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Medication Administration Errors at Children's University Hospitals: Nurses Point of View

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Abstract: *Medication administration errors(MAE) can threaten patient outcomes and are a dimension of patient safety directly linked to nursing care. Children are particularly vulnerable to medication errors because of their unique physiology and developmental needs.*

Aims: *The present study aims to examine types, stages and causes of medication errors. Barriers of medication administration errors reporting and its facilitator at pediatric University hospitals from nurses point of view.*

Methods*: A descriptive study was conducted in Pediatric intensive care units, medical, surgical and urology ward of children's university hospital at Mansoura University, intensive care units, kidney dialysis at Abouelrash pediatric hospital and general wards of Elmonaira at Cairo University Hospitals. 80 nurses were included in the study after fulfilling the criteria of selection. A structured interview questionnaire that consists of four sections was used.*

Results: *The highest types of medication errors as reported by studied nurses occurred when the medication is delivered by the wrong route, the highest stage of medication errors done by nurses was missing of medication then patient monitoring and administration and the highest cause of medication errors was due to heavy workload. The results of this study indicated that the strongest perceived barriers to medication administration errors reporting were fear from consequences of reporting, then managerial factor and then the process of reporting from the nurse's viewpoint. The nurses agree that identifying benefits of reporting followed agree that feeling safe about working environment, and agree that good professional relationship with physicians was the most facilitating factors of reporting medication errors.*

Conclusions*: It was concluded that medication errors result from interrelated factors, the strongest perceived barriers to medication administration errors reporting were fear from consequences of reporting, and good relationship with nurse managers and physicians were the most facilitators of reporting medication errors.*

Recommendation*: The study recommended that the assessment of medication errors should be done periodically and in- service training program about medication administrations should be applied*

Key words: *Medication errors causes types and stages, Barriers in reporting medication errors, facilitator of medication errors reporting*

I. Introduction:

Medication administration is one of the most important duties of nurses. It requires a particular set of knowledge and attitude to be implemented correctly. Medication errors can put nursing practice at risk and can create preventable risk for children. Nurses hold responsibility for taking care of children and providing safety for them. Therefore, medication administration and preventing medication errors impose more obligation on them **(Tang, et al 2007**).Medication errors have been reported as the most common cause of hospital adverse events, as a large number of children are prescribed drugs on a hospital basis **(Chiang,et al 2010**). Numerous studies and reports have presented figures of medication error occurrences around the world **(Balas, Scott & Rogers 2006)**

Medication errors have been recognized as an area of grave concern and are preventable adverse events in all age groups of patients. The National Coordinating Council for Medical Error Reporting and Prevention has given the following definition: "Medication error is any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the healthcare professional, patient, or consumer. Such events may be related to professional practice, incompetent professional, healthcare products, procedures and systems, including prescribing; order communication; product labeling, packaging, and nomenclature; compounding; dispensing; distribution; administration; education; monitoring; and use **(The Quality Care Committee, 2010)**.These errors whether occurring singularly by nurses or associatively with physicians or pharmacists can leading to morbidity and mortality among children worldwide. Therefore those who prescribe and give medication should maintained highly professional standards to protect their patients and themselves **(Hughes & Ortiz 2005).**

Children safety is a central concern of current health-care delivery systems. It is an important indicator of health care quality **(Startton,et al 2004).** Overall, in the third world and developing countries, it is difficult to acquire accurate estimates about medication administration errors due to absence of a proper recording and reporting system and shortage of research information, but experts speculate that the rate of these errors is high, and the increasing number of complaints against health care team in courts and to judicial authorities also confirms this **(Mohammad Nejad,et al 2010**) Clearly, medication errors are a significant and growing problem in health care settings. Enhanced understanding of some associated factors, such as the hospital unit and nursing shift, on which the error occurred, might assist nursing administrators to identify common patterns and improve nursing care, ensure patient safety, and reduce hospital costs. Better organizational systems then could be designed and implemented to reduce potential medication errors **(Mohamed & Gabr 2011).**

