Mansoura Nursing Journal (MNJ)

vol.7 No.1 - 2020

ASSESSMENT OF NURSES' KNOWLEDGE AND PRACTICES ABOUT MEDICATIONS ADMINISTRATION VIA NASOGASTRIC TUBE AT EMERGENCY HOSPITAL

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Abstract

Background: Directing a patient their medications through nasogastric tube (NGT) is a sensibly basic nursing intervention that involves various aptitudes, including preparing the medication, confirming the tube position, flushing the tube and evaluating for potential complications. Inappropriate prescription and preparation of oral drugs given through NGT may result in significant harm to patients. **Aim of the study:** To assess the nurses' knowledge and practices about medications administration via nasogastric tube at Emergency Hospital. **Subjects and method:** A descriptive exploratory research design was utilized to conduct this study on fifty eight nurses who are associated with giving direct care for critically ill patients in Emergency Hospital, Mansoura University. Data were collected through using two tools: nurses' knowledge assessment questionnaire and nurses' practice observational checklist. **Results:** Most of nurses had unsatisfactory knowledge and practice level regarding medications administration via nasogastric tube in percentage of 74% &71% respectively. There was no significant statistical correlation existed between total and subtotal knowledge and practices scores regarding medication administration via nasogastric tube. **Conclusion:** Based on findings of the present study, it can be considered that nurses had deficient knowledge and practices about medications administration via nasogastric tube. There is a need for continuing education to upgrade nurses' knowledge and improve their practice. **Recommendation:** The study recommended providing training programs/ sessions for nurses regarding safe medications administration via nasogastric tube to enhance their knowledge and improve their practices; availability of printed universal guidelines illustrated simply in posters and booklets for guiding nurses practice regarding medications administration via nasogastric tube; and replication of this study on large probability sample.

***Keywords*:** Nurses' knowledge, nurses' practice, nasogastric tube, medications administration, critically ill patients.

Introduction

Gastric intubation is a common procedure that gives access to the stomach through the nasal entry for diagnostic and therapeutic purposes. By inserting a nasogastric tube, you are gaining access to the stomach and its contents. While generally considered a basic medical procedure, it frequently includes some level of uneasiness for the patient, if he isn't adequately prepared with anesthesia to the nasal passages and explicit guidelines on how to participate with the administrator during the procedure **(Lapierre, 2009)**.

Administering medications via nasogastric tube is a key duty of nurses in intense care settings **(Phillips & Nay 2007)**. There are various aptitudes engaged with the therapeutic intervention of administering enteral medication,

including confirming tube placement, medication preparation (involving appropriate form selection, e.g. liquid or solid, crushing of solid form and dilution), tube flushing and evaluating for related difficulties **(Phillips & Endacott, 2011)**.

Majority of tube occlusions happen in connection to drug or enteral feed administration **(Smith & Myers 2005)**. Tubes ought to be flushed before and after giving medication to counteract occlusion and/or potential interaction with feeds. The amount of fluid prescribed for diluting crushed or viscous medication varies, proposing that nurses' practices may likewise vary. Poor practices prompt expanded patient morbidity and mortality. There can prompt patients contracting pneumonia or dying when nutrition and medications were conveyed into the patient's lungs **(British Association for Parenteral and Enteral Nutrition (BAPEN), 2004; Ellett & Metheny 2006)**.

The right administration of oral medications to patients on enteral tube feeding presents a special challenge. As patients are normally incapable to swallow oral medications and numerous medications ought not be crushed. Measures to improve the quality of oral drug administration in patients with enteral feeding tubes may comprise of presenting guidelines, preparing nurses, or granting patient-tailored advice by the pharmacist. The scientific community has likewise created rules for medication administered to patients with EFC **(Seifert, Johnston, Rojas-Fernandez, 2002; Van den Bemt., et al, 2006)**.

Significance of the Study:

The nursing team is fundamentally in charge of medication administration and tube care. Nurses must provide high quality, safe, evidence-based care to diminish the event of medication risk (**Boullata et al., 2009**). Most nurses depend essentially on their own experience and on that of their colleagues for knowledge about preparing and administering enteral drugs. Because few nurses depend on pharmacists, nutritionists, or printed rules, a variety of improper techniques and a general absence of consistency have regularly been the outcome **(Grissinger, 2013)**.

