurse's knowledge – Nurse's practice.

### Introduction

NUTRITION supports are important as malnutrition in critically ill patients lead to increased morbidity and mortality, decreased quality of life, prolonged duration of mechanical ventilation, and increased length of hospital stay, all of which contribute to the higher cost of health care. Critically ill patients and those patients with respiratory failure require special monitoring to prevent muscle wasting, avoid overfeeding and complications associated with nutritional supports [1].

As clarified by Sole, Klein & Moseley, 2013 [2] parenteral nutrition is one of nutrition modalities

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that maintain nutritional supply to critically ill patients; who are unable to tolerate enteral therapy because of some reasons such as; gastrointestinal obstruction, intractable vomiting, diarrhea, and patients who don't have anything by mouth for longer than one week. Also, it used if the mechanically ventilated patient is unable to meet his/her nutritional needs with enteral nutrition alone. However, enteral nutrition is more efficient than parenteral nutrition as maintaining the gut integrity with modulation of immune system and stress. The administration of TPN must follow strict adherence to aseptic technique, and being alert for complications, as many of the patients will have altered defense mechanisms and complex conditions [3].

Also, Kagan, Theilla & Singer, [4] reported that complication associated with parenteral nutrition include; fluid and electrolyte imbalances, hyperglycemia or hypoglycemia, metabolic disturbance, bone disorders, such as osteomalacia (softening of the bones), and liver and biliary system are common and serious problems associated with PN. Also, complications due to overfeeding, infections, increased length of stay, length of ventilation, and liver function tests may occur. The risk of adverse events can be greatly reduced by achieving hemodynamic stability, controlling blood glucose levels, and correcting electrolyte disturbances before initiating PN [5].

Therefore, Martindale, 2009 [6] emphasized that critical care nurses have important responsibilities in the care of patients receiving TPN, including maintaining the catheter and delivery system, preparation and administration of TPN solutions, replacing the dressings at the catheter insertion site and changing the infusion set at periodic intervals. Furthermore, nursing practices, which reduce the risk factors for catheter related infection include aseptic techniques and compliance with recommendations for equipment and dressing changes are essential if microbial contamination is prevented, also, using appropriate maximal barrier precautions during insertion, education and training of nurses on central venous access device management, adequacy of hand washing, use of 2% chlorhexidine, appropriate dressing of exit site, adequacy of securement of CVAD, cleaning of hubs/needle-free injectors, changing of administration sets, and consider using antibiotic-impregnated CVAD [7].

Moreover, Infusion Nurses Society, 2011 [8] added that monitoring of critically ill patients receiving TPN should include; physical assessments, laboratory data, and a subjective and objec-

tive evaluation of response to therapy. Regarding physical assessment; body weight, hydration and electrolyte status should be examined including calcium, phosphorous, and magnesium daily until stable, gradually reducing the frequency of testing on the basis of the patient's clinical status, glycemic control, performance status, and psychosocial response. Concerning the laboratory tests must be monitored closely, including periodic measurement of vitamin and trace element levels. The nutritional plan of care should be evaluated and revised on the basis of the results of ongoing monitoring [9].

Consequently, Feleke, Mulatu & Yesmaw, 2015 [10] illustrated that critical care nurse's lack of knowledge is considered to be one of the most significant factors contributing to Medication Administration Errors (MAEs) which are often made by nurses administering medications in critical care units. MAE has a significant impact on critically ill patients in terms of morbidity, mortality, adverse drug event, and increased length of hospital stay. In addition, it increases costs to clinicians and healthcare systems. So, (Martindale, 2009) [6] said that to ensure safe and effective drug therapy for patients; nurses need to be familiar with the indications, customary dosage, and intended effects of prescribed drugs. Also, nurses need to assess each patient before administering a drug. And they need skills to be able to administer a drug efficiently, minimizing patient's anxiety and maximizing the drug's effectiveness.

#### *Significance:*

Total parenteral nutrition is recognized a method of feeding critically ill patients with specific clinical conditions. It is used to preserve lean body mass, to maintain immune function, and avoid metabolic complications. And it is consider a proactive therapeutic strategy that may reduce disease severity, diminish complications, decrease ICU length of stay, and favorably impact patient outcome. However, it has several potential risks and complications including sepsis, metabolic and electrolyte imbalances. Therefore, the use of TPN should be monitored closely by critical care nurses, and prescribed by a specialist nutrition support team, that has the knowledge and skills required to ensure it is given appropriately and safely. Nurses caring for these patients need to be aware of the potential complications and how to prevent, detect and act on them quickly to ensure safe and effective care [11,12].