The major barriers to safe medication administration were lack of interdisciplinary collaboration and communication, nurses' work environment that does not support safety, missing voices of front-line nurses in decision making. Systems design and difficulties in translating research into practice were also identified as the most significant barriers to safe medication administration **(Hartnell,et al 2012**). The most contributing challenge of safe and competent medication administration is the complexity of the nurses' work environment. The effects of errors on nurses were reported in terms of quality, professional development and professional identity **(Lewis, et al 2009).** Nursing error is an operational expression which happens because a planned chain of physical and mental actions fail to reach the goal and this failure cannot be attributed to the intervention of the chance. This type of errors results high morbidity and mortality among children, in addition to large sums of treatment costs annually **(Harding & Petric 2008**). Medication errors can put nursing practice at risk and can create preventable risk for patients. Nurses hold responsibility for taking care of children and providing safety for them. Therefore, medication administration and preventing medication errors impose more obligations on them **(Chiang & Pepper 2006)** Although there are abundant advantages and ethical bases in elaboration and reports of nurses' errors, it is very difficult to obtain accurate statistics of medication errors due to nurses' protection against punishment, absence of an appropriate reporting and recording system, and shortage of information **(Cheraghi et al 2012)**

Reporting errors is fundamental to error prevention. Reporting reduces the adverse effects of errors and effectively helps to avoid future errors that can cause patient harm. In addition, reporting reduces diminish personal suffering and decrease financial costs **(Travaglia, Westbrook & Braithwaite 2009).** However, a low percent of medication errors are actually reported , medication administration errors present a universal problem and can cause serious consequences for children, especially those with acute complex medical conditions **(Alsulami, Conroy & Choonora 2013)**. As safe drug therapy for children is a major issue in many low-income countries, enhancing good professional relation can facilitate medication error reporting and consequently diminishes personal suffering and decrease financial costs **(Sadat-Ali, et al 2010).**

Significance of the study:

Pediatric medication errors are occurring at an alarming rate , These errors are both preventable and expensive to the health care system and often lead to severe and devastating consequences for children and their families. All of these challenges mean that the safe administration of pediatric medication requires safeguards beyond those provided to adults, however, this area remains significantly understudied. Pediatric medication errors can cause disability, death, physical and psychological harm, and also, increase the cost of hospitalization **(Islamian, et al 2010**).Research in this particular area is necessary to identify the system changes that would be beneficial to advance the level of safe medication administration for children.

Aim Of The Study:

The aim of this study is to assess nurses points of view for medication administration errors at children's university hospitals.

Research questions:

- What are the types, stages and causes that lead medication errors through medication administration process?
- What are the barriers of reporting medication errors among nurses?
- What are the facilitators of reporting medication errors among nurses?

-Is their differences between nurses demographic criteria and barriers to medication administration error reporting?

II. Subjects and Methods

Research design

A descriptive design was used to conduct this study

Setting:

Data were collected from PICU, medical, surgical and urology ward of children's university hospital at Mansoura University children's hospital and ICU and kidney dialysis of Abouelrash pediatric hospital and general wards of Elmonaira children hospital at Cairo University Hospitals. Each ward has an average 8 beds and the average length of children stay was 6 days.

Sample and subject:

A convenience sample were used in the study, Sample size was calculated using EPI inf. Program version 6.02 taken into consideration the total number of nurses working with drug administration for children admitted to the selected setting. 80 nurses were included in the study, these nurses had to fulfill the criteria of having a minimum of one year experience in the work setting, with different categories to guarantee that nurses are involved in administering medications. The exclusion criterion was unwillingness to participate in the study 50 of them working at children's university Hospital of Mansoura University and 30 working at Abouelrash pediatric hospital and Elmonaira hospital at Cairo University Hospitals.

