

Nurses' Performance Regarding Care of Patients Post Percutaneous Endoscopic Gastrostomies in Critical Care Unit

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Abstract:

Background: Percutaneous endoscopic gastrostomy (PEG) is a medical procedure using endoscopic guidance to insert a tube into the patients stomach through the abdominal wall which using as a way to introduce enteral feeding when the oral pathway is not patent. **Aim:** This study aimed to assess nurses' performance regarding care of patients post percutaneous endoscopic gastrostomies in critical care unit. **Design:** A descriptive explorative design was utilized for conduction of this study. **Setting:** the study was carried out in critical care unit of Ain Shams University Hospital. **Study subject:** A convenience subject of all available nurse's (N=30). **Tools:** I - Self – administration questionnaire form which composed of nurses demographic characteristics' and nurses' knowledge questionnaire regarding care of patients post percutaneous endoscopic gastrostomies in critical care unit, II nurses' practice observational checklist to assess nurses' performance regarding care of patients post percutaneous endoscopic gastrostomies in critical care unit, **Results:** This results revealed that, 57% of the studied nurse's had unsatisfactory level of total knowledge about care of patients post PEG in critical care unit and 67% of them had unsatisfactory level of the total practices regarding care of patients post PEG in critical care unit, **Conclusion:** About more than half of studied nurse's had unsatisfactory level of knowledge and practices regarding care of patients post percutaneous endoscopic gastrostomies in critical care unit. **Recommendations:** Continuous evaluation of nurses' knowledge and practice is essential to identify their needs in ICU about care of patients post PEG to design nurses' educational program to improve their performance about care of patients post PEG placement.

Keywords: Nurses performance. Care of patients. Post PEG

Introduction:

Percutaneous endoscopic gastrostomy (PEG) is a medical procedure using endoscopic guidance to insert a tube into the patients stomach through the abdominal wall which using as a way to introduce enteral feeding when the oral pathway is not patent. As causes of enteral feeding is more preferable to parental nutrition which is only used when the gastrointestinal tract must be avoided. Percutaneous endoscopic gastrostomy (PEG) used to provide enteral nutrition with the use of the natural digestion

process of the gastrointestinal tract. The PEG procedure is an alternative to open surgical gastrostomy insertion, and does not require a general anesthetic; mild sedation is typically used.(*Ata, Naghshizadian, Kurtz & Farkas 2014*)

Percutaneous endoscopic gastrostomy (PEG) is the preferred route of feeding and nutritional support in patients with a functional gastrointestinal system who require long-term enteral nutrition. Percutaneous endoscopic gastrostomy (PEG) tubes are important in

patients with barriers to oral feeding, including benign or malignant conditions, iatrogenic causes such as radiation therapy that cause mechanical obstruction in the esophagus, motility disorders of the esophagus, neurologic causes resulting in oro-pharyngeal dysphagia include stroke, head trauma, parkinson's disease, motor neuron disease and myopathy and psychosomatic issues such as dementia, and mental retardation or developmental delay. (*Belen & Lucendo, 2015*)

Percutaneous endoscopic gastrostomy (PEG) contraindications should be taken in consideration before the procedure. Contraindications can be divided into two groups: Absolute contraindications which include sepsis, hemodynamic instability, severe ascites, peritonitis, coagulopathy, abdominal wall infection at the site of insertion, interposed or total gastrectomy. Relative contraindications which include obesity (might hinder trans-illumination during the procedure and finding the appropriate site on the abdominal wall), presence of non-obstructive oropharyngeal or esophageal malignancy, hepatomegaly, splenomegaly, peritoneal dialysis, gastric varices or partial gastrectomy. (*Arvanitakis et al., 2020*)

Percutaneous endoscopic gastrostomy (PEG) tube placement is relatively safe procedures despite there are several minor and major complications to note. Some minor complications which reported include: peristomal wound infection, granuloma formation, tube leakage into the abdominal cavity causing peritonitis, stoma leakage, inadvertent PEG removal, tube blockage, pneumoperitoneum, and gastric outlet obstruction. Major complications include aspiration pneumonia (particularly with a weak lower esophageal sphincter), hemorrhage, buried bumper syndrome,

necrotizing fasciitis, colonic fistula and metastatic seeding. (*Haskins et al., 2017*)