Hence, the researchers found an urgent need to investigate nurses' current level of knowledge and practice about medications administration via nasogastric tube to determine the gaps, defects. They must be adequately educated and practically skilled in managing their patients to avoid any basic complexities and problems associated with medications administration via NGT processes. So there is a conspicuous need to contribute in the improvement quality of patient care.

Aim of the Study:

The aim of this study was to assess the nurses' knowledge and practices about medications administration via nasogastric tube at Emergency Hospital.

Research Questions:

To achieve the aim of this study the following research questions were formulated:

Q1: What are the nurses' knowledge about medications administration via nasogastric tube to critical patients?

Q2: What are the nurses' practices in relation to medication administration via nasogastric tube to critical patients?

Subjects and Method:

Research Design:

A descriptive exploratory research design was utilized to conduct this study.

Settings:

This study was performed in the intensive care units (ICU) at Emergency Hospital, Mansoura University. These

units are located at the second floor and consist of three intensive care units (ICU1, ICU2 & ICU3). The first ICU consists of 10 beds; the second ICU consists of 8 beds, while the third ICU consists of 4 beds. The nurse patient ratio was 1:2. These units receive critically ill patients traumatic and non-traumatic with different ages.

Sample:

A convenience sample consisting of all nurses (58) who had at least one year of experience, with different level of education, engaged with giving direct care to critically ill patients and willing to take part voluntary were included in the study.

Tools of data collection:

Two tools were developed and used to gather data pertinent to the present study as follow:-

Tool I: Critical Care Nurses' Knowledge Assessment Questionnaire:

It was developed by the researchers dependent on the scientific literature to assess nurse's knowledge about medications administration via nasogastric tube. It was translated to Arabic language and comprised two main parts which are:

Part (A): Critical Care Nurses' demographic and clinical data. It incorporates data such as nurses' gender, marital status, educational level, age by years, years of experience and Attending training programs / workshop / scientific conference regarding medication administration via nasogastric tube.

Part (B): Nurses knowledge questionnaire schedule about nasogastric medication administration. This tool was developed by the researcher subsequent to reviewing the recent related literature **(Shahin, 2012; Boullata & Guenter, 2013; Abdullah, 2014; Joos et al., 2015)** to assess nurses' knowledge about medication administration via nasogastric tube. It consists of four main domains: nasogastric intubation, pre-administration of medication knowledge, intra_administration of medication knowledge, post administration of medication knowledge and source of information.

Scoring system two points was allocated for each true complete answer, one point was allocated for each true incomplete answer and zero point was allocated for each incorrect or unknown answer. The total score are 50 classified into two categories as follows: score less than 75% is measured as an unsatisfactory knowledge level while score equal or more than 75% is measured as a satisfactory knowledge level.

Tool II: Critical Care Nurses' practices observational checklist about nasogastric medication administration. This tool was developed by the researcher subsequent to reviewing the recent related literature **(Mota, 2010; Mula, 2011; Lilley et al., 2011; Perry et al., 2014; Assessment technology institute (ATI), 2014; British Columbia Institute of Technology (BCIT), 2015)** to assess level of nurses' practice about nasogastric medication administration. It consists of three main parts and included 38 observational statements.

Scoring system: one point was allocated for each adequately done practice and zero point was allocated for each false or missed practice. The total score are 38 classified into two categories as follows: score less than 75% is measured as an unsatisfactory practice level while score equal or more than 75% is measured as a satisfactory practice level.

Validity and reliability of the tools

The tools were tested for validity of the content by group of experts in the field of 5 researchers allocated to two professors from Anesthesia and Intensive Care Department, Faculty of Medicine, Mansoura university, Professor of Public

Health and Preventive Medicine, Faculty of Medicine, Mansoura university and two doctors from Critical Care and Emergency Nursing Department, Faculty of Nursing Mansoura University who reviewed the tool for clarity, relevance and applicability. Modifications were done accordingly. Internal consistency and reliability of the tools was tested via cronbach's Alpha which revealed that r =.84 for knowledge assessment questionnaire and r = .83 for practice observational checklist.

Pilot study

A pilot study was carried out on six nurses approximately (10%) of the total sample to test the feasibility, applicability of the tools and estimate time needed to fill out the data collection tools. Minor modifications were done dependent on the result of the pilot study prior to data collection. The participants of the pilot study were precluded from the study group.

