NURSES' PERFORMANCE REGARDING CARE OF POST PERCUTANEOUS ENDOSCOPIC GASTROSTOMY PATIENTS IN CRITICAL CARE UNITS

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Abstract

Background Percutaneous endoscopic gastrostomy (PEG) is a method of enteral nutrition applied in the case of patients at risk of malnutrition and undernourished patients in specific clinical conditions. **Aim of the study:** was to assess nurses' performance regarding care of post percutaneous endoscopic gastrostomy patients in critical care units. **Design:** A descriptive exploratory research design was used. **Setting:** The study was conducted in the endoscopy & critical care units at El-Fayoum General Hospital. **Subjects:** A Convenient sample of all available nurses (50) nurse from both sex working in endoscopy & critical care units. **Tools:** two tools were used for data collection. Tool I: Nurses' self-administered interview Questionnaire: which included (a) Demographic characteristics of nurses (b) Nurses' knowledge regarding care of post percutaneous endoscopic gastrostomy patients Tool II: Observational check list to assess nurses' practice regarding care of post percutaneous endoscopic gastrostomy patients. **Results:** the study results reported that 64%, 78% of the studied nurses had unsatisfactory level of total knowledge and incompetent level of total practices regarding care of post percutaneous endoscopic gastrostomy patients respectively. Additionally, there was a statistically significant correlation between total knowledge and practice regarding care of post percutaneous endoscopic gastrostomy patients. **Conclusion:** The study concluded that nearly two thirds of the studied nurses had unsatisfactory knowledge, and more than three quarters of them had incompetent level of practice regarding care of post percutaneous endoscopic gastrostomy patients. Additionally, there was a statistically significant correlation between total nurses' knowledge and practice regarding care of post percutaneous endoscopic gastrostomy patients. **Recommendations:** Continuing educational program to improve knowledge and practices of nurses regarding care of post percutaneous endoscopic gastrostomy patients.

Keywords*:* Nurses' performance, percutaneous endoscopic gastrostomy.

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Introduction

Enteral feeding provide nutritional support in patients for whom oral intake is unsafe and contraindicated. Nasogastric tube (NGT) or gastrostomy tube feeding provide two options for enteral tube feeding. Percutaneous endoscopic gastrostomy (PEG) involves an endoscopy to insert a feeding tube into the stomach. Nutritional support through PEG has been shown to result in increased nutritional indicators, weight gain, and lower treatment failure compared with NGT feeding *(Lee, et al., 2021).*

Percutaneous endoscopic gastrostomy (PEG) is a relatively safe procedure that has been the widely preferred method of enteral feeding access since its introduction in the 1980s. It is used primarily in patients with a functional gastrointestinal system who require long-term enteral nutrition and are unable to feed by mouth. PEG tubes are not permanent, lasting on average around 6–12 months, and routine exchange is necessary to prevent malfunction *(Gkolfakis, et al., 2021).*

Percutaneous endoscopic gastrostomy (PEG) tube feeding is indicated if long-term difficulty in swallowing or prolonged failure of oral feeding is expected, such as in patients with obstruction of the oropharynx or esophagus, a pharyngeal tumor or esophageal tumor, or neuromuscular disorders such as stroke. It can be used for palliative gastric decompression or for therapeutic purposes in pediatric patients *(Choi & Cho 2022).*

There are several considerations that should be made prior to placement of a PEG tube which will increase the risk of complications with tube placement. Relative risks include patient with coagulopathy and hemodynamic instability. Often

these should be corrected prior to proceeding with the procedure. Additional contraindications include ascites, peritonitis, carcinomatosis, history of gastrectomy, interposed organs, and in cases where consent is not obtained or discussions have not been had regarding the goals of care *(Brawley & Sachdev, 2021).*

Although PEG tube placement is a relatively safe procedure, there are several minor and major complications to note. Some minor complications 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, perforated viscus, necrotizing fasciitis, colonic fistula (due to misplacement of the PEG tube), and metastatic seeding *(Gravina, et al., 2021).*

