Assessment of Nursing Performance toward Enteral Feeding at Pediatric Critical Care Units

Hayam Mohamed Abo Elezz.Prof. Randa Mohamed Adly, Prof. Hyam Refaat Tantawi.

Pediatric Nursing Department, Faculty of Nursing, Ain Shams University-Cairo-Egypt.

Abstract

Background: This study aimed to assess Nursing Performance toward Enteral Feeding at Pediatric Critical Care Units. **Subjects and methods:** A descriptive study was conducted at pediatric critically care units (Pediatric Intensive Care Unit (PICU) – Neonatal Intensive Care Unit (NICU) – Emergency department) in the Children's Hospital affiliated to Ain-Shams University Hospitals. **Sampling:** A convenient sample composed of all available nurses at the previously mentioned settings regardless the age, gender, level of education, training and years of experience, their total number was 100 nurses. **Tools:** A structured questionnaire sheet to assess nurses' characteristics and their knowledge regarding enteral feeding. The second tool was an observation checklist to assess nurses' practice toward enteral feeding. The third tool was an attitude sheet to assess nurses' attitude toward enteral feeding. **Results:** revealed that the nearly half of studied nurses had 20-<25 years. That majority of studied nurses had technical institute of nursing and bachelor of nursing Also, it was clear that about three fifths of the studied nurses had satisfactory level of knowledge regarding enteral feeding. Less than half of studied nurses had positive attitude level about enteral feeding. And less than three quarters of the studied nurses had competent total level of practice regarding enteral feeding at pediatric critical care units. **Conclusion:** the study concluded that, the majority of the studied nurses had good level of knowledge, incomplete level of practice and negative attitude regarding enteral feeding. **Recommendation:** the study recommended that, Implementation of infection control training program for nurses regarding enteral feeding. Continuous monitoring and teaching on spot from nurse supervisor are needed to ensure quality of care provided by nurses for enteral feeding.

Keywords: Nursing Performance, Enteral Feeding, Pediatric Critical Care Units.

Introduction

Optimal nutrition is very important in the care of critically ill children. Furthermore, malnutrition has been associated with a longer length of stay in the pediatric intensive care unit (PICU) and with higher risk-adjusted mortality. The traditional concept of nutrition support has evolved to a strategy that involves more focused nutrition therapy in the ICU setting ***(Bedier et al., 2016).***

Numerous publications describe the importance of optimizing nutrition provision in acute and critically ill children. It may be to modify the systemic response to infection or injury, mitigate immune system dysfunction, promote tissue repair, prevent loss of lean muscle mass and body weight, or potentially improve patient outcomes ***(Sharon et al., 2019).***

Children who are unable to ingest a sufficient amount of food and unsure maintenance of adequate nutrition, may require methods for feeding. Those methods include both parenteral intravenous methods and enteral through gastrointestinal system. Enteral feeding is the preferred route of nutrient administration in the critically ill children. It maintains the integrity of the gut children mucosa and has immunologic advantages over parenteral feeding. Compared with total parenteral feeding; the enteral rout is safer more physiologic and less expensive ***(American Society for Parenteral and Enteral Nutrition (ASPEN), 2009).***

Nurses are considered as an important link to care for pediatric patients with enteral feeding. However, minimal attention has been paid to how enteral feeding is administered by nurses. There are wide variations in the management of nutritional support which may be related to knowledge gaps, or the use of multiple sources of information or to a lack of standardization in the care environment. Maintaining consistencies in feeding for critically ill children has been identified as a problem secondary to the inadequate knowledge of the nurses ***(Mula et al., 2014).***

Significance of the Study

According to a review of the literature, few studies have been done to assess the nursing performance related to enteral feeding in pediatric ICU and revealed a lack of knowledge and performance among the pediatric nurses. According to statistical records in the Children Hospital affiliated to Ain-Shams University Hospitals the researcher found that, the number of pediatric patients depending on enteral feeding was ranging from 600 to 800 cases per year in the previous 3 years. It is beneficial in many ways, clarifying points of errors and pitfalls that have a major effect on the care of critically ill children, and saving children's life and guarding against its complications. From this point the researcher will conduct this study to assess the nursing performance toward the enteral feeding at pediatric critical care units.

Aim of the study

This study aimed to assess the nursing performance toward enteral feeding at pediatric critical care units.

Research Questions:

1- What is the level of nurses' knowledge toward enteral feeding at pediatric critical care units?

2- What is the level of nurses' attitude toward enteral feeding at pediatric critical care units?

3- What is the level of nurses' practices toward enteral feeding at pediatric critical care units?

Subjects and Methods

This present study aimed to assess the nursing performance toward enteral feeding at pediatric critical care units.

1- Technical design:

A) Research design:

A descriptive exploratory design was followed to achieve the aim of this study.

Setting:

This study was conducted at pediatric critically care units (Pediatric Intensive Care Unit (PICU) – Neonatal Intensive Care Unit (NICU) – Emergency department) in the Children's Hospital

affiliated to Ain-Shams University Hospitals.

Subject:

A convenience sample includes of all available nurses who are working at the previous mentioned settings: their total number was 100 nurses who are providing care for the admitted children at the pediatric critically care units in the previously mentioned settings. They were distributed as 39 nurses at neonate intensive care unit; 36 nurses at emergency department and 25 nurses at pediatric intensive care unit at the previously mentioned setting.

Tools of data collection:

Data collected through using of the following tools:

Structured questionnaire format:

It was designed and developed by the researcher in a simple Arabic language after reviewing the relevant literature in the form of closed ended questions and multiple choices to assess nurse's knowledge about enteral feeding. It covered the following parts.

Part I- Demographic data to assess characteristics of the studied nurses, include: age, gender, qualifications, level of education and years of experiences.

Part II- characteristics of the studied children included gender, age, and types of feeding tube.

Part III It concerned with nurse's knowledge regarding enteral feeding. This included definition, indications, types, complication, contraindication, hospital policy, take doctor order, alternative, equipment and role of nurse toward enteral feeding.

