

## Nurses' View about Contributing Factors and Reducing Strategies regarding Medication Administration Errors

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**Abstract:** The preventable medication error is the greatest cause of mortality and morbidity in a healthcare setting.

**The Aim of Study:** 1. To identify nurses' view about contributing factors regarding medication administration errors. 2. To identify nurses' view about reducing strategies regarding medication administration errors.

**Design:** Quantitative cross-sectional descriptive design

**Setting:** King Fahd Armed Forces Hospital (KFAFH), Jeddah.

**Sampling:** Convenient sample including 287 nurses. Data were collected from October 10, 2016, for 3 weeks.

**Tool:** The investigator used two tools a Medication Errors and Reducing Strategies questionnaire to collect data. The tool I divided in two parts, part one, Socio-Demographic and Clinical Data, Part two, Contributing Factors. The tool II structured questionnaire to identify reducing strategies.

**Result:** Most of the participated nurses were agreed with contributing factors and strongly agreed with reducing strategies, other relations findings and high significant correlation between the contributing factors and reducing strategies.

**Conclusion and Recommendations:** the study concluded that the participants agreed to contributing factors and strongly agreed to reducing strategies. The investigator recommendation is develops policies and procedures and providing education regarding the implementation, which will improve the practice of healthcare providers to provide safe and high quality of care.

**Keywords:** Medication, administrations, errors, factors, causes, reducing, strategies, nurses and nursing.

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### I. Introduction

Medication errors are one of the incidents which affect patient safety, more than 7000 of patients' deaths per years [9]. Moreover "Institute of Medicine" reported around 98,000 deaths yearly due to medication errors [14]. One of the significant impacts of medication errors is the cost, so the healthcare settings spends \$32.59-\$136.40 for hospitalization [19]. An estimated 1% to 2% of the medication errors results in patient harm. The result of the harm contributes to an increased hospital stay of between 4.6 and 10.3 days for every affected patient [18]. The application of medication process (prescribing, dispensing and administration) needs the collaboration of different healthcare provider starts by doctors, then pharmacists and end by nurses [15]. The medication errors do occur at any stage of medication process. The prescribing as well as administration accounts for the largest rate of all errors with an approximation of 39% and 38% respectively [18]. The high rates of medication administration, with the other loads of duty, lead to nurses' increase the risk of making a medication error [16]. Safety is one worldwide healthcare provider concern. "The mission of the National Coordinating Council for Medication Error Reporting and Prevention [22] is to maximize the safe use of medications and to increase awareness of medication errors through open communication, increased reporting, promotion of medication error and prevention strategies". The identifying of contributing factors and reducing strategies regarding MAEs will serve a significant role in an attempt to reduce the rate of errors. Further, an introduction about those errors is significant in educating nurses on what they will experience in a health care facility. An educated nurse will be keen on individual human mistakes that they may control themselves. Therefore, is an important step to other health care professionals such as the physician and pharmacist in all fields of health care facilities.

## **II. Methodology**

A quantitative descriptive cross-sectional design was chosen to identify contributing factors and reducing strategies regarding medication administration errors. A convenience sample was used in given study. It is one type of non-probability sampling. Which include all available samples to reach the desired sample. According to Raosoft online calculator, based on the number of nurses at inpatients departments in KFAFH are 1000 the sample size were calculated to be 287 nurses. Inclusion criteria include nurses working at KFAFH responsible for administering medications as well as preparing and dispensing medications during all shifts on weekdays and weekends and willingness to participate voluntarily. Exclusion criteria were nurses who are not involved in administering medication in the hospital such as head nurses and nurse manager and newstaff.

### **2.1. Instrument**

In this study, the investigator used two tools a Medication Errors and Reducing Strategies questionnaire to collect data. The tool I divided in two parts, part one, Socio-Demographic and Clinical Data, Part two, Contributing Factors. Part one develop by investigator from several published articles, consisted of 12 close-ended questions with responses set of multiple options to assess nurses' socio-demographic and clinical data. Part two used "Medication Administration Error Survey developed by Wakefield, Uden-Holman & Wakefield, 1996". Permission to use was obtained from Dr. Wakefield through e-mail. Part one "why medication errors occur" of Dr.Wakefield survey used which was applied in this study. Modifications were made by the investigator to serve the aim of the current study. The modified questionnaire had 28 items, divided into four sections to identify contributing factors regarding MAEs. The four sections were: Physician prescribing (4 items), pharmacists dispensing (5 items), nurses administering stages (13 items) and other factors (6 items). Tool II structured questionnaire developed by an investigator after reviewing the related published articles, had 14 items selected to identify the reducingstrategies.

