



RESEARCH ARTICLE

REPORTING NURSES' MEDICATION ERRORS IN THE PEDIATRIC EMERGENCY  
DEPARTMENTS IN SAUDI ARABIA

\*Manal F. Al-Harbi, R. N.

PhD College of Nursing - King Saud University

ARTICLE INFO

Article History:

Received 26<sup>th</sup> June, 2017  
Received in revised form  
12<sup>th</sup> July, 2017  
Accepted 09<sup>th</sup> August, 2017  
Published online 30<sup>th</sup> September, 2017

Key words:

Emergency Department,  
Medication Errors,  
Pediatric Nurses,  
Saudi Arabia.

ABSTRACT

**Aim:** The main purpose of this study is to determine the factors which influences pediatric emergency nurses to report medication errors.

**Methods:** The study utilized descriptive correlation design with 200 conveniently selected pediatric emergency nurses from the tertiary hospitals in Saudi Arabia. SPSS Ver. 17.0 to was used to determine the average weighted mean, standard deviation and rank.

**Results:** The fear towards the consequences, being blamed, and punishment by the organization hinders the nurses from reporting medication errors. However, the nurses will likely report errors when the incidence is potentially or absolutely harmful to their pediatric patients. When the incident is perceived beneficial and without fear of retaliating, it is more likely that errors are reportable. The positive relationship of the nurses to their supervisors also influences the likelihood of reporting the error.

**Conclusion:** Accountability and fear are barriers to pediatric emergency nurses to conceal the errors. The administrative role in education and trainings, utilization of research, and standardization of operating procedures are recommended to create a flawless reporting system. This will make reporting mandatory, or nurses become driven to voluntarily report which will enhance the patients' safety and ensure delivery of quality health care.

Copyright©2017, Manal F. Al-Harbi. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: Manal F. Al-Harbi. 2017. "Reporting Nurses' Medication Errors in the Pediatric Emergency Departments in Saudi Arabia", *International Journal of Current Research*, 9, (09), 58237-58242.

INTRODUCTION

About 1.5 million preventable injuries due to medication errors occur among hospitalized patients which adds cost in health care services (Aspden *et al.*, 2007; Rinke *et al.*, 2014). Medication errors are a problem in hospitalized patients (Gimenes *et al.*, 2014). This refers to mistakes in the prescription, transcription, dispensing and administration of medication. Errors in medication practices when not caught or prevented can conceivably result to detrimental effects. These errors frequently occur in the emergency department due to the large volume and high average number of medications administered per patient (Croskery *et al.*, 2004; Kaufmann, Laschat & Wappler, 2012). In the study of Scott, Considine and Botti (2014), medications errors in the emergency departments occurs during prescription and administration, and the delays in medication causes dissatisfaction and increased in-patient mortality. Overcrowding in emergency units has been identified as the primary factor inviting errors in administering medications (Thomas *et al.* 2000).

These errors in the emergency department, according to Blank *et al.* (2011), are not due to difficulty in leaning new technologies or drugs but also with the poor compliance of nurses to the basic principles of medication. Furthermore, nurses are also substantially accountable to medication errors among hospitalized children. In pediatric clients, the health risks are higher and serious than the adults. The Institute of Medicine in USA (2006) reported that a 0.3 prescribing error in adults is less serious compared to the 0.1 per pediatric patient per day which is 19.5% were more serious than the former. Koren (2002) showed that that the 10-fold likely medication errors in children is due to the miscalculation of pediatric drug dosage. Nurses are responsible in ensuring the correct medication administration at the right time and patient (Hughes & Edgerton, 2005). Monitoring the patients for both the therapeutic and adverse effects are also part of the nurses' role. However, several studies presented that patients manifesting the drugs' undesirable effects are not frequently reported. Reporting medication errors are generated by the nurse who identifies the errors and then forwarded to the managements, quality departments or risk management departments. Reporting systems are dependent on the nurses' ability to recognize that an error has occurred, belief that the error warrants reporting, belief that the nurse committed the

errors, the willingness to overcome embarrassment, and fear of retaliation for having committed a medication error (Stratton, 2004; Chua, 2010). Several organizations worldwide are instituting measures which will improve patient safety relevant to medication administration, and this does not exempt the kingdom of Saudi Arabia. According to Mohammad (2014), reporting of medication errors were less recounted in Saudi Arabia compared to the United States of America. The incidence can be accounted to the latter's transparent system of reporting the errors. Aljadhey *et al.* (2014) reported that underreporting of medication errors and adverse reactions has been one of the challenges of medication safety in Saudi Arabia. Among pediatric clients, medication errors accounted 10% of the overall 1,356 cases in Saudi Arabia (Mohammad, 2014). In 2014, only 129 out of 722 cases of errors were only confirmed by the Ministry of Health Statistics. These reports supported the recommendations of Aboshaiqah (2013) based on research findings that administrative support play a significant role in securing a safety culture in the health care facilities of Saudi Arabia. Nurses from various hospital units in a Saudi tertiary hospital showed that administrative response and blaming the nurses were perceived as main barriers to reporting medication errors (Aboshaiqah 2013; Mohammad, Aljasser & Sasidhar 2015). The fear of blame, punishment, difficulty in completing forms, inadequate reporting, and the lack of clarity on the procedures were found as reasons for both nurses and physicians to not report medication errors (Alduais *et al.*, 2014). Predictors, such as degree of education and nationality, have also been linked to underreporting (Mohammad, Aljasser & Sasidhar 2015). However, there are no existing studies which are specifically relevant to reporting medication errors among the nurses working in the pediatric emergency units in Saudi Arabia. Due to the limited research findings in Saudi Arabia, the high incidence of errors in the emergency departments and the safety of pediatric clients toward medication errors, this study aimed to explore factors which impact the pediatric emergency nurses to report medication errors in the emergency settings.

