

## The relationship between perceived safety climate, nurses' work environment and barriers to medication administration errors reporting

<sup>1</sup>Yaldez K. Zein ElDin and <sup>1</sup>Nevine H. Abd ElAal

<sup>1</sup>Nursing Administration Department, Damanhour University, Egypt  
[Yaldez.zaineldeen@damanhour.edu.eg](mailto:Yaldez.zaineldeen@damanhour.edu.eg)

**Abstract:** patient safety is considered a major concern for healthcare consumers and providers in addition to the work environment which is essential in ensuring patient safety climate and in promoting excellence in clinical practice and in preventing medication administration errors. **Subjects:** Nurses working in all units (n= 176) at Damanhour National Medical Institute agreed to participate in the study. **Tools of the study:** Three tools were used in the study namely; Safety climate Scale, Work environment questionnaire and barriers to medication administration errors reporting questionnaire. **Results:** Nurses perceived their work environment the highest as its mean percent score was (67%), followed by the barriers of medication administration errors reporting which received the same percent score of the safety climate (66%) respectively. There are positive weak significant correlations between education on quality (P= 0.001), Health care team attitude (P= 0.012), worker safety (P= 0.030), the reporting system (P= 0.044) and barriers to MAE reporting. On the other hand, only one negative significant correlation was found between the blame system and barriers to MAE reporting. In relation to work environment sub-items a positive weak correlation was found between peer relations and barriers to MAE reporting where P= 0.005, counter to a weak negative correlation between staffing resources and barriers to MAE reporting where P= 0.000. **Conclusion:** There was no relationship between perceived safety climate, nurses' work environment and barriers to medication administration errors reporting. Although the absence of relationship between total of the study variables, there were some correlations between sub items of the study variables and barriers to medication administration errors reporting. **Recommendation:** Nurses are in need for training programs about the medication safety guidelines, Head nurses are in need to be encouraged to learn more about the incident reports and how to write a medication administration error reports.

[Yaldez K. Zein ElDin and Nevine H. Abd ElAal **The relationship between perceived safety climate, nurses' work environment and barriers to medication administration errors reporting**] *Life Sci J* 2013;10(1):950-961]. (ISSN: 1097-8135). <http://www.lifesciencesite.com>. 148

**Keywords:** Safety climate, Nurses' work environment, Barriers to medication administration errors reporting, incident reports.

### 1. Introduction:

The value of fostering a safety climate within healthcare organizations has been increasingly recognized as a necessary strategy for improving the safety of both healthcare providers as well as their patients<sup>1,2</sup>. Moreover, patient safety continues to be a major concern for healthcare consumers and providers in addition to the work environment which is considered essential in ensuring patient safety climate and in promoting excellence in clinical practice<sup>3</sup>. According to a report published by the Institute of Medicine (IOM) at Washington DC, approximately 7000 patients die every year because of medication errors<sup>4</sup>. For this reason, The critical issues of patient safety climate, work environment and medication administration errors (MAE) have received a great deal of attention lately<sup>5,6</sup>.

Safety climate describes employees' perceptions, attitudes, and beliefs about risk and safety<sup>7</sup>. Evidence supports that organizations with higher levels of safety climate have fewer adverse events, higher reporting of errors and near misses, better

communication among managers and staff, and higher patient safety<sup>8</sup>. In a follow-up report the Institute of Medicine pointed out the critical role nursing plays in providing safe care and identified healthcare management practices necessary for creating a positive patient safety climate<sup>9</sup>.

Several studies have examined the connection between nursing work environments and patient safety issues. For example, in 2 separate studies, Aiken and colleagues<sup>10,11</sup> linked lower nursing staffing levels (more patients per nurse) to increased patient mortality. Armstrong and Laschinger found a significant relationship between supportive nursing practice environments, and perceptions of a positive patient safety climate<sup>12</sup>. Institute Of Medicine identified several practices that enhance patient safety climate which include creating and maintaining trust throughout the organization, adequate staffing, creating a culture of openness with regard to the reporting and prevention of errors, involving workers in decision making pertaining to work design and work flow, and actively managing

the process of change<sup>9</sup>. From the previously mentioned studies and report, it could be seen the strong relation between safety climate and work environment.

Disch (2002)<sup>13</sup> defined a work environment as a work setting in which policies, procedures and systems redesigned so that employees could be able to meet organizational objectives and achieve personal satisfaction in their work. A healthy work environment is necessary to ensure patient safety<sup>14</sup>. Current thinking in health care safety emphasizes the importance of environmental context in the occurrence of errors and accidents<sup>15,16</sup>. Growing evidence supports nurses as indispensable to patient safety. However, the typical nursing work environment is characterized by multiple threats to patient safety found within all types of health care organizations, these threats include: a) Frequent failure to follow management practices necessary for safety; b) Unsafe workplace deployment; c) Unsafe work and workspace design and finally d) punitive cultures that hinder reporting and prevention of errors<sup>15</sup>.

Reason (2000) stated that management decisions and organizational processes, such as staff hierarchy, pattern and quality of staff communications, staff workload, work culture, and so on, can affect nursing and medication errors either directly (e.g., miscommunication of medication information) or indirectly by creating error-producing conditions (e.g., staff fatigue leading to error)<sup>17</sup>. For medication error reporting to be effective, error detection is necessary. The most common and least costly method is voluntary reporting. A model of medication safety provides a foundation for investigating the influence of the nurse's work environment and the perceived safety culture in an organization on person and system attributes that contribute to nurse outcomes (medication error occurrence and reporting) and patient outcomes (potential or actual consequences of a medication error)<sup>18</sup>.