### **2.2 Pilot Study**

A pilot study conducted among 25 participants. No modifications were made in the tool after piloting. The 10 % of piloting sample included in the sample size of the study.

### **2.3 Ethical Considerations**

The participants received adequate informations such as study title, aim, voluntary to participate in the study, the right to withdraw anytime, ensured privacy, confidentiality and no known risk for study participants.

### **2.4 Validity and Reliability**

For the tool I and II, the content validity was reviewed by 5 experts in the field of medical-surgical nursing all changes done accordingly before distribution to participants. The questionnaire items were assessed for clarity, relevance and comprehensive. The reliability of the tool I and II was calculated and reported statistically by Alpha Cronbach's was 0.95 and 0.97 respectively.

### **2.5 Data Analysis**

The investigator codes the questionnaires and enters the data into SPSS program version 22. The descriptive statistics used to analyses the data with tests such as frequency, percentage, mean and average. And inferential statistics used to make inference such as t-test and ANOVA test. As well measure the correlation between scale variables, used a statistic called Pearson coefficient.

## **III. Result**

The socio-demographic characteristics of the 287 participants, the more than half were female (68.8%). The age of the participants ranged between  $\leq 25$  years and  $\geq 36$  years, more than one third were between theages of 26 to 30 (40.4%). The half was married (54%) and the majority (86.1%) responding held a bachelor degree. The clinical data characteristic were clinical experiences as registered nurse and in current unit ranged from 12 to 72 months, the participants had greater than 72 months consequently (71.8%), and (40.4%) with different working area. The(73.9%) participants worked full time. Approximately one-third of participants (38.7%) had a Nurse- patient ratio in the unit was 1:5. The half of medication order in the hospital (54.4%) was mixed (handwritten and computerized). The majority of participants (89.5%) reported that attended lecture and workshop in medication administration, within the last 12 months 1-2 times(77.8%).

### **3.1. Contributing Factors regarding MAEs**

The analysis showed the factors in (Table1), the most reported factors are Shortage of nurses' staff agreement rate (88%), Excessive workload (89.2%), and Stress due to workload (88.2%). while the lowest reported factors is abbreviated medication names (72.6%), Change medication orders (72.6%), Pharmacy

delivers incorrect medication (69.6%), Similarity of medications packaging (72.6%), Nurses are interrupted during medication administration (71.2%), All medication that assignment for one nurse cannot be done with proper time (69.6%), no time to have information about certain medication (71.8%). In general, the analysis showed that the nurses were agreed to contributing factors regarding MAEs.

### 3.2. Reducing Strategies regarding MAEs

The analysis reported reducing strategies (Table2), the most strategies were reduce patient/nurse ratio (91.2%), ensure the 10 rights rule of medication administration (91%), avoid distraction/ interruption during medication administration (91%), Improve communication between physician, nurses and pharmacists (91.2%), and assign clinical pharmacists to be responsible for medications at unit (90.6%). While the lowest strategy was apply Barcode medication administration (81.6%). The Relation between Contributing Factors and Reducing Strategies related to Socio-Demographics and Clinical Data The analysis showed that there was a significant relation of the MAEs rate in pharmacist dispensing stage related to gender and marital status. Moreover, there was a significant relation of MAEs rate in pharmacists dispensing stage, nurses administration stage, and reducing strategies related to educational degree. Furthermore there was a significant relation of MAEs rate in contributing factors and reducing strategies related to working area. The final relation reported was in the reducing strategies related to attendance lectures and workshop. Also, the analysis showed (Table3), that there was a positive and significant correlation between contributing factors and reducing strategies (P 0.000).