Nurses should have sufficient knowledge and skills for caring patients post PEG because their important role during the golden hours post PEG placement and later on include continuous and effective assessment to ensure the optimal well-functioning of the tube, early recognize the complications as infections, tube blockage, aspiration pneumonia and malnutrition which is common and serious problem that followed by sever clinical results as risk of infection and pressure ulcers, increased hospitalization and cost of treatment and mortality. (*Morphet, Clarke & Bloomer, 2016*)

Significance of the study:

Although the process of administering Enteral Nutrition (EN) may appear less complex compared with parenteral nutrition; serious harm and death can result due to potential adverse events occurring throughout the process. These events include reports of percutaneous endoscopic gastrostomy (PEG) misplacements and displacements, metabolic abnormalities, mechanical tube complications, GI intolerance related to formula contamination, and drug-nutrient interactions. (*Tian, Gao, Wu, et al., 2017*)

Nurses are the most health care providers who are responsible for caring of percutaneous endoscopic gastrostomy (PEG), they have to be sufficiently informed and practically skilled in dealing with their patients. Those patients are usually needed for careful and continuous observation from their nurses so as to avoid and or prevent any common complications and problems associated with percutaneous endoscopic gastrostomy (PEG) feeding processes. So there is an obvious need to contribute in the improvement quality of patient care. (*Stephen, Beth, Robert, et al., 2016*)

Aim of the study:

This study aims to assess nurses performance regarding care of patients with percutaneous endoscopic gastrostomies in critical care unit. It will be achieved through the following:

- Assessing nurses level of knowledge regarding care of patients post percutaneous endoscopic gastrostomy in critical care unit
- Assessing nurses level of practice regarding care of patients post percutaneous endoscopic gastrostomy in critical care unit

Research questions

The current study answered the following questions:

- What are nurses level of knowledge regarding care of patients post percutaneous endoscopic gastrostomy in critical care unit?
- What are nurses level of practice regarding care of patients post percutaneous endoscopic gastrostomy in critical care unit?

Subjects and Methods:**I. Technical design****Research Design:**

A descriptive exploratory research was utilized of questions. It helps the investigator to describe and document aspects of a situation as it naturally occurs. As well, this design helps to establish a database for future research.

Research Settings:

The current study was carried out at four different critical care unit of Ain Shams University Hospital.

Subjects:

A convenience sample (30) nurses was included in the study, representing all those who work in the selected critical care units of Ain Shams University Hospitals. Nurses had a minimum of one

year working experience, and were willing to participate in the current study.

Tools of the study:

Two tools were used to achieve this study namely:

Tool I: Nurses self-administered questionnaire was developed by the investigator based on recent literature review (*Tabashy et al., 2019; Ata. et al., 2014; Bourgault et al., 2007;*) consists of the following 2 parts:-

Part I: The demographic characteristics of nurses which include (Age, gender, level of education, patient to nurse ratio, years of experience and training courses regarding care of patients post percutaneous endoscopic gastrostomy in critical care unit.)

Part II: knowledge of nurses regarding care of patients post percutaneous endoscopic gastrostomy in critical care unit which include: Anatomy and physiology of GIT system (5 items), knowledge about PEG. (6 items), indications of PEG. (6 items), contraindications of PEG. (5 items), complications of PEG. (7 items), nursing management post PEG placement. (5 items), nursing management before administration of feeding or medications. (5 items), and nursing management during administration of feeding or medications. (7 items).