Medication error was defined as the failure to complete a planned action as intended. However, a variety of strategies have been developed in an effort to prevent medication errors. Medication errors do occur and are a persistent problem associated with nursing practice<sup>19,20</sup>. Medication administration errors are often used as an indicator of patient safety in hospitals because of their common incident and potential injury to patient<sup>21</sup>. Many types of medication errors exist including omissions, medication given to the wrong patient, administration of the wrong medicine, incorrect route, frequency or wrong time of administration, duplication, and administration of drugs after a "to discontinue" order was issued<sup>22</sup>.

Many interacting factors can lead to medication errors which include regulatory environment, organizational leadership and commitment, management policies and procedures, complexity of tasks involved, work culture, and physical environment<sup>23</sup>. Reason argued that instead of focusing on individual carelessness or mishandling of a task per se, to prevent errors, it is critical to address the underlying systems and their faults<sup>17</sup>. For this purpose, the use of voluntary reporting to detect and communicate about medication administration errors (MAEs) has become more feasible, timely, and effective, thus providing a major strategy to manage patient safety events in healthcare organizations<sup>4,24-26</sup>. Additionally, learning from errors is considered a crucial element of a safety climate which mainly relies on frontline nurses' willingness to report and share mistakes in medication administration<sup>27</sup>.

In general, available medication error rates are misrepresentative because a small proportion of administration errors are reported by the staff<sup>28</sup>. However, the number of errors reported is less than the number of errors most experts recognize. This discrepancy likely originates from nurses' perspectives on reportable MAEs, views of learning from errors, perceived obstacles to reporting, and attitudes toward reporting systems<sup>29</sup>. Several survey studies have shown that the underlying reasons for not reporting MAEs included organizational and individual factors. These organizational or system factors were articulated as administrators' attitudes and responses to medication errors such as unsupportive responses from administrators and coworkers, challenges to professional credibility, a focus on system approaches rather than human approaches, a culture of blaming, reporting burden, post-reporting feedback, and policy related to patient safety, as well as the disciplinary actions after reporting<sup>30-32</sup>. Waring (2005) and Rathert (2007) reported that a high level of reporting was secured through the creation of a just culture and was threatened by reporting barriers of blame and bureaucratic management<sup>33,34</sup>.

The reporting of all medication errors makes responsible parties aware of potentially correctable problems; establishes base rates of error; and facilitates quality-improvement efforts to reduce future errors, for these purposes reporting of medication errors is advantageous<sup>35,36</sup>.

However, when nurses use an informal methods of communicating medication errors such as change of shift reports, there is no formal mechanism for shared learning. Only the staff directly involved in the error stand to benefit from communications about the error<sup>37</sup>.

In Egypt, a number of studies discussing patient safety have been conducted<sup>38-40</sup>. However, a little is known about the safety climate, work environment in relation to barriers to medication administration errors reporting. Hence, research on nurses' perceptions of Medication Administration Errors (MAE) reporting in Egypt is a timely topic for study. Also, the way in which the organizational factors of safety climate and work environment relation to nurses' perceptions of MAE reporting needs further research.

### **Aim of the study:**

The study aims to determine the relationship between perceived nurses' safety climate, work environment and barriers to medication administration errors reporting at Damanhour National Medical Institute.

### **Research question:**

Is there a relationship between perceived nurses' safety climate, work environment and barriers to medication administration errors reporting?

## **2. Methodology**

### **Design:**

The study has a descriptive correlational design.

### **Setting:**

The study was conducted in all critical care units (1 ICU, 1 CCU, 1 High risk, 1 Emergency) and Medical, Surgical and Dialysis units of Damanhour National Medical Institute. The Medical Units are; (Liver diseases, Kidney diseases, Diabetes, Psychiatric, Neurology, Obstetrics, Thalassemia, Ophthalmology, Hematemesis). The Surgical Units are; (General Surgery A, B, C and D, Orthopedic, ENT, Urology, and three operating theaters) and 1 Dialysis unit. The institute is the largest governmental medical institute that provides health care services for the population of El Beheira Governorate (n= 564 beds).

### **Subjects:**

Subjects of the study included all nurses working in the units mentioned previously in Damanhour National Medical Institute. 176 nurses agreed to respond to the questionnaire.

### **Study Instrument:**

The research instruments contained four questionnaires namely; Safety climate scale, Work Environment Questionnaire, Barriers to MAE reporting questionnaire and demographic data questionnaire containing the personal information of the nurses e.g. age, qualification, years of experiences and the units where they are working.

**Tool I: The Safety Climate Scale:** It was developed by Belgen and associates (2005)<sup>41</sup> to determine nurses' perception toward their safety climate. The

scale contains 31 items divided into seven dimensions namely; (a) Education on quality (5 items), (b) Health care team positive attitude (5 items), (c) worker safety (5 items), (d) safety emphasis (5 items), (e) blame system (5 items), (f) Non punitive system (3 items), and (g) report system (3 items). The higher the total score (sum of the sub items scores) the stronger the safety climate perceived by nurses.

**Tool II: The Work Environment Questionnaire:** It was developed by Blegen et al. (2004)<sup>42</sup> to measure nurses' opinions about the work environment in the nursing units. Four factors are measured in the work environment questionnaire, namely; a) quality management process on the unit (8 items), b) adequacy of staffing resources (4 items), c) adequacy of physical resources including supplies, equipment and space (3 items), and d) peer relations on the unit (4 items). The higher the score the better quality is the work environment perceived by nurses.