Tools of data collection:

A structured interview questionnaire that consists of four sections:

- **The first section**: was developed by the researchers and includes nurses' demographic characteristics such as age, gender, marital status, education level, employment status, and types of work shifts, experience, service unit, and their job satisfaction
- **Second section** consists of three parts concerned with types, stages and causes of medication error, questionnaire adopted from Al-Shara (2011) and modified by researchers

Part 1: asked the nurse to rank a list of 10 of most frequent types of medication errors with number 1 being the most frequent and number10 being the least frequent type of medication error includes: Wrong patient ,Wrong Dose ,No or wrong date ,Wrong drug ,Wrong time ,Wrong documentation ,Wrong Route, No medication , Frequency of medication and Changing of medication .

Part 2: asked the nurse to rank a list of 6 possible stages of medication errors, which are carried by medical staff with number 1 being the most frequent and number 6 being the least frequent stage of medication error. The six possible stages of medication error were as following: Patient monitoring (Nurse), Physician ordering (Physician), Transcribing (Pharmacist) ,Administration (Nurse) , Pharmacy dispensing(Pharmacist) and Missing of medication (Nurse).

Part 3: asked the nurse to rank a list of 7 possible causes of medication errors, with number 1 being the most frequent cause and number 7 being the least frequent cause of medication errors

- **The Third section**: ask about barriers to reporting medication errors adopted from **Bahadori, et al (2013)** that included 19 questions in 3 domains: fear of the consequences of reporting (with 11 items), managerial factors (with 5 items), and factors related to the process of reporting (with 3 items). The five-point Likert scale was used to determine the factors affecting the refusal of reporting on medication errors, whereby 1 refers to strongly disagree and 5 as strongly agree.
- **The fourth Section**: ask about perceptions of nurses about facilitators of reporting medication errors that adopted from **Bayazidi,et al (2012**) . Seven items Likert scale scored as 1-5 whereby 1 refers to strongly disagree and 5 as strongly agree.

Methods of Data Collection

-Acceptance was obtained from ethical committee from both Faculty of Nursing at Mansoura University and Cairo University to carry out the study

-A permission to conduct the study was obtained from the director of the selected Hospital. Ethical approval was obtained from all study subjects after informing them about the objectives and methods of the study.

-Questionnaire was developed and tested for its content validity and relevance by 5 faculty members in pediatric and nursing administration department and 3 nurse managers in the hospital.

-A pilot study was conducted on 5 staff nurses working in children university hospital in Mansoura and 3 staff nurse working in the selected setting at Cairo university hospitals in order to ascertain its clarity and feasibility.

-After obtaining the required permissions and ethical approval, all participants interviewed for explaining the purposes of the study, confidentiality of information, and their right to withdraw at any time.

-Data was collected using the tested questionnaire. Each nurse were record her response separately. The time required was 15-20 minutes during the period from February to April 2014.

Statistical Analysis:

The collected data was analyzed suing SPSS14 (SPSS Inc., Chicago, IL, USA). Descriptive statistics such as frequency, mean, standard deviation were used to summarize the data. Also T test and ANOVA was used**.**

Limitation of the study:

The culture of the units in each study setting was not examined. Therefore, it is impossible to determine if some units reported more errors as they felt safe and reporting was part of the culture at that unit. Besides study was implemented in only two pediatric hospitals.

III. Results:

Table(1) represent characteristics of the studied sample, it is show that majority of nurses 85% were female, half of them 50% were in the 25-34 of age with mean age 27.7 ± 3.4 years , 77.5% were married, 52.5% had diploma degree, 42.5% were working in intensive care units, 73.8% were employed contractual and 85% were working in morning shift. As regard job experience 48.8% of nurses had from 5-10 years experience with mean 7.3 ± 1.9 years, as well as 86.3% were satisfied in working with children.