Nurses have a vital role in the care of patients during the golden hour post percutaneous endoscopic gastrostomy placement in critical care units, to prevent complications such as tube extraction, bleeding, gastric ulcers, as well as continuous nursing observation later to ensure the optimal well - functioning of the tube and the absence of complications such as peritonitis resulting from gastric fistula and buried bumper syndrome in which the gastric part of the tube migrates into the gastric wall *(Akçay, et al., 2020).*

Significance of the study

Percutaneous endoscopic gastrostomy (PEG) was first described by **Gauderer and Ponsky** in 1980. A PEG tube is passed into the stomach through the abdominal wall to provide a long-term means of enteral nutrition for patients whose oral intake is restricted. PEG is performed more than 200, 000 times yearly in the United States, 140, 000 times in Germany, and 17, 000 times in the United Kingdom. This procedure is the most commonly used method in long-term enteral feeding due to ease of placement, shorter hospital stay, early initiation of nutrition support, and cost-effectiveness and safety. Besides these advantages, PEG might cause various complications if adequate postoperative care is not provided *(Sezer, et al., 2020).*

Aim of the Study

The aim of this study was to assess nurses' performance regarding care of post percutaneous endoscopic gastrostomy patients in critical care units. This aim will be achieved through the following objectives:

1- Assess nurses' level of knowledge regarding care of post percutaneous endoscopic gastrostomy patients in critical care units.

2- Assess nurses' level of practice regarding care of post percutaneous endoscopic gastrostomy patients in critical care units.

Subjects and methods:

I-Technical item:
Research design: Descriptive exploratory research design was used in this study.
Setting:
This study was conducted at El-Fayoum General Hospital.
Subjects:
A convenient sample of all available nurses (50) nurse from both sex. who provide direct patient care and willing to participate in the study.

Tools for data collection are:

There were two tools utilized to collect the data of the current study:

Tool I : Nurses' self administered interview Questionnaire:

This tool was adapted from *(Abdulla, 2021)* and was modified by the investigator based on reviewing related literature and was written in simple Arabic to gather data regarding the following parts**:**

Part 1: Demographic characteristics of nurses: such as (age, gender, marital status, educational level, years of experience in intensive care units, attending training courses and there a booklet). It composed of (8) closed end question.

Part 2: Nurses' knowledge regarding care of post percutaneous endoscopic gastrostomy patients: This part includes (46) questions in form of (5) multiple choice questions(MCQ) and(41) true & false questions.

Scoring system

Regarding scoring system: the self-administrated questionnaire nurses' total score was 46 points. The scoring system was distributed according to the following**:-** Correct response scored as(two) point and incorrect response scored as(one) point. The score were summed up and were converted into a percentage score .

It was classified into two categories :

- Satisfactory knowledge if score ≥85%.
- Un satisfactory knowledge if score < 85%.

Tool II: Observational check list to assess nurses' practice regarding care of post percutaneous endoscopic gastrostomy patients:

This tools was adopted from*(Abdulla, 2021)* This part contains three main items as the following**:** (A) Before procedure which include10 points: (B) During procedure which include5 sub items as the following 1- care of PEG tube at golden hours which include7 points 2- continuous care of PEG tube which include 8 points 3- continuous feeding via PEG tube which include 21 points 4- Administration of a bolus feed Via PEG tube which include 11

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points 5- Administrating medication via PEG Tube which include 5 points (C) After the procedure which include 6 points.

Scoring system

Regarding scoring system: the nurses' performance checklist, the total score was 47 points. The score was distributed according to the following, the task which is performed correctly done was graded as(two) point, the task which is performed incorrectly or not done was graded as(one) point. The score were summed up and were converted into a percentage score .

It was classified into two categories :

- Competent if score ≥85%
- Incompetent if score < 85% .

II- Operational Item: operational item included the preparatory phase, validity, reliability of the developed tools, pilot study and field work.