**Tool III: The Barriers to Medication Administration Errors (MAE) reporting questionnaire:** This questionnaire was developed by Wakefield et al (2001)<sup>31</sup> in order to identify nurses' perceptions of barriers to MAE reporting. All items are positively scored items. The questionnaire consists of 25 items. The 25 items measuring 6 factors which are: a) Fear (5 items), b) disagreement over medication error (4 items), c) Administrative responses (4 items), d) reporting efforts (2 items), e) Face- saving (4 items) and f) Power-distance (6 items). The higher the total score (sum of subscale scores) the more barriers to MAE reporting perceived by nurses. The lowest score is 25 and the highest is 125.

The above questionnaires were paper-and-pencil ones using a 5 point Likert scale ranging from 1= Strongly Disagree to 5= Strongly Agree. Negatively worded items are included on safety climate scale and work environment questionnaire to avoid response set bias. Scores of these items are reversed for calculating the total score.

### **Methods:**

1. An official permission from the hospital administrative authority was obtained.
2. The three tools were translated into Arabic by the researchers and were tested for content validity using five experts' reviews. Modifications were done according to experts' opinions.
3. The three tools were tested for their reliability by the researchers using Cronbach's and their values were as following: Tool I (0.80), Tool 2 (0.77) and Tool III (0.81).

4. A pilot study was done on 18 nurses (10%) of the total sample in order to test the clarity of the questionnaires. Nurses who were included in the pilot study were excluded from the main study sample.
5. **Ethical consideration:** The purpose of the research was explained to all nurses. Confidentiality was ensured and their right to withdraw from the research at any time was explained and ensured.
6. Data was collected in the period from March 2012 to May 2012.

#### Statistical analysis:

After data were collected it was revised, coded and fed to statistical software SPSS version 16. All statistical analysis was done using two tailed tests and alpha error of 0.05. P value equals to or less than 0.05 was considered to be significant. The statistical tests used in data analysis were one way ANOVA test and the Spearman correlation coefficient (rho). The value of (rho) indicates the strength of relation as follow: Weak correlation for rho less than 0.25, intermediate correlation is for values between 0.25-

0.74 and strong correlation is for values between 0.75-0.99.

#### 3. Results:

In total 176 nurses shared in the study. (43.8%) of nurses were working in surgical units, while the lowest percentage was for nurses working in Dialysis unit (10.8%). In relation to their age, the highest percentage (55.1%) was in age group 30 to less than 40 years. While, the lowest percentage (4%) of nursing staff was in age group 50 years and more with mean age ( $35.5 \pm 7.3$ ). Regarding their educational qualification, the majority of nursing staff (77.8%) were diploma nurses compared to only (21%) had Bachelor degree of nursing science. As regards to nursing staff's years of experience, it could be observed that more than half (51.7%) of the study participants had from 10 to less than 20 years of experience. On the other hand, (3.4%) of nursing staff had more than 30 years of experience in nursing, with mean years of experience ( $16.7 \pm 6.9$ ). In relation to the administrative responsibility (60.2%) of nursing staff had no administrative responsibility. (Table 1)

**Table (1): Demographic characteristics of nursing staff at Damanhour National Medical Institute (n=176)**

Demographic characteristics of nursing Staff		Frequency (N= 176)	Percent (%)
Units	Medical	45	25.6
	Surgical	77	43.8
	ICU	35	19.9
	Dialysis	19	10.8
Age (years)	20-	32	18.2
	30-	97	55.1
	40-	40	22.7
	50-60	7	4.0
	Mean $\pm$ SD	$35.5 \pm 7.3$	
Educational qualifications	Bachelor of Ng. Science and Master Degree of Ng. Science	37	21.0
	Nursing Secondary School Diploma	137	77.8
	Technical health institute diploma	2	1.2
Years of experience	<10	25	14.2
	10-	91	51.7
	20-	54	30.7
	30+	6	3.4
	Mean $\pm$ SD	$16.7 \pm 6.9$	
Administrative responsibility	No	106	60.2
	yes	70	39.8

The group mean percent score of the total safety climate scale was (66%), The mean percent scores of the safety climate could be ranked from the highest to the lowest mean as follows; Education on quality (76%), reporting system (73%), Health care team positive attitude (66%), worker safety (65%), safety emphasis (63%), blame system (58%) and finally non-punitive system (54%). Regarding, the total work environment scale (67%) was the group mean score. The highest mean score for work environment sub-items was for peer relations (75%), followed by physical resources (66%), quality management (62%) while the lowest mean was for staffing resources (56%). In relation to barriers of Medication Administration Error (MAE) reporting, it could be observed that the group mean for the total scale was (66%). The highest mean score was for the disagreement over medication errors sub-items (0.73), then reporting efforts (72%), face saving (68%), Power distance (66%) Administrative responsibilities (64%) and lastly the lowest mean score was for fear sub-items (60%). (**Table2**)

Nursing staff's mean of safety climate items showed that medical unit nurses perceived their

safety climate more favorable ( $107.3 \pm 13.1$ ) than surgical, dialysis and ICU nurses with no significance difference between them. In relation to the nurses' age, the highest mean was for nurses aged from 50 to less than 60 and those aged from 40 to less than 50 ( $105.7 \pm 27$ ,  $105.3 \pm 17.7$ ) respectively, while the lowest mean of safety climate item was for nurses aged less than 20 ( $98.7 \pm 13.3$ ). Regarding the nursing staff educational qualifications, Nurses holding a Bachelor degree of nursing science perceived their safety climate higher ( $104 \pm 14$ ) than those with diploma degree and technical health institute nurses. As regards to nurses' years of experience, The highest mean ( $122.8 \pm 14.7$ ) was for nurses who had more than 30 years of experience, while the lowest mean ( $96.4 \pm 13.4$ ) was for nurses who had 10 years and less of experience, with a significant difference where  $P = 0.001$ . It could be observed that nurses with administrative responsibilities perceived their safety climate higher ( $106.4 \pm 14$ ) than those with no administrative responsibilities ( $99.3 \pm 16.2$ ), with a significant difference between the two groups where  $P = 0.003$ . (**Table 3**)

