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Assessing Nurses' Knowledge and Practice Regarding Medication Administration Safety Practice

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ABSTRACT

Background The first priority for nurses is to enhance the quality of the drug administration process, as this is the foundation of health policy and ensures the safe and error-free delivery of medical care. Errors in medication administration have long been a concern for patient safety. It has been determined that the nursing profession is essential to promoting patient medication safety. **Aim:** To assess staff nurses' knowledge and practice regarding medication administration safety practice at Main Mansoura University Hospital. **Methods:** A descriptive correlational design was utilized with a sample of (98) staff nurses in medical and surgical unit at Main Mansoura University Hospital. **Tools of data collection were:** Medication Administration Safety Practice Knowledge Questionnaire, Nurses' Medication Administration Safety Practice Observation Checklist. **Results:** two third of studied staff nurses (60.2%) have poor level of knowledge regarding medication administration safety practice and (100%) of studied staff nurses have poor level of practice regarding medication administration safety practice. **Recommendations:** putting in place a program for nurse medication safety training to improve nurses' attitudes about medication safety. the creation of precise, current, and evidence-based recommendations for the safe administration of medications, as well as continuing education and training programs for healthcare professionals based on these guidelines.

Keywords: *Medication administration, Safety, Staff nurses*

Introduction

Safety is a key component of the harm-free healthcare ideal and a priority for global healthcare organizations and practitioners. Administering medications without harm is one of the proactive ways to protect patient safety and excellent quality of life. (Tingle, Milo, Msiska & Millar, 2023). Additionally, safety is strong for regular administrations and worldwide healthiness establishments, as shown by policies that lead the healthcare (World Health Organization, 2021). The concept in harm-free healthcare is mostly based on the feeling of wellbeing, and worldwide healthcare professionals and healthcare organizations are under pressure to achieve this goal (Tingle, Milo, Msiska& Millar, 2023).

Medication management is one of the most important routinely performed nursing tasks; it makes up around 40% of all nursing labor and can be a multi-step process requiring a variety of expert data, such as the pharmacologic characteristics of medications. The rational management of drugs is a complex process due to changes in medicine, modifications to treatment devices, and the severity of patients' conditions. This is why drug errors are a contributing factor in the majority of medical mishaps (McCuistion, DiMaggio, Winton & Yeager, 2021).

Medicine management is a substantial accountability of nurses yet it remainders one of the furthermost problematic leadership abilities for nursing students. It means providing the patient with an ingredient prescribed and intended for the judgement, treatment or stoppage of a medical illness or state (Moloney, Kingston & Doody, 2020). Worldwide organization highlights that, in spite of efforts to preserve patient safety during this procedure, various mistakes are finished (Park, Jeon, Kim, Kim & Jeong, 2023).

Before being requested to administer new or less often handled medications to patients securely in a clinical setting, nurses are lastly trained and informed about them (Marufu, Bower, Hendron & Manning, 2022). Acute care nurses actively participate in the topic of medication safety on a daily basis. Medication administration safety practice reduced due to issues that inspire workplace stresses on nursing staff members such as regularly listing assignment, being under-staffed, or distractions during delivery of nursing care (Luokkamäki, Härkänen, Saano & Vehviläinen Julkunen, 2021).

The standard during nursing teaching to obtain instructions on a guide to therapeutic medication management and keeping patient safety known as the ten rights of medication supervision (Solberg, Devik, Bell & Olsen, 2023). It is imperative that nurses are aware of the proper site, method, and timing for administering medication. It is also assumed that knowing the proper site, method, and timing for parenteral medicine monitoring is crucial for all nurses (Dick□Smith, Fry, Salter,Tinker, Leith, Donoghoe & Elliott,2023). Nurses should be correctly proficient to administer the medications effectively, also they need information about drugs and their movements to cut problem in medication administration (Wondmieneh, Alemu, Tadele & Demis, 2020).

Medicine management security has been a goal of today's health care situation. Medication safety means the veracity and functionality of frequent multiplexes, consistent stages and the association of medical personnel to stop such opposing drug events. The difficulty of both medications uses and management process particularly in inpatient setting makes an important risk for hospitalized patient and rises the incidence of medication administration errors (Atif, Malik, Asif, Qamar-Uz-Zaman, Ahmad & Scahill, 2020).