Ethical consideration and human rights

An official permission to perform the purposed study was gotten from the Ethics Committee of the Faculty of Nursing, Mansoura University and the hospital director. Informed consent was gotten from each participant in this study after explaining the study aim. Participants were assured that the information is confidential and used for study purpose only and wouldn't be used for any other research. Participants had the right to pull back from the study at any time without granting any reasons. The obtained data of every nurse were encoded to ensure privacy and anonymity.

Field of work

The current study was carried out through two phases: preparation and implementation phase

A. Preparation phase

The current study started from August 2016 with preparation of different data collection tools after reviewing of the nationally and internationally related literature. Tools were developed in Arabic and tested for validity. The official agreement to carry out the study was obtained from the director of the emergency hospital. Then (10%) of the nurses were chosen randomized as a pilot study for testing the reliability of the tools and excluded from the study.

B. Implementation phase

The actual data collection started from February to June 2017. The nature and the purpose of the study were clarified to nurses, who consented to collaborate in the study. Informed consent was gained and nurses were asked to fill out the knowledge assessment questionnaire taking 15-20 minutes.

The data were collected during the three shifts, morning, afternoon and evening shifts according to nurses' schedule predetermined. Nurses practices were evaluated by using tool (II) which include observational checklist to assess level of nurses' practice regarding nasogastric medication administration.it had been assessed by the researcher at three times apart during the care of intensive care unit (ICU) patients who were connected with nasogastric tube and delivered medication through it. The mean of three observations was calculated.

Statistical design:

Data were extracted from the nurses' knowledge assessment questionnaire and practices observational checklist then computerized. Analysis was undertaken utilizing SPSS (statistical package for social science) version 22.0. Variables such as gender, marital status, educational level…. etc were defined utilizing number and percent. Whereas, arithmetic mean and standard deviation (X ± SD) were utilized as a measure of central tendency and desperation for normally distributed quantitative data. Qualitative

variables were compared utilizing qui square test (X^2) as the test of significance and the p-value is the degree of significant. The p value of < 0.05 demonstrates a significant result while, p value of > 0.05 demonstrates a non-significant result. As well reliability analysis (Cronbach's Alpha) that is model of internal consistency, based on the average of inter_item correlation.

Results:

Table (1) Percentage Distribution Of The Studied Sample As Regards To Their Sociodemographic Characteristics (N = 58)

Variables \ Sample	N = 58	
	No	**%**
Gender		
Male	2	3.4
Female	56	96.6
Marital status		
Single	2	3.4
Married	56	96.6
Educational level		
BSC nurses	20	34.5
Technical diploma nurses	7	12.1
Secondary school diploma nurses	31	53.4
Age group (years)		
<20	2	3.4
20 – 29	26	44.8
30 – 39	27	46.6
≥ 40	3	5.2
Mean ± SD 30.7 ± 6.8		
Years of working at the Intensive Care Unit(ICU)		
< 5	19	32.8
5– 9	11	19.0
10 – 14	8	13.8
≥15	20	34.5
Mean ± SD 10.5 ± 5.3		
Attending training programs / workshop / scientific conference regarding medication administration via nasogastric tube		
Yes	5	8.6
No	53	91.4

As regard most of the studied subjects (96.6%) were female, married and (53.4%) of them had secondary school diploma nursing degree. Also, (46.6%) of them were in the age group ranged between 30 and less than 40 years with a mean ± SD (30.7 ± 6.8). In addition to, (34.5%) of them had more than 15 years of working experiences in ICU with a mean ± SD (10.5 ± 5.3). While (91.4%) of them didn't attend training programs, workshops or scientific conferences regarding medication administration via nasogastric tube

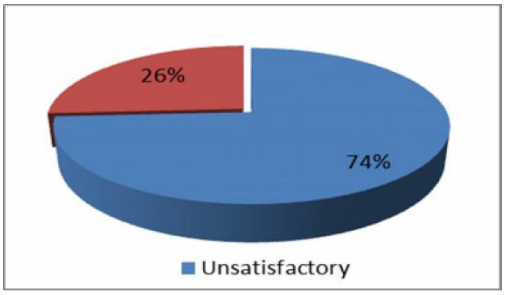

Figure (1) Percentage Distribution Of The Studied Subjects According To Their Total Knowledge Regarding Medication Administration Via Nasogastric Tube (N=58)

Figure (1) clarifies percentage distribution of the studied subjects according to their total knowledge regarding medication administration via nasogastric tube. As indicated from figure that (74%) of the studied subjects had got unsatisfactory knowledge level (< 75%) regarding medications administration via nasogastric tube.