**Table 2:** Nurses perception mean percent scores for safety climate, work environment and barriers to Medication Administration Errors (MAE) reporting. (n= 176)

Items	Minimum	Maximum	Mean	SD	Mean Percent score
<b>Safety climate items</b>					
Education & quality (5-25)	5	24	19.0	3.4	76%
Health care team attitude (5-25)	7	25	16.6	4.0	66%
Worker safety (5-25)	5	25	16.2	4.4	65%
Safety emphasis (5-25)	7	24	15.8	3.1	63%
Blame system (5-25)	6	25	14.4	4.5	58%
Non punitive system (3-15)	3	15	8.1	2.2	54%
Reporting system (3-15)	4	15	11.0	2.2	73%
<b>Total (31-155)</b>	43	143	102.1	15.7	<b>66%</b>
<b>Work environment items</b>					
Quality management (8-40)	12	37	27.8	5.1	62%
Peer relations (4-20)	5	20	15.0	3.0	75%
Physical resources (3-15)	3	15	9.9	2.1	66%
Staffing resources (4-20)	4	19	11.3	2.8	56%
<b>Total (19-95)</b>	27	83	64.0	9.6	<b>67%</b>
<b>Barriers to MAE reporting</b>					
Fear (5-25)	6	25	15.1	3.6	60%
Disagreement over medication errors (4-20)	8	20	14.6	2.8	73%
Administrative responsibilities (4-20)	6	19	12.8	2.6	64%
Reporting effort (2-10)	2	10	7.2	1.5	72%
Face saving (4-20)	7	20	13.6	2.3	68%
Power distance (6-30)	13	28	20.0	2.8	66%
<b>Total (25-125)</b>	58	105	83.2	10.2	<b>66%</b>



Regarding the work environment item mean scores, nurses working in Medical units perceived more favourable work environment ( $67.2 \pm 7.4$ ) than those working in Surgical units ( $62.2 \pm 11.4$ ) denoting a significant difference between nurses of the two previously mentioned units, where  $P = 0.047$ . Furthermore, nurses who were aged from 40 to less than 50 and from 30 to less than 40 are nearly equal in their perception of their work environment ( $64.7 \pm 11.3$ ,  $64.2 \pm 8.3$ ) as compared to nurses aged 50 to 60 who recorded the least work environment mean ( $61.9 \pm 19.7$ ) with no significant difference between the different age groups. In relation to nurses educational qualifications, nurses with Bachelor degree of nursing science and over recorded the

highest mean ( $64.9 \pm 7$ ) toward their work environment as compared to those diploma degree nurses and technical health institute diploma ( $63.8 \pm 10.2$ ,  $60 \pm 8.5$ ) respectively. The highest mean of work environment item was recorded by nurses who had 30 years and over of experience ( $69.7 \pm 11.9$ ), while the lowest mean was recorded by nurses who had less than 10 years of experience ( $61.4 \pm 7.8$ ). Additionally, nurses with administrative responsibilities perceived their work environment more favourable ( $65.8 \pm 9.1$ ) than those with no administrative responsibilities ( $62.8 \pm 9.7$ ) with a significant difference between the two groups, where  $P = 0.040$ . (**Table 3**)

**Table 3: Mean, standard deviation and ANOVA value of nurses' perception of safety climate, Work environment and barriers to medication administration errors reporting according to nurses' demographic characteristics. (n=176)**

Demographic characteristics of nursing staff	Safety climate		Work Environment		Barriers to MAE reporting	
	Mean	SD	Mean	SD	Mean	SD
<b>Units</b>						
Medical	107.3	13.1	67.2	7.4	83.4	9.9
Surgical	100.7	18.7	62.2	11.4	81.8	10.5
ICU	99.0	12.0	64.1	7.9	84.3	9.8
Dialysis	100.9	12.2	63.9	7.3	86.5	10.4
ANOVA (f)	2.4		2.7		1.2	
P	0.072		0.047*		0.298	
<b>Age</b>						
20-	98.7	13.3	63.0	8.1	82.6	9.0
30-	101.6	14.5	64.2	8.3	83.5	9.8
40-	105.3	17.7	64.7	11.3	83.0	12.8
50-60	105.7	27.0	61.9	19.7	83.3	7.0
ANOVA (f)	1.2		0.33		0.06	
P	0.311		0.802		0.979	
<b>Educational qualifications</b>						
BSc and Master Degree	104.0	14.0	64.9	7.0	82.2	12.2
Nursing Secondary School Diploma	101.8	16.1	63.8	10.2	83.5	9.8
Technical health institute diploma	89.5	26.2	60.0	8.5	84.5	2.1
ANOVA (f)	0.93		0.36		0.22	
P	0.396		0.698		0.803	
<b>Years of experience</b>						
<10	96.4	13.4	61.4	7.8	81.7	9.2
10-	101.0	15.0	63.6	7.8	83.3	9.9
20-	104.2	16.2	65.3	12.3	83.7	11.4
30+	122.8	14.7	69.7	11.9	83.2	11.0
ANOVA (f)	5.4		1.8		0.22	
P	0.001*		0.165		0.882	
<b>Administrative responsibility</b>						
No	99.3	16.2	62.8	9.7	84.4	10.2
Yes	106.4	14.0	65.8	9.1	81.4	10.1
t- test	3.0		2.1		1.9	
P	0.003*		0.040*		0.062	