❖ Scoring system:

The questions were in the form of multiple choice and true and false questions. One grade was given for each correct answer, and zero for the incorrect one. The total grades for every part were summed and percentage was calculated. The knowledge level was categorized into satisfactory and unsatisfactory as follow:

- Satisfactory $\geq 85\%$ (≥ 39 degrees)
- Unsatisfactory $< 85\%$ (< 39 degrees)

Tool II: Seven observational checklists to assess nurses' practices regarding care of patients post percutaneous endoscopic gastrostomies in critical care it was written in English by the investigator after reviewing the related literature. (Lynn 2019). It composed of 68 items covering the following parts:-

- Practices related to preparation of (10 items)
- Practices regarding care of PEG tube at golden hours. (7 items)
- Practices regarding continuous care of PEG.(8 items)
- Practices regarding continuous feeding via PEG tube.(21 items)
- Practices regarding administration of a bolus feed via PEG tube. (11 items)
- Practices regarding administrating medication via PEG Tube. (5 items)
- Practices after the procedure. (6 items)

❖ Scoring system:

The total scores for every part and for all checklists were calculated and changed into percentage, every step was correctly done given one grade, and zero for the not done or done incorrectly. The total grades for every part were summed and percentage was calculated:

- $\geq 85\%$ (≥ 58 degree) considered satisfactory level of practice
- $< 85\%$ (< 58 degree) considered unsatisfactory level of practice

Content, Face Validity and Reliability:

Validity and reliability of the prepared tool was conducted to determine whether the content of the tool cover the aim of the study. It measured by a jury of seven experts, four of them were professors and three of were assistant professors in medical surgical nursing at Faculty of Nursing, Ain Shams University. The experts reviewed the tool for clarity of sentences, relevance, accuracy,

comprehensiveness, simplicity and applicability. Finally, the final forms were developed.

Testing reliability of the scales used in the tool was done through assessed through measuring their internal consistency by Alpha Cronbach Coefficient test. They demonstrated good reliability levels as shown below.

Tool	tems	Reliability	
		Reliability Coefficient	Cronbach's Alpha
Total knowledge	6	0.69	0.89
Total practice	8	0.79	0.86

II. Operational Design:

Preparatory Phase:

In this phase, the researcher reviewed current and past, local and international related literature to gain in-depth knowledge of the difference aspects of the study subjects. This was achieved by using textbooks, articles, journals and internet search. This was helpful in the selection and preparation of the data collection tool and in writing up the scientific background of the study.

Ethical Considerations

The ethical research considerations in this study included the following: The research approval of protocol was obtained from Scientific Research Ethical Committee in Faculty of Nursing in Ain Shams University before starting the study. The investigator clarified the objective and aim of the study to the nurse's included in the study. The investigator assured maintaining anonymity and confidentiality of the subject's data. Nurses were informed that they allowed choosing to participate or not in the study and that they had the right to withdraw from the study at any time without giving any reasons. Ethics, values,

culture, and beliefs were respected. An approval was obtained from the director of critical care units at Ain Shams University hospitals.

Pilot Study:

A pilot study was conducted to test feasibility and applicability of the study tools used in this study. It was carried out on 10 % of total subjects. To test the applicability and clarity of the tool and as well as to estimate the time needed to fill the tool. There is no necessary modification was done for the used tool so that the nurses who included in the pilot study were included to the main study group.

Fieldwork:

To carry out the study, an approval was obtained from the hospital and nursing directors of critical care units at Ain Shams University hospitals. The purpose of the study was explained to the studied nurses who agreed to participate in the study prior to data collection.

Data were collected in six months from beginning of April 2019 to the end of September 2019. The investigator visited the study setting for four days weekly. The investigator filled the observational checklist in the morning shifts (from 8 am to 2 pm) and afternoon shifts (from 2 pm to 8 pm) during actual nurse's work and documented steps of care for the patients in intensive care unit.

The observational checklist was used prior to administration of the questionnaire to ensure the maximal realistic observations of the nurse's performance and minimize the possibility of bias. The nurse's practice was assessed by the investigator while they were caring of patients.

Each nurse was observed individually by the investigator during

practice using the observational checklist it took about 30-45 minutes. Then, the self-administered questionnaire tool was filled by the nurses who providing care for patients it took about 30-35 minutes.