Table (2) Percentage Distribution Of The Studied Subjects ' Source Of Information When They Need To Ask About Medication Administration Via Nasogastric Tube (N =58).

Items	No	%
Your source for information on medication administration via NGT		
Institutional policies & procedures.	16	27.6
A comprehensive, current drug references	8	13.8
Available doctor	8	13.8
Pharmacy colleagues.	12	20.7
Previous experiences	3	5.2
Head nurse & colleagues.	4	6.9
Website	7	12
Does the institution have a nursing strategy, procedures or guidelines for medication administration through enteral feeding tube		
Yes	12	20.7
No	28	48.3
I don't know	18	31
How regularly do you counsel with pharmacist when you are uncertain about medication administration or availability of liquid form?		
Never	10	17.2
Rarely	31	53.4
Always	9	15.5
I don't have access to pharmacist	8	13.8

Table (2): reveals that the nurses' major sources of information are the institutional policies and procedures followed by the pharmacy colleagues (27.6% and 20.7% respectively). Moreover, comprehensive, current drug references, available doctor, website the head nurse & colleagues and previous experiences are not common source of information for them**.** Also, (48.3%) of the studied sample reported that there is no nursing policy, procedures, or guidelines for medication delivery through enteral feeding tube. Finally, (53.4%) of the studied subjects rarely counsel with pharmacist when you are uncertain about medication administration or availability of liquid form.

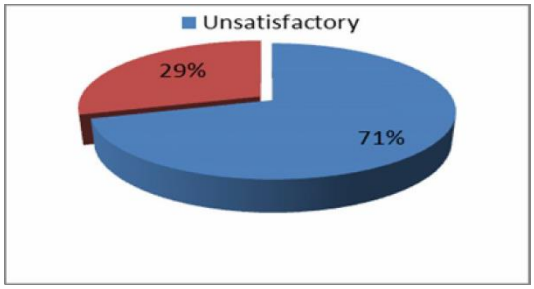

Figure (2) Percentage Distribution Of The Studied Subjects According To Their Total Practice Regarding Medication Administration Via Nasogastric Tube (N=58)

Figure (2) clarifies percentage distribution of the studied subjects according to their total practice regarding medication administration of via nasogastric tube. As indicated from figure that the majority of the studied subjects (71%) had got unsatisfactory practice level (< 75%) regarding medications administration via nasogastric tube.

Table (3): Relationship Between Total Knowledge Scores And Demographic Characteristics (N=58).

Variables	Total knowledge scores				Test of significance
	Satisfactory (> 75%)		Unsatisfactory (<75%)		
	N	%	N	%	
Gender					
Male	0	0.0%	2	100%	FET: .723
Female	15	26.8%	41	73.2%	P:0.546
Marital status					
Single	0	0.0%	2	100%	FET: .723
Married	15	26.8%	41	73.2%	P:0.546
Educational level					
Secondary school diploma nurses	5	16.1%	26	83.9%	**FET:3.698**
Technical diploma nurses	2	28.6%	5	71.4%	
BSC nurses	8	40.0%	12	60.0%	**P:0.040***
Age in years					
< 20	1	50%	1	50%	
20 – 29	8	30.8%	18	69.2%	FET:2.499
30 – 39	5	18.5%	22	81.5%	
> 40	1	33.3%	2	66.7%	P:0.252
Years of working experience in ICU by years					
< 5	2	10.5%	17	89.5%	**FET:9.135**
5 – 9	1	9.1%	10	90.9%	
10 – 14	2	25%	6	75.0%	**P:0.003***
>15	10	50%	10	50.0%	
Attending training programs / workshop / scientific conference regarding medication administration via nasogastric tube					
Yes	1	20%	4	80%	FET:.103
No	14	26.4%	39	73.6%	P:1.000

Table (3) illustrate the relationship between total knowledge score of the studied subjects regarding medication administration via nasogastric tube and their sociodemographic characteristics which reflect there is a significant statistical correlation between total knowledge score of the studied subjects and their educational level (P = 0.040) and years of working experience in ICU (P = 0.003). The satisfactory level of total knowledge score was reported mostly by the female, married nurses (26.8%) whose age were whose age were < 20 years (50%), > 40 years (33.3%), having bachelor science in nursing (40.0%), their experience in nursing field > 15 years (50%) and Attending training programs, workshop, scientific conference regarding medication administration via nasogastric tube (20%).