At the same time, little is known about the nurse's knowledge regarding TPN administration in the critical care units. Moreover, few studies handled the daily nursing practices regarding PN

in critical care settings, especially in Egypt. Therefore, the current study will be carried out on an attempt to assess critical care nurse's knowledge and practices regarding the importance, indications, complication of TPN, and caring of hospitalized critically ill patients managed by TPN therapy.

#### *Aim of the study:*

The purpose of current study is to assess critical care nurse's knowledge & practices regarding care of patients receiving total parenteral nutrition at Cairo University Hospitals.

#### *Research questions:*

To fulfill the aim of the current study the following research questions are formulated.

Q1: What is the level of critical care nurse's knowledge regarding care of patients receiving TPN at Cairo University Hospitals?

Q2: What is the level of critical care nurse's practices regarding care of patients receiving TPN at Cairo University Hospitals?

### **Subjects and Methods**

*Research design:* A descriptive exploratory research design was utilized in the current study.

*Setting:* The current study was performed at different Critical Care Units of Cairo University Hospitals from January 2016 to February 2016 these units are:

- 1- Surgical ICU at the National Institution of Cancer; which consists of two ICUs, the first ICU contains (9 beds), the second ICU contains (2beds) for isolation.
- 2- Critical Care Medicine Department (first & second units), the first unit is present in the first floor and consists of three ICUs, two Coronary Care Unit (CCUs) and an examination room. While the second unit is located at the second floor, it consists of ICU14, it contains (14) beds, ICU 9 which contains (9) beds, an isolation room which contains (4) beds, shock room which contains (3) beds, and an examination room which contains (one) bed.
- 3- Critical Care Medicine Department (3<sup>rd</sup> Unite) in the 3<sup>rd</sup> floor which consists of two ICUs. Each ICU room contains (9) beds.
- 4- Finally, the Surgical Unit ICU which is located at El-Manial Specialized University Hospital at the 3<sup>rd</sup> floor, and consists of (7) beds.

#### *Sample:*

A purposeful sample of 60 bedside male and female nurses, their ages ranges between 20-60 years old, with a minimum one year of experience, different educational categories, and working in different ICUs at Cairo University Hospitals, providing direct care to patients receiving TPN and willing to participate in this study. The exclusion criteria were; subjects who were piloted and refused voluntarily to participate in the study.

#### *Tools:*

*Three tools were utilized for data collection these tools were:*

*Tool (1):* Nurse's personnel and background data sheet: It was developed by the investigator and revised by a panel of 5 expert's professors in critical care & emergency nursing and nutrition. It covers data regarding age, gender, qualification (educational level), place of work and years of experience in nursing and critical care units, and training courses concerning TPN.

*Tool (2):* Nurse's Knowledge assessment questionnaire about TPN: It was developed by the investigator and revised by a panel of 5 expert's professors in critical care & emergency nursing and nutrition to assess nurse's knowledge regarding care of patients receiving TPN. It consisted of 35 questions in the form of multiple choices, fills in the space and true/false questions, and classified into four main domains. The first domain is concerned with knowledge about general information regarding TPN therapy (questions 1 to 11), the second domain is concerned with knowledge related to care of patient before administering TPN therapy (questions 12 to 17), the third domain includes knowledge related to nursing care of patient during TPN administration (questions 18 to 30), and the fourth and last domain is concerned with knowledge related to nursing care required during weaning and disconnecting patient from TPN therapy (questions 31 to 35). The total score for the questionnaire was 37. Scoring system classified as; scores less than 75% unsatisfactory and scores equal or more than 75% satisfactory. Tool reliability was calculated and confirmed using SPSS, with a Pearson correlation value of 0.82.

*Tool (3):* Critical care nurse's observational check list about TPN: It was developed by the investigator and revised by a panel of 5 expert's professors in critical care & emergency nursing and nutrition to assess nurse's practices regarding care of patients receiving TPN therapy. It consists of 80 items classified under four main domains:

The first domain is concerned with nursing practice during preparation before TPN administration (steps 1 to 22). The second domain is concerned with nursing practice during administration of TPN therapy (steps 23 to 35). The third domain is concerned with nursing management of patient receiving TPN therapy (steps 36 to 63). And the fourth and last domain is concerned with nursing practice during removal and disconnecting of TPN therapy (steps 64 to 80). The total score for the check list was 160. It was carried out three times for each nurse during TPN administration and the average mean of three observational checklists was obtained. The scoring system was; each step that checked as "done complete" took 2 grades, "done incomplete" took one grade, and "not done" took zero grades; scores less than 85% unsatisfactory and scores equal or more than 85% satisfactory. Tool reliability was calculated and confirmed using SPSS, with a Pearson correlation value of 0.85.

#### *Tools validity and reliability:*

Content validity was done to identify the degree to which the used tools measure what was supposed to be measured. The developed tools were examined by a panel of 5 expert's professors in critical care & emergency nursing and nutrition to determine whether the included items were clear and suitable to achieve the aim of the current study.