**Table (1)** the Contributing Factors regarding MAEs

Contributing Factors to MAEs	Weighted Mean ± SD	(%)	Overall Response (in Mean)
<b>Physician prescribing stage</b>			
The use of abbreviated medication names.	3.63 ± 1.26	72.6	Agree
Illegible handwriting of medication orders.	3.97 ± 1.19	79.4	Agree
Change medication orders frequently by physicians.	3.63 ± 1.03	72.6	Agree
Verbal orders.	3.67 ± 1.12	73.4	Agree
<b>Total</b>	<b>3.72 ± 0.94</b>	<b>74.4</b>	<b>Agree</b>
<b>Pharmacist dispensing stage</b>			
Pharmacy delivers incorrect medication.	3.48 ± 1.12	69.6	Agree
Pharmacy prepares incorrect medication.	3.39 ± 1.19	67.8	Neither agree or disagree
Pharmacy labels the medication incorrectly.	3.38 ± 1.20	67.6	Neither agree or disagree
Pharmacists are not available when needed.	3.69 ± 1.13	73.8	Agree
Similarity of medications packaging.	3.63 ± 1.07	72.6	Agree
<b>Total</b>	<b>3.51 ± 1.03</b>	<b>70.2</b>	<b>Agree</b>
<b>Nurse administrating stage</b>			
Un follow the 10 rights rule of medication administration.	3.37 ± 1.32	67.4	Neither agree or disagree
Unfamiliar with drug.	3.36 ± 1.24	67.2	Neither agree or disagree
Miscalculation the drug.	3.34 ± 1.29	66.8	Neither agree or disagree
Nurses have inadequate knowledge about medications.	3.08 ± 1.32	61.6	Neither agree or disagree
Nurses do not follow medication administration policy and procedure.	3.09 ± 1.33	61.8	Neither agree or disagree
Nurses are interrupted during medication administration to make other task.	3.56 ± 1.23	71.2	Agree
Medication equipment errors or is set up incorrectly (e.g., Intravenous pump).	3.15 ± 1.19	63	Neither agree or disagree
All patients' medication that assignment for one nurse cannot be done with proper time.	3.48 ± 1.18	69.6	Agree
Nurse doesn't ask about a known allergy.	2.97 ± 1.27	59.4	Neither agree or disagree
Administration of same type of medication to several patients.	3.34 ± 1.13	66.8	Neither agree or disagree
Patients out of ward for any procedure.	3.32 ± 1.07	66.8	Neither agree or disagree
The communication between nurses, pharmacists and physicians are poor.	3.76 ± 1.08	75.2	Agree
There is no time to have information about certain medication.	3.59 ± 1.12	71.8	Agree
<b>Total</b>	<b>3.34 ± 0.97</b>	<b>66.8</b>	<b>Neither agree or disagree</b>
<b>Other factors</b>			
Shortage of nurses' staff.	4.40 ± 0.87	88	Strongly Agree
Excessive workload (nurses- patients' ratio, terminal ill patient and immobilized patients).	4.46 ± 0.81	89.2	Strongly Agree
Stress due to workload.	4.41 ± 0.81	88.2	Strongly Agree
Staff nurses do not have enough education for new medications.	3.68 ± 1.11	73.6	Agree
Some medications are look-alike and sound alike.	4.07 ± 0.88	81.4	Agree
Insufficient place for medication preparation.	3.94 ± 1.10	78.8	Agree
<b>Total</b>	<b>4.16 ± 0.72</b>	<b>83.2</b>	<b>Agree</b>

**Table (2)** the Reducing Strategies regarding MAEs

Reducing strategies	Weighted Mean ± SD	(%)	Overall Response (in Mean)
1-Orient about institution medication administration policies and Procedure	4.33 ± 0.64	86.6	Strongly Agree
2- Apply Double Check procedure by two nurses	4.49 ± 0.59	89.8	Strongly Agree
3- Provide training program and workshop about safety medication Administration	4.44 ± 0.58	88.8	Strongly Agree
4-Reduce patient/nurse ratio	4.56 ± 0.59	91.2	Strongly Agree
5-Reduce work hours	4.34 ± 0.74	86.8	Strongly Agree
6-Ensure the 10 rights rule of medication administration	4.55 ± 0.57	91	Strongly Agree
7-Administer medication directly after Preparing by same nurse at same Time	4.51 ± 0.62	90.2	Strongly Agree
8-Avoid distraction/ interruption during medication administration	4.55 ± 0.59	91	Strongly Agree
9-Implement computerized prescriber order entry system	4.21 ± 0.88	84.2	Strongly Agree
10- Apply Barcode medication administration	4.08 ± 1.00	81.6	Agree
11- Implement Automated medication dispensing	4.23 ± 0.81	84.6	Strongly Agree
12-Implement medication reconciliation	4.31 ± 0.72	86.2	Strongly Agree
13- Assign Clinical pharmacists to be responsible for medications at unit	4.53 ± 0.60	90.6	Strongly Agree
14- Improve communication between physician, nurses and pharmacists	4.56 ± 0.57	91.2	Strongly Agree
<b>Total</b>	<b>4.41 ± 0.50</b>	<b>88.1</b>	<b>Strongly Agree</b>

**Table (3)** the Correlation between contributing Factors and Reducing Strategies regarding of Medications Administration Errors

-Prescribing stage (physician)	Nurses Views in Reducing Strategies of Medication Administration Errors	.315*
- Dispensing stage (pharmacist)		.000**
- Administering stage (nurses)		.269*
- Others factors		.000**
		.382*
		.000**
		.334*
		.000**