A) Preparatory phase: It was included reviewing of past, current, national and international related literature and theoretical knowledge of various aspects of the study using books, articles, internet, periodicals and magazines to develop tools for data collection. During this phase, the investigator also visit the selected place to get acquainted with the personal and the study setting. The development of the tools was under supervisors guidance and experts opinions were considered.

B) Validity:

The tools of the study were revised by a jury of 5 experts: assistant professors and lecturer of medical surgical nursing from faculty of nursing, Helwan University to review tools for clarity, relevance, comprehensiveness, understanding and applicability. Modifications of tools were done according to the panel judgment on clarity of sentence, appropriateness of content, sequence of items and accuracy of scoring.

Reliability:-

Cronbach's Alpha were used to determine the internal reliability of the tool. The result was as the following: Nurses' knowledge regarding care of post percutaneous endoscopic gastrostomy patients (0.984), Observational checklist (0.984). Statistical equation of Cronbach's alpha reliability coefficient normally ranges between 0 and 1. Higher values of Cronbach's alpha (More than 0.7) denote acceptable reliability.

C) Pilot study:

The pilot study was done on 10% of the sample (5 nurses) to examine the clarity of questions, assess the ability of the tools to achieve the stated study objectives , determine to applicability of the study, and time needed to complete the study tools. There was no modification done for used tool, and nurses in the pilot study were included in the study.

D) Field work:

- An approval was obtained from a scientific ethical committee of the faculty of nursing at Helwan University.
- An approval was obtained from the director of El-fayoum general hospital.
- A written informed consent was obtained from each participant prior to data collection after explanation aim of the study.
- Data collection was started and completed within three months from September (2022) until the end of November (2022).
- Purpose of the study was simply explained to the nurses who agreed to participate in the study prior to data collection.
- Data collection was done 3days/week by the investigator from 9 am : 4 pm to collect data from nurses in morning and afternoon shift .
- The observational checklist was used prior to administration of self-administrated questionnaire to ensure the maximal realistic observations of the nurses' performance and minimize bias possibility.
- The study tools were checked in and completed as the following:-

- **The self-administrated questionnaire** were filled in and completed individually by the nurses and took from the nurses about 15-20 minutes to be completed.

  - **The observational checklist** to assess nurses' practice regarding care of post percutaneous endoscopic gastrostomy patients was filled in and completed by the investigator through observation of each nurse directly and indirectly during patients' care.

III- Administrative Item:

An official permission was obtained from the director of El-fayoum general hospital. A letter was issued to them from the faculty of nursing; Helwan University explains the aim of the study for obtaining the permission for data collection.

Ethical considerations:

An official permission to conduct the proposed study was obtained from the Scientific Research Ethics Committee Helwan University. Participation in the study is voluntary and investigator gave a complete full information about the study to nurses and their role before signing the informed consent. The ethical considerations included explaining the purpose and nature of the study, stating the possibility to withdraw at any time, confidentiality of the information where it had not been accessed by any other party without taking permission of the nurses. Ethics, values, culture and beliefs were respected.

IV- Statistical Item:

Upon completion of data collection, data were coded and analyzed using Statistical Package for the Social Science (SPSS), version 25 for

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analysis. Categorical variables were expressed as number and percentage while continuous variables were expressed as (mean ±SD). Chi-Square (x2) was used to test the association between row and column variable of qualitative data. The fisher exact test was used with small, expected numbers. T independent test was used to compare mean in normally distributed quantitative variables at two groups. Pearson correlation was done to measure correlation between quantitative variables. For all tests, a two-tailed p-value ≤ 0.05 was considered statistically significant, P-value ≤ 0.01 was considered highly statistically significant. While p-value> 0.05 was considered not significant.