❖ **Scoring system:**

According to the answers obtained from studied nurses a scoring system was followed to obtain the outcome of nurses' knowledge. The total numbers of questions were 32 questions, according to the nurses' answer, the correct answer was scored is one and the incorrect answer was scored zero, then the total level of knowledge was categorized as the following:

- Satisfactory level ≥ 60%
- Un Satisfactory level < 60%

Observational checklist:

It was adopted and modified by the researcher after reviewing the related procedure from ***(Wilkinson et al., 2015)*** to assess nurses' practice regarding enteral feeding as nasogastric feeding gastrostomy feeding and Neso jejunal. Each nurse was observed using the observational check list which filled by the researcher during providing enteral feeding for the children. The procedure that was done scored (1) and when not done or done incorrectly scored (zero).

❖ **Scoring system**

The total score of nurses' practices. Each correct answer was given one grade and the incorrect answer was given zero. It was considered as follows:

- Their total level of practice was categorized as the following
- Competent level of practice ≥85%
- Incompetent level of practice <85%

Nurses attitude (Likert scale): -

This tool it was adapted from **Suen et al, (2017)** and it was developed by the researcher and consisted of 13 statements to assess nurses' attitudes, scale statements

are categorized as agree, indifferent and disagree.

❖ **Scoring system**

Nurses answer was given (2) score for positive attitude, (1) score for indifferent attitude, (0) score for negative attitude.

- If total score of answer is 80% and more is positive attitude.
- Less than 80% to 60% is indifferent attitude.
- Less than 60% is negative attitude.

Operational Design:

The operational design of the study entails three main phases:

A- Preparatory phase.
B- Exploratory phase.
C- Field work.

Preparatory phase:

a- Extensive review of current, past, local and international literature related to the research problem was made using articles, magazines, book and internet search to get acquainted with the research problem and also to develop the study tools.

b- Content validity and reliability:

- Content validity of the tool was tested through panel of three experts in the pediatric nursing field from faculty of Nursing, Ain Shams University to test its content validity and the final form of the tools was obtained.
- Reliability of the tool: The internal consistency was measured to identify the extent to which the items of the tools measure the same concept and correlate with each other. It is used to compute correlation value among questions corn Bach's alpha and its value was (0.84).

Exploratory phase:

Pilot study:

A Pilot study was carried out on 10 nurses. The Purpose of the pilot study was to test applicability, clarity, relevance, feasibility of study tool and sequence of questions to maintain consistency. The necessary modifications (structure of the sentence) were done and the final form was developed. The nurses in the pilot study were excluded from the final subjects of the study.

Filed work:

The actual field work was carried out over 6 months started from February (2019) to the end of July (2019). For data collection each nurse was interviewed and assessed individually using the study tools. The researcher was available at each study setting by rotation, three days/weekly (Tuesday, Wednesday, and Thursday) throughout the morning shift from 9Am to 2 Pm and started by introducing herself to the nurses then informing them about the aim of the study. Each nurse was individually interviewed to fulfill the questionnaire ranges from 15- 20 minutes. As regards the nurse's practices, they were observed in previously mentioned settings during their actual work in the shift. Time consumed for assessing procedures takes 10-20 minutes according to checklist.

Administrative Design:

An official permission was obtained from the Dean of faculty of Nursing Ain Shams University to medical and nursing directors and head of each department in study settings in order to conduct the study after clear explanation about the aim of the study and its benefits.

Ethical consideration:

Approval of the study protocol was obtained from Ethical Committee in the Faculty of Nursing at Ain Shams University before starting the study. The written approval was taken from the studied nurses. All the collected data was used for research purpose only, also anonymity and confidentiality of the obtained data was guaranteed. The researcher clarified the aim and expected outcomes of the study to the nurses included in the study. Nurses were informed that they were allowed to choosing to participate in the study or not, and that they had the right to without giving any reasons.

Statistical Design

Recorded data were analyzed using the statistical package for social sciences, version 20.0 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were expressed as mean± standard deviation (SD). Qualitative data were expressed as frequency and percentage. So, the p-value was considered significant as the following: P-value ≤0.05 was considered significant, P-value ≤0.001 was considered as highly significant, P-value >0.05 was considered insignificant.

Results:

Part I: characteristics of the studied nurse's sample.

Table (1): shows that **the mean age** of the studied nurses was 26.75±5.08 years old and 37% of them were nursing technician institute and bachelor of nursing. Also, it was 44% of them were from <3 years of experience. In addition to 57% of them were attended training course.

Table (2): shows that the mean age and SD of the studied nursing was 2.31±1.07, 82% of them were from nasogastric, regarding mean of duration feeding tube at pediatric 3.71, regarding has the child installed a feeding tube before 35% of them were from yes.

Table (3): This table states that there were statistically significant relations between the studied nurses' level of knowledge and their level of qualification, years of experience and training course, with p-value ($p<0.05$).

Table (4): This table reports that there were statistically significant relations between the studied nurses' total level of attitude and their level of qualification and training course, with p-value ($p<0.05$).

Table (5): This table shows that there were statistically significant relations between the studied nurses' level of practice and their age, level of qualification, years of experience and training course, with p-value ($p<0.05$).

Table (6): This table shows that there were statistically significant relations between the studied nurses' total level of knowledge and their total level of practice ($p<0.05$).

Table (7): This table shows that there were **statistically significant relations** between the studied nurses' total level of knowledge and their total level of attitude ($p<0.05$).

Table (8): This table shows that there were statistically significant relations between the studied nurses level of practice and their total level of attitude ($p<0.05$).

Table (9): This table observed that there was positive correlation between the total score of attitudes, total score of knowledge and total score of practice ($p<0.05$).

Table (1): Number and percentage distribution of studied nurses according to their demographic data (N=100).

Demographic data	No.	%
Place of job		
Neonate Intensive care unit	39	39
Emergency department unit	36	36
Pediatric intensive care unit	25	25
Age (years)		
20-<25 years	47	47
25-<30 years	31	31
≥30 years	22	22
Mean±SD	26.75±5.08	
Level of Qualification		
Diploma of Nursing	20	20
Nursing Technician Institute	37	37
Bachelor of Nursing	37	37
Others as nurse aid	6	6
Years of experience		
<3years	44	44
3-5 years	31	31
>5years	25	25
Training course about enteral feeding		
Yes	57	57
No	43	43

Part II: Characteristics of the studied children.

Table (2): Number and percentage distribution of the studied children according to feeding tube history (N=100).