Table (2) shows types, stages and causes of medication error, The highest types of medication errors as reported by studied nurses occurred when the medication is delivered by the wrong route in (28.80%) followed by changing of medication in 25% of subjects and 23.80% due to frequency of medication, however, wrong date and wrong documentation were the least frequent in 15% and 13.80% respectively. As regard stages of error the highest stage done by nurses was missing of medication in(35%),then patient monitoring (31.30%), and administration (25%) Other stages of medication errors occurred during physician ordering (27.5%), and pharmacy dispensing (22.5%) and transcribing (21.3%). Concerning causes of error the highest cause of medication errors was due to heavy workload (51.3%) by the nurses followed by personal neglect (27.5%), whereas, the lowest cause of medication errors was due to unfamiliarity with medication (20%).

Table (3) shows the barriers of reporting to medication errors, as regard barriers from fear of the consequences of reporting. (58.8%) of nurses were strongly agree that fear of producing side effects in patients followed by (30%) of them fear from the impact of reporting of errors on the personnel's annual evaluation and informing colleagues working in other units and other facilities about one's medication error. While (53.8%) of nurses agree that fear of expressing a negative attitude towards the nurse making errors, however (32.5) and (20%) of nurses were strongly disagree and disagree that fear of being blamed by colleague was barrier , as well as (22.5%) of nurses uncertain that fear of being blamed by doctors was barrier.

Regarding barriers of reporting medication errors related to managerial factors, more than half of nurses (55%) strongly agree that disproportionate reaction of the heads to the error importance was barrier followed by lack of receiving positive feedback from the nursing heads following to report on medication errors in (52.5%) , however (42.2) of nurses agree that the head focus only on finding the culprits and blaming them, regardless of other factors involved in the occurrence of errors was barrier. Concerning barriers of reporting to medication errors related to the process of reporting most of nurses (53.8) was agree with not paying attention to the reporting on some medication errors and 43.8% was from lack of a clear definition of medication errors and 33.8% was forget reporting on the medication errors

Table (4) illustrate perception of nurses about facilitators of reporting medication errors,(52.5%) of nurses agree that identifying benefits of reporting followed by43.5% agree that feeling safe about working environment, and 38.8% agree that good professional relationship with physicians was the most facilitating factors of reporting medication errors. While 40.0% from the participants strongly disagree that anonymous reporting was facilitators of reporting medication errors.

Table (5) indicated comparison between the mean and standard deviation of barriers of reporting medication error and studied nurses demographic criteria, it was founded that there was no statistical significant differences regarding nurse's marital status, job experience and the studied domains of barriers of reporting medication errors. While there was statistical significant difference between nurses gender, job satisfaction and managerial factors as a barrier of medication error reporting p=0.000 and 0.004 respectively. Also there was statistical significant difference between nurses level of education, service unit and process of reporting p=0.005 and 0.001 respectively. As regard nurses employment status there was statistical significant difference regarding fear factor as a barrier of reporting medication error reporting p== 0.004 .

Table (1): Frequency distribution of the studied sample as regards to socio-demographic characteristics.

Variables	No =80	%
Gender:		
Male	**12**	**15%**
Female	**68**	**85%**
Age:		
>25 year	**15**	**18.75%**
25 - <35	**40**	**50%**
35 and more	**25**	**31.25%**
M ± SD	27.7 ±3.4	
Marital Status:		
Single	**18**	**22.5%**
Married	**62**	**77.5%**
Level of education:		
Diploma	**42**	**52.5%**
Technical Institute	**26**	**32.5%**
Bachelors	**12**	**15%**
Service Unite:		
General Unit	**26**	**32.5%**
I C U	**34**	**42.5%**
Dialysis	**20**	**25%**
Employment status:		
Official	**21**	**26.3%**
Contract	**59**	**73.8%**
Work shift:		
Morning shift	**68**	**85%**
Afternoon	**11**	**13.8%**
Night	**1**	**1.3%**
Job experience:		
< 5 years	**13**	**16.3%**
5 -10 years	**39**	**48.8%**
➢ 10 years	**28**	**35%**
M± SD	7.3± 1.9	
Job Satisfaction:		
Satisfied	**69**	**86.3%**
Non Satisfied	**11**	**13.8%**

Table (2): Types, stages and causes of medication errors as reported by studied sample in percentage distribution (n=80)