Administrative Design:

An official letters were obtained from faculty of nursing, Ain Shams University to get permission from the director of Ain Shams University hospital explaining the purpose of the study to obtain the permission for conducting this study.

III. Statistical Design:

The data were collected and coded. Then the collected data were organized, analyzed using appropriate statistical significance tests using the Computer Statistical Package for Social Science (SPSS), version 24. Data were presented using descriptive statistics in the form of frequencies and percentages. Chi square test was used to compare the frequencies and the correlation between study variables. Degrees of significance of results were considered as follow: Non-significant (NS) difference at $P > 0.05$. Significant (S) difference at $P < 0.05$.

Results:

Table (1): Shows that the mean age of studied nurses was 25.96 ± 4.96 , regarding to gender 60 % of them are females, 63.3% of subjects had age between 20-30 years. 90% of subjects had bachelor nursing degree, 63.3% of the subjects had 1-5 years of experience in ICU and 83.3 % of subjects weren't received training courses in caring of patients post PEG.

Table (2): Reveals that 76.6 % of subjects had unsatisfactory knowledge about anatomy of GIT system, 66.7 % of subject had unsatisfactory general knowledge about PEG tube and nursing care before feeding or giving medications

through PEG tube respectively, 63.3% of the subjects had unsatisfactory level of the total score of knowledge.

Table (3): reveals that 83.3 % of subjects had unsatisfactory level of practice about Administration of a bolus feed via PEG tube, 76.7% of subjects had unsatisfactory level of practice regarding administrating medication via PEG tube, 66.7 % of the subjects had unsatisfactory level of the total practice.

Table (4): There is non-statistically significant relation between the nurses' age and their level of knowledge ($p \leq 0.2$), there is non-statistically significant relation between the nurses' educational level and their level of knowledge ($p \leq 0.31$).

Table (5): There is a non-statistically significant relation between the nurses' age and their level of practice. ($p \leq 0.68$), there is a non-statistically significant relation between the nurses' sex

and their level of practice. ($p \leq 0.5$), there is non-statistically significant relation between the nurses' educational level and their level of knowledge ($p \leq 0.27$)

Figure (1): Regarding percentage of the studied nurses who had satisfactory level of knowledge regarding care of patients post PEG in critical care unit, figure 1 shows that, the highest percentage of the studied nurses (57%) had unsatisfactory level of the total knowledge regarding care of patients post PEG in critical care unit.

Figure (2): Regarding percentage of the studied nurses who had satisfactory level of practice regarding care of patients post PEG in critical care unit, figure 2 shows that, the highest percentage of the studied nurses (67%) had unsatisfactory level of satisfactory level of practice regarding care of patients post PEG in critical care unit.

Table (1): Distribution of studied nurses according to their demographic characteristics. (N=30).

Items	Number	Precent %
Age (years)		
20 < 30	19	63.3 %
30 < 40	11	36.7 %
Mean ± SD	25.96 ± 4.96	
Gender		
Male	12	40.0 %
Female	18	60.0 %
Marital Status		
Single	16	53.3 %
Married	14	46.7 %
Educational level		
Bachelor	27	90.0 %
Higher degree	3	10.0 %
Experience (years)		
1- <5	19	63.3 %
≥ 5	11	36.7 %
Mean ± SD	1.51 ± 2.05	
Position		
Bedside nurse	30	100 %
Nurse's/ Patients Ratio		
1: 1	4	13.3 %
1: 2	25	83.3 %
1: 3	1	3.3%
Attendance training courses about PEG		
Yes	5	16.7 %
No	25	83.3 %
Availability of PEG procedure technique book		
Yes	12	40.0 %
No	18	60.0 %

Tables (2): Number and percentage distribution of the total nurses regarding to their knowledge about care of patients post PEG. (N = 30).