#### *Pilot study:*

A pilot study was carried out on 6 nurses to test feasibility, and applicability of the study tools. Carrying out the pilot study gave the investigator experience to deal with the included subjects, and to be familiar with the data collection tools. Based on results of the pilot study, needed refinements and modifications were done and pilot study subjects were excluded from the actual study sample.

#### *Protection of human rights:*

An official permission to conduct the study was obtained from the Research Ethics Committee and hospital directors of Intensive Care Units at Cairo University Hospital. Participation in the study was voluntary; each subject had the right to withdraw from the study at any time without any rational. Every participant was informed about the benefits, purpose, and nature of the study and then written consents obtained from them. Moreover, confidentiality and anonymity of each subject was assured through coding of all data.

#### *Procedure:*

Once an official permission were obtained to carry out the study from the Research Ethics Com-

mittee at Faculty of Nursing, Cairo University and directors of selected setting, then the study tools were developed through extensive review of relevant literature. The implementation phase was initiated by interviewing nurses who agreed to participate in the study individually by investigator to explain the nature and purpose of the study. Written consents were obtained. The investigator visited the selected settings on daily basis during the morning and afternoon shifts. The average number of nurses who answered the questionnaire was five to seven nurses per day. Answering the nurse's personnel and back ground data sheet and nurse's knowledge assessment questionnaire about TPN required about 45-60 minutes from each nurse. Later, two nurses were observed directly by the investigator in each shift using critical care nurse's observational checklist about TPN. Each nurse was observed in three different occasions for 20-30 minutes, during morning and afternoon shifts while performing each step of the procedure in the observational checklist. The average mean of the three observations was calculated.

#### *Data analysis:*

After completion of data collection each sheet was manually scored, data were analyzed using Statistical Package for Social Science (SPSS) program Version 20; then tabulated. Relevant statistical analysis was used to test the obtained data. Descriptive and inferential statistics were done such as means; standard deviations; frequency; percentage; independent sample *t*-test, and analysis of variance (ANOVA). The level of significance was considered at the 5% level ( $p=0.05$ ) for testing hypothesis.

#### *Limitations of the study:*

- This study was limited to a small sample size (60 nurses); as it was conducted on the nurses who were willing to participate in the study.
- Findings are less amenable for generalization because the sample was selected from one geographical area in Egypt.
- As well as, studies in this area of research are limited especially in Egypt.

## **Results**

#### *Socio demographic characteristics of the studied sample:*

*Table (1):* Revealed that, 60% of the studied samples were females. The age, more than one thirds of the studied subjects 43.3% were ranged between 20-29 years with a mean age of 32.43 ±

7.64. As regards to educational level, most 51.7%, 35% of nurse's participants had technical nursing diploma degree and secondary nursing school degree, respectively. Concerning years of experience in the nursing, 40% of the study subjects had more than 10 years of experience, with a mean year of experience of  $9.45 \pm 5.20$  while 36.7% of the study subjects had 1-5 years of experience in the ICU with a mean year of  $7.9 \pm 4.56$ .

*Nurse's knowledge levels about total parenteral nutrition:*

Fig. (1): Showed that the great majority 92% of the studied sample had unsatisfactory total knowledge level about TPN (<75%) with a mean total knowledge scores of  $20.22 \pm 4.99$ .

Table (2): Clarified that the great majority of the studied sample had unsatisfactory subtotal knowledge score regarding general information about total parenteral nutrition, nursing care of patients before administration of TPN, nursing management of patients during TPN administration, and weaning and disconnecting patients from TPN in percentage of (63.3%, 90%, 80%, 85%), respectively, with subtotal mean knowledge scores of  $7.77 \pm 2.16$ ,  $3.47 \pm 1.14$ ,  $6.57 \pm 2.23$ , and  $2.42 \pm 1.15$ , respectively.

*Nurse's practices levels about total parenteral nutrition:*

As shown from Fig. (2): All of studied subject's 100% had unsatisfactory total practice level (>85%) regarding care of patients receiving TPN, with a mean total practice scores of  $91.22 \pm 6.72$ . While 83.3% of the studied sample had satisfactory practice level related to administration of TPN therapy.

Table (3): Delineated that all of studied sample 100% had unsatisfactory subtotal practice score regarding preparation and initiation of TPN therapy, nursing management during TPN therapy, nursing practice during disconnecting and weaning of TPN therapy with subtotal mean practice scores of  $26.28 \pm 1.32$ ,  $27.99 \pm 3.00$ , and  $15.05 \pm 0.30$ , respectively. However, more than half of studied sample 83.3% had satisfactory practice score pertinent to administration of TPN therapy, with subtotal mean practice scores of  $21.88 \pm 2.62$ .