Medication Error	N %	Rank
Types of Error:		
Wrong route	23 (28.8%)	1
Changing of medication	20 (25%)	2
Frequency of medication	19 (23.8%)	3
Wrong drug	18 (22.5%)	4
Wrong Dose	17 (21.3%)	5
Wrong patient	16 (20%)	6
Wrong time	15 (18.8%)	7
No medication	13 (16.3%)	8
No or wrong date	12 (15%)	9
Wrong documentation	11 (13.8%)	10
Stages of Error:		
Missing of medication(Nurse)	28 (35%)	1
Patient monitoring (Nurse)	25 (31.3%)	2
Physician ordering(Physician)	22 (27.5%)	3
Administration (Nurse)	20 (25%)	4
Pharmacy dispensing(Pharmacist)	18 (22.5%)	5
Transcribing (Pharmacist)	17 (21.3%)	6
Causes of Error:		
Heavy workload	41 (51.3%)	1
Personal neglect	22 (27.5%)	2
Insufficient training	21 (26.3%)	3
Complicated prescription	19 (23.8%)	4
New staff	18 (22.5%)	5
Unfamiliarity with patient's condition	17 (21.3%)	6
Unfamiliarity with medication	16(20%)	7

Table (3): Barriers of reporting to medication errors among studied nurses in percentage distribution: (n=80)

Barriers	St. Disagre %	Disagre %	Uncertain %	Agree %	St. Agree %	M ± SD
1- Fear Factors						
The impact of reporting of errors on the personnel's annual evaluation	13.8	18.8	11.3	26.3	30.0	3.40± 1.43
The impact of reporting of errors on their salary and benefits	8.8	23.8	7.5	38.8	21.3	3.4± 1.23
Being blamed by nursing heads	15.0	20.0	16.3	31.3	17.5	3.16±1.34
Being blamed by doctors	17.5	31.3	22.5	17.5	11.3	2.73±1.26
Being blamed by colleagues	20.0	32.5	21.3	18.8	7.5	2.61±1.21
Producing side effects in patients	7.5	6.3	1.3	26.3	58.8	4.22±1.22
Being labeled as incompetent nurses and inadequacy	12.5	16.3	6.3	36.3	28.8	3.52±1.38
Colleagues' behavior	17.5	15.0	2.5	42.5	22.5	3.37±1.43
Expressing a negative attitude towards the nurse(s) making errors	8.8	17.5	3.8	53.8	16.3	3.51±1.211
Judicial issues following reporting on medication errors	8.7	10.0	11.3	42.5	28.8	3.75±1.95
Informing colleagues working in other units and other facilities about one's medication error	8.8	21.3	7.5	32.5	30.0	3.53±1.34
Total M ± SD	**37.24± 9.6**					
2- Managerial factors						
Lack of receiving positive feedback from the nursing heads following to report on medication errors	3.8	5.0	11.3	27.5	52.5	4.20±1.07
-False beliefs in nursing heads and managers.	3.8	11.3	8.8	45	31.3	3.88±1.09
-The heads' focus only on finding the culprits and blaming them, regardless of other factors involved in the occurrence of errors	7.5	12.5	11.3	42.5	26.3	3.67±1.209
-Disproportionate reactions of the heads to the error seriousness	2.5	7.5	3.8	30	55	4.312±1.038
-Disproportionate reactions of the heads to the error importance	2.5	7.5	3.8	30	55	4.321±1.038
Total M± SD	**16.7± 3.6**					
3- Process of reporting:						
Not paying attention to the reporting on some medication error	5.0	7.5	7.5	53.8	26.3	3.88±1.04
Lack of a clear definition of medication errors	5.0	8.8	7.5	43.8	35.0	3.95±1.11
Forget reporting on the medication errors	7.5	10.0	17.5	33.8	31.3	3.71±1.22
Total M± SD	**11.55± 2.76**					

Table (4): Perception of nurses about facilitators of reporting medication errors in percentage distribution (n=80):

