

Nurses' Perception of Safety Culture, Medication Errors Occurrence and Reporting.

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Abstract: Patient safety is a concern worldwide and viewed as a crucial component of quality in healthcare service. Medication administration errors (MAEs) often used as indicators of patient safety in hospitals because of their common occurrence and potential risk to patients. The aim of the study is to (1) compare the nurses' perception toward patient safety culture at the work unit in the Ministry of Health Hospital and Teaching Hospital. (2) compare nurses' perception of reasons of medication errors occurrence and barriers to reporting at both hospitals (3) and determine how difference in nurses' perception of patient safety culture can affect medication error occurrence and barriers to reporting among nurses. A descriptive comparative research design was used. Data was collected from convenience sample of nurses using Safety Attitudes Questionnaire (SAQ) for assessing nurses' attitude toward safety culture and The Medication Administration Error (MAE) Reporting Survey for assessing nurses' perception of reason of medication errors and reason for not reporting. Data were coded and entered the statistical package of social science (SPSS), version 20. The study results revealed highly significant difference between the overall nurses' perception of safety attitude and its elements, which are; teamwork climate, safety climate, job satisfaction, perceptions of management, and working conditions ($p = <0.001$) respectively between the two hospitals. On the other hand, there was no statistically significant difference between the overall nurses' perception of medication errors occurrence reasons and its elements at both hospitals. Also, there was no statistically significant difference between the overall nurses' perception of the reasons of not reporting medication errors and its elements at both hospitals.

Keywords: patientsafety, safetyattitude, medicationerrors, reporting, nurses, hospitals.

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I. Introduction

The issue of patient safety has become one of the most significant challenges facing the health care system⁽¹⁾. It is the initiative of developing safety cultures to assure patients' freedom from harm⁽²⁾. The WHO defined a safety culture as "the product of individual and group values, attitudes, perception, competencies and patterns of behaviour that determine the commitment to quality and patient safety"⁽³⁾. It is one where the manager of the organization is highly committed to safety and the health care providers are committed to adhering to the safety goals and patient safety⁽⁴⁾.

Patient safety culture is built on open communication, mutual respect, support, the ability of individuals to work as a team, evidence based processes, and patient centered culture⁽⁵⁻⁶⁾. It requires focused efforts from every member of the healthcare team specially nurses⁽⁷⁾. They must be able to recognize potentially harmful situations to prevent error and mitigate the risk of unintended consequences particularly in medication errors because drug administration is an important part of the treatment and care process and is regarded as the main part of the nurses' performance a major part of the nurse role⁽⁸⁾.

The National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP) defined a medication error as "any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient or consumer"⁽⁹⁾. It includes any type of error occur in the prescription, transcription, dispensing and administration process which could bring significant direct implications on patient safety and increase healthcare cost⁽¹⁰⁾. Additionally, indirect consequences as nurses' harm in term of personal and professional status, confidence and practice⁽¹¹⁾. Medication errors are under-reported specially in developing countries due to lack of proper archiving and reporting systems as well as the absence of a data registration system⁽¹²⁾. On the other hand, voluntary reporting by health care providers depends on their awareness, hence many errors remain frequently unreported⁽¹³⁾. According to WHO report, the percent of under reporting of adverse events is estimated to range from 50% to 60% annually⁽¹³⁾. Medication error detection depend on an active management and effective reporting system discloses errors and encourages safe practices and linked to prevention of these errors⁽¹⁴⁾.

Despite their high incidence, medication errors reporting in the health care practice is usually done in an informal manner⁽¹⁵⁾. Errors are discussed verbally at meetings without formal written reports. So, patient safety improvement opportunities will be very limited⁽¹⁶⁾. Error reporting helps to understand why errors occur, prioritize opportunities for error prevention and generate long term improvements in patient safety⁽¹⁷⁾. The Joint Commission on Accreditation of Health Care Organization reemphasized the importance of error reports analysis to prevent future errors with implementation of additional patient safety standards that address the development of a culture of safety (Joint Commission Accreditation of Health Care Organization⁽¹⁷⁾). Therefore, determining nurses' attitudes towards healthcare safety culture is one factor in developing a safer environment and decrease the medication errors.