*Comparison of knowledge level related to socio demographic characteristics:*

It is apparent from (Table 4) that a high significant statistical difference in the mean knowledge scores was found in relation to gender ( $t=4.26$  at  $p \leq 0.04$ ), who attended courses ( $t=13.8$  at  $p \leq 0.00$ ),

age category/group of (30-39)  $22.35 \pm 4.55$  than other with ( $F=3.67$  at  $p \leq 0.03$ ), as well a high significant statistical difference in the mean knowledge scores was found in the critical care medicine ICU (1 st & 2nd unite)  $24.85 \pm 3.91$  than other with ( $F=15.17$  at  $p \leq 0.00$ ). Also, the highest mean scores were found in females ( $21.0 \pm 5.53$ ), single ( $20.30 \pm 4.69$ ), who attended previous courses ( $20.83 \pm 0.75$ ), bachelor degree ( $23.62 \pm 3.99$ ), age category of 30-39 ( $22.35 \pm 4.55$ ), critical care medicine ICU 1 st & 2nd unite ( $24.85 \pm 3.91$ ), and having 6-10 years of experience in nursing and in ICU with a mean knowledge scores ( $22.2 \pm 6.66$  &  $22.0 \pm 5.64$ ), respectively.

*Comparison of practice level related to socio demographic characteristics:*

As can be seen from (Table 5), a high significant statistical difference in the mean practice scores was found in relation to marital status ( $t=50.99$  at  $p \leq 0.00$ ), who attended courses ( $t=8.34$  at  $p \leq 0.00$ ), place of work ( $F=12.00$  at  $p \leq 0.00$ ). In addition years of experience in nursing more than 10 years ( $F=4.63$  and  $p \leq 0.01$ ). Also, the highest mean scores were found in female ( $91.69 \pm 6.25$ ), married ( $93.23 \pm 4.09$ ), attending previous courses ( $94.22 \pm 0.17$ ), technical institute diploma degree ( $93.08 \pm 4.47$ ), age category of 30-39 ( $93.34 \pm 4.00$ ), national institution of cancer ICU ( $94.33 \pm 0.00$ ), and having more than 10 years of experience in nursing and ICU with a mean practice scores ( $94.19 \pm 0.16$ ,  $94.20 \pm 0.16$ ), respectively.

Table (6): Clarifies that no significant statistical correlation was found between ages, years of experience in nursing, and ICU in relation to total knowledge score & total practice score. However, a high significant statistical strong correlation was found between total mean knowledge scores and total mean practice scores ( $r=0.46$ ,  $p \leq 0.00$ ).

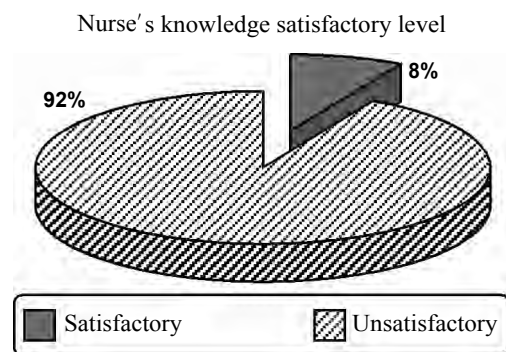


Fig. (1): Percentage distribution of the studied sample as regards to knowledge levels about Total Parenteral Nutrition (TPN) (n=60).

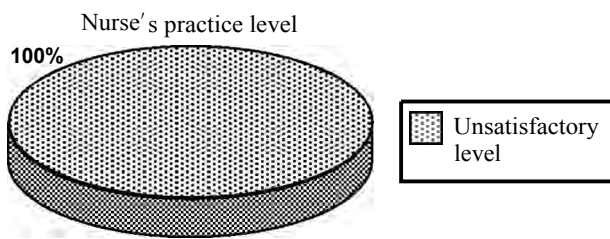


Fig. (2): Percentage distribution of the studied sample according to practice level regarding nursing care of patients receiving TPN (n=60).

Table (1): Frequency distribution of the studied sample as regards to age, educational level, place of work, years of work and ICU experience, and attending courses (n=60).

Variables	Frequency	No	Percentage %
<b>Age category (years):</b>			
20-29 years		26	43.3
30-39 years		20	33.3
40-49 years		14	23.3
Mean ± SD		32.43	±7.64
<b>Level of education:</b>			
Bachelor degree		8	13.3
Technical institute diploma degree		31	51.7
Secondary nursing school degree		21	35
<b>Place of work:</b>			
Critical Care Medicine ICU 3rd Unite		10	16.7
Critical Care Medicine ICU 1st & 2nd Unite		20	33.3
Cancer ICU		20	33.3
Surgical ICU		10	16.7
<b>Work experience in nursing (years):</b>			
1-5 years		17	28.3
6-10 years		19	31.7
>10		24	40.0
Mean ± SD		9.45	±5.20
<b>ICU experience (years):</b>			
1-5 years		22	36.7
6-10 years		20	33.3
>10 years		18	30.0
Mean ± SD		7.9	±4.56
<b>Attending courses/programs:</b>			
Yes		6	10
No		54	90
Mean ± SD		0.10	±.30

Table (2): Percentage distribution of the studied sample as regards to total & subtotal knowledge scores in relation to care of patients receiving TPN (n=60).