Items	St. Disagre %	Disagre %	Uncertain %	Agree %	St. Agree %	M ± SD
Anonymous reporting	40.0	11.3	15.0	16.3	17.5	2.60±1.56
Benefits of reporting	13.8	2.5	16.3	52.2	15.0	3.52±1.20
Feeling safe about working environment	8.8	11.3	20.0	43.5	16.3	3.47±1.15
Harm to patient or patient's vulnerability	12.5	12.5	26.3	13.8	35.0	3.46±1.40
Good relationship with nurse managers	11.3	6.3	20.0	17.5	45.0	3.78±1.37
Errors in principles of medication administration	8.8	6.3	40.0	17.5	27.5	3.48±1.21
Good professional relationship with physicians	7.5	7.5	20.0	38.8	26.3	3.68±1.16
Total M± SD	**24.02± 5.72**					

Table (5): comparison between barrier of reporting medication error and demographic criteria of studied nurses. (n=80)

Items	Barriers of reporting medication error		
	Fear Factor	**Managerial Factor**	**Process of reporting**
Gender:			
Male	35.53±10.40	15.86±4.76	10.40±2.47
Female	38.34±8.05	17.51±2.92	11.28±2.21
t-test	1.15	1.73	1.37
p-value	.684	.000	.216
Marital Status:			
Single	38.11±8.8.	17.74±2.92	11.27±2.38
Married	37.04±7.89	15.77±4.07	10.72±1.93
t-test	.501	2.41	.958
p-value	.061	.047	.621
Level of education:			
Diploma	39.17±7.05	17.52±2.85	10.62±2.46
Technical Institute	35.42±11.50	18.28±3.37	12.47±1.40
Bachelors	37.65±7.40	15.45±3.76	10.70±2.10
ANOVAs	1.34	4.31	5.61
p-value	267	.017	.005
Service Unite:			
General Unit	40.48±5.78	17.88±2.76	12.11±1.42
I C U	37.75±9.67	17.53±2.54	10.89±2.57
Dialysis	35.15±1.77	16.15±4.41	10.34±2.34
ANOVAs	2.692	2.012	3.59
p-value	.074	.141	.001
Employment status:			
Official	37.96±11.41	18.50±3.22	11.42±2.63
Contract	37.75±6.66	16.52±3.26	10.96±2.06
t-test	.104	2.59	.877
p-value	.004	.646	.242
Job experience:			
< 5 years	39.09±8.62	16.42±4.16	11.28±2.23
5-10 years	37.88±8.31	17.19±3.30	11.72±1.52
>10 years	36.62±8.96	17.91±2.56	10.08±2.88
ANOVAs	.465	1.099	4.11
p-value	.630	.338	.020
Job Satisfaction:			
Satisfied	38.54±8.86	17.56±2.95	11.31±2.38
Non Satisfied	36.12±7.58	16.37±4.12	10.66±1.94
t-test	1.16	1.45	1.17
p-value	.184	.004	.375

IV. Discussions:

Medication safety is a complex issue especially in hospital environments with their complex mix of technological and human systems. Patient safety dependent on a variety of processes intended to ensure that they receive the appropriate treatment with minimum medication errors**.(Henry, and Foureur 2007**). Identification and reduction of medication errors requires a system to be designed for finding the root causes of occurring them **(Beyea,Hicks, and Becker 2003).**

The study results showed that the rout of medication and changing of medication were the highest ranking two types of medication errors, however the lowest ranking types of medication errors were due to wrong date and wrong documentation. The possible explanation is may due to numerous routes of pediatric drug administration and doctors in our society can change medicine without telling nurse in charge. This results come in contrast with **Al Shara (2011**) who indicated that choosing the wrong patient or the wrong dose were the two leading types of medication errors, while the lowest leading types of medication errors were due to frequency of medication and changing of medication.