Medication administration mistakes are an important matter distressing patient protection and expenses in hospitals and they often cause contrasting consequences for patients. It is described as any preventable incident that might lead to or affect the improper use of medication or harm the patient. It could also be the main factor in a number of counterproductive pharmacological actions, an increase in the rate of readmissions, and prolonged hospital stays for patients (Paul, Sobhan Gupta & Mian, 2023). Medication errors can have several contributing factors, such as personal, systemic, and management issues. It is also possible that professional practice, processes, and systems, such as ordering, prescribing, communicating, product labeling, packaging, and nomenclature, are connected to these errors (Fathallah Mostafa, Ibrahem Aboseada & Sayed, 2023).

According to Joint Commission international (JCI, 2016) medicine mistakes are a dynamic concern to health care organization and nurses must make a philosophy of patient safety with medication administration. Accurate medication management is a nurse accountability and it embodies a fundamental goal of quality and safety enhancement involvements. Nurses want technical and logical care to carry out meaningless and actual practices in the management (Stolic & Sheridan, 2023).

Significance of Study

The proportion of medication administration errors (MAE) with the potential to harm patients such as permanent disability and death (WHO 2020). The growing population means that there is a greater need for healthcare and nursing services, and more importantly, nurses need to be qualified to use this drug administration safety procedure.

Aim of the study

This study aims to assess medication administration safety practice knowledge and practice among staff nurses.

Research questions

RQ1: What is the level of medication administration safety practice knowledge?

RQ2: What is the level of practice of medication administration safety practice?

RQ3: Is there a relation between medication administration safety practice knowledge and practice?

Method

Research design

This study research methodology was descriptive correlational design.

The study setting

The Mansoura University Hospital, a tertiary care teaching hospital associated with Mansoura University, hosted the trial in all of its medical and surgical departments at Main Mansoura. This hospital, which is situated in Mansoura City, is significant since it serves as the main teaching facility for medical education programs.

Participants of the study

Convenience sample was applied which includes all accessible staff nurses (n=98) assigned to work in medical and surgical departments, throughout the data collection period with at least one-year experience to be oriented for working condition.

Tool of Data Collection

Tool (I): Medication Administration Safety Practice Knowledge Questionnaire.

The tool comprises two parts: -

The first part: used to identifying personal characteristics of the study nurses such as, age, hospital, educational qualifications, years of experience and attending training program.

The second part: It was designed by the researcher based on literature review (Araújo, Lima, Ferreira, Oliveira & Carvalho, 2019) to assess study nurses' knowledge about medication administration safety practice. It consists of questions in the form of true and false and multiple choice (MCQ) that related to medication administration safety practice. For true /false and MCQ questions response was considered as (1) for right answer and (zero) for false answer. One point will give for each correct answer. The % score will be generated from these scores.

Tool I: Nurses' Medication Administration Safety Practice Observation Checklist.

The researcher built it under the direction of a literature review (Araújo, Lima, Ferreira, Oliveira & Carvalho, 2019) (Luk *et al*., 2008) (Moyen *et al.,* 2008) & (Tang *et al*., 2007). It aims to assess nurses related to safety measures regarding medication administration route in medical and surgical units. It was categorized under four dimensions. The first dimension is general safety measures for all route of medication (5 items). The second dimension is performing medication administration rights (14 items), Third dimension is using basic principles of aseptic technique for preparation and administration of the medication (111 items) for IM injection (37 items), cannula injection (23 items), oral medication (22 items) and subcutaneous medication 29 items). Fourth dimension is post-administration of medication /documentation that includes 7 items. Data were collected when the nurse administer medications for their assigned patients, observation doses of medication administration. Each statement response will be considered as done (1) and not done (zero).

Validity and Reliability

Validity: the tools were redesigned for clarity, relevancy, applicability, comprehensiveness, understanding, and ease of implementation. A panel of five experts in the field of nursing administration also evaluated each item individually and the entire instrument as being relevant and appropriate to test what it wanted to measure, and based on their opinions, the necessary modification was made. Based on the opinions of experts, the questionnaire's face validity was determined to be 98%, and its content validity index (%) for the Medication Administration Safety Practice Questionnaire was 98%, while the Nurses' Medication Administration Safety Practice Observation Checklist had a 94% index. **Reliability:** test of the study tools, Medication Administration Safety Practice Knowledge Questionnaire and Nurses' Medication Cranach's Alpha tested the Administration Safety Practice Observation Checklist. Calculations of reliability yielded results of (0.841), (0.813), respectively. The threshold for significance was set at ($P < 0.05$) for interpreting the findings of tests.