Knowledge assessment domains/items	Knowledge level				Subtotal Mean ± SD
	Satisfactory (≥75%)		Unsatisfactory (<75%)		
	No.	%	No.	%	
1- General information's about total parenteral nutrition.	22	36.7	38	63.3	7.77±2.16
2- Nursing care of patients before administration of TPN.	6	10	54	90	3.47±1.14
3- Nursing management of patients during TPN administration.	12	20	48	80	6.57±2.23
4- Weaning and disconnecting patients from TPN.	9	15	51	85	2.42±1.15
Total knowledge score	5	8.3	55	91.7	20.22±4.99

Table (3): Percentage distribution of the studied sample as regards to total & subtotal practice scores in relation to care of patients receiving TPN (n=60).

Practice assessment domains	Practice level				Average subtotal Mean ± SD
	Satisfactory (≥85%)		Unsatisfactory (<85%)		
	No.	%	No.	%	
1- Preparation and initiation of TPN therapy.	0	0	60	100	26.28±1.32
2- Administration of TPN therapy.	50	83.3	10	16.7	21.88±2.62
3- Nursing management during TPN therapy.	0	0	60	100	27.99±3.00
4- Nursing practice during disconnecting and weaning of TPN therapy.	0	0	60	100	15.05±.30
Total practice score	0	0	60	100	91.22±6.72

Table (4): Comparison of studied sample total mean knowledge scores in relation to socio demographic data (n=60).

Items	Mean ± SD	t-test /F	P-value
<b>Gender:</b>			
• Male	19.04±3.86	4.26	0.04**
• Female	21.0±5.53		
<b>Marital status:</b>			
• Single	20.30±4.69	.266	0.61Ns
• Married	20.16±5.23		
<b>Attended courses:</b>			
• Yes	20.83±0.75	13.8	0.00**
• No	20.14±5.25		
<b>Qualifications:</b>			
• Bachelor degree	23.62±3.99	2.24	0.11Ns
• Technical institute diploma degree	19.67±4.54		
• Secondary nursing school degree	19.71±5.62		
<b>Age category:</b>			
• 20-29 years	18.50±3.96	3.67	0.03 **
• 30-39 years	22.35±4.55		
• 40-49 years	20.35±6.29		
<b>Department:</b>			
• National Institution of Cancer ICU	18.50±4.34	15.17	0.00**
• Critical Care Medicine ICU 1st & 2nd Unite	24.85±3.91		
• Critical Care Medicine ICU 3rd Unite.	17.1±3.17		
• Surgical Unite ICU at El-Manial (3rd floor)	17.50±2.79		
<b>Work years of experience:</b>			
• 1-5 years	19.05±4.06	2.35	0.10Ns
• 6-10 years	22.2±6.66		
• >10 years	19.45±4.73		
<b>ICU years of experience:</b>			
• 1-5 years	18.36±4.0	3.01	0.05Ns
• 6-10 years	22.0±5.64		
• >10 years	20.50±4.76		

\*\* : p<0.05 significance value.

Ns : No significant statistical difference.

Table (5): Comparison of studied sample total mean practice scores in relation to socio demographic data (n=60).

Items	Mean ± SD	t-test /F	P <sup>^</sup> value
<b>Gender:</b>			
• Male	90.51±7.43	1.96	0.16Ns
• Female	91.69±6.25		
<b>Marital status:</b>			
• Single	87.98±8.70	50.99	0.00**
• Married	93.23±4.09		
<b>Attended courses:</b>			
• Yes	94.22±0.17	8.34	0.00
• No	90.88±7.00		
<b>Qualifications:</b>			
• Bachelor degree	89.74±8.28	2.64	0.08Ns
• Technical institute diploma degree	93.08±4.47		
• Secondary nursing school degree	89.03±8.23		
<b>Age category:</b>			
• 20-29 years	91.43±6.56	3.05	0.05Ns
• 30-39 years	93.34±4.00		
• 40-49 years	87.78±8.86		
<b>Department:</b>			
• National Institution of Cancer ICU	94.33±0.00	12.00	0.00**
• Critical Care Medicine ICU 1st & 2nd Unite	85.33±9.23		
• Critical Care Medicine ICU 3rd Unite.	94.00±0.00		
• Surgical Unite ICU at El-Manial (3rd floor)	94.00±0.00		
<b>Years of experience in nursing:</b>			
• 1-5 years	89.99±7.81	4.63	0.01**
• 6-10 years	88.55±8.53		
• >10 years	94.19±0.16		
<b>ICU years of experience:</b>			
• 1-5 years	90.93±7.04	3.27	0.045Ns
• 6-10 years	88.84±8.40		
• >10 years	94.20±0.16		

\*\* : p≤0.05 significance value.