Nowadays in Egypt, there are highlight on the need to improve the patient safety culture among health care providers at hospitals and to develop their willingness to act to reduce patient harm⁽¹⁸⁻²⁰⁾. MAEs often used as indicators of patient safety in hospitals⁽²¹⁾. The medication administration process is an everyday part of nursing practice⁽²²⁾. The study conducted in Egyptian hospital 2016 revealed that 47.4% of medication errors are preventable, also, 20.9% of MR occurred during administration phase. 20.2% of MR occurred by nurses. 50% of MR are not reported⁽²³⁾.

Aims of the study:

This study aims to: (1) to compare the nurses' perception toward patient safety culture at the work unit in the Ministry of Health Hospital and Teaching Hospital. (2) compare nurse perception of reasons of medication errors occurrence and barriers to reporting at both hospitals (3) and how difference in nurses perception of patient safety culture can affect medication error occurrence and barriers to reporting among nurses.

II. Materials and Method:

Materials:

Research design: A descriptive comparative design was used to conduct this study.

Setting: The present study was carried out in all medical, surgical and ICU units at both Ministry of Health Hospital and Teaching Hospital in Egypt during the period from March 2018 to the end of May 2018.

Subjects: A convenience sample of nursing staff was contacted and asked to participate in the survey. The subjects of the study consisted of 372 nurses, classified into 144 nurses working at Ministry of Health hospital and 228 working at Teaching Hospital. The sampling criteria for selection of nurses were working in hospital settings for a minimum period of one year of experience and involved in administering medications to the patient.

d. Instruments:

Two tools used in this study:

Tool(1) Safety Attitudes Questionnaire (SAQ):It is a psychometric sound instrument developed by University of Texas 2006 for assessing nurses' attitude toward safety culture⁽²⁴⁾. It contains of 30 items through six safety related climate domains namely: teamwork climate (6 items), safety climate (7 items), job satisfaction (5 items), stress recognition (4 items), perceptions of management (4 items), and working conditions (4 items). Items 2 and 11 are reverse-scored [9]. The mean score range from 0-50 indicating (negative safety culture attitude), range from <50-100 reflecting (moderate safety culture attitude), and range from <101-150 reflecting (positive safety culture).

Tool (2) The Medication Administration Error (MAE) Reporting Survey:it developed by Wakefield et al (2005)⁽²⁵⁾. It contains 45 questions in 2 general content areas;

- a. **Why medication errors occur**(29 items) divided into 5 subscales; medication packaging, nurse-physician communication, nurse staffing, transcription-reasons, and pharmacy processes. The mean score range from 0-58 indicating (low medication error occurrence), range from <58-116 reflecting (moderate medication error occurrence), and range from <116-174 reflecting (high medication error occurrence).
- b. **Why medication errors are not reported**(16 items) has four subscales; disagreement with definition of error, reporting effort, fear, and administrative response. The mean score range from 0-32 indicating (low medication error reporting), range from <32-64 reflecting (moderate medication error reporting), and range from <64-96 reflecting (high medication error reporting). Respondents were indicate their level of agreement using a five point Likert scale ranging from 5 = strongly agree to 1 = strongly disagree.

Method:

Tools were translated into Arabic and tested for content validity by 5 experts in the field of study. Accordingly, some items were modified.

Tools were tested for reliability using the Cronbach's alpha coefficient to measure the internal consistency of items. The two tools were reliable (SAQ= 0.79) and (MARs and reporting survey= 0.832).

Ethical consideration:

1. Approval was obtained from the Ethics Committee of the Faculty of Nursing, Alexandria University.
2. A written approval was obtained from the administrative authority at the identified setting to collect the necessary data.
3. A pilot study for the questionnaires was conducted on 20 nurses (10%) who were excluded from the study subjects. In the light of the findings of the pilot study, no changes occurred in the tools.
4. Data were collected from nurses through the study's tools after obtaining their approval to participate in the study and maintaining the confidentiality of data.