Pilot study

Before starting the primary investigation, a pilot study using the data gathering instruments was carried out. Ten staff nurses from Main Mansoura University Hospital, or 10% of the study sample, participated in a pilot study. They were eliminated from the research after being chosen at random. The pilot study's objectives were to assess the questions' viability and clarity, spot any roadblocks and issues during data collection, evaluate the language's clarity, and calculate the amount of time needed to complete each question. Staff nurses under study were given the drug administration safety practice questionnaire, which took them 15 to 20 minutes to complete. Prior to the commencement of the training program, the researcher evaluated the nurses' drug delivery safety practices.

Ethical Considerations

The Mansoura University Faculty of Nursing's Research Ethical Committee granted ethical permission. The responsible hospital management granted permission for the study to be carried out. After giving clarity on the purpose and scope of the study, all candidates who agreed to take part in it gave written informed consent. Every participant was made aware of their voluntary nature and their freedom to withdraw from the research at any moment. The confidentiality of the data obtained was assured to all participants, and the study sample's privacy was protected throughout.

Data Collection

Questionnaire sheets were dispersed to the accessible staff nurses. The researcher described the purpose of the study and how to fill out the survey forms. Staff nurses reviewed the surveys and completed the forms individually at one time. Medication administration safety practice questionnaire was spread to studied staff nurses took from 15-20 minutes to be finished. The researcher spent forty minutes reviewing the nurses' drug administration safety practice observation checklist before the training session began. The process of gathering data began in January 2024 and ran through February 2024.

Data Analysis

Using SPSS (Statistical Package for Social Science) version 25 (IBM Corporation, Armonk, NY, USA), the data were coded, entered, organized, and examined .The range, mean, and standard deviation were computed for quantitative data. Regarding qualitative data, which express a set of categorical data as a percentage, proportion, or frequency for each category **(Dawson & Trapp, 2001).**

Results

Table 1 shows the personal characteristic of nurses. It showed that near a half (48%) of studied staff nurses age were ranged from (20-30) years old, most of them were female (95.9%) and were married. Concerning staff nurses' educational qualification (59.2%) were diploma degree, and also, half of them (50%) have (10-20) years of experience and most of them wasn't take any training on medication administration.

Table 2 illustrates levels of the studied staff nurse's knowledge about medication administration safety practice. It showed that (60.2%) of studied staff nurses was at low level and (39.8%) was at average level.

Table 3 illustrates practice levels of practice dimensions about medication administration safety practice by the studied staff nurses. It showed that (100%) of studied staff nurses was at low level in using basic principles of aseptic technique in order to prepare and administer medicine, followed by general safety measures for all route of medication which at low level (79.6%).

Table 4 is seen the relationship between total knowledge and total practice scores about medication administration safety practice dimensions of the studied staff nurses. The preparation and administration of oral medicine scores and the overall knowledge scores of staff nurses were shown to be statistically significantly positively correlated

Table 1: Personal Characteristics of Staff Nurses.

Characteristics	no.	%
Age years		
▪ **20-30**	47	48.0
▪ **>30-40**	38	38.8
▪ **>40-55**	13	13.3
Mean±SD	***32.50 ± 7.23***	
Years of Experience		
▪ **<10 years**	31	31.6
▪ **From 10-20 years**	49	50.0
▪ **>20years**	18	18.4
Mean±SD	***14.68±4.87***	
Gender		
▪ **Male**	4	4.1
▪ **Female**	94	95.9
Educational qualification		
▪ **Diploma of nursing**	58	59.2
▪ **Technical nursing institute**	40	40.8
Marital status		
▪ **Married**	80	81.6
▪ **Not Married**	18	18.4
Attending training programs about medication administration		
▪ **No**	68	69.4
▪ **Yes**	30	30.6

Table 2: Knowledge levels About Medication Administration Safety Practice (n=98).

Knowledge total score level about medication administration safety practice	Total knowledge level (n=98)	
	No.	%
Low level (0-20)	59	60.2
Average level (21-27)	39	39.8
Good level (28-35)	0	0

N.B. Knowledge level was classified into; low level (<60% of scores), average level (60-<80% of scores) and good level (≥ 80% of scores)

Table (3): levels of Medication Administration Safety Practice Dimensions (n=98).