Ns : No significant statistical difference.

Table (6): Correlation between studied sample age, years of experience in nursing, and ICU, in relation to total knowledge and total practice scores (n=60).

Variables	Total mean knowledge scores	Total mean practice scores
<b>Total mean knowledge scores:</b>		
Pearson correlation		
Sig. (2-tailed)		
<b>Total mean practice scores:</b>		
Pearson correlation	0.46	
Sig. (2-tailed)	0.00**	
<b>Age:</b>		
Pearson correlation	0.159	0.169
Sig. (2-tailed)	0.225Ns	0.196Ns
<b>Years of experience in nursing:</b>		
Pearson correlation	0.076	0.257
Sig. (2-tailed)	0.566Ns	0.05Ns
<b>Years of experience in ICU:</b>		
Pearson correlation	0.19	0.18
Sig. (2-tailed)	0.15Ns	0.16Ns

\*\* : r=(1, 1-).

Ns : No significant statistical difference.

## Discussion

### Socio demographic characteristics of the subjects:

The present study delineated the dominance of females, especially in the age group reflecting young and middle adulthood. This finding is merely in agreement with that of Taha (2014) [12], who conducted a clinical published study entitled as “critical care nurses' knowledge and practice regarding administration of TPN at critical care areas in Egypt, Benha University” and found that the majority of the studied samples were female and more than half of them were young adult. Concerning qualification, more than half of the studied samples had diploma nursing degree. This finding is contradicted with Taha, (2014) [12] who said that the majority of educational level of the studied sample was secondary school graduates followed by technical school graduates and finally baccalaureate degree graduates.

Moreover, the current study reported that, more than one third of the studied sample had more than 10 years of experiences in nursing and one to five years of ICU experience. This finding is in the same line with that of Shahin, (2012) [13] who done a published study entitled as “impact of a designed instructional program about EN on the nurses knowledge and practices at the Critical Care Department on 85 nurses carried out at Al-Manial University Hospital” and clarified that three quarters of the studied samples were females, more than one third of their age ranged between 25-34 years and more than half of them were diploma nurses with more than ten years of experience in work.

As regards to training courses, the current study declared that the great majority of studied sample didn't attend training courses/programs regarding care of patients receiving TPN. Consistent with this finding a study performed by Abdullah, Mohamed, Ismail, (2014) [14] entitled as “nurses' knowledge and practices about administration of medications via nasogastric tube among critically ill patients” and revealed that more than half of the studied sample needs to take training sessions about administration of medication via NGT.

### Nurse's knowledge related to care of patients receiving TPN:

The current study revealed that, the great majority of studied sample had unsatisfactory knowledge score regarding care of patients receiving TPN. In the same line with these findings Rajalak, Thanasekaran, & Rajan, (2014) [15] in a clinical study addressed as “evaluate the effectiveness of

a self-instructional module regarding knowledge on TPN for staff nurses” and concluded that the majority of staff nurses had inadequate knowledge scores with a mean pretest knowledge scores about TPN ( $37.7 \pm 11.5$ ) before starting educational program; congruence with their lack of knowledge prior to educational program and succeed to show an improvement with mean post-test knowledge scores ( $68.6 \pm 10.5$ ). Also, another published study performed by Abdollahi, et al., (2013) [16] entitled as “the nutrition knowledge level of physicians, nurses and nutritionists in some educational hospitals” the author illustrated that clinical staff in these teaching hospitals didn't have enough nutrition knowledge to meet the demands of their work. Ensuring the majority of failure in nutritional care has been linked to a lack of appropriate and sufficient nutritional knowledge among clinical staff.

*Relation between nurse's knowledge and socio demographic characteristics:*

The current study clarified that a significant statistical difference was found between gender and their knowledge scores with a higher mean knowledge scores of females than males. This finding is inconsistent with that of Shahin, (2012) [13] who reported that no statistical significant difference was found between males and females in pre-test knowledge and practice.