	No	%
Feeding Tube Type (FT)		
Gastrostomy	18	18
Nasogastric	82	82
Duration of feeding tube at pediatric (days)		
1-3 days	61	61
4-7 days	21	21
>7 days	18	18
Mean±SD	3.71±0.85	
Past history of insertion of feeding tube.		
No	65	65
Yes	35	35

Table (3): Relation between the studied variables level of knowledge and their demographic data (n=100).

Demographic data	Level of knowledge				Chi-square test	
	Satisfied (n=57)		Unsatisfied (n=43)			
	No.	%	No.	%	x2	p-value
Place of work						
Neonate Intensive care unit	24	42.1%	15	34.9%	3.973	0.137
Emergency department unit	23	40.4%	13	30.2%		
Pediatric intensive care unit	10	17.5%	15	34.9%		
Age (years)						
20-<25 years	23	40.4%	24	55.8%	2.3657	0.308
25-<30 years	20	35.1%	11	25.6%		
≥30 years	14	24.6%	8	18.6%		
Level of Qualification						
Diploma of Nursing	10	17.5%	10	23.3%		
Nursing Technician Institute	19	33.3%	18	41.9%	8.499	0.013*
Bachelor of Nursing	22	38.6%	15	34.9%		
Another mentions	6	10.5%	0	0.0%		
Years of experience						
<3 years	22	38.6%	22	51.2%	7.234	0.039*
3-5 years	17	29.8%	14	32.6%		
>5years	18	31.6%	7	16.3%		
Training course						
Yes	40	70.2%	17	39.5%	9.388	0.002*
No	17	29.8%	26	60.5%		

p-value >0.05 NS; *p-value <0.05 S

Table (4): Relation between nurses' level of attitude and their demographic data (n=100).

Socio-demographic data	Level of attitude						Chi-square test	
	Indifferent *(n=31)*		Negative *(n=21)*		Positive *(n=48)*			
	No.	%	No.	%	No.	%	x2	p-value
Place of job								
Neonate Intensive care unit	15	48.4%	4	19.0%	20	41.7%	5.569	0.234
Emergency department unit	8	25.8%	10	47.6%	18	37.5%		
Pediatric intensive care unit	8	25.8%	7	33.3%	10	20.8%		
Age (years)								
20-<25 years	17	54.8%	12	57.1%	18	37.5%	3.629	0.459
25-<30 years	8	25.8%	6	28.6%	17	35.4%		
≥30 years	6	19.4%	3	14.3%	13	27.1%		
Level of Qualification								
Diploma of Nursing	7	22.6%	5	23.8%	8	16.7%		
Nursing Technician Institute	10	32.3%	13	61.9%	14	29.2%	10.6988	0.048*
Bachelor of Nursing	12	38.7%	3	14.3%	22	45.8%		
Another mentions	2	6.5%	0	0.0%	4	8.3%		
Years of experience								
<3 years	16	51.6%	10	47.6%	18	37.5%	3.332	0.504
3-5 years	8	25.8%	8	38.1%	15	31.3%		
>5years	7	22.6%	3	14.3%	15	31.3%		
Training course								
Yes	11	35.5%	9	42.9%	37	77.1%	15.468	<0.001**
No	20	64.5%	12	57.1%	11	22.9%		

p-value >0.05 NS; *p-value <0.05 S; **p-value <0.001 HS

Table (5): Relation between nurses regarding level of practice and their demographic data (n=100).

Demographic data	Level of Practice: Competent (n=72) No.	%	Incompetent (n=28) No.	%	Chi-square test x2	p-value
Work setting						
Neonate Intensive care unit	30	41.7%	9	32.1%	2.415	0.299
Emergency department unit	27	37.5%	9	32.1%		
Pediatric intensive care unit	15	20.8%	10	35.7%		
Age (years)						
20-<25 years	29	40.3%	18	64.3%	6.674	0.039*
25-<30 years	25	34.7%	6	21.4%		
≥30 years	18	25.0%	4	14.3%		
Level of Qualification						
Diploma of Nursing	11	15.3%	9	32.1%	8.482	0.026*
Nursing Technician Institute	25	34.7%	12	42.9%		
Bachelor of Nursing	30	41.7%	7	25.0%		
Another mentions	6	8.3%	0	0.0%		
Years of experience						
<3 years	26	36.1%	18	64.3%	10.796	0.005*
3-5 years	22	30.6%	9	32.1%		
>5years	24	33.3%	1	3.6%		
Training course						
Yes	57	79.2%	0	0.0%	51.55	<0.001**
No	15	20.8%	28	100.0%		

p-value >0.05 NS; *p-value <0.05 S; **p-value <0.001 HS

Table (6): Relation between nurses' total level of knowledge and total level of practice toward enteral feeding at pediatric critical care units (n=100).

Level of Practice	Level of knowledge: Satisfied No.	%	Unsatisfied No.	%	Total No.	%	Chi-square test x2	p-value
Competent	52	91.2%	20	46.5%	72	72.0%	24.310	<0.001**
Incompetent	5	8.8%	23	53.5%	28	28.0%		
Total	57	100.0%	43	100.0%	100	100.0%		

**p-value <0.001 HS

Table (7): Relation between nurses' total level of knowledge and total level of attitude toward enteral feeding at pediatric critical care units (n=100).

Level of attitude	Level of knowledge: Satisfied No.	%	Unsatisfied No.	%	Total No.	%	Chi-square test x2	p-value
Indifferent	7	12.3%	24	55.8%	31	31.0%	36.264	<0.001**
Negative	8	14.0%	13	30.2%	21	21.0%		
Positive	42	73.7%	6	14.0%	48	48.0%		
Total	57	100.0%	43	100.0%	100	100.0%		

**p-value <0.001 HS

Table (8): Relation between nurses' total level of practice and total level of attitude toward enteral feeding at pediatric critical care units (n=100).

Level of attitude	Level of Practice				Total		Chi-square test	
	Competent		Incompetent					
	No.	%	No.	%	No.	%	x2	p-value
Indifferent	13	18.1%	18	64.3%	31	31.0%	36.575	<0.001**
Negative	11	15.3%	10	35.7%	21	21.0%		
Positive	48	66.7%	0	0.0%	48	48.0%		
Total	72	100.0%	28	100.0%	100	100.0%		

**p-value <0.001 HS

Table (9): Correlation between nurses' practice, attitude and knowledge toward enteral feeding at pediatric critical care units (n=100).