Practice dimensions level about Medication Administration Safety Practice	Practice score (n=98)	
	No	%
A-Practice level of general safety measures for all route of medication		
Low level (0-2)	78	79.6
Average level (3)	17	17.3
High level (4-5)	3	3.1
B-Practice level of performing medication administration rights		
Low level (0-7)	70	71.4
Average level (8-10)	27	27.6
High level (11-14)	1	1.0
C-Practice level of basic principles of aseptic technique for preparation and administration of medication		
Low level (0-66)	98	100
Average level (67-88)	0	0
High level (89-111)	0	0
D-post-administration of medication /Documentation		
Low level (0-3)	25	25.5
Average level (4-5)	64	65.3
High level (6-7)	9	9.2

N.B. Knowledge level was classified into; low level (<60% of scores), average level (60-<80% of scores) and good level (≥ 80% of scores)

Table (4): Correlation Between Total Knowledge Scores and Total Practice Scores About Medication Administration Safety Practice Dimensions of the Studied Staff Nurses (n=98).

Practice scores	Total knowledge scores of the studied staff nurses (n=98)	
	r	p value
A-General safety measures for all route of medication scores	**0.109**	**0.286**
B-Perform medication administration rights scores	**0.016**	**0.879**
C-Using basic principles of aseptic technique for preparation and administration of medication scores		
C.a. Preparation and administration of IM injection medication scores	0.134	0.188
C.b. Preparation and administration of cannula injection medication scores	0.129	0.207
C.c. Preparation and administration of oral medication scores	0.211	0.037*
C.d. Preparation and administration of subcutaneous medication scores	0.079	0.440
Using basic principles of aseptic technique for preparation and administration of medication scores	**0.165**	**0.105**
D-post-administration of medication /Documentation	**0.167**	**0.100**
Total practice score of Medication Administration Safety Practice	**0.155**	**0.127**

**Statistically significant (P < 0.05)*

r=Correlation Coefficient

Discussion

Medication safety administration is one of the international patient safety goals that is one of the dynamic processes that safeguard patient safety and high quality of life (Jafaru & Abubakar, 2022). Medication administration is one in all the primary frequently performed nursing tasks, accounting for about 40% of all nursing work, and may be a multistep process that requires several types of professional knowledge as the pharmacological characteristics of medications (World Health Organization, 2019). Medication administration in clinical is a complex practice as a result of medication route and medical device diversification and increasing severity of patients' circumstances (Kim & Lee, 2020). Nurses can keep patients from contact to medication errors by using medication safety through application of Deming Cycle for continuous improvement of performance for medication administration (Kuppadakkath, 2023).

Therefore, aim of the present study is to assess medication administration safety practice knowledge and practice among staff nurses at Main Mansoura University Hospital.

As regards to staff nurses' knowledge for medication administration safety practice finding of the present study reveals that staff nurses' knowledge is at low level this may be due to inattentive of regular training program related to medication administration safety practice, beside the inadequate course content they had during their studying educational program or during period of their work after graduate.

Finding of the present study is supported by Fathy, Khalil, Taha and Abd-elbaky, (2020) who conducted study entitled with nurse's knowledge and practice regarding medication errors in critical care units and the study revealed that most of nurses got unacceptable knowledge level regarding general knowledge & medication administration mistakes (MAEs). They pointed to inadequate training in this area, the absence of regular group discussion to revive their knowledge regarding medication errors, lack of inspiration, increased nursing workload which made the postponement of nurse's abilities and motives to obtain and update their knowledge. These finding on the same line with Abukhader & Abukhader, (2020) who conducted study entitled with the effect of medication safety education program on intensive care nurses' knowledge regarding medication faults and they showed half of the nurses had inacceptable knowledge level about the medication administration at pre-test .

These results in the same line with Kim & Lee, (2020) who conducted study entitled with medication error encouragement training and reported that after the intervention, the experimental group showed an important increase in medication administration information compared to the control group. Also, Alsulami et al., (2019) who conducted study entitled with knowledge, attitude and practice on medication mistake reporting among health practitioners and found that nurses had inadequate knowledge of the definition of medication and kinds of medication errors.

As well as Zyoud, Khaled, Kawasmi et al., (2019) who conducted a study entitled with knowledge about the administration and regulation of high alert medications among nurses in Palestine and found that nurses who had high alert medications (HAMs) training and ICU training attained advanced knowledge score which supports the importance of training and ongoing education. Furthermore, they found that nurses who were working in the ICU attained higher knowledge scores.