Statistical tests

Data were coded and entered the statistical package of social science (SPSS), version 20. Frequency and percentages were used for describing demographics characteristics. Arithmetic mean and standard deviation (SD) were used as measures of central tendency and dispersion respectively, for quantifying variables under the study. Chi-square/ Monte Carlo test was used to compare between different groups, Pearson correlation coefficient analysis (r) was used to test the nature of the relationship between the study variables. All statistical analyses were performed using an alpha error of p value ≤ 0.05 which considered significant.

III. Result

Participants Demographic Characteristics

Table (1) illustrated the demographic characteristics of nursing staff at Ministry of Health Hospital and Teaching Hospitals. The table revealed that, there was a significant difference between nurses age group at both hospitals as the highest percentage of nurses at Teaching Hospital ministry of health and population Hospital (54.9%, 68.4%) were at the age group ranged from 41 to 50. Female nurses represented the whole percentage of study sampling. Regarding nurse's job position, more than two third (68.8%, 66.7%) of nurses were professional nursing staff at Ministry of Health and Population Hospital and Teaching Hospital. As regard to years of experience, more than two third (66.0%, 63.2%) of nurses had experience ranged from 11 to 20 years at both hospitals, respectively. Regarding to studied nurses' educational level, more than one third of nurses (34.7%, 35.1%) had technical nursing institute educational level at both Ministry of Health and Population hospital and Teaching Hospital. Also, more than one third of nurses (34.0%) had technical nursing school educational level at Ministry of Health and Population Hospital, while more than one third of nurses (33.3%) had bachelor nursing science educational level Teaching Hospital. . According to classification by type of unit, 38.2% and 34.2% of studied nurses were working in surgical care units at both hospitals, respectively.

Table (1): Demographic characteristics of nursing staff at Ministry of Health Hospital and Teaching Hospital.

	Ministry of health and population Hospital (n = 144)		Teaching Hospital (n = 228)		χ^2	p	
	No.	%	No.	%			
Age (years)	30 – 40	65	45.1	72	6.975*	0.008*	
	41 – 50	79	54.9	156			68.4
Job position	Professional nurses	45	31.3	76	0.175	0.676	
	Technical nurses	99	68.8	152			66.7
Years of Experience	5 – 10	49	34.0	84	0.304	0.581	
	11 – 20	95	66.0	144			63.2
Educational level	Bachelor degree of nursing	45	31.3	76	0.284	0.868	
	Diploma of Technical institute of nursing	50	34.7	80			35.1
	Diploma of Secondary Technical nursing school	49	34.0	72			31.6

Units	Ministry of health and populationHospital (n = 144)		Teaching Hospital (n = 228)		χ^2	p
Medical	52	36.1	73	32	0.361	0.548
Surgical	55	38.2	78	34.2	0.682	0.409
ICU	37	25.7	77	33.8	0.881	0.609

χ^2 : Chi square test p: p value for comparing between the two groups *: Statistically significant at $p \leq 0.05$

Table(2)revealed that there was a highly significant difference between the overall nurses' perception of safety attitude and its elements, which are; teamwork climate, safety climate, job satisfaction, perceptions of management, and working conditions ($p = <0.001$) respectively between the two hospitals. Additionally, nurses had a moderate perception of safety attitude (57.09 ± 16.51) at Ministry of health and population Hospital. The highest mean score (61.02 ± 19.24) of nurses' perception safety attitude was related to teamwork climate. In contrast, the lowest mean score (51.43 ± 20.45) was related to their perceptions of management. As regards, nurses' perception of safety attitude at the Teaching Hospital was 44.53 ± 5.77 which indicated that nurses had a negative safety attitude toward patient safety culture. The highest mean score (47.76 ± 10.19) was related to job satisfaction dimension. While, the lowest mean score (41.03 ± 8.51) was related to teamwork climate dimension.