Table (4) Relationship Between Total Practices Scores And Demographic Characteristics (N=58).

Variables	Total practices scores				Test of significance
	Satisfactory (> 75%)		Unsatisfactory (<75%)		
	N	%	N	%	
Gender					
Male	1	50%	1	50%	FET:0.428 P:0.504
Female	16	28.6%	40	71.4%	
Marital status					
Single	1	50%	1	50%	FET:0.428 P:0.504
Married	16	28.6%	40	71.4%	
Educational level					
Secondary school diploma nurses	10	32.3%	21	67.7%	FET:1.694 P:0.248
Technical diploma nurses	3	42.9%	4	57.1%	
BSC nurses	4	20%	16	80.0%	
Age in years					
< 20	0	0.0%	2	100%	FET:1.514 P:0.970
20 – 29	8	30.8%	18	69.2%	
30 – 39	9	33.3%	18	66.7%	
> 40	0	0.0%	3	100%	
Years of working experience in ICU by years					
< 5	4	21.1%	15	78.9%	FET:3.727 P:0.079
5 – 9	3	27.3%	8	72.7%	
10 – 14	1	12.5%	7	87.5%	
>15	9	45%	11	55%	
Attending training programs / workshop / scientific conference regarding medication administration via nasogastric tube					
Yes	2	40%	3	60%	FET:0.286 P:0.586
No	15	28.3%	38	71.7%	

Table (4) illustrate the relationship between total practices score of the studied subjects regarding medication administration via nasogastric tube and their sociodemographic characteristics which reflect there is no significant statistical correlation between the studied subjects total practices score and their sociodemographic characteristics. The satisfactory level of total practices score was reported mostly by the nurses having technical diploma in nursing (42.9%), whose age (30 – 39) years (33.3%), their experience in nursing field >15 years (45%) and attending training programs, workshop, scientific Conference regarding medication administration via nasogastric tube (40%).

Table (5): Relationship Between The Studied subjects Total and Subtotal Knowledge And Practice Scores Regarding Medication Administration Via Nasogastric Tube (N=58)

Variables	Mean ± SD	Test of significance
Pre-administration of medication		
Pre-administration of medication knowledge	13.4±3.3	F:0.943 P:0.514
Pre-administration of medication practice	13.6±2.7	
Intra-administration of medication		
Intra-administration of medication knowledge	4.1±2.4	F:1.832 P:0.123
Intra-administration of medication practice	3.0±.9	
Post administration of medication		
Post administration of medication knowledge	5.0±1.5	F:0.580 P:0.718
Post administration of medication practice	7.4±1.1	
Total score		
Total Knowledge Scores	29.4±6.0	F:1.414 P:0.176
Total Practices Scores	24.1±3.8	

Table (5) illustrate the relationship between total and subtotal knowledge score and practice score regarding medication administration via nasogastric tube which reflect there is no significant statistical correlation existed between any of them.

Discussion

In light of the results of the present study, the total numbers of the current studied subjects was 58 nurses; most of them were female, married and carrying secondary school diploma nursing degree that might due to the study of nursing at Egypt was exclusive for females just till few years ago, thus the profession of nursing in Egypt was for the most part feminine. Differences in educational background from the researcher point of view may be linked to having different types of nursing education in Egypt. Secondary school has traditionally been the most prevalent form of nursing education. Variation in patient diagnosis and increase acuity of illness require highly qualified nurse to be able to cope with patients in the intensive care unit. These study findings are supported by **Shahin (2012)** who carried out a designed instructional program about nurses' knowledge and practices regarding enteral nutrition and commented that the mostly studied sample were females, married and more than half of them had got a diploma nursing degree in comparing with fewer

numbers of nurses getting a bachelors' degree in nursing science. But, these findings are contraindicated partially with **Nurcan, Hatice, Gok & Maslak (2016)** who carried out research about evaluation nurses' practices for medication administration via enteral feeding tube on 184 nurses and the study uncovered that, more than half of the nurses carrying baccalaureate degree.