Results of this study indicated that nurses, physicians and pharmacists were involved in all stages of medication errors. However nurse was the most responsible person for occurrence of medication errors especially through missing of medication, patients monitoring and during administration of medication to child, followed by a physician who prescribe and order the medication and finally the pharmacist during medication transcribing and dispensing, this may results from availability of different preparation of the same drug combined with diverse formulation for pediatric administration were reported to increase the risk of error. These results come in contrary with the results of **Ashcroft et al (2003) and Dibbi et al (2006**) mentioned that physicians had been committed the most medication errors followed by pharmacists and then nurses. This may due to over duties up on Egyptian nurses that can associated with errors.

As regard causes of medication error, the results of this study indicated that more than half of studied nurses believed that multiple causes were involved in medication error. The three main causes that they stated to

be involved were heavy workload, personal neglect and insufficient training. This results supported by **Al-Shara (2011**) who observed that many medication errors were due to heavy workload (41.4%) and new staff (20.6%). In contrast, **Stratton et al (2004**) reported that distractions and interruptions, nurse to-patient ratios and volumes of medications administered were the main factors of medication errors and only 5% of the nursing staff considered lack of knowledge as an effective factor affecting the incidence of medication errors. Also studies made by **Cowly,Williams and Cousins (2001) & Holdsworth et al (2003)** identified the contributing factors by nurses for the occurrence of medication error as distractions, increased workload and inexperienced staff. The sources of nurses' distraction were other patients, coworkers or events on the unit. Another study indicated that physical environment variables, such as insufficient space for documentation for charting (78.6%) were perceived in leading to medication errors. In addition, staff and organizational variables include overwork and stress (70.2%) and inadequate staffing as primary reasons for medication administration errors (**Mahmood, et al 2011).**

Concerning barriers of reporting to medication errors, the results of this study indicated that the strongest perceived barriers of reporting were fear from consequences of reporting, standardized mean of this sub-score was between 3.16-4.22, indicating that fear barriers to reporting were located between uncertain and agreement. Then factors related to managerial factor and then related to the process of reporting from the nurse's viewpoint. While results of **Koohestani and Baghcheghi (2009)** showed that managerial factor was the most one causing not reporting on medication errors, and other factors including factors related to the process of reporting and fear of the consequences of reporting had the next priorities for not reporting on medication errors from the viewpoint of nurses.

As regard fear from the consequences of reporting most of nurses strongly agreed that fear from producing side effects in patients and fear from the impact of reporting of errors on the personnel's annual evaluation were the common barriers to medication errors reporting. A similar study by **Tol et al (2011)**identified that fear of legal liability, job threat, economic adverse effects, face saving concerns, and adverse consequences of reporting for the individual are the most important barriers to error reporting. While another study carried out by **Hosseinzadeh, Aghajari and Mahdavi (2012)** indicated that the most important reasons for not reporting on medication errors were fear of being blamed, fear of being labeled as incompetent nurses and inadequacy, fear of their future professional career, fear of judicial issues, and adverse reactions of their heads and colleagues**.**

As regard managerial factors as a barrier of medication error reporting, the main concerns of nurses were from disproportionate reactions of the heads to the error seriousness and importance in (55%) as well as lack of receiving positive feedback from the nursing heads following to report on medication errors in (52.5%) of them. **Tol et al (2011)** stated that the heads focus only on finding the culprits and blaming nurses, regardless of other factors involved in the occurrence of errors, had the greatest impact on not reporting medication errors from the viewpoints of nurses. Also another study finding carried out by **Aboshaiqah (2013**) suggests that focusing on poor work and wrong or unacceptable behaviors with no positive feedback for giving medication correctly and too much emphasis on MAE as a quality indicator of nursing care were the barriers that indicated instructor's management and attitudes toward medication administration errors.

Concerning barriers related to process of reporting, the current study indicated that not paying attention to the reporting on some medication errors and lack of clear definition to medication errors were the most relevant barriers in this study. This results agreed with **Kouhestani and Baghcheghi (2009)** that introduced not paying attention to the reporting on some medication errors as the most important reason for not reporting on medication errors. And **Tol et al (2011**) who stated that lack of a clear definition of medication errors was the most important variable influencing not reporting on medication errors from the studied nurses' viewpoints.