\* Significant difference at  $P < 0.05$

In relation to barriers to Medication Administration Errors (MAE) reporting, nurses working in dialysis unit perceived the highest mean of barriers ( $86.5 \pm 10.4$ ) as compared to surgical units nurses who recorded the least barriers mean ( $81.8 \pm 10.5$ ). Nurses in the age group 30 to less than 40, 40 to less than 50 and 50 to 60 were nearly equal in their perceptions toward barriers to MAE reporting ( $83.5 \pm 9.8$ ,  $83 \pm 12.8$ ,  $83.3 \pm 7$ ) respectively, while nurses aged 20 to less than 30 recorded the least mean score ( $82.6 \pm 9$ ). Nurses qualified from the Technical health Institute recorded the highest mean score of barriers to MAE reporting ( $84.5 \pm 2.1$ ) as compared to nurses holding Bachelor degree of Nursing Science who recorded the least mean score ( $82.2 \pm 12.2$ ). As regards to participants' years of experiences, those nurses with 10 to less 20 ( $83.3 \pm 9.9$ ), 20 to less than 30 ( $83.7 \pm 11.4$ ) and 30 and over ( $83.2 \pm 11$ ) were nearly equal in their perception toward barriers of MAE reporting. Those nurses without administrative responsibilities recorded the highest mean of barriers

( $84.4 \pm 10.2$ ), while nurses with administrative responsibilities recorded the least mean of barriers ( $81.4 \pm 10.1$ ). No significance differences were found between any of nurses demographic characteristics and mean scores of barriers to MAE reporting item. (Table 3)

Regarding safety climate sub-items and their relations with barriers to Medication Administration Errors (MAE) reporting, There are positive weak significant correlations between education on quality ( $P= 0.001$ ), Health care team positive attitude ( $P= 0.012$ ), worker safety ( $P= 0.030$ ), the reporting system ( $P= 0.044$ ) and barriers to MAE reporting. On the other hand, only one negative significant correlation was found between the blame system and barriers to MAE reporting. In relation to work environment sub-items a positive weak correlation was found between peer relations and barriers to MAE reporting where  $P= 0.005$ , counter to a weak negative correlation between staffing resources and barriers to MAE reporting where  $P= 0.000$ . (Table 4)

**Table 4:** Correlation between safety climate, work environment and barriers to Medication Administration Error (MAE) reporting.(n=176)

Safety Climate, Work Environment Sub items	Total Barriers to (MAE) reporting	
	rho	P
<b>Safety Climate:</b>		
Education on quality	0.238	0.001**
Health care team attitude	0.190	0.012*
Worker safety	0.163	0.030*
Safety emphasis	-0.002	0.977
Blame system	-0.196	0.009**
Non punitive system	-0.053	0.484
Report system	0.152	0.044*
<b>Total Safety Climate</b>	<b>0.142</b>	<b>0.060</b>
<b>Work Environment:</b>		
Quality management	0.129	0.088
Peer relations	0.213	0.005**
Physical resources	0.081	0.283
Staffing resources	-0.265	0.000**
<b>Total Work Environment</b>	<b>0.097</b>	<b>0.198</b>

\* Significant difference at  $P \leq 0.05$

\*\* Highly Significant difference at  $P \leq 0.01$

#### 4. Discussion:

Issues on patient safety have become a priority in health policy and healthcare management<sup>43</sup>. Thus, the current study is conducted to assess nurses' perceptions toward safety climate, work environment and barriers to Medication Administration Errors (MAE) reporting and to detect the relationships between the study variables. The current study

revealed that there was no relationship between perceived safety climate, nurses' work environment and barriers to medication administration errors reporting. The same was found by Chiang (2005)<sup>44</sup>.

The current study results revealed that the highest mean score of the safety climate scale was for "education on quality" sub-item, while "non-punitive system" sub-item had the least mean score. The

possible explanation could be that varied quality management programs have been employed to improve care quality. Nowadays, University and Governmental hospitals are implementing quality assurance and infection control programs which focus mainly on patient safety in the nursing units and in the overall hospital units. Also, these programs require the involvement and training of health care providers especially the nurses. That's why the current finding is not surprising. Regarding non-punitive system sub-items which received the least mean scores, this could be explained by the consistent blaming that nurses face while conducting safety errors, which make them afraid and hesitated to report events that are related to patient safety. Smits et al (2008)<sup>45</sup> stated that event reporting can only be achieved in a non-punitive environment where events can be reported without people being blamed. The same was found by VanGeest and Cummings (2003)<sup>46</sup> and by AbdelHai et al (2012)<sup>47</sup> who stated that the majority of their study participants felt reports of errors are held against them leading to that the reports are kept in files.

When analyzing the work environment sub-item scores among participants, findings of the study showed that "peer relations" sub-item received the highest mean, while "staffing resources" sub-item had the lowest mean score. This is a natural finding, as the Egyptian nurses are characterized by their abilities to socialize and their working in teams, as well as the work pressures that make the nurse perform better with the peers' assistance. This finding is congruent with those of many researchers<sup>2,9,48,49</sup> who stated that the participants responses reflect the evidence of team collaboration and favorable peer relations. As regards to the "unit staffing" sub-item which recorded the lowest mean score. This finding is predictable. Nursing shortage is a worldwide problem and it is well known that this shortage jeopardize patient safety. Many studies have been conducted and reported nurses' dissatisfaction among staffing resources in their units<sup>50,51</sup>.