Results

Table (1): Frequency and percentage distribution of demographic characteristics for the studied nurses(n=50):

Items		No.	%
Age (year)	0 ≤ 29	48	**96.0**
	0 ≤ 39	2	4.0
	Mean ± SD	**24.14 ± 2.71**	
Gender	Male	18	36.0
	Female	32	**64.0**
Marital status	Single	23	46
	Married	27	**54.0**
Educational level	Technical Institute of Nursing	34	**68.0**
	Bachelor of Nursing	16	32.0
Years of experience	1 year	17	34.0
	1 year to < 5 years	29	**58**.0
	5 years	4	8.0
	Mean ± SD	**3.58 ± 2.33**	
Attending training courses	Yes	12	24.0
	No	38	**76.0**
There a booklet related to PEG	Yes	9	18.0
	No	41	**82.0**

Table (1) shows that **96%** of the age of the studied nurses was ranged from 20 ≤ 29 years old, with a mean age of **24.14 ± 2.71**. Considering gender, **64%** of them were females . **54%** of the studied nurses were married and **68%** had Technical Institute of Nursing ,In relation to years of experience in intensive care units, **58%** of the studied nurses working for > 1 year to < 5 years with a total mean of **3.58 ± 2.33.** Moreover, **76%** of the studied nurses not attended training courses and there is absence of booklet related to PEG with the percentage **82%**

Table (2): Frequency and percentage distribution of nurses' knowledge regarding care after PEG among the studied nurses (n= 50)

Nursing care after PEG	Satisfactory		Un-satisfactory		χ^2	P value
	N	%	N	%		
▪ Good fixation of the inner ring of the tube after installation and not moving.	38	**76.0**	12	24.0	13.5	0.000**
▪ Use dry soap and warm water to clean the position of the gastric orifice tube.	12	**24.0**	38	76.0	13.5	0.000**
▪ Continuous moistening of the area surrounding the gastrostomy.	21	42.0	29	58.0	1.28	0.258
▪ Using the gastric tube for feeding immediately after installation	25	50.0	25	50.0	0.000	1.00
▪ Replace the feeding tube as soon as it becomes clogged.	26	52.0	24	48.0	0.080	0.777

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| Total | 21 | 42.0 | 29 | 58.0 | 1.28 | 0.258 |

*Significant p ≤ 0.05 **Highly significant p ≤ 0.01

Table (2) represents nurses' knowledge regarding to care after PEG. Considering total knowledge, it clarifies that **58%** of the studied nurses had un-satisfactory level of knowledge regarding to nursing care after PEG. Moreover, in relation to satisfactory level, it demonstrates that **76%** of the studied nurses had knowledge in relation to good fixation of the inner ring of the tube after installation and not moving. While only **24%** of them had knowledge in relation to using dry soap and warm water to clean the position of the gastric orifice tube.

Figure (1): Percentage distribution of total level of knowledge regarding care of patients with PEG among the studied nurses (n= 50)
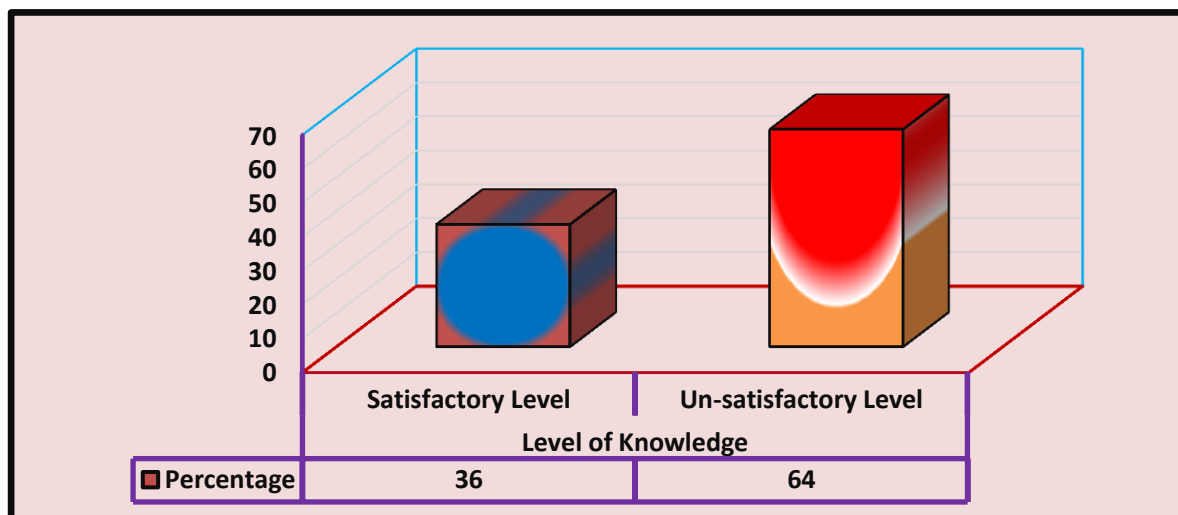