		Total Knowledge score	Total attitude score	Total Practice score
Total Knowledge score	r		0.504	0.409
	p-value		<0.001**	<0.001**
Total attitude score	r	0.504		0.544
	p-value	<0.001**		<0.001**
Total Practice score	r	0.409	0.544	
	p-value	<0.001**	<0.001**	

**p-value <0.001 HS

Discussion

Malnutrition in the critically ill or injured child is associated with increased morbidities and mortality in the pediatric intensive care unit (PICU), whether present upon admission or acquired during the PICU stay (***Brown et al., 2015)***. Enteral nutrition is the most basic and important method of nutritional intervention, and its indications should be identified. This approach to enteral nutrition and proper administration can help in the proper growth and recovery of pediatric patients with nutritional imbalances or nutritional needs ***(Dae, 2018).*** Therefore, the aim of the study was to assess the nursing performance toward enteral feeding at pediatric critical care units.

Part 1: Demographic characteristics of studied nurses:

The results of the current study showed that the nearly half of studied nurses had 20-<25 years with mean 26.75±5.08 years old. This might be related to their recent graduation. This finding was in the same line with ***Moustafa et al. (2018)*** mentioned that, the studied nurses' age was less than 25 years with a mean age of 26.60 ± 5.128. Moreover, ***Metwaly et al. (2013)*** who reported that nearly half of the nurses their ages equal 20 years or less than 25 years.

This is in disagreement with a study conducted by ***Mula (2011)*** who found that majority of nurses' ages in his study ranged between 35 and 45 years. While ***Shahin and Mohamed (2012)*** who mentioned that three-quarters of the nurses in the study less than 25 years old. Also, ***Taha and Mohammed (2014)***

found that half of nurses aged between 26-35 years old.

Concerning level of education, the result of the present study showed that majority of studied nurses had technical institute of nursing and bachelor of nursing. This finding may be due to many Pediatric Critical Care Units prefer to employ higher educated nurses in order to be able to carry up their responsibilities and provide advanced quality of care.

This is consistent with ***Ahmed et al. (2018)*** who found that majority of studied subjects graduated from technical institute of nursing. Also, ***AL-Hawaly et al. (2016)*** who emphasized that nursing institute was the most frequent educational attainment among the studied sample. Similarly, ***Babapour et al. (2016)*** observed that the majority of nurses had bachelor degree. This finding was inconsistent with ***Abdullah et al. (2014)*** who found that majority of studied subjects were having diploma nursing degree.

In addition, the current study revealed that more than half of studied nurses were attended training course. This finding is in agreements with ***Metwaly et al. (2013)*** who recorded that more than half of participants having training courses. While these results disagree with ***Shehab et al. (2017)*** who registered that, the majority of nurses did not receive training programs regarding nasogastric tube feeding.

Part II: The nurses' knowledge regarding enteral feeding at Pediatric Critical Care Units:

Regarding nurses' knowledge about enteral feeding, the present study revealed that about three fifths of the studied nurses had satisfactory level of knowledge regarding enteral feeding. This may be attributed to sufficient basic information obtained during their basic nursing education. These findings agree with ***Taha (2014)*** who found that the majority of nurses reported correct answers related to general knowledge about nasogastric tube feeding.

Also, ***Yalcin et al. (2014)*** revealed that nurses who conducted nutritional assessment activities had a greater knowledge score than who did not. While this study disagreement with ***Ahamed and Mondal (2014)*** who illustrated those three quarters of studied nurses had inadequate knowledge regarding Ryle's tube feeding.

Concerning studied nurses' knowledge about indication and contraindication of enteral feeding. The current study revealed that the slightly more three fifths of the studied nurses had satisfactory level of knowledge. This might be due to presence of scientific teaching activities in clinical field e.g. (Informal teaching activities) directed to studied nurses in the hospital to refresh the nurses' knowledge.

This is in the line with ***Londolani (2017)*** mentioned that about three quarters had satisfactory level of knowledge regarding indication and contraindication of enteral feeding. Also, ***Shahin (2012)*** also displayed in his study that minority of nurses had knowledge about the indications and contraindications of enteral nutrition. Similarly, ***Mula (2011)*** emphasized that near to half of nurses had good knowledge about indications and absolute contraindications of enteral feeding.

Furthermore, ***Ahmed et al. (2018)*** who reported that majority of nurses didn't know both indication and

contraindications of enteral tube feeding before implementing of educational guidelines.

Findings were inconsistent with ***Shahin (2012)*** who mentioned that, lack of written updated protocol of enteral nutrition. Moreover, ***Robert et al. (2019)*** who discovered that, the extent to which nurses perceived their adherence to the standard nursing protocols and hospital policy on NG tube feeding was largely low. Also, ***Janssens et al. (2015)*** who found that, adherence to standard protocols and hospital policy in the management of NG tube feeding is particularly critical in resource poor settings in Africa where quality of healthcare delivery and safety remain significant challenges.

In contrary with the study finding a study ***Ahmed et al. (2018)*** reported that there were no written guidelines about enteral nutrition in their workplaces. ***Abdullah et al. (2014)*** reported that more than half of the studied sample sure about there was no available standard precaution guidelines about the enteral feeding procedure.

Meanwhile, in contrary with the present study findings ***Metwaly et al. (2013)*** found that, nurses had unsatisfactory level of knowledge about nasogastric tube indications.

As regards to studied nurse's knowledge regarding common problems may occurrence during and after feeding. The results of the current study showed that, more than half of the studied nurses had unsatisfactory level of knowledge regarding common problems may occurrence during and after feeding. This could be due to not attending the training course due to increased workload, shortage of nursing staff.

This finding was in agreement with ***Ameri et al. (2016)*** concluded that, nurses working in Neonatal Intensive Care Unit had unsatisfactory level of knowledge regarding common problems may occurrence during and after feeding. Also, ***Shahin (2012); Ahmed et al. (2018)*** emphasizes that the majority of nurses had unsatisfactory knowledge level regarding complications during and after feeding pre implementing of educational guidelines.

Concerning the studied nurses' knowledge regarding role before feeding, the results of the current study showed that, more than half of the studied nurses had satisfactory level of knowledge regarding role before feeding. This may be due to the fact that in real-life work situations, the main task of a nurse is to monitor the infant receiving PN in large part of their work shift.