Regarding barriers of medication administration errors reporting sub-items scores, the current study findings indicated that the highest mean score was for the "disagreement over medication errors" sub-item. On the other hand, "fear" sub-item received the lowest mean score. This finding is very strange and contradicting with many previous researches findings which concluded that the fear received the highest mean score<sup>8,32,52</sup>. This could be justified by the unawareness of nurses about the dramatic outcomes that result from medication administration errors and from the underreporting of these events. Also, another cause could be the absence of incident reports in which the nurses are expected to record the

medication errors conducted and the name of person responsible for this error. In relation to the "disagreement over medication errors" sub-item which received the highest mean score, this finding is expected as the nurses are unable to detect the errors and the medication error is not clearly defined for them, this could be due to lack of nurses' training especially about the rules of medication administration, lack of supervision for the early detection of medication administration errors, as well as, the inability of nurses to define the medication errors.

The present study findings showed a significant difference between nurses' years of experiences, administrative responsibilities and their perceptions toward the safety climate, denoting that the more experienced nurses and those who have administrative responsibilities perceive more favorable safety climate than those less experienced nurses. This finding is not surprising as more experienced nurses have less opportunity to observe the safety issues and hazards which are commonly faced by the less experienced nurses. Another explanation could be the absence of reporting process as well as the absence of culture that encourage reporting which makes head nurses unable to identify the presence of safety problems in their units. Another reason could be that head nurses were satisfied with their units and had a feeling that they apply more control. The same finding was reported from several previous studies (Ahmed et al. (2011),<sup>53</sup> Singer et al. (2003),<sup>54</sup> Kim et al.(2007),<sup>55</sup> and Singer et al. (2008)<sup>56</sup>), while the while the contrast was found by Richardson & Williams (2007)<sup>57</sup>.

Regarding nurses' demographic data and work environment scale scores, the result of the current study revealed a significant difference between nurses working in medical units and those working in surgical units. Medical units' nurses perceived more favorable work environment than surgical units' nurses. This could be attributed to the nature of medical units, which is characterized by team work spirit, as well as the collaboration between nurses in performing all nursing care especially in the process of medication administration. During data collection, it was observed that the most common method of patient care assignment used in the medical units was the team method but not following all its principles, this could be a cause for this finding. Regarding administrative responsibilities nurses who have administrative responsibilities reported higher work environment mean scores than those who don't have administrative responsibilities, this could be justified that the persons responsible have control over their work environment more than those nurses who don't have administrative responsibilities.



The current study findings showed a surprising result which is the positive correlation between the majorities of safety climate sub-items namely; education on quality, health care team attitude, worker safety, reporting system and barriers to Medication Administration Error (MAE) reporting. This finding means that the more favorable responses of nurses toward safety climate sub-items, the more barriers they perceive for reporting medication administration errors. On the other hand, the present results showed a negative correlation between blame system and barriers to medication administration errors reporting. This finding could be attributed to the lack of training program given to the nurses about the procedures of medication administration, the proper guidelines to be followed while giving medication, the meaning of medication errors and the reporting system of medication errors which in turn keep the nurses unable to determine what is the medication error and how to deal with each error, what are the problems of reporting these errors as well. The contrast was found by Wakefield and colleagues (1999)<sup>58</sup>, Blegen et al (2004)<sup>41</sup> who reported that the safety climate sub-items especially education on quality were related to lower agreement with reporting barriers. In relation to the work environment sub-items, the current study findings revealed a positive weak correlation between peer relation and barriers to Medication Administration Errors (MAE) reporting, while a negative correlation was found between staffing resources and barriers to MAE reporting. This finding denotes that the more favorable staffing resources, the less barriers to MAE reporting. This result is normal as it is well known that the staffing levels and mix affects the patient's safety and the medication administration is one of the most important dimensions included in patient's safety. Furthermore, it is reasonable that insufficient staffing, heavy workload could lessen the nurses' willingness to report MAEs because filling out reports is perceived as extra work leading to increased workload. This finding is consistent with those of Blegen et al (2004)<sup>41</sup> who demonstrated that staffing and physical resources were inversely related to the perceived MAEs barriers.

## 5. Conclusion:

The current study findings revealed that there was no relationship between perceived safety climate, nurses' work environment and barriers to medication administration errors reporting. Although the absence of relationship between total of the study variables, there were some correlations between sub-items of the study variables and barriers to medication administration errors reporting. There are positive weak significant correlations between education on quality

$P=0.001$ , Health care team positive attitude  $P=0.012$ , worker safety  $P=0.030$ , the reporting system  $P=0.044$  and barriers to MAE reporting. On the other hand, only one negative significant correlation was found between the blame system and barriers to MAE reporting. In relation to work environment sub-items a positive weak correlation was found between peer relations and barriers to MAE reporting where  $P=0.005$ , counter to a weak negative correlation between staffing resources and barriers to MAE reporting where  $P=0.000$ .

## 6. Recommendations:

1. Developing and disseminating the patient safety guidelines in all hospital setting.
2. Training programs about the medication safety guidelines should be provided for nurses.
3. There should be a link between quality assurance and infection control program implemented in the hospital and safety climate.
4. Head nurses are in need to be encouraged to learn more about the incident reports and how to write a medication administration error reports.
5. In daily practice, Nurses are in need to be closely observed while administering medication in order to detect the mistakes, learn from it and receive feedback.
6. Develop a healthy learning work environment in which nurses can learn more about the medication administration procedures without fear from mistakes.