Table (2): Mean percent score of nurses' perceptions of safety culture at the study settings.

variables	Ministry of health and populationHospital (n = 144)	Teaching Hospital (n = 228)	t	p
	Mean \pm SD.	Mean \pm SD.		
Safety Attitude				
Teamwork climate	61.02 ± 19.24	41.03 ± 8.51	11.766*	<0.001*
Safety climate	54.84 ± 19.93	44.22 ± 9.55	5.973*	<0.001*
Job satisfaction	59.03 ± 20.28	47.76 ± 10.19	6.190*	<0.001*
Stress recognition	60.68 ± 18.27	47.45 ± 11.41	7.782*	<0.001*
Perceptions of management	51.43 ± 20.45	45.94 ± 13.70	2.843*	0.005*
Working conditions	54.82 ± 21.10	41.94 ± 11.52	6.719*	<0.001*
Overall patient safety attitude	57.09 ± 16.51	44.53 ± 5.77	8.801*	<0.001*

t: Student t-test p: p value for comparing between the two groups *: Statistically significant at $p \leq 0.05$

Table (3) showed that, there was no statistically significant difference between the overall nurses' perception of medication errors occurrence reasons and its elements at both hospitals. Additionally, they had low perception of the medication error occurrence reasons at Ministry of Health and Population Hospital and the Teaching Hospital ($54.89 \pm 2.14, 54.82 \pm 2.17$) respectively. The highest mean score ($72.59 \pm 5.04, 61.02 \pm 19.24$) respectively, was related to documentation transcription reasons. In contrast, the lowest mean score ($6.66 \pm 6.57, 51.43 \pm 20.45$) respectively, was related to pharmacy reasons at the two hospitals.

As well as, there was no statistically significant difference between the overall nurses' perception of the reasons of not reporting medication errors and its elements at both hospitals. Additionally, the nurses' perception mean score at Ministry of Health and Population Hospital and Teaching Hospital were $61.46 \pm 9.15, 61.46 \pm 9.15$ respectively reflecting that, nurses had moderate perception of the reasons of not reporting medication administration errors. Otherwise, the highest mean score of their perception of the reasons of not reporting medication administration errors ($77.43 \pm 15.27, 77.13 \pm 14.84$) respectively, was related to administrative response reasons at both hospitals. In contrast, the lowest mean score of their perception ($46.40 \pm 18.14, 47.27 \pm 18.37$) respectively, was related to reporting effort reasons.

Table (3): Mean percent score of nurses' perceptions of medication errors occurrence and reporting at the study settings.

variables	Ministry of health and population Hospital (n = 144)	Teaching Hospital (n = 228)	t	p
	Mean ± SD.	Mean ± SD.		
A. Reasons of Medication Errors Occurrence				
Medication packaging	52.22 ± 9.94	52.37 ± 9.96	0.138	0.890
Nurse- Physician communication Reasons	54.63 ± 3.02	54.52 ± 3.03	0.325	0.746
Nurses staffing	56.57 ± 10.64	56.23 ± 10.69	0.305	0.761
Documentation transcription reasons	72.29 ± 5.16	72.59 ± 5.04	0.546	0.585
Pharmacy reasons	35.25 ± 34.84	6.66 ± 6.57	0.580	0.562
Overall Reasons of Medication Errors Occurrence	54.89 ± 2.14	54.82 ± 2.17	0.318	0.751
B. Reasons of not Reporting Medication Administration Errors				
Disagree with definition	55.90 ± 11.26	56.40 ± 11.39	0.415	0.679
Reporting effort	47.27 ± 18.37	46.40 ± 18.14	0.446	0.656
Fear	62.19 ± 15.23	62.02 ± 14.82	0.111	0.912
Administrative response	77.43 ± 15.27	77.13 ± 14.84	0.190	0.849
Total	61.63 ± 9.48	61.46 ± 9.15	0.142	0.707

t: Student t-test p: p value for comparing between the two groups *: Statistically significant at $p \leq 0.05$

Table 4 revealed that reasons of medication errors occurrence had a statistically negative correlation with reasons of not reporting ($r = -0.156$, $p = 0.003^*$).

Table (4): Correlation between nurses' perception regarding safety culture, medication error occurrence and reporting at the study settings.