Similarly, ***Al-Hawaly et al. (2016)*** clarified that nearly three quarters of the studied nurses had a satisfactory total level of knowledge before NGT feeding administering. In contrary with the study findings ***Rajalak et al. (2014)*** majority of staff nurses had inadequate knowledge scores regarding role before feeding before starting educational program.

Also, the study finding demonstrated that, more than half of the studied nurses had satisfactory level of knowledge regarding role during feeding. The available trainings adequately prepare studied nurses by maximum amount of knowledge regarding role during feeding. This finding is consistent with ***AL-Hawaly et al. (2016)*** clarified that nearly three quarters of the studied nurses had a satisfactory total level of knowledge during NGT feeding administering.

In the same line with the study finding ***El-Meanawi (2017)*** who mentioned that nurses had satisfactory level of knowledge during nasogastric tube feeding after implementing the educational program. In contrary with the study findings ***Mohammed and Abdel Fattah (2018)*** reflected that the nurses' knowledge during nasogastric tube feeding at the neonatal intensive care units was inadequate knowledge pre implementing the educational program. Furthermore, ***Metwaly et al. (2013)*** clarified that more than half of the studied nurses had unsatisfactory level of knowledge about role during feeding administration.

Furthermore, the result showed that about three fifths of the studied nurses had satisfactory level of knowledge regarding role after feeding. This may be due to continuous in-services education programs improve studied nurses' knowledge. This study finding is relevant and consistence with ***Das (2014)*** who reported that highest percentage of nurses had satisfactory level of knowledge about role after administration of feeding.

Also, ***Metwaly et al. (2013)*** clarified that more than two thirds of the studied nurses had satisfactory level of knowledge about role after feeding administration. In contrary ***Mohammed and Abdel Fattah (2018)*** reflected that the nurses' knowledge after nasogastric tube feeding at the neonatal intensive care units was inadequate knowledge preprogram.

Furthermore, the present study illustrated that slightly more than half of the studied nurses had satisfactory level of knowledge regarding nursing documentation. This finding may be due to nursing ethics still maintains that accurate and complete medical records are an obligation, and that undocumented care is a deviation from standards. This study finding consistent with ***Mula (2011)*** emphasized that the majority of nurses had satisfactory level of knowledge regarding nursing documentation.

Concerning studied nurses' knowledge regarding advantage of enteral feeding and success of EF, the present study illustrated that slightly more than half of the studied nurses had satisfactory level of knowledge regarding advantage of enteral feeding and success of EF. This finding may be due to studied nurses' upgrade their knowledge regarding enteral feeding. This finding is supported by ***Gupta et al. (2015)*** concluded that the majority of staff nurses are found to understand the advantages of EN.

Regarding studied nurses' knowledge about complication from EF, the present study illustrated that slightly more than half of the studied nurses had satisfactory level of knowledge regarding complication from EF. Similarly, findings of a Jordanian study by ***Kalaldeh et al. (2014)*** mentioned that majority of staff nurses had satisfactory level of knowledge regarding EN complications.

Also, ***Shehab et al. (2017)*** displayed that near to half of nurses had adequate knowledge about enteral feeding complications. In contrary with the study findings ***Londolani (2017)*** who reported that, it is troubling to note majority of participants could not identify the potential EN complications. ***Yalcin et al. (2014)*** supported this result and noticed that the nurses involved in their research had the least knowledge about the complications of enteral nutrition support.

Concerning studied nurses' knowledge regarding enteral feeding methods, the results of the present study revealed that slightly more than half of the studied nurses had satisfactory level of knowledge. These findings were supported by ***Morphet et al. (2016)*** stated that three fifths of respondents had good knowledge level about enteral nutrition. Moreover, ***Das (2014)*** clarified in his study that the highest percentage of knowledge of study subjects was on items related to enteral nutrition.

Moreover, ***Londolani (2017)*** revealed that nurses in general possessed inadequate knowledge with regard to EN. ***Darawad et al. (2015)*** also determined a significant lack of EN knowledge among nursing personnel. In addition to ***Ahmed et al. (2018)*** reported that majority of nurses had unsatisfactory total knowledge score at pre implementing of educational guidelines.

Part III: The nurses' attitude regarding enteral feeding at Pediatric Critical Care Units:

Concerning studied nurses' attitude about enteral feeding, the study finding demonstrates that, slightly more than two fifth of studied nurses had agree with the statement I think it is necessary to record enteral feeding in a patient's file. It is possible that problem could be due to shortage of time and workload. In agreements with the study finding ***Londolani (2017)*** reported that nurses' attitude about EN is time consuming due to the great amount of recording that is required in patient feeding charts. In contrary with the study finding ***Mula* et al *(2014)*** mentioned that majority of nurses reported that they document their feeding practices.

While more than three fifths of the nurses had disagreed with the statement that I find it not important to have a written order from doctor before giving enteral feeding. In contrary with

In addition, the results of present study noted that, slightly less than half of studied nurses had positive attitude level about enteral feeding. This finding may be due to studied nurses were aware that EN is necessary for the patient's well-being and prevents malnutrition. This finding is consistent with ***Bryon et al. (2012)*** noted that the good attitudes of nurses towards EN. Also, ***Londolani (2017)*** reported that overall, nursing personnel have a positive attitude towards EN.

Part IV: The nurses' practice regarding enteral feeding at Pediatric Critical Care Units:

Regarding studied nurses' practice of NGT, the results of the current study clarified that slightly more than three quarters of studied nurses had done the steps of NGT procedure practice. This may be due to studied nurses had knowledge and expertise to ensure satisfactory outcomes, and to provide high quality nursing care. for the result of this study is incongruent with ***Das (2014)*** who mentioned that more than two thirds of staff nurses having good skill and minority were having poor skill in nasogastric tube feeding.

In addition, ***Ahamed and Mondal (2014)*** in their study revealed that most of the studied nurses had a satisfactory level of practiced skill regarding nasogastric feeding. This finding was inconsistent with ***Bedier et al. (2016)*** who illustrated that overall level of performance related to nasogastric tube was unsatisfactory pre implementation of the educational

program. Also, ***El-Meanawi (2017)*** reported that, nurse's had unsatisfactory practices related to NGT Feeding before the education program. In addition, ***Mohammed et al. (2017)*** revealed that unsatisfactory level of performance in providing care to patients undergoing nasogastric tube among nurses in the sample.