Figure (1) illustrates that **64%** of the studied nurses had unsatisfactory level of knowledge regarding care of patients with PEG among the studied nurses.

Table (3): Frequency and percentage distribution of nurses' practice regarding to on-going care phase in relation to continuous care of PEG tube among the studied nurses (n= 50)

Item	Competent		In-competent		χ^2	P value
	N	%	N	%		
▪ Gently clean around the insertion site.	8	16.0	42	84.0	23.1	0.000**
▪ Removing any crust or drainage.	11	22.0	39	78.0	15.6	0.000**
▪ Rinse site.	7	14.0	43	86.0	25.9	0.000**
▪ Removing all soap.	10	20.0	40	80.0	18.0	0.000**
▪ Gently rotate the guard or external bumper 90 degrees at least once a day.	21	42.0	29	58.0	1.28	0.258
▪ Assess that the guard or external bumper is not digging into the surrounding skin.	25	**50.0**	25	50.0	0.000	1.00
▪ Avoid placing any tension on the feeding tube.	6	**12.0**	44	88.0	28.8	0.000**
▪ Leave the site open to air unless there is drainage.	8	16.0	42	84.0	23.1	0.000**
Total	8	16.0	42	84.0	23.1	**0.000****

*Significant p ≤ 0.05 **Highly significant p ≤ 0.01

Table (3) represents nurses' practice regarding to on-going care phase in relation to continuous care of PEG tube. Considering total level of practice, it clarifies that **84%** of the studied nurses had in-competent level of practice regarding to on-going care phase in relation to continuous care of PEG tube. In addition to, presence of difference between observed and expected values with a highly statistically significant difference, at **P = 0.000.** Moreover, in relation to competent level, it demonstrates that **50%** of the studied nurses had practice in relation

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to assessing that the guard or external bumper is not digging into the surrounding skin. While only **12%** of them had practice in relation to avoiding place any tension on the feeding tube.

Table (4): Frequency and percentage distribution of nurses' level of practice regarding to on-going care phase in relation to administration of a bolus feed Via PEG tube among the studied nurses (n= 50)

Item	Competent		In-competent		χ^2	P value
	N	%	N	%		
▪ Set the patient upright with head and chest elevated to 30 degrees angle.	9	18.0	41	82.0	20.4	0.000**
▪ Check the gastrostomy button is firmly in position.	13	26.0	37	74.0	11.5	0.001**
▪ Attach syringe to the gastrostomy with clamp closed.	8	**16.0**	42	84.0	23.1	0.000**
▪ Pouring formula into syringe.	11	22.0	39	78.0	15.6	0.000**
▪ Release the clamp and allow formula to run through the tube by gravity.	18	36.0	32	64.0	3.92	0.048*
▪ Continue to top up the syringe with the feed as it begins to empty.	11	22.0	39	78.0	15.6	0.000**
▪ Clamp the tube after feed is completed.	13	26.0	37	74.0	11.5	0.001**
▪ Add 30 mills of water to the syringe and release clamp to flush the tube.	11	22.0	39	78.0	15.6	0.000**
▪ Re – clamp the tube.	12	24.0	38	76.0	13.5	0.000**
▪ Secure the button	14	28.0	36	72.0	9.68	0.002**
▪ Observe patients for signs of abdominal discomfort.	32	**64.0**	18	36.0	3.92	0.048*
Total	**11**	**22.0**	**39**	**78.0**	**15.6**	**0.000****