In relation to age and years of experience, nearly half of studied subjects age ranged between 30 and less than 40 years with a mean ± SD (30.7 ± 6.8) and more than one third of them having more than 15 years of working experience in the ICU with a mean ± SD (10.5 ± 5.3). These findings agreed with the result of the most recent study carried out at Mansoura hospitals, **Zanaty (2015), El. Nosary (2016)** who revealed that, near three quadrants of the studied subjects carrying diploma nursing degree, more than half of the studied subjects aged between 30 to less than 40 years and more than one third of them having more than 15 to less than 20 years of working experience in the ICU. These results are inconsistent with **Al-Hawaly (2016)** who carried out research about assessment of nurses' knowledge and performance regarding feeding patients with nasogastric tube, revealed that two-thirds of studied nurses' had nursing institute of education, more than half of the nurses aged from 20 to less 25 years and there were a vast majority of studied nurses' had experience under 1 years. But in a similar line regarding gender of participants as more than half of nurses were females. This could mirror that the profession of nursing in Egypt was generally females

Concerning attendance training programs/ workshops/ scientific conferences regarding nasogastric tube; the majority of the studied subjects didn't receive in-services training program or workshops specifically for medications administration via nasogastric tube. Lack of in-services training programs which are very important in improving quality of care regarding patients receiving medication via nasogastric tube and limit complications inherent to this nursing activity might be the primary factor. This result is in harmony with **Nurcan et al. (2016),** those found that a 64.1% of the nurses reported that they had not received training for medication administration via enteral feeding tube, (81.0%) reported that there was no written enteral nutrition guideline at their centers and (65.8%) revealed that they had not perused research identified with the subject. While this study finding disagreed with **Al-Hawaly (2016)** who clarified that, almost one third of studied subjects had training session in regards to feeding patients with nasogastric tube.

In the present study, the finding data that responded to the first research question concerning nurses' knowledge about medication administration via nasogastric tube which consists of (pre-administration, intra-administration and post-administration), uncovered that most of the studied nurses (74%) had got unsatisfactory knowledge level with the mean (29.4 ± 6.0) and only half of the studied sample who answered knowledge questions correctly. The researcher interpreted reasons for lack of knowledge to insufficient scholastic training, explicitly in connection to medication, which does not deliver items identified to medication administration techniques and lack of cooperation among multidisciplinary health team providers (nurses- physician- clinical pharmacist). And also lack of nursing polices or standard guidelines for medication delivery through nasogastric tube; and

negative attitude of nurses whereby new information learned at workshops were not readily applied in clinical practice. This disturbing and in the meantime demonstrates that educational issues related to medication administration should be reconsidered so as to recognize errors and guarantee the security of patients and restorative achievement.

This study finding is supported by **Dashti-Khavidaki, Badri, Eftekharzadeh, Keshtkar & Khalili (2012)** those carried out research about the role of clinical pharmacist to improve medication administration through enteral feeding tubes by nurses revealed that more than half of the studied nurses had lacking standard knowledge about characteristics and principles of medication administration via enteral tubes. This finding is contraindicated with **Al-Hawaly (2016)** who explained that almost three-quarters of the studied nurses had a satisfactory total level of knowledge with regards to feeding administration via nasogastric tube.

Regarding to nurses' source of information about safe medications administration through nasogastric tube, the study findings showed that a higher proportion's main source of knowledge for nurses when they need to ask about medication administration through nasogastric tube was the institutional policies and procedures followed by the pharmacy colleagues. Moreover, comprehensive, current drug references, available doctor, website the head nurse & colleagues and previous experiences are not common source of information for them**.**

Relatively similar results were reported by **Fulbrook, Bongers & Albarran (2007)** who carried out a European survey of enteral nutrition practices and procedures in adult intensive care units and reported that three-quarters of the respondents to the questionnaire replied that they used clinical protocols or guidelines for enteral feeding and medication delivery through enteral feeding tube.

Policies and procedures are one possible strategy for moving research evidence into practice among nursing staff **(Squires et. al, 2007)** as an absence of guidelines may affect one's practice. Concurrently, presence of nursing policy, procedures, or guidelines for medication delivery via enteral feeding tube, the current study finding revealed that nearly half of nurses reported that there was no nursing policy, procedures, or guidelines for medication delivery via enteral feeding tube**.** The study finding is in agreement with **Shahin (2012)** who revealed that nurses at the critical care department at Al-Manial university hospital had no accessible written protocols or resources of information to refresh their insight and improve their practices concerning enteral nutrition, medications administration, drugs arrangements, adverse reactions, drug – drug and drug – food interactions.