Total knowledge	Satisfactory		Unsatisfactory	
	N	%	N	%
Anatomy of GIT system.	17	56 %	13	43.3 %
Knowledge of PEG tube.	13	43.3 %	17	56.7 %
Indications of PEG tube.	13	43.3%	17	56.7%
Contraindications of PEG tube.	12	40.0%	18	60.0%
Complications of PEG tube.	16	53.3%	14	46.7%
Nursing care of PEG tube.	12	40.0%	18	60.0%
Nursing care before feeding or giving medications through PEG tube.	20	66.7%	10	33.3%
Nursing care before feeding or giving medications through PEG tube.	11	36.7 %	19	63.3 %
Total score of knowledge	13	43.3%	17	56.7%

Table (3): Number and percentage distribution of subjects according to their total level of practice regarding care of patients post PEG. (N=30).

Total Practices	Satisfactory		Unsatisfactory	
	N	%	N	%
Preparation for PEG care (before the procedure).	10	33.3%	20	66.7%
During the procedure (care of PEG tube at golden hours).	20	66.7%	10	33.3%
Continuous care of PEG tube.	12	40.0%	18	60.0%
Continuous feeding via PEG tube.	9	30.0%	21	70.0%
Administration of a bolus feed via PEG tube	5	16.7%	25	83.3%
Practice regarding administrating medication via PEG tube	7	23.3%	23	76.7%
Practice regarding PEG care after its insertion.	8	26.7%	22	73.3%
Total	10	33.3%	20	66.7%

Table (4): Relations between nurse's demographic data and their level of knowledge about PEG.

Items	Nursing knowledge				Chi	P. value	Sig.
	Unsatisfactory		Satisfactory				
	N	%	N	%			
Age							
From 20 ≤ 30 yrs	17	73.7%	8	26.3%	2.69	0.2	N.S
From 30 ≤ 40 yrs	3	60.0%	2	40.0%			
Sex							
Male	5	41.7%	7	58.3%	13.69	0.000	H.S
Female	18	100%	0	0.0%			
Marital status							
Single	16	100 %	0	0.0%	10.43	.001	H.S
Married	7	50.0 %	7	50.0%			
Educational level							
Bachelor	20	74.1%	7	25.9%	1.82	.4	N.S
Master	3	100%	0	0.0%			
Years of experience							
1 to 5 yrs	19	100%	0	0.0%	1.82	.4	N.S
> 5 yrs	4	36.4%	7	63.6%			
Nurse to patient ratio							
1:1	4	100%	0	0%	1.82	.4	N.S
1:2	18	72%	7	28.0%			
1: >3	1	100%	0	0.0%			
Attending training sessions about PEG care							
Yes	18	72.0%	7	28.0%	1.82	.4	N.S
No	5	100%	0	0.0%			

Table (5): Relations between nurse's demographic data and their level of practice about PEG.

Items	Nursing practices				Chi	P. value	Sig.
	Unsatisfactory		Satisfactory				
	N	%	N	%			
Age							
20 ≤ 30 yrs.	17	73.7%	8	26.3%	0.76	0.68	N.S
30 ≤ 40 yrs.	3	60.0%	2	40.0%			
Sex							
Male	8	66.7%	4	33.3%	0.45	0.5	N.S
Female	14	77.8%	4	22.2%			
Marital status							
Single	16	100.0%	0	0.0%	12.46	.000	H.S
Married	6	42.9%	8	57.1%			
Educational level							
Bachelor	19	70.4%	8	29.6%	0.45	0.5	N.S
Master	3	100%	0	0.0%			
Years of experience							
1 to 5 years	19	100.0%	0	0.00%	0.45	0.5	N.S
> 5 years	3	27.3%	8	72.7%			
Nurse to patient ratio							
1:1	0	0.00%	4	100%	12.81	.002	S
1:2	21	84.0%	4	16.0%			
1: >3	1	100.0%	0	0.00%			
Attending training sessions about PEG care.							
Yes	21	84.0%	4	16.0%	8.72	.003	N.S
No	1	20.0%	4	80%			

Total Knowledge**Figure (1):** Percentage distribution of the studied nurses according to their total level of knowledge regarding care of patients post PEG in critical care unit.**Total Practice****Figure (2):** Percentage distribution of the studied nurses according to their total level of practice regarding care of patients post PEG in critical care unit.