Moreover, it was noticed that majority of studied nurses had done the steps of NGT before, during, and after feeding administering. This could be due to the simplicity of tube feeding procedure which may lead the nurses to estimate such procedure perfectly. ***Metwaly et al. (2013)*** mentioned that majority of nurses had unsatisfactory level of practice before, during and after feeding administration. ***Al-Hawaly et al. (2016)*** clarified that studied nurses' practice scores about care given before, during and after NG tube be feeding administration were low.

Furthermore, the results of the current study clarified that slightly more than three fifths of studied nurses had done the steps regarding nasojejunal feeding. This finding may be due to well-trained nurses regarding nasojejunal feeding practice. In contrary ***Al- Kalaldeh (2011)*** who concluded that the nursing practice regarding enteral nutrition is not enough and highly reflected on the improvement of the patients' nutritional status and health condition, as well as, the patients' safety and reported medications errors. Moreover, ***Hazel (2018)*** reported that, health professionals demonstrate a lack of consistency in practice of nasojejunal tube feeding in children.

Also, the finding was inconsistent with ***El-Meanawi (2017),*** reported that the study participants had unsatisfactory level of practice. And explained that this unsatisfactory level of nurses' practices regarding enteral feeding may be due to lack of available written protocols or resources of information to update the nurses' knowledge and improve their practices. ***Ahmed et al. (2018)*** mentioned that majority of nurses had unsatisfactory total practice score regarding enteral feeding in pre implementation of guidelines. Also, ***Mohammed et al. (2017)*** concluded that unsatisfactory level of practice related to care of patient with nasogastric tube.

Part V: The relation between socio-demographic variables and stud nurse's knowledge, practices and attitude regarding enteral feeding.

The study finding revealed that, there was a statistically significant relation between the studied nurses' level of knowledge and their years of experience. This finding may be related to with increasing experience, there was increase in knowledge. In congruent with the study finding ***Mohammed et al. (2017)*** showed that there was positive correlation between nurse's knowledge and experience. In contrary with the study finding ***Shahin et al. (2012)*** concluded that highly negative statistically significant correlation between the participants' years of experience and scores of knowledges regarding enteral feeding in pre-program.

Moreover, the result of current study finding revealed that, there was a statistically significant relation between the studied nurses' level of knowledge and training course. This may be attributed to the importance of effective training program for improving nurses' knowledge. In agreements ***Bedier et al. (2016)*** reported that, implementation of

an educational programmed among nursing personnel with regard to EN enhances their working skills and knowledge.

Regarding the relation between socio-demographic variables of the studied sample and nurse's attitude regarding enteral feeding, the result showed that there was a statistically significant relation between the studied nurses' total level of attitude and their level of education. This may be attributed to nurses with higher education are more interactive and better tolerance when a patient is on EN. In contradiction with the study finding ***Londolani (2017)*** reported that higher the rank and qualification of nurses were less understanding and attitude of the holistic management of the patient with enteral nutrition.

In addition, the result showed that there was a statistically significant relation between the studied nurses' total level of attitude and training course. In agreements with the study finding ***Londolani (2017)*** reported that there was a statistically significant relation between the nurses' total level of attitude and training course regarding enteral nutrition.

Regarding the relation between socio-demographic variables of the studied sample and nurse's practice regarding enteral feeding, the result showed that there was a statistically significant relation between the studied nurses' level of practice and their age, and years of experience. This result may be related to the relation between practice and years of working, the more years of working and experience, the higher level of practice and skills.

In the same line ***Metwaly et al. (2013)*** mentioned that, there was a statistically significance relationship between nurses' practice of EN and their ages and years of working. Also, the results were congruent with ***Shahin et al. (2012)*** concluded that, there was a positive statistically correlation between practice and age, year of experience. while ***Bedier et al. (2016)*** reported that, there was negative correlation between practice and age (this means that, with increasing age, practice is decreasing and vice versa); while there was positive correlation between experience and practice.

Concerning level of education, it was found that, there was a statistically significant relation between nurses' total practice regarding enteral feeding and their level of education. These results agree with ***Shahin (2012); Mohamed and Wafa (2011)*** all of them found that; there was statistical significance relation between nurses' practice and educational level of participant.

Moreover, there was a statistically significant relation between nurses' total practice regarding enteral feeding and their training course. This may be attributed to the importance of effective training program for improving nurses' practice regarding enteral feeding. In agreements with the study finding ***Mohammed and Abdel Fattah (2018)*** reported that, the educational program had good effectiveness in promoting where marked nurses promoting skills regarding nasogastric tube feeding

The results were incongruent with ***Metwaly et al. (2013)*** mentioned that, there was a statistically significance relationship between nurses' practice of EN and training course. Also, in contrary with the study finding ***Mula (2011)*** found in his study that almost all nurses, 96.1 % involved in tube feeding practice have

never had in-service training in the area of nasogastric tube.

Part VI: The relation between studied nurse's knowledge, practices and attitude regarding enteral feeding.

According to the study finding there was a statistically significant relation between the studied nurses' total level of knowledge and their total level of practice regarding enteral feeding. This result was expected, because the knowledge regarding enteral feeding is important at the nursing skills. This result is in-line with ***Mohammed and Abdel Fattah (2018)*** reported that, there was a highly statistically significant relation among knowledge and practices for the studied sample at pre-implementation and post-implementation for the educational program.

Also, ***Metwaly et al. (2013))*** revealed that there was positive correlation between nurses' knowledge, and their practice regarding nasogastric tube feeding. While ***AL-Hawley et al. (2016)*** showed that there is no significant correlation where found between total nursing knowledge and practice about NG tube feeding administration.

Moreover, the result showed that, there was a statistically significant relation between the studied nurses' total level of knowledge and their total level of attitude regarding enteral feeding. This study finding is relevant and consistence with ***Alhashemi et al. (2019)*** mentioned that, there was a statistically significant relation between knowledge and attitudes of nurses in medication administration through enteral feeding tubes.