According to the ethical principles of non-malfeasance and beneficence, the ethical and moral duty of healthcare providers is to prevent harm and to benefit patients. Implementing effective error reporting systems require careful consideration in order to modify and reduce the barriers to reporting medication errors (**The quality care committee of the AAPA, 2010).**The results of the present study indicated that good relationship with nurse managers and physicians, knowing benefits of reporting and feeling safe about working environment were the most facilitators of reporting medication errors. Most surveys have placed a high emphasis on the importance of a safe environment for error reporting. As safer environments will increase the rate of medication error reporting(**Hughes and Ortiz 2005 & Karavasiliadou and Athanasakis 2014).**

As regard comparison between nurses characteristics and domain of barrier on medication error reporting, the results indicated that there was no statistical significant differences regarding nurse's marital status, job experience and the studied domains of barriers for reporting medication errors, this may because this two variables had no impact on reporting domain as a barriers to medication administration errors, as most of nurses not paying attention to the reporting of medication error and lack of dosage guidelines for pediatric population. This results come in accordance with **Zahmatkeshan, et al (2010)** that studied variables, including: age, experience, work experience in the ICU and employment, the study found no statistically

significant relationship between experience and medication errors .Also the current study found statistical significant difference between other nurses' demographic variables as nurses gender and managerial barrier of medication error reporting as female nurses perceived more barrier to reporting than male, this may because large number of female nurses than males in nursing profession..A study made by **Hajibabaei et al (2011)** expressed significant relationship between gender and medication errors as medication errors by men were more than female.

Also the current study found significant difference between nurses service unit and reporting barrier of medication error administration especially in general unit than specific units, this could be attributed to the nature of work in general units that characterized by large number of patients and multiple medications prescription that could require high number of medication administration which causes more liability and opportunity to the risk and incidence of medication errors. **Dabaghzadeha et al (2013)** found that the higher workload and acuity demands create an environment that carries a greater risk of errors and high rate of reporting reflecting these errors.

The present study found a statistical significant difference between nurses employment status, job satisfaction and the perceived barriers to report medication errors especially for official and satisfied work pediatric nurse that have positive risk barrier to medication error reporting in the form of fear and managerial barrier. This probably can occur when a person had family or wants to serve their reputation among their colleague in the work setting. **Arakwawa, Kanoya and sato(2011)** emphasized that nurses might perceive that safe work climate could be related to their unreporting of medication errors. This could be attributed to that the culture of reporting errors still underdeveloped in these units

V. Conclusion:

Medication administration errors result from interrelated factors, concerning the types of errors (wrong rout and changing medication),the highest stages of medication errors done by nurses (missing of medication, patients monitoring and medication administration) and causes of errors (heavy workload and personal neglect). The results of this study indicated that the strongest perceived barriers to MAE reporting were fear from consequences of reporting, and then factors related to managerial factor and then factors related to the process of reporting from the nurse's viewpoint. The results indicated that good relationship with nurse managers and physicians, knowing benefits of reporting and feelings safe about working environment were the most facilitators of reporting medication errors. Also the current study found significant statistical difference between nurses demographic criteria such as gender, level of education, job satisfaction, service unit ,employment status and barriers domains to reporting medication errors.

VI. Recommendation:

Based on the results of the current study the following recommendations for a safer pediatric medication administration:

a) Assessment of medication errors should be done periodically
b) Periodic training of nurses and nurse managers on aims, benefits, and processes of medication error reporting through lectures, projects, simulation methods, practice and other didactic measures in special medication errors' fields (e.g. medication calculation skills, distractions/interruptions).
c) A designed in-service training program about medication administration either in the computer for easy use or in a written policy for the unit must be offered.
d)Future studies addressing avoidance of errors in pediatric medicine should therefore focus on nurse workloads and on developing appropriate guidelines for the use of specific medications in a pediatric setting to increase the level of professional preparation of pediatric nurse.

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