For consultation with pharmacist about availability of liquid form of medication and when you are unsure about medication delivery the study finding uncovered that, more than half of the studied subjects rarely consult with pharmacist. And it reflected a lack of cooperation among multidisciplinary health team providers (nurses- physician-clinical pharmacist). But it is contrary with numerous studies **Seifert & Johnston (2005); Guenter & Boullata (2013)** who detailed that almost all the nurses routinely counseled a pharmacist with respect to liquid dosage form availability. At the point when the pharmacist was counseled with respect to the liquid dosage form availability, there altogether higher

percentage of liquid medications given. It's been exhibited that less medication errors occur when pharmacists and nurses work together on medication administration.

On investigating nurses' practices about medications administration through nasogastric tube, most of the studied subjects (71%) had got unsatisfactory practice level with the mean (24.1 ± 3.80). The researcher may interpret this low practice level regarding medication administration via nasogastric tube were worry to be infected, increased workload, physical weariness just as shift time enough or not, shortage of nursing staff in relation to numbers of patients in ICU, lack of continuous evaluation of nurses practices and opportunities for attending training course.

The study finding is in a similar line with **Dashti-Khavidaki et al., (2012)** who found that the majority of studied sample had unsatisfactory practice in various domains of drug administration via enteral catheters in the case group in the pre-test before instructive program. While, these study finding is contraindicated with **Shahin (2012)** who carried a study on 85 critical care nurses; stated that, the greater part of nurses had agreeable level of practice related to drug administration via enteral catheters in the pre-test before instructive program.

In this research there was a significant statistical differences among the studied subjects by their instructive level (F= 3.698, P = 0.040) and years of working experience in ICU (F= 9.135, P = 0.003) as regard to total knowledge score. The study finding is in concurrence with **Ahamed & Mondal (2014)** who reported that there was a significant correlation of knowledge of staff in regards to enteral nutrition with the professional qualification and period of experience.

The current findings showed that there is no statistical significance between the nurses' sociodemographic variables "gender, marital status, educational level, age and years of experiences" and total score practices. This study finding is in agreement with **Ahamed & Mondal (2014)** who announced that there was no significant correlation of practice of staff in regards to enteral nutrition with the professional qualification and period of experience. In the same line study by **Shahin (2012)** & **Al-kalaldeh (2011)** who concealed that there was no significant association amongst male and female nurses with their knowledge and practices scores regarding enteral nutrition.

Concerning the connection among total and subtotal knowledge and practices with respect to medication administration via nasogastric tube. It was clear from the present study that there was no significant statistical association existed between any of them. Furthermore, it's supported by **Al-Hawaly (2016)** who explained that there was no significant association found between all out nursing knowledge and practice with regards to feeding administration via nasogastric tube.

While this study finding disagreed with **Shahin (2012)** who expressed that there is there is a highly statistically significant association between participants' scores of knowledge and practice in pre-test before instructive program. And also contraindicated with **Ahamed & Mondal (2014)** who revealed that there was tolerably positive connection amongst knowledge and practice of staff nurses regarding Ryle's tube feeding.

Conclusion:

In view of discoveries of the present study, it can be considered that the critical care nurses in the present study had deficient knowledge and practices about

medications administration via nasogastric tube. There was a lack of instructive materials, policies and protocol about enteral drug administration in the intensive care units. These findings could negatively affect patient response to treatment and outcomes.

In spite of having unsatisfactory knowledge and practices level, nurses have strength points and able to provide better care for patients. Thus, building up an instructive training program dependent on the distinguished needs and observation will advance their insight and improve their compliance in regards to medications administration practice.

Recommendation:

In the light of the findings of the present research, the accompanying proposals are recommended:

- Availability of printed universal guidelines illustrated simply in posters and booklets for guiding nurses practice regarding medications administration via nasogastric tube,
- Provide continuous education and training sessions for nurses to enrich their knowledge and improve their compliance regarding medications administration practice.
- Study the impact of an educational training program on this subject can add to the right determination of the medication dosage form and administration technique and assess incompatibilities and interactions.
- Further Studies of this subject are needed to be implemented on larger probability sample from various sites in Egypt to generalize the findings.

Acknowledgements:

I express my gratitude and thank towards all the critical care nurses who have directly helped us to complete this study and their support in each major step of the study. Also, I would like to thank hospital administration who allowed us to conduct this study.

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