Also, the finding of the current study showed that there was statistically significant relation between the studied nurses' total level of practice and their total level of attitude regarding enteral feeding. In agreements with the study finding ***Londolani (2017)*** reported that there was a statistically significant relation between the nurses' level of practice and their total level of attitude regarding enteral nutrition.

Finally, the research questions were confirmed by that, there were positive correlation between the total score of attitudes, total score of knowledge and total score of practice regarding enteral feeding. This finding may be due to nursing knowledge has been developed and established as a systemic and generalized knowledge base for practice, also knowledge production viewed in conjunction with practice itself.

This study finding is relevant and consistence with ***Alhashemi et al. (2019)*** mentioned that, there were positive correlation between the total score of attitudes, total score of knowledge and total score of practice regarding medication administration through enteral feeding tubes. In the same line ***Londolani (2017)*** reported that there was positive correlation between the total score of attitudes, total score of knowledge and total score of practice regarding enteral nutrition.

Conclusion

Based on the findings of the present study, it can be concluded that:

The present study revealed that about three fifths of the studied nurses had satisfactory level of knowledge regarding enteral feeding, while nearly less than half of studied nurses had positive attitude level about enteral feeding, and, slightly less than three quarters of the studied nurses had

competent total level of practice regarding enteral feeding.

Recommendations

Based on the results of the current study. The following recommendations are suggested:

1. Implementation of training program for nurses regarding enteral feeding.
2. Upgrading nurse's knowledge and performance through continuous education program and orientation program about enteral feeding.
3. Continuous monitoring and teaching on spot form nurse supervisor is needed to ensure quality of care provided by nurses for enteral feeding.
4. Furthers studies should be conducted to improve nurses' knowledge and performance regarding enteral feeding.

References

Abdullah, Maha. Mohammed, Warda. Ismail, Manal. (2014): Nurses' Knowledge and Practices about Administration of Medications via Nasogastric Tube among Critically Ill Patients. Journal of Education and Practice. Vol.5, No.1, 2014

Ahamed N. Mondal D., (2014): Assessment of Knowledge and Practice of Staff Nurses Regarding Ryle's Tube Feeding in a Selected Hospital of Kolkata, West Bengal. SMU Medical Journal. 1(2): 294-304.

Ahmed, F. Ahmed, O. Albitar, E. Ghoneim, S. (2018): Effect of Educational Nursing Guidelines Regarding Enteral Feeding on Nurses' Knowledge and Practices at Critical Care Units. Journal of Nursing and Health Science. Volume 7, Issue 5 Ver. II (Sep.-Oct. 2018), PP 69-75

Alhashemi, S. Ghorbani, R. Vazin, A. (2019): Improving knowledge, attitudes, and practice of nurses in medication administration through enteral feeding tubes by clinical pharmacists: a case–control study. Dove Press journal: Advances in Medical Education and Practice. 2019:10 493–500.

AL-Hawaly M., Ibrahim M., Qalawa Sh., (2016): Assessment of Nurses' Knowledge and Performance Regarding Feeding Patients with Nasogastric Tube in Ismailia General Hospital. Medical Journal of Cairo University 44(8): 99-105.

Al-Kalaldeh, M. (2011): Enteral nutrition in the critically ill: A mixed methods study of adherence to evidence-based protocols, nursing responsibility and teamwork. Access to Electronic Thesis of Sheffield University: 1-287.

Ameri, Zahra. Vafaee, Ali. Sadeghi, Tahere. Mirlashari, Zhila. Djavad, Ghoddoosi-Nejad. Faramarz, Kalhor. (2016): Effect of a Comprehensive Total Parenteral Nutrition Training Program on Knowledge and Practice of Nurses in NICU. Global Journal of Health Science; Vol. 8, No. 10; 2016.

American Society for Parenteral and Enteral Nutrition (ASPEN) (2009): Guidelines for the use of parenteral and enteral nutrition in adult and pediatric patient. Section VIII: Access for administration of nutritional support. JPEN, 26 (1Supp1): 33SA-35SA.

Ashouri, Elaheh. Fatehi, Nahideh. (2012): A comparison of performing tube feeding with the standard procedures at selected educational and treatment centers of Isfahan University of Medical Sciences, Iran. Iranian Journal of Nursing and Midwifery Research. 17(2 suppl1).

Babapour S., Esmaeili R., Esteki T., Naderiravesh N., Pourhoseingholi M., Marzangu S., (2016): Nurses' Practice about Performance of Nasogastric Tube Feeding in Intensive Care Unit. International Journal of Advanced Biotechnology and Research (IJBR). 7(5): 1585-1594.

Ball, J., Bindler, R and Cowen, K. (2012): principles of pediatric nursing: caring for children. 5th ed. Pearson, USA; p: 366.

Bedier N., EL-Ata A. & Shehab M. (2016): Effect of educational Program on Nurses' Practice Related to Care of Patients Undergoing Nasogastric Tube Feeding. International Journal of Caring Sciences, 9(2), 432.

Bedier, N. Abo EL-Ata, A. Shehab, M. (2016): Effect of Educational Program on Nurses' Practice Related to Care of Patients Undergoing Nasogastric Tube Feeding. International Journal of Caring Sciences May– August 2016 Volume 9 | Issue 2| Page 432

Brown, A. Carpenter, D. Keller, G. Morgan, S. Irving, S. (2015): Enteral Nutrition in the PICU: Current Status and Ongoing Challenges. J Pediatric Intensive Care 2015; 4:111–120.

Bryon, E. Gastmans, C. de Casterlé, BD. (2012): Nurse-physician communication concerning artificial nutrition or hydration (ANH) in patients with dementia: a qualitative study. J Clin Nurs. 2012;21: 297-284.

Cederholm T, Barazzoni R, Austin P, Ballmer P, Biolo G, Bischoff SC, et al. (2017): ESPEN guidelines on definition and terminology of clinical nutrition. Clin Nutr; 36:49-64.

Dae, Yong, Yi. (2018): Enteral Nutrition in Pediatric Patients. Pediatric Gastroenterology Hepatic Nutrition 2018 January 21(1):12-19.

Darawad, MW. Hammad, S. Al-Hussami, M. Haourani, E. Aboshaiqah, AE. Hamdan-Mansour, AM. (2015): Investigating critical care nurses' perception regarding enteral nutrition. Nurse Educ Today. 2015;35:414-419.