Discussion:

Percutaneous endoscopic gastrostomies might cause various complications if adequate postoperative care is not provided. These include mechanical complications such as tube blockage and tube leakage associated with stomal hypergranulation and buried bumper syndrome. Other problems are gastrointestinal complications such as nausea, vomiting, increased gastric residual volume, abdominal distension, and diarrhea or metabolic irregularities due to either under-feeding or over-feeding and wound site infection (*Sezer, Koken, & Celik., 2019*). Therefore, this study aimed to assess nurses performance regarding care of patients with percutaneous endoscopic gastrostomies in critical care unit.

Part I. Demographic characteristics of the studied nurses:

The present study results showed that more than half of the studied nurses were females and their age ranged between 20-30 years. These results agree with a study done by *Hassan, et al. (2020)* who revealed that more than half of the staff nurses were female and their aged from ranged 20 to 25 years old. Also, these results contradicted with a study done by *Aziz et al. (2020)* who discovered that the majority of studied nurses were male and their age range from 22-26 years old.

This study revealed that the majority of studied nurses had bachelor of nursing degree and about more than half of them had 1-5 years of experience in ICU. These results agree with a study done by *Khani et al. (2016)* who studied evaluating knowledge, attitude and practice of intensive care unit nurses in administering medications via enteral tubes, that who

revealed that about the majority of the staff nurses had bachelor's degree in nursing practice and the mean average of working experience in different ICUs was more than 5 years and their experience in their current ICU was about 4 years. Also, these results contradicted with a study done by *Muneer, et al. (2016)* who studies assessment of nurses' knowledge and performance regarding feeding patients with nasogastric tube in Ismailia General Hospital who revealed that nursing institute was the most frequent educational attainment among the studied sample. Forty percent of them had previous experience less than one year and about one-quarter of them had from 5 to less 10 years of experience.

Also, the results showed that the majority of the studied nurses received courses in caring of patients post PEG. This result agree with a study done by *Aziz, et al. (2020)* who stated that more than four fifth of the studied nurses received a training courses regarding enteral tubes. Also this result contradicted with a study done by *Shehab et al. (2017)* who studied assessment of the nurses' performance in providing care to patients undergoing nasogastric tube in Suez Canal University Hospital, who showed that, the majority of nurses did not receive training programs regarding enteral feeding. From the researcher point of view this result might be due to availability of improvement plan for the staff regarding variety of nursing skills.

Part II. Nurse's level of knowledge regarding care of patients post PEG:

The results of this study revealed that near two third of the studied nurses had unsatisfactory level of the total knowledge regarding care of patients post PEG. These results contradicted with (*Bayoumy et al. 2015*) who showed that

about more than half of the studied nurses had satisfactory level of knowledge regarding care of patients post PEG. Also, this result agree with a study done by (*Morphet et al. 2016*) who revealed that high percentage of the studied nurses had unsatisfactory level of knowledge regarding enteral nutrition. From the researcher point of view this result might be due to lack of self-learning and development according to updated nursing guidelines.

Part III. Nurse's level of practice regarding care of patients post PEG:

Concerning total level of practice regarding care of patients post PEG, the study revealed that more than four fifths of the studied nurses had unsatisfactory level of practice about administration of a bolus feed via PEG tube. Also, it revealed that about two third of them had unsatisfactory level of the total practice regarding administration medication via PEG tube. These results contradicted with *Hussein E, et al. (2020)* who studied nursing-based guidelines for caregivers regarding adult patients with percutaneous endoscopic gastrostomy, who revealed that a high percentage of caregivers had satisfactory level of practice related to care of patients post PEG. From the researcher point of view these results might be due to workload of nurses and high rate of patients under care.

This study showed that about two third of the studied nurses had unsatisfactory level of the total practice regarding continuous care of PEG tube. This result agrees with a study done by (*Hussein, et al.2020*) who revealed that the majority of subject had a poor level of drug administration, nutritional management, and care for PEG. From the researcher point of view these results might be due to lack of demonstration and

re-demonstration of practices related to continuous care of PEG tube.