As regards of practice of safety medication administration of the studied staff nurses finding of the present study reveals most of studied staff nurses have low level of practices regarding safety medication administration , it may be attributed to lack of staff development activities to advance their knowledge and skills in quality as shown by the shortage of presence of such on job training among them made them missing of knowledge and practice regarding drugs also, high work load caused from imbalance ratio between nurses and number of patients in the unit and disruption they exposed to it in their working environment.

These finding was supported by Rizk, (2021) who investigated the effect of tele-nursing education program on nurses' compliance with standard precautions during COVID-19 pandemic and showed that nurses' performance levels about safety measures related to medication administration, where poor performances at pre-program in all skills regarding three stages, including pre, during and post administration of medication. Also, this result was in accordance with the study done by Ahmed, Tahir, Akhtar & Faiz, (2021) who conducted study entitled with pharmacogenomics guided prescription changes improved medication effectiveness in patients with mental health-related disability and showed that the most of nurses had low performance regarding the medication administration safety at pre phase.

Additionally, these finding similar to Ebrahem & Elnagar, (2021) who conducted a study entitled with impact of nursing intervention regarding medications errors on the level of psychiatric nurses' practice and found two thirds of the nurses had low level of practice to control errors before implementing the program. This finding may be related to nursing administrators who do not do the role in the management of medication errors. The head nurses do not have strong effect in clinical nurses' behavior to keep positive attitude towards the safe medication administration and reporting of medication errors, there is no collaboration between the head nurses and nurses for generating a safe setting, there is no head nurse's decision to diminish phone calls throughout drug administration time and insufficient management.

In the same line with Fathy, Khalil, Taha, & Abd-elbaky, (2020) who showed that only more than one third of them had acceptable practices in the preparation of medication, only more than one third of them had satisfactory practices during medication administration, the common of them had satisfactory level of practice after drug administration after program and only one third of them had total satisfactory performance about drug administration.

Regarding Correlation between study variables the present study shows that there is statistically significant positive correlation between staff nurses' total knowledge scores and preparation and administration of oral medication scores. This finding is in a harmony with Nasr Abd El Aziz, Ahmed & Abolwafa, (2021) in their study entitled with nurses' knowledge and practice regarding medication preparation and administration errors incidence at neonatal intensive care units and showed that there was statistically significant correlation regarding the total scores of nurses' knowledge and practices regarding medication preparation and administration of oral medication. These results agree with the study by Abassy, & AL-Mosawi, (2021), who conducted study entitled with assessment of pediatric nurses' knowledge concerning medication administration errors at critical care units at children welfare teaching hospital in Baghdad city and showed that there was a strong correlation between knowledge and practice related to all types of medication administration. So, there was an important correlation between knowledge and practice of staff nurses each one can affect the other.

The finding of the present study is similar to Abd Elmageed, Soliman & Abdelhamed, (2020) who found that there was a statistically significant correlation between nurses' knowledge, attitude and practices regarding oral medication administration.

Conclusion

According to the study findings most of studied staff nurses had inadequate knowledge and practice of medication administration safety practice. There was statistically significant positive correlation between staff nurses' total knowledge scores and preparation and administration of oral medication scores.

Recommendations

- Implementing nurse medication safety training program improve medication safety attitudes among nurses.
- Developing of strong and efficient evidence-based strategies for medication administration and safety, and continuing in-service training and educational programs based on these rules
- Overwhelming the problematic of scarcity of staff and hiring satisfactory number of nurses to make equivalent nurse to patient ratio.
- Providing training for all health care providers in all medication administration stages that comprises reasons of mistakes and their prevention; action of drug and their relations; dosage calculation; drug preparation and administration; and clinical manifestations of opposing responses of some drugs.
- Providing policies that help staff nurses to overwhelmed disruption during medication administration process.
- The nurses should double check medication administration process, if she is uncertain about any data related to calculation of a dose, and/or five rights.
- Nurses should be alert about LASA medication and high alert medication and how to deal with them.
- Near management of head nurses to staff nurses who accountable to giving medication during diverse stages of medication administration.
- Nurses should record and confirm patient allergies and prior medication usage.
- Nurses should accomplish right patient identification previous administering any medication and avoid giving more medications to different patients at the same time.
- The nurses should check transcription of the medication order is correct by linking it with the original physician's order before preparing and administrating medications and conscious about medication that stopped by the doctor.
- Consistent meeting between practicing nurses and supervisors should be held to evaluate practice and examine behaviors for its continuous improvement.

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