*Significant $p \leq 0.05$ **Highly significant $p \leq 0.01$

Table (4) represents nurses' level of practice regarding to on-going care phase in relation to administration of a bolus feed Via PEG tube. Considering total level of practice, it clarifies that **78%** of the studied nurses had in-competent level of practice regarding to on-going care phase in relation to administration of a bolus feed Via PEG tube. In addition to, presence of difference between observed and expected values with a highly statistically significant difference, at **P = 0.000.** Moreover, in relation to competent level, it demonstrates that **64%** of the studied nurses had practice in relation to observing patients for signs of abdominal discomfort. While only **16%** of them had practice in relation to attaching syringe to the gastrostomy with clamp closed.

Figure (2): Percentage distribution of the total level of practice regarding care of patients with PEG among the studied nurses (n= 50)
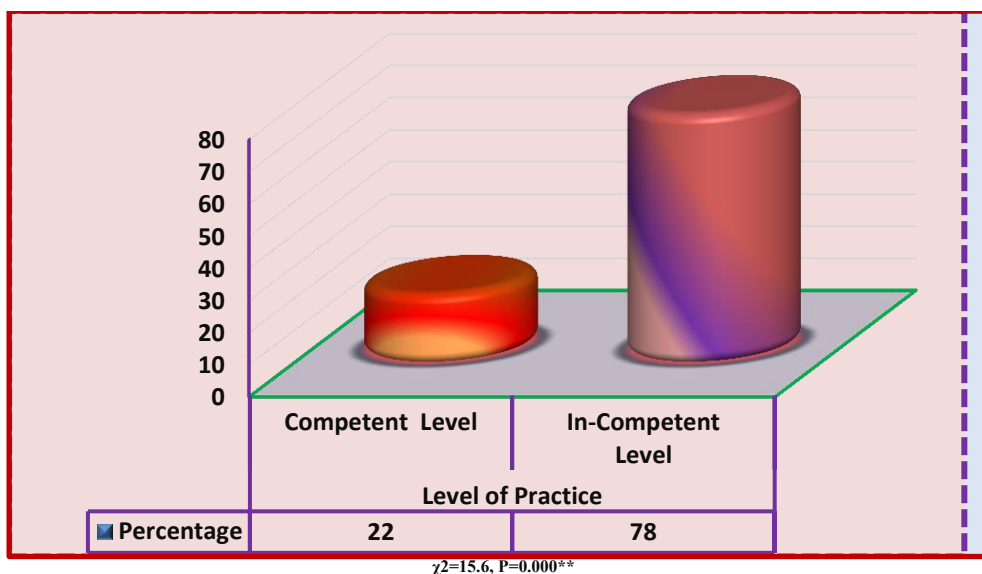
$\chi 2=15.6, P=0.000**$

Figure (2) illustrates that **78%** of the studied nurses had in-competent level of practice regarding care of patients with PEG among the studied nurses. In addition to presence of difference between observed and expected values with a highly statistically significant difference, at **P = 0.000.**

Table (5): Relation between total level of knowledge regarding care patients with PEG and demographic characteristics among the studied nurses (n= 50)

Items		No	Satisfactory		Un-Satisfactory		χ^2	P-Value
			18	36	32	64		
			N	%	N	%		
Age (year)	▪ 20 ≤ 29	48	32	64.0	16	32.0	3.70	0.054*
	▪ 30 ≤ 39	2	0	0.0	2	4.0		
Gender	▪ Male	18	13	26.0	5	10.0	0.825	0.540
	▪ Female	32	19	38.0	13	26.0		
marital status	▪ Single	23	6	12.0	17	34.0	28.1	0.000**
	▪ Married	27	26	52.0	1	2.0		
Educational level	▪ Technical	34	30	60.0	4	8.0	27.0	0.000**
	▪ Bachelor	16	2	4.0	14	28.0		
Years of experience	▪ ≤ 1 year	17	17	34.0	0	0.0	18.5	0.000**
	▪ > 1:<5 Yrs.	29	15	30.0	14	28.0		
	▪ ≥ 5 years	4	0	0.0	4	8.0		
Attending training courses	▪ Yes	12	1	2.0	11	22.0	21.2	0.000**
	▪ No	38	31	62.0	7	14.0		
There a booklet related to PEG	▪ Yes	9	0	0.0	9	18.0	19.5	0.000**
	▪ No	41	32	64.0	9	18.0		