Regarding academic qualification; no significant statistical difference was found between academic qualification of studied sample and their knowledge scores; in spite of having the bachelor nurse higher mean knowledge scores followed by secondary nursing school then the less one is the technical diploma nurses. To advocate this finding a study conducted by Hamed, (2009) [17] about “nurses performance during cardio-pulmonary resuscitation in Intensive Care Unit and Cardiac Care Unit at Benha University Hospital” illustrated that bachelor degree nurses scores were significantly better than diploma nurses possibly because of the basic knowledge received during academic years is different than that received by diploma nurses.

As regard to years of experience those nurses who have 6-10 year of experience had a higher mean knowledge score than other without significant statistics; this may be due to new graduation with fresh knowledge. This mean when the years of experience increase the level of knowledge increase. This finding is merely in agreement with that of Rajalak, Thanasekaran & Rajan, (2014) [15] they found a high significant statistical association in the mean knowledge score in relation to gender,

age, in contrast, total years of experience, years of experience in the areas of work; were found to have a significant relationship with nurses' knowledge. However, no significant statistical difference was found in the mean knowledge scores in relation to qualification, and area of work.

Concerning age category of the current study, a high significant statistical difference was found between age of studied sample and their knowledge, and between attended courses and mean knowledge scores. This finding is matches with a recent study done by Taha, (2014) [12] who showed that a high significant statistical difference was found in the mean knowledge score in relation to attended courses and demonstrated that age is positively correlates with knowledge score.

*Nurse's practice related to care of patients receiving TPN:*

The present study revealed that the entire studied sample had unsatisfactory practice level regarding care of patients receiving TPN therapy. In the same line with these findings Taha, (2014) [12] who clarified that more than half of the studied sample had unsatisfactory practice level; as there was a lack of educational materials, policies and protocol about PN in the Critical Care Department. Furthermore, this finding is congruence with a published textbook by Smeltzer, et al., (2010) [18] the author implies that, nurses are the one who can provide specialized assessment and interventions to the patients, staff nurses can use the knowledge which gained through structured teaching programme for carrying out the nursing care in an effective manner, from this study, it can be seen that nurses should be periodically evaluated to determine their level of knowledge and skill based on which appropriate education programme can be planned.

*Relation between nurse's practice and socio demographic characteristics:*

The current study clarified that no significant statistical difference was found between gender, age category, qualifications, and ICU years of experience and nurse's practice level. Although the female nurses had a higher mean practice score. Concerning years of experience; a significant statistical difference was found between year of experience in nursing and practice level scores; however, the nurses who have more than 10 year of experience in nursing had a higher mean practice score than other. This finding of current study is consistent with Shahin, (2012) [13] who said no statistical significant difference was found between males and females in pre-test knowledge and prac-



tice. In addition, the present study revealed that nurse's practice level differs significantly in relation to marital status and attended courses. Therefore, this finding is confirmed by Taha, (2014) [12] who mentioned that the highest mean practice scores were related to married nurses who didn't attended courses. Also, the current study revealed that nurse's practice level differ significantly in relation to working units and this incongruence with finding of a published study by Abdullah, Mohamed, Ismail, (2014) [14] delineated no significant statistical difference was found in practice scores in relation to working units.

The current study showed that, no significant statistical correlation was found between age & year of experience and nurses knowledge. Related to this, a study fulfilled by Yalcin, N., Cihan, A., Gundogdu, H. & Ocakci, A.F. (2014) [19] in their study on nutrition knowledge level of nurses in Zonguldaki in Turkey, they indicated that long-term clinical experience without any special education on nutrition and without working experience in this field doesn't increase the nutrition knowledge. Otherwise, these findings are incongruence with that of Taha, (2014) [12] where the author reported that a highly significant positive correlation was found between age and years of experience and nurse's knowledge and practices.

The current study clarified that, no significant statistical correlation was found between age & year of experience and nurse's practice. Incongruence with these finding a study conducted by Daniel, et al., (2013) [20] who concluded that more years of working in ICUs and years of experience the higher efficiency of nurses clinical practices, as years of experience were positively correlated to their knowledge and performance. Also, this finding is incompatible with Taha, (2014) [12] who mentioned that a highly significant positive correlation was found between age and years of experience and nurse's knowledge and practices.

Findings of the present study delineated that, a positive correlation with highly significance statistical difference was found between nurse's knowledge and practice. However, the effective care of patient's receiving TPN therapy is often hindered by lack of knowledge, as a basic knowledge about TPN therapy is essential for nursing practice. In this regard, this finding is accordance with Shahin, (2012) [13] who announced that a highly statistical significant correlation was found between participant's scores of knowledge and practice in pre-program, post program. Also, this result is merely in agreement with Taha, (2014)

[12] who said that a highly significant positive correlation was found between nurse's knowledge and practice.