Part IV. Relations and association:

Concerning the relations between the studied nurse's demographic data and their level of knowledge this results revealed that, there were no statistically significant relation between the nurses' age and their level of knowledge. Also, it revealed that there were no statistically significant relation between the nurses' educational level and their level of knowledge .These results agree with a study of *Al-Qalah & Alrubaiee. (2020)* who revealed that there was no significant associations between the level of ICU nurses' knowledge regarding enteral nutrition management and their age and educational level.

Also, this result contradicted with the results of the study done by *Mooi,(2018)* who studied knowledge of intensive care nurses regarding the monitoring of early enteral nutrition studied who showed that there was a highly statistically significant relation between the level of nurses' knowledge regarding enteral nutrient management and the subjects' age and educational level. From the researcher point of view, this discrepancy might be attributed to the nature of training courses provided and the differences in the respondents' data, where it was found that young and newly graduated nurses had been more receptive, more tolerant and have a more potent memory.

Also, the results revealed that there was a highly statistically significant relation between the nurses' level of knowledge and their sex, marital status and years of experience. These results contradicted with a study done by (*Ramuada,2017*) who showed that, there

were no statically significant relation between the level of nurses' knowledge regarding enteral nutrient management and the following variables: gender, marital status and years of experience. Also, these results contradicted with a study done by (Aml, et al. 2018) who showed that there were no significant relation between studied sample age, sex, marital status, years of experience and total nurses' knowledge and practice scores. From the researcher point of view, this discrepancy might be attributed to continuous and appropriate evaluation system.

The present study findings revealed that there was no statistically significant relation between nurses' level of practice and their age and sex. These results contradicted with a study done by Milad, et al., (2018) who showed that there was statistically significant relationship between the performance of the feeding skills and personal characteristics (age, sex). The results substantiated that there were no significant relationship between individual performance and the features and that the nurses in this study had relatively good performance despite individual differences. Also, these results agree with a study done by Shahin, et al. (2012) who studied nurses' knowledge and practices regarding enteral nutrition at the critical care department of Al-Manial University Hospital in Egypt who showed that there were no statistical significant difference between age, sex and practice. From the researcher point of view, this discrepancy might be attributed to young and newly graduated nurses had been more tolerant.

Also, the results revealed that, there were no statistically significant between nurses' level of practice and following variables (educational level, attending training sessions about PEG care). This results agree with a study done by Saeedeh, et al. (2016) who showed that

there were no significant relationship between individual performance of the feeding skills and personal characteristics educational level, attending training courses. From the researcher point of view, these results might be attributed to newly graduated nurses have a more power.

Also, table stated that there were a highly statistically significant between nurses' level of practice and the following variables (nurses' marital status and years of experience). These results contradicted with a study done by Saeedeh, et al. (2016) who showed that there were no significant relationship between individual performance and personal characteristics (marital status, years of experience). Also these results agree with a study done by Darawad, et al. (2018) who studied ICU nurses' perceived barriers to effective enteral nutrition practices, who revealed that there were no statistically significance between nurses' level of practice and nurses' marital status and years of experience

Conclusion:

Based on the findings of the current study, it can be concluded that more than half of studied nurse's had unsatisfactory level of knowledge and practices regarding care of patients post PEG in critical care unit, moreover; there are significant relation between age, educational level and years of experience of the participating nurse's and their knowledge and practice

Recommendations:

The results of this study projected the following-recommendation:

- Continuous evaluation of nurses' knowledge and practice is essential to identify their needs in ICU about care of patients post PEG.

- Designing nurses' educational program to improve nurses' knowledge about care of patients post PEG placement.
- Procedure technique book regarding care of PEG tube should be available in ICU as a reference for all nurses.
- An orientation program should be prepared to help the newly appointment nurse's to revise, acquire and develop the knowledge and practice regarding care of patients post PEG.
- Replication of the study on larger subjects selected from a different geographical area of Egypt is recommended.
- Further research is recommended to evaluate the effect of training program on nurse's performance regarding care of patient post PEG.

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