Das, S., Patra, D., Pradhan, P. (2014): Critical Care Nurses' Knowledge and Skill Regarding Enteral Nutrition in Critically Ill Patients at a Glance. Journal of Nursing Science & Practice, 4 (3), 35-42.

Eldakhakhny, A., Zaiton, H., (2011): Impact Of Utilizing Nursing Giudlines Protocol On Minimizing Ventilator Associated Pneumonia among Children At Zagazig University Hospital. Journal of American Science; 7(12); 444-451.

El-Meanawi, N., H. (2017): Impact of Implementing an Educational Program Regarding Care of Nasogastric Tube Feeding on Nurses' Knowledge and Performance. IOSR Journal of Nursing and Health Science:6 (1) PP 101-109

Eskander, H. Morsy, W. Elfeky, H. (2013): Intensive Care Nurses' Knowledge & Practices regarding Infection Control Standard Precautions at a Selected Egyptian Cancer Hospital. Journal of Education and Practice. Vol.4, No.19, 2013

Gijare M, (2012): Effectiveness of teaching on infection control practices among health care professionals. Sinhgad e Journal of Nursing, 2(2): 5-9.

Gupta B, Agrawal P, Soni KD, Yadav V, Dhakal R, Khurana S, et al. (2015): Enteral nutrition practices in the intensive care unit: understanding of nursing practices and perspectives. J Anaesthesiol Clin Pharmacol. 2015;28:41-44.

Hazel, Rollins. (2018): Nasojejunal tube feeding in children: knowledge and practice. British Journal of Community Nursing. Vol. 23, No. Sup7.

Janssens W, Alhassan RK, Duku SO, Nketiah-Amponsah E, Spieker N, van Ostenberg P, et al. (2015): Comparison of perceived and technical healthcare quality in primary health facilities: implications for a sustainable National Health Insurance Scheme in Ghana. PLoS One. 2015;10(10):e0140109.

Kalaldeh MA, Watson R, Hayter M. (2014): Jordanian intensive care nurses' perspectives on evidence-based practice in nutritional care. Br J Nurs. 2014;23:1023-1029.

Londolani, Ramuada. (2017): Assessment of knowledge, attitude and practice of nurses regarding Enteral Nutrition at a Military hospital. Thesis presented in partial fulfillment of the requirements for the degree Master of Nutrition at the University of Stellenbosch. Stellenbosch University https://scholar.sun.ac.za

Mehta, N. Hamilton, S. Naples, E. Leavitt, K. Duggan, C. (2012): Challenges to Optimal Enteral Nutrition in a Multidisciplinary Pediatric Intensive Care Unit. Journal of Parenteral and Enteral Nutrition Volume 34 Number (1). January 20120 38-45.

Meshal, Margrate. Shaier, Khan. Farhan, Mukhtar. Kainat, Asmat. (2018): Knowledge and Practices among Nurses of Tertiary Care Hospitals, Lahore Regarding Nasogastric Tube Feeding in Adult Patients. Saudi Journal of Medical and Pharmaceutical Sciences. Vol-4, Iss-7 (Jul, 2018): 798-801

Metwaly, E. Mohammed, E. Mohammed, M. (2013): Nurses' Performance Regarding Nasogastric Tube Feeding in Intensive Care Units. Zagazig Nursing Journal January; 2013 Vol.9, No.1. PP 69-84.

Mohamed, S., and Wafa, A. (2011): The effects of an educational program on nurse's knowledge and practice related to hepatitis c virus: a pretest and posttest quasi experimental design. Australian Journal of Basic and Applied Sciences, 5(11): 564-570.

Mohammed, A. Abdel Fattah, S. (2018): The effect of educational program on nurse's knowledge and practices about nasogastric tube feeding at neonatal intensive care units. Journal of Nursing Education and Practice 2018, Vol. 8, No. 8

Mohammed, H. Farag, A. (2019): EFFECT OF SELF-INSTRUCTIONAL MODULE ON KNOWLEDGE AND PRACTICE OF NURSING STUDENTS REGARDING TUBE FEEDING INSERTION. Journal of Health, Medicine and Nursing. Vol.4, Issue 1 No.1, pp 1- 14, 2019.

Mohammed, M. Mohammed, M. Shehab, M. (2017): Assessment of the Nurses Performance in Providing Care to Patients Undergoing Nasogastric Tube in Suez Canal University Hospital. International Journal of Caring Sciences May–August 2017 Volume 10 | Issue 2| 915.

Morphet J., Clarkea A. Bloomer M. (2016): Intensive care nurses' knowledge of enteral nutrition: A descriptive questionnaire Intensive and Critical Care Nursing. Elsevier.

Mula Ch. (2011): A Descriptive Study of Nurses' Knowledge and Practice about Adult Enteral Nutrition In Special Care Units of A Referral Hospital IN Malawi. Published Master Thesis. University Of Kwazulu Natal: Pp.44-56.

Robert, Alhassan. Richard, Tsikata. Richard, Tizaawaw. Prince, Tannor. (2019): Adherence to standard nursing protocols on nasogastric tube feeding in a secondary referral hospital in Ghana: comparing self-ratings by professional and auxiliary nurses. BMC Health Services Research (2019) 19:119

Shahin M, Mohamed W. (2012): Nurses' knowledge and practices regarding nasogastric feeding at the neonatal intensive care units of Al-Manial University Hospital in Egypt: impact of a Designed Instructional Program. Journal of American Science. 2012; 8(9): 397-404.

Shehab M., Sleem H., Mahmoud M. Mohammed M (2017): Assessment of the Nurses Performance in Providing Care to Patients Undergoing Nasogastric Tube in Suez Canal University Hospital. International Journal of Caring Sciences 10 (2):

Taha A, Mohammed E. (2014): Critical care nurses' knowledge and practice regarding administration of total parental nutrition at critical units in Egypt. Journal of Biology, Agriculture and Healthcare. 2014; 4(13): 10-22.

Wilkinson, J. Treas, L. Barnett, K.& Smith, M. (2015): Procedure Checklists for Fundamentals of Nursing, 3rd edition, F. A. Davis Company, ch.26,p199

Yalcin, N. Cihan, Agundogdu, H. And Ocakci A.F. (2014): Nutrition knowledge level of nurses, Health Science Journal, 7 (1): 99-108, 2014.