#### *Conclusion:*

The main emphasis of this study was to assess critical care nurse's knowledge & practices regarding care of patients receiving TPN. Based on findings of the current study, it can be concluded that, although critical care nurses have vital role in assessment and management of critically ill patients, they had unsatisfactory knowledge (92%) and practice (100%) regarding care of patients receiving TPN. There was a lack of educational materials, policies and protocol about PN in the Critical Care Department. However, unexpectedly nurses were found to have specific knowledge and practices regarding certain items concerned with care of patient receiving TPN therapy. Thus, there is a need to increase nursing awareness of nutritional assessment through providing training programs and observation of clinical performance is necessary. Management should be concerned with offering an available source of knowledge, and required equipment and documentation systems. Enhancing collaboration between health care providers and offering appropriate advising should also be underlined.

#### *Recommendation:*

- Establishment of continuing educational programs based on evidence-based guidelines to improve critical care nurse's knowledge and practice regarding care of patients receiving TPN therapy.
- Availability of written universal guidelines, booklets, posters, algorithms and standard precaution illustrated simply nursing management of patients receiving TPN therapy to ensure enough, knowledge, unified and safe nursing practice.
- Strict observation of ongoing monitoring and evaluation of critical care nurse's practices regarding caring of patients receiving TPN therapy.
- Study the impact of a designed nursing intervention protocol on the outcome of patients receiving TPN.
- Replication of the study on a larger probability sample from different geographical locations in Egypt.

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## تقييم معلومات وممارسات مرضى الحالات الحرجة عن العناية بالمرضى المتلقين للتغذية الوريدية الكاملة

تستخدم التغذية الوريدية الكاملة لمنع الآثار السلبية لسوء التغذية في المرضى الذين لا يستطيعون الحصول على التغذية الكافية عن طريق الفم أو عن طريق التغذية المعوية. ومع ذلك، قد تسبب التغذية الوريدية العديد من المضاعفات والآثار الجانبية التي تهدد الحياة. وبالتالي فإن تمييز الرعاية الحرجة ليس مسئول فقط عن معرفة كيفية تقييم الحالة الغذائية، ولكن أيضا ملاحظة المرضى عن أى علامات سلبية في الحالة المرضية العامة، وتوفير العناية التمريضية، ووضع خطة للرعاية لهؤلاء المرضى. وأجريت هذه الدراسة بهدف تقييم معلومات وممارسات مرضى الرعاية الحرجة عن العناية بالمرضى المتلقين للتغذية الوريدية الكاملة في مستشفيات جامعة القاهرة. وتم استخدام تصميم إستكشافي وصفي في هذه الدراسة. وقد تم الإستعانة بعينة هادفة من (٦٠) ممرض/ممرضة من وحدات الرعاية الحرجة المختلفة مع حد أدنى سنة من الخبرة ذات فئات تعليمية مختلفة. وأجريت الدراسة في وحدات الرعاية الحرجة المختلفة في مستشفيات جامعة القاهرة. وقد إستخدمت: (١) إستمارة البيانات الشخصية لممرضى الرعاية الحرجة. (٢) وإستمارة تقييم معلومات تمييزى الرعاية الحرجة عن التغذية الوريدية الكاملة. (٣) إستمارة ملاحظة أداء تمييزى الرعاية الحرجة أثناء رعاية المرضى المتلقين للتغذية الوريدية الكاملة لجمع المعلومات. وقد أشارت نتائج هذه الدراسة أن (٩٢٪) من العينة المدروسة لديهم معرفة غير مرضية بمتوسط  $4.99 \pm 20.22$ ، وكانت عينة الدراسة بأكملها (١٠٠٪) بمستوى ممارسة غير مرضى بمتوسط  $6.72 \pm 91.22$ . أيضا يوجد علاقة إرتباطية إحصائية عالية بين مجموع متوسط درجات المعرفة ومتوسط درجات الممارسة الكلية ( $r=0.46, p=0.00$ ). ومع ذلك، لا يوجد إرتباط ذو دلالة إحصائية بين سنوات الخبرة والعمر، ومستوى معرفة ممرضى الرعاية الحرجة أو مستوى ممارستهم فيما يتعلق بالتغذية الكاملة. وفي ضوء هذه الدراسة نوصى بتحديث معرفة وممارسات ممرضى الرعاية الحرجة من خلال: تنفيذ برامج تعليمية مستمرة حول الرعاية التمريضية بالتغذية الوريدية ومضاعفاتها، و مراعاة صارمة لممارسة/لأداء التمريض عند الرعاية بمرضى الحالات الحرجة المتلقين للتغذية الوريدية الكاملة، ومراجعة الإرشادات القياسية لتصبح الممارسات الخطأ، وضمان سلامة المرضى وتوفير تكلفة الرعاية وأخيرا، تكرار هذه الدراسة على عينة مختارة أكبر من مواقع جغرافية مختلفة وذلك للحصول على بيانات يمكن تعميمها.