Percent score		Overall SAQ	Overall reasons of medication errors occurrence	Overall reasons of not reporting
Overall SAQ	r		-0.094	-0.022
	P		0.260	0.792
Overall reasons of medication errors occurrence	r			-0.156
	p			0.003*
Overall reasons of not reporting	r			
	P			

r: Pearson coefficient *: Statistically significant at $p \leq 0.05$

IV. Discussion

Medication errors have significant implications on patient safety. These errors occur at all stages in medication use: ordering, prescription, dispensing, and administration. Error detection discloses those errors and thus, encourages a safe culture⁽²⁶⁾. Nurses play a major role in reducing medication errors in healthcare settings⁽²⁷⁾. Thus, they are the last line of defense to safeguard against medication errors, as the medication administration is the last part of the medication process⁽²⁶⁾. Therefore, the aim of the present study was to assess the influence of nurses' perception of safety culture on medication error occurrence and reporting.

Our research revealed a significant difference between ministry of health hospital and teaching hospital in nurse's perception of safety attitude. As ministry of health hospital nursing staff had a moderate safety attitude, while the teaching hospital had negative attitude. These results could be due to the direction of all ministry of health hospitals to apply patient safety standard and Egyptian standard of accreditation of health care organization to be included as a health care provider under the umbrella of new Egyptian health insurance. This result is consistent with Abdelsalam, Abdalha, and Kamel (2016)⁽²⁰⁾ who clarified that more than half of nurses working in the teaching hospital perceived low level of patient safety. On the other hand, it is inconsistent with published result of research using SAQ at Egyptian hospital that revealed positive culture of safety. in the survey conducted at two non-profit medical centers) found that all mean scores of all dimensions of SAQ were significantly greater than international benchmarks El-Gendi (2017)⁽²⁸⁾. Abdo H (2011)⁽²⁹⁾ conducted study at teaching hospital and found that positive attitude toward safety culture and the collaborative work environment with strong team work was the highest rated dimension of the SAQ.

The current study results revealed that nursing staff at Teaching Hospital and Ministry of Health Hospital had low perception of medication error reasons of occurrence. The highest mean percent score was related to documentation transcription reasons. While, the lowest one, was related to pharmacy reasons. In a

descending order of magnitude, these categories included medication package reasons, followed by nurse staffing, then documentation-transcription reasons, physician-nurses reasons and finally pharmacy reasons.

The highest perceived reasons of medication errors was documentation-transcription followed by nurse staffing. These reasons included delaying scheduled medications, nurses do not communicate the time when the next dose is due, nurses on this unit do not adhere to the approved medication administration procedure, nurses interrupted while administering medications. Additionally, medication didn't transcribed to the medication sheet correctly, errors made in the medication Kardex and no easy way to look up information on medications in this unit. These findings might be because the nurses misread what is written on the source document or perhaps mishears what the physician tells them over the telephone. This finding is in the line with Shehata et al (2015)⁽³⁰⁾ who suggested that transcription errors are usually attributed to misinterpretation of handwriting, abbreviation use and mistakes in reading. Also, these findings is consistent with Wilkins and Shields (2008)⁽³¹⁾. And hammodiect (2017) nurse staffing included a lack of access to information on medications, limited knowledge about medications, movement of nurses from one ward to another, nonadherence to medication administration guidelines by nurses, interruption of nurses while administering medications and staff shortages. and Joyce (2011)⁽³³⁾ who found that Medication errors related to perceived role overload and perceived staffing and resource adequacy. Also, Brits et al (2017)⁽³⁴⁾ who found that Poor or illegible handwriting contribute to 68% of medication errors and busy environment due to shortage of nurses contribute to 78% of it.