*Significant p ≤ 0.05 **Highly significant p ≤ 0.01 F: Fissure Exact Test

Table (5): represents that, there was a highly statistically significant relation between demographic characteristics (age, marital status, educational level, years of experience, attending training courses and presence of booklet related to PEG) and total level of knowledge regarding care of patients with PEG among the studied nurses, **at P = ≤ 0.01.**

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Table (6): Correlational between total score of knowledge and practice regarding care patients with PEG among the studied nurses (n= 50)

Item		Total Knowledge	Total Practice
Total Knowledge	R		0.873
	P		0.000**
Total Practice	R	0.873	
	P	0.000**	

*Significant p ≤ 0.05 **Highly significant p ≤ 0.01

Table (6): represents that, there was a highly statistically significant positive correlation between total score of knowledge and practice regarding care patients with PEG among the studied nurses, at **P = 0.000.**

DISCUSSION

In relation to nurses' demographic characteristics:

The current study result revealed that more than two-thirds of the nurses were females and their age group of 20≤ 29 years. These findings explained by the investigator 's experience may be due to the majority of nurses work power providing direct care for the patient in nursing field are young while higher age category senior nurses perform administrative role. These findings are agreed with **Ahmed, (2018)** who revealed that the majority of the studied nurses were females and less than thirty years.

Regarding to marital status the present study results showed that More than half of the studied nurses were married. This finding consistent with **Faris & Abed., (2022)** who showed that the majority of nurses were married.

This finding was inconsistent with **Al-Sayaghi, et al., (2022)** who showed that more than have of the nurses were single.

As regards to years of experience, the current study revealed that about three fifth of the studied nurses having 1-5 years of experience, according to the investigator point of view this may be due to most of those nurses were newly graduated and were more interested to work in critical care units. This finding is consistent with **Attia, et al., (2021)** who showed that three quarters of the studied nurses had 1-5 years of experience in ICU.

This result was inconsistent with **Huang, et al., (2019)** who showed that half of nurses had 6-10 years of experience.

As regards to level of education the current study revealed that more than two third of studied nurses had Technical Institute of Nursing, this could be due to the financial burden and preference of bachelor degree nurses to work at private hospitals and travel abroad, and when working in the governmental hospitals, bachelor degree nurses work as head nurse not as bedside nurse. This finding is consistent with **Attia, et al., (2021)** who showed that the majority of the studied nurses graduated from technical institute of nursing.

In contrast **Hadera, et al., (2022)** who illustrated that the majority of the studied nurses had bachelor of nursing degree.

Regarding attending courses the present study results showed that nearly three quarters not attended training courses on care of post percutaneous endoscopic gastrostomy patient. This may be due to poor reinforcement from hospital administrators, insufficient medical resources, time limits and lack of communications between nurses and the hospital policy leaders.

This finding is goes in hand with a study done by **Al-Qalah, et al., (2022)** who showed that more half of nurses did not receive training programs regarding enteral feeding

This results contradicted with the results by **Ramuada, et al., (2022)** reported that in-service training courses about one quarter was the most frequent source for knowledge, followed by collages or schools of nursing education.

Regarding to presence a booklet related to PEG the present study results showed that the majority of the studied nurses sure about there was no available booklet related to PEG. This finding consistent with **Ahmed, et al., (2018)** who showed that more than half of the studied sample sure about there was no available standard precaution guidelines about the enteral feeding procedure.