## References:

- 1-Gershon, R., Karkashian, C., Grosch, J., Murphy, L., Escamilla-Cejudo, A., Flanagan, P. Hospital safety climate and its relationship with safe work practices and workplace exposure incidents. *American Journal of Infection Control*. 2000; 28: 211–21.
- 2-Pronovost P & Sexton B. Assessing safety culture: guidelines and recommendations. *Quality and Safety in Health Care*. 2005; 14: 231–33
- 3- Baker GR, Norton PG, Flintoft V. The Canadian adverse events study: the incidence of adverse events among hospital patients in Canada. *Canadian Medical Association Journal*. 2004;170: 1678–86.
- 4- Institute of Medicine. *To Err Is Human: A Safer Health System*. 1st ed. Washington, DC: National Academies Press. 1999.
- 5- Davies P. Fatal medical errors said to be more widespread. *The Wall Street Journal*. July 2004; 27:5.
- 6- Katz Navon T., Naveh E. & Stern Z. Safety climate in health care organizations: a multidimensional approach. *Academy of Management Journal*. 2005; 48(6): 1075–89.

- 7- Mearns, K., & Flin, R. Assessing the state of organizational safety – culture or climate. *Current Psychology*. 1999;18(1): 5–17.
- 8- Hartmann C, Meterko M, Rosen A, Zhao S, Singer S, Guba D. Relationship of hospital organizational culture and patient safety climate in the Veterans Health Administration. *Medical Care Research and Review*. 2009;66 (3):320-38.
- 9- Institute of Medicine. Keeping Patients Safe: Transforming the Work Environment of Nurses. Washington, DC: National Academies Press. 2004.
- 10- Aiken L, Smith H, Lake E. Lower Medicare mortality among a set of hospitals known for good nursing care. *Medical Care*. 1994; 32(8):771–87.
- 11- Aiken L, Clarke S, Sloane D, Sochalski J, Silber J. Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. *The Journal of American Medical Association*. 2002;288 (16):1987–93.
- 12- Armstrong K, Laschinger H. Structural empowerment, Magnet hospital characteristics and patient safety culture: making the link. *Journal of Nursing Care Quality*. 2006;21(2):124–132.
- 13- Disch J. Creating healthy work environments. *Creative Nurs*. 2002; 8(2):3-4.
- 14- Aiken LH, Clarke SP, Solane DM, Sochalski JA, Busse R, Clarke H, et al. Nurses' reports on hospital care in five countries. *Health Affairs*. 2001;20 (3):43-53
- 15- Page A. Keeping patients safe: transforming the work environments of nurses. Washington (DC): National Academies Press; 2004 URL <http://www.nap.edu/openbook.php?isbn=0309090679> retrieved November 2012
- 16- McClure, Margaret L., and Ada Sue Hinshaw. Magnet hospitals revisited: Attraction and retention of professional nurses. Washington, DC: American Nurses Association, 2002.
- 17- Reason J. Human error: Models and management. *British Medical Journal*. 2000; 320: 768–70.
- 18- Walker, L. O., & Avant, K. C. Strategies for theory construction in nursing. Norwalk: Appleton & Lange Publisher. 1995
- 19- Kazaoka T, Ohtsuka K, Ueno K and Mori M. Why nurses make medication errors: A simulation study. *Nurse Education Today*. 2007; 27: 312–17.
- 20- Evan J. Prevalence, risk factors, consequences and strategies for reducing medication errors in Australian hospitals: A literature review. *Contemporary Nurse*. 2009; 31: 176–89
- 21- Benjamin DM. Reducing Medication errors and increasing patient safety: Case studies in clinical pharmacology. *Journal of Clinical Pharmacology*. 2003; 43 (7): 768-83
- 22- Hughes R. G. & Ortiz E. Medication errors: Why they happen and how they can be prevented. *American Journal of Nursing*. 2005; 105(3 suppl): 14–24.
- 23- Chaudhury H., Mahmood A., & Valente M. The effect of environmental design on reducing nursing errors and increasing efficiency in acute care settings: A Review and Analysis of the Literature. *Environment and Behavior*. 2009. URL <http://eab.sagepub.com/cgi/content/abstract/0013916508330392v1> Retrieved on November 2012
- 24- Murff H, Patel V, Hripcsak G and Bates D. Detecting adverse events for patient safety research: A review of current methodologies. *Journal of Biomedical Information*. 2003;36 (1-2):131-43.
- 25- Milch CE, Salem DN, Pauker SG, Lundquist TG, Kumar S and Chen J. Voluntary electronic reporting of medical errors and adverse events. *Journal of General Internal Medicine*. 2006;21(2):165-70.
- 26- Thomas E, Petersen L. Measuring errors and adverse events in health care. *Journal of General Internal Medicine*. 2003;18 (1) :61-7.
- 27- Meurier CE, Vincent CA and Parmar DG. Learning from errors in nursing practice. *Journal of Advanced Nursing*. 1997;26(1) :111-9.
- 28- Carlton G & Blegen M A. Medication-related errors: A literature review of incidence and antecedents. *Annual Review of Nursing Research*. 2006; 24: 103–25.
- 29- Wakefield DS, Wakefield BJ, Uden-Holman T, Blegen MA. Perceived barriers in reporting medication administration errors. *Best Pract Benchmarking Healthc* 1996;1:191-7.
- 30- Uribe CL, Schweikhart SB, Pathak D S, Dow M and Marsh GB. Perceived barriers to medical-error reporting: An exploratory investigation. *Journal of Healthcare Management*. 2002;47 (4):263-80
- 31- Wakefield BJ, Blegen MA, Uden-Holman T, Vaughn T, Chrischilles E and Wakefield DS. Organizational culture, continuous quality improvement, and medication administration error reporting. *American Journal of Medical Quality*. 2001;16 (4):128-34.
- 32- Weiner B J, Hobgood C and Lewis MA. The meaning of justice in safety incident reporting. *Social Science and Medicine*. 2008;66 (2):403-13