With regard to nurses' perceptions of the reasons why medication errors are not reported, the study revealed that Egyptian nurses at Teaching Hospital and Ministry of Health Hospital had moderate perception of reasons why medication errors are not reported. Additionally, the most influential factors were the administrative response and fear were the top two perceived barriers to medication errors reporting. These results could be attributed to that blameless and punitive environment to error reporting culture is still under develop in these hospitals. Additionally, the first line nurse managers tend to evaluate nurse's performance based on the errors reported. The third barrier for reporting MR is agreements over the definitions of MAEs. The reasons included disagreements of nurses with hospitals' definitions of medication errors, failure to recognize that an error occurred, the perception that the error was not important enough to be reported and the opinion that the expectation that medications be given exactly as ordered was unrealistic. Several studies⁽³⁵⁻³⁸⁾ have used similar tools to examine nurses' perceptions of unreported medication errors, and their findings support ours but with a different ranking. These results are consistent with Hammoudi, Ismaile and Abu Yahya (2017)⁽³²⁾. So, as reported in other studies, Perceived barriers to ME reporting include the nurse could afraid of being punished or stigmatized as professionally incompetent or fear from in appropriate response with the error^(25, 39-41).

The present study revealed inverse relationship between reasons of medication errors occurrence and nor reporting. This means as medication errors increased, reasons of not reporting increase due to blaming culture, fear from adverse consequences of reporting as publicity of medication errors and thinking of incompetent and negative attitude about the nurse. Additionally, manager response that might not match the error. This result is consistent with Stratton, et al (2004)⁽⁴²⁾, Fry and Dacey (2007)⁽⁴³⁾ who found that as medication errors occurs, reasons of nor reporting occur.

In this aspect, Cohen et al. (2003)⁽⁴⁴⁾ mentioned that the error reports are a poor indicator of a nurses' competence. Nurses who report their own errors or errors they discover are probably conscientious and know that reporting errors helps identify and correct recurring problems. Nurses who are frequently reported by others for errors may not be liked by others in the unit for reasons that have little to do with competence.

V. Conclusion

The present study has several valuable findings that are very important and should be taken into consideration in order to improve patient safety culture. The attitude of nurses toward the patient safety culture was poor in the following dimensions; management perception job satisfaction, working condition, teamwork climate at the Ministry of health hospital and Teaching Hospital. Our findings could be used to identify the areas of the patient safety culture that need to be improved. Furthermore, it is particularly important to design specific interventions to enhance the work conditions and safety climate in the selected hospitals.

The data of this study found the ranking of reasons of why MAEs occur as the following; documentation-transcription, nurse staffing, nurse-physician communication, medication package and finally pharmacy reasons. Additionally, the ranking of reasons of why MAEs not reporting were administrative followed by fear, then disagreement over error definition and the lowest reason was reporting effort. Actually, reducing these errors requires the commitment of everyone with a stake in keeping patients safe. The physician who wrote the prescription, pharmacist who dispensed it and the nurse who received the medicine and administered to the patient, all play an important role in preventing MEs reaching to patient.

VI. Recommendations

the study findings could be used to identify the areas of the patient safety culture that need to be improved, while determining the targets for relevant interventions, evaluating the success of patient safety interventions, tracking the changes over time, fulfilling regulatory requirements, and benchmarking. In general, findings of the studies in this regard could be used to assess the cultural impact of patient safety initiatives, verify the status of the attitudes toward the patient safety culture, and raise the awareness of nursing managers regarding the necessity of these interventions in hospitals. The following step would be conducting a qualitative study so as to explore various aspects of the patient safety culture from the perspective of the stakeholders and explaining the mechanisms underlying these differences, while developing proper guidelines for promoting the safety culture in developing countries and strengthening the network of patient safety in the Eastern Mediterranean region.

The current study suggested the need to improve the accuracy of MEs reporting by nurses through: designing safe work environment conducive for patient care delivery and reduce the occurrence of MAEs, top management should encourage their staff to perform incident report away from any sort of blame or punishment culture and perceived by nurses as designed to improve patient safety as opposed to discover mistakes, and developing and disseminating the patient safety guidelines in all hospital setting. The researchers recommended for provision of ongoing education & training on practice of double checking medication to safe medication administration for all nurses, as well as utilization of medication information guide though developing self-report logbook. The findings from this study pointed to the need to further investigation on how the hospital administration is addressing the problem of MEs underreporting and the role of the unit nurse in quality management process.

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