\*\*\* Pearson correlation

\*\* The p-value is less than 0.05

#### IV. Discussions

Medication errors remain one of the leading threats to patient safety [9]. It is a major health care provider's concern and an important for quality care services [2]. However, Healthcare Organizations stated that the increasing use of medication rising risk of patients harm [23]. The aim of this study to identify nurses' view about contributing factors and reducing strategies regarding medication administration errors. The study found that the most contributing factors regarding to physician prescribing stage the abbreviated medication names and change medication orders frequently by physician. A result that consistent at where researcher [6] confirmed that the errors related to using of abbreviated medication names. Also, similar to where Aboshaiqah [2] reported that the errors were related to physicians change orders frequently. In regards to pharmacist dispensing stage, the most contributing factors were pharmacy deliver incorrect medication and similarity of packaging. De Las Mercedes [7] who reviewed incidents reports from pharmacy records, and found dispensing errors due to the exchange of medications and inappropriate dose. In regards to nurses administering stage, the most contributing factors were interruption during medication administration to make another task, all medication that assignment for one nurse can't be done with proper time, and no time to have information about certain medication. [21] A systematic reviewed related to medication errors identified contributing factors regarding MAEs as nurse distraction during preparing or administering medication. Härkänen [12] reported that the cause of medication errors was nurses asked for help due to increase rushed and increase the number of medication that patients used. Also, is consistent with the study by Govranos & Newton [1], who reported that the time the most important barriers for the nurses to have continuous education and improve their information. In regards to other factors the most contributing factors were shortage of nurses' staff and excessive workload. Founding of this study similar with previous study [5] who reported that the errors related to increasing patients- nurse ratio was significantly related to poor patient safety and task left uncompleted due to lack of time. Salmasi [21] stressed on similar factors were shortages of nurses' staff and heavy workload. Nurses were strongly agreed that stress due to workload contributes to MAEs. Esi, [8] explored that the nurses knew that feel of stress as an effect of workload contributes to medication errors. In related to reducing strategies table (2), the most strategies were reduce patient/nurse ratio, the finding similar with a study by Kim [16], who reported that nurses mentioned the heavy workload as a factor of medication errors. Although ensure the 10 rights rule of medication administration reducing strategies regarding MAEs, [17] stated that the applying the 10 rights rule of medication administration increases safe practice and prevent patient harm such as medication errors. Moreover the nurses reported the

avoiding distraction/ interruption during medication administration as reducing strategies. In similar study [13] a systematic concluded a critical relationship between interruptions, distractions and medication error rates. Also improve communication between physician, nurses and pharmacists, and Assign Clinical pharmacists to be responsible for medications at unit contribute to MAEs, which is similar to study [3] who identified that the pharmacist role was one of the reducing strategies to prevent and reduce medication errors. Study by Kim [16], who reported that the medication errors related to miscommunication among health care providers.

## V. Conclusions

The study findings concluded that most of the participated nurses were agreed to contributing factors and strongly agreed with reducing strategies regarding MAEs. There was a significant relation in the pharmacist dispensing stage regarding gender, marital status and educational degree. Also there was a significant relation in the nurses administering stage and reducing strategies regarding educational degree. Moreover, there was a significant relation of the reducing strategies regarding attending lecture and workshops. Also there was a significant relation in the contributing factors and reducing strategies regarding working area. Finally there was highly correlation between the contributing factors and reducing strategies regarding MAEs.

## Recommendations

Based on the finding of the current study, the investigator made the following recommendations to serve the clinical practice, education and research for nurses, other health care provider and patients.

### Recommendations for Nursing Administration

- Develop policies and procedures and providing education regarding the implementation to direct safe nursing practice.
- Provide nurses manager round to assist nurses in delivering safe and competent care.

### Recommendations for Nursing Clinical Practice

- Improve nurses' practice to fulfil safety medication administration process through an orientation about policy and procedure, apply double check procedure, ensure the 10 rights of medication administration, and avoid distraction.
- Use knowledge-based profession to be critical thinker and delivery safety nursing care.
- Implement new technology such as computerized prescriber order, barcode, and automated dispensing that reduce the medication errors.
- Use affective communication between health care providers to perform high quality of care.

### Recommendations for Education

- Prepare competent nurses who are responsible to promote safely care for patients.
- Implement continues professional development and education for staff nurses.
- Provide periodic schedule in-service education that covers the nurses need such as about new medication and reviews of calculation.

### Recommendation for Research

- Create clinical practice website that address pharmacological issue such as medication indication, dosage calculation, side effects and nursing consideration to allow exchange of knowledge.
- Assess nurse's knowledge, practice and attitude toward MAEs.
- Encourage nurses and other healthcare professional to candidate action research to decrease medication errors.

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