- 33-Waring JJ. Beyond blame: Cultural barriers to medical incident reporting. *Social Science and Medicine*. 2005;60 (9):1927-35.
- 34- Rathert C, May D R. Health care work environments, employee satisfaction, and patient safety: Care provider perspectives. *Health Care Management Review*. 2007;32 (1):2-11
- 35- Leape LL. Reporting of adverse events. *National England Journal of Medicine*. 2002;347 (20):1633-38.
- 36- Winterstein AG, Hatton RC, Gonzalez-Rothi R, et al. Identifying clinically significant preventable adverse drug events through a hospital's database of adverse drug reaction reports. *American Journal of Health- System Pharmacy*. 2002;59 (18): 1742-49.
- 37- Chaudhury H, Mahmood A and Valente M. The effect of environmental design on reducing nursing errors and increasing efficiency in acute care settings: A Review and Analysis of the Literature. *Environment and Behavior*. 2009. 41; 755-86
- 38- Abdou HA and Sabir KM. A baseline assessment of patient safety culture among nurses at Student University hospital. *World Journal of Medical Sciences*. 2011; 6 (1): 17 – 26.
- 39- Abbas HAE, Bassiuni NA and Baddar FM. Perceptions of front-line healthcare providers towards patient safety: a preliminary study in a University hospital in Egypt. *Topics in Advanced Practice Nursing e-Journal*. 2008; 8(2): Medscape. URL: <http://www.medscape.com/viewarticle/570921> Retrieved September, 2012
- 40- Nabhan A and Ahmed-Tawfik MS. Understanding and attitudes towards patient safety concepts in obstetrics. *International Journal of Gynecology and Obstetrics*. 2007; 98 (3): 212 – 16.
- 41- Blegen M A, Pepper G A and Joseph R. Safety Climate On Hospital Units: A new measure. URL retrieved on September 2012 <http://www.ncbi.nlm.nih.gov/books/NBK20592/>
- 42- Blegen M A, Vaughn T, Pepper G, Vojir C, Stratton K, Boyd. M et al. Patient and Staff Safety: Voluntary reporting. *American Journal of Medical Quality*. 2004; 19(2): 67-74
- 43- Yang Gz, Kelly E and Dazi A. Patient safety for global health. *The Lancet*. 2011; 377(9769): 886-87
- 44- Chiang H-Y. Nurses' demographics and perception of safety climate, work environment and barriers to medication administration errors reporting in Southern Taiwan. Published Doctorate thesis. College of Nursing. University of Utah. 2005
- 45- Smits M, Christiaans-Dingelhoff I, Wagner C, Wal G and Groenwegen P P. The psychometric properties of the 'Hospital Survey on Patient Safety Culture' in Dutch hospitals. *BMC Health Service Research*. 2008; 8: 230 URL: <http://www.biomedcentral.com/content/pdf/1472-6963-8-230.pdf> retrieved November 2012
- 46- VanGeest JB and Cummins DS. An educational needs assessment for improving patient safety: results of a national study of physicians and nurses. National Patient Safety Foundation. 2003; White Paper Report 3. URL <http://s197607105.onlinehome.us/download/EdNeedsAssess.pdf> Retrieved October 2012.
- 47- Abdelhai R, Abdelaziz SB and Ghanem NS. Assessing Patient Safety Culture and Factors Affecting It among Health Care Providers at Cairo University Hospitals. *Journal of American Science*. 2012;8 (7): 277-85.
- 48- World Health Organization. "World Alliance for Patient Safety". WHO 2012. URL: [http://www.who.int/features/factfiles/patient\\_safety/en/index.html](http://www.who.int/features/factfiles/patient_safety/en/index.html) Retrieved September, 2012.
- 49- Espin S, Lingard L, Baker G R. and Regehr G. Persistence of unsafe practice in everyday work and exploration of organizational and psychological factors constraining safety in the operating room. *Journal of Quality and Safety of Health Care*. 2006; 15(3):165-70.
- 50- Adam A and Bond S. Hospital nurses' job satisfaction, individual and organizational characteristics. *Journal of Advanced Nursing*. 2000; 32(3): 536- 43
- 51- Khairy Y. The Relationship between Nurse - Patient Ratio, Nursing Care Organization systems and the Hospital Ward Organizational Environment. Unpublished Doctoral Thesis. Faculty of Nursing .Alexandria University. 2009.
- 52- Nicholson D, Hersh T K, Gandhi S.N. Weingart and Bates D W. Medication Errors: Not Just a Few Bad Apples. *Journal of Clinical Outcomes Management*. 2006; 13(2):114-5.
- 53- Ahmed NG, Adam SM, Abd Al- Moniem II. Patient safety: Assessing nurses' perception and developing an improvement plan. *Life Science Journal*. 2011; 8(2): 53-64
- 54- Singer S J, Gaba D M, Geppert A D, Sinaiko A D, Howard SK and Park KC. The culture of safety: Results of an organization-wide survey in 15 California hospitals. *Quality and Safety in Healthcare*. 2003; 12 (2): 112-18.
- 55- Kim J, An K, Kim M K & Yoon S H. Nurses perception of error reporting and patient safety culture in Korea. *Western Journal of Nursing Research*. 2007; Nov (7):827-44.

- 56- Singer, S. J, Falwell, A, Gaba, D M and Baker L.C. Patient safety climate in US hospitals: Variation by management level. Medical Care. 2008; 46 (11): 1149-56
- 57- Richardson S & Williams T. Why is Cultural Safety essential in health care? Medical Law. 2007; 26(4):699-707.
- 58- Wakefield DS, Wakefield BJ, Uden-Holman T, Borders T, Belgen M & Vaughn T. Understanding why medication administration errors may not be reported. American Journal of Medical Quality. 1999. 14(2); 81-8.