Concerning the total nurses' knowledge, the results of the current study indicated that more than two-thirds of the studied nurses had unsatisfactory level of knowledge regarding care of patients with PEG among the studied nurses. From the investigator point of view this result might be due to studied nurses had technical institute of nursing, recently graduated so they are not prepared or knowledgeable enough to provide evidence based nursing care, lack of self-learning and development according to updated nursing guidelines. This result agreed with a study done by **Al-Qalah, et al., (2022)** who showed that about half of the studied nurses had unsatisfactory level of knowledge regarding enteral nutrition. These results contradicted with **Harjit & K. G., (2019)** who reported that the majority of the studied nurses had satisfactory level of knowledge regarding enteral feeding.

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Concerning the total nurses' level of practice, the present study showed that more than three quarters of the studied nurses had incompetent level of practice regarding care of patients with PEG. From the investigator point of view, this may be attributed to the poor knowledge level, shortage of nursing staff, increasing work overload, less years of experience, refusal of some nurses to change their practice, lack of demonstration and re-demonstration of practices related to continuous care of PEG tube. This finding goes in the same line with **Hadera, et al., (2022),** who reported that more than half of the studied nurses had incompetent level of practice. These results contradicted with **Hussein, et al., (2020)** who showed that the majority of caregivers had competent level of practice related to care of patients post PEG in post follow up intervention.

Regarding relation between nurses' knowledge and demographic characteristics the present study results showed that there were a highly statistically significant relation between demographic characteristics and total level of knowledge regarding care patients with PEG among the studied nurses.. From the investigator 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. This finding is agreed with **Mooi, (2018)** 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.

This finding is disagreed with a study of **Kawalec-Kajstura, et al., (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.

Regarding relation between nurses practice and their demographic characteristics, the current study results revealed that there were a highly statistically significant relation between demographic characteristics (age, marital status, educational level, years of experience, attending training courses and presence of booklet related to PEG) and total level of practice regarding care patients with PEG among the studied nurses. This findings were supported by **Mahmoodpoor, et al., (2021)** who illustrated that nursing practice had a significant relationship with age, work experience in the ICU, and the level of education. On other hand this findings were disagreed with a study of **Abdullah**, et al., (2023) who illustrated that there was no significant associations between nurses' level of practice and the following variables (educational level, attending training sessions about PEG care.

In relation to correlation between nurses' knowledge and practice regarding care of Post Percutaneous Endoscopic Gastrostomy Patients in Critical Care Units.

This finding showed a statistically significant correlation between total knowledge and total practice. This is might be because the nurses should be have knowledge to provide care for gastrostomy patient and if nurses not have knowledge this will affect on care patient and not understand this fatality of case of patient and two domain of performance (knowledge, practice) not achieved. This finding is similar to **Shehab, et al., (2017)** who showed that there was a statistically significant relation between nurses' level of knowledge and practice regarding nurses performance for patients with percutaneous endoscopic gastrostomy.

On the other hand, this findings were disagreed with the study conducted by **Ahmed, et al., (2018)** who revealed that no correlations between total scores of knowledge and total scores of practice level.

CONCLUSION
Based on the results of the current study, the following can be concluded:

The nearly two third of nurses has unsatisfactory level of knowledge and more than three quarter of nurses had incompetent level of practice regarding care of post percutaneous endoscopic gastrostomy patients. Also, there was a highly statistically significance relation between demographic characteristics (age, marital status, educational level, years of experience, attending training courses and presence of booklet related to PEG) and total level of knowledge and there was highly statistically significance positive correlation between total score of knowledge and practice regarding care patients with PEG among the studied nurses.

Recommendations
Based upon the results of the current

- Providing well organized training program to improve and refresh nurses' knowledge and practice regarding care of post percutaneous endoscopic gastrostomy patients.

- Providing nursing care standards for patient with percutaneous endoscopic gastrostomy should be written.

Recommendations for further researches

- Replication of the study on other sample selected from different hospitals in Egypt to generalize the study findings.

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