## METHODS

### Study Design

The study used descriptive cross-sectional and correlational approach to explore the factors that influence emergency pediatric nurses to likely and unlikely report medications errors.

### Population and sample

The target population are nurses working in the pediatric unit of the emergency departments in Saudi Arabia. The eligibility criteria include (1) working in the pediatric emergency department, (2) with hospital experiences of 3 months or more, (3) belonged to the two selected tertiary hospitals in Saudi Arabia. The criteria were specifically relevant to the primary aim. The participants were conveniently selected and generalization will only be limited to the areas covered in the study.

### Sample Size and Power

By using power analysis by Raosoft Incorporated, a sample of 200 participants is recommended with alpha 0.05, power 0.80 and effect size of 0.50. In this a study, a total of 350 pediatric

emergency nurses were invited, 263 were eligible but 200 were included after excluding questionnaires with missing data.

### Data Collection

After ethical clearance was approved by the Institutional Review Board, data collection was performed which was from January to June 2014. Recruitment was done through poster invitations and facilitation from the heads of the pediatric emergency departments. The questionnaire used in the survey was the *Nurses' Perceptions About Reporting Medication Errors* which was developed by the researcher. The tool was used to specifically assess the pediatric emergency nurses' perceptions on the factors influencing the like and unlikely to report medication errors. The following databases were used for all searches when the tool was structured: CINAHL, Academic Search Premier, Alternate Health Watch, Health Source: Nursing/Academic Edition, and Medline. Face validity was also established by reviewing previously published survey instruments on medication errors reporting. To establish content validity, the questionnaire was sent to an expert group (n = 4) of reviewers that had strong expertise in survey research and medication error knowledge based on their research and publication records. For reliability testing, a convenience sample of 25 registered nurses working in the Riyadh participated for pilot testing.

The first section asked for the profile characteristics including gender, age, nationality, marital status, economic status, highest level of education, years of clinical experience, time since attending pharmacology course, and their relationship with their family and with other health care professionals. The second section explores the reasons of not reporting medication errors. Items included *the focus on the individual rather than the system, thinking colleagues will feel the nurse is incompetent, feeling the error is not important enough to report, fear of blame, finding reporting to be too detailed or time consuming, afraid of a reprimand, afraid of consequences, and feeling a near-miss is not an error*. Lastly, the third section aimed to determine the factors of likely reporting medication errors. Items included *violation of any of the "five rights" of medication administration, anonymous reporting process, safety of the patient has been compromised, benefits of reporting are identified by nurse, no fear of retaliation in the workplace, positive relationship with supervisor, and positive relationship with physicians*. The tool followed the 2 point Likert-scale which include: "Major Barrier to Not a Barrier" or "Highly Likely to Highly Unlikely".

### Data Analysis

Analysis of data was done using SPSS 17.0 statistical software application for Windows (SPSS Inc. Released 2008. SPSS Statistics for Windows, Version 17.0. Chicago: SPSS Inc.). The gender, age, nationality, marital status, economic status, highest level of education, years of clinical experience, time since attending pharmacology course, and their relationship with their family and with other health care professionals were presented as frequencies, percentages, means, and standard deviations to describe demographic data. Independent t-tests and analysis of variance (ANOVA) was calculated with appropriate post-hoc tests to determine if there were significant differences between the means. A significance level of .05 was used for all of the analysis.

## Ethical Considerations

Informed consents were obtained which confirms their voluntary participation. Confidentiality of the information obtained was preserved by minimizing the likelihood that any data can be tied to the identity of any participant. It was emphasized with participants that data was not being collected specific to any medication errors, but instead focused on the dilemma that surrounds the decision to report the medication event. The data collection method posed no risk to participants.

## RESULTS

### Profile characteristics

As shown in Table 1, the majority of the participants are female (93.0%), non-Saudi (72.5%), belonged to age group 30-39 (41%), and were married (66%). Most of the participants has fair economic status (70%) and earned a bachelor's degree in nursing (60.5%).

**Table 1. Profile characteristics of pediatric nurses in the emergency department (N=200)**

Demographic characteristics	n	%
<b>Sex</b>		
Male	14	7.0
Female	186	93.0
<b>Nationality</b>		
Saudi	55	27.5
Non-Saudi	145	72.5
<b>Age group</b>		
20-29	61	30.5
30-39	82	41.0
40-49	40	20.0
50-59	17	8.5
<b>Marital Status</b>		
Single	63	32.0
Married	131	66.0
Divorced	6	3.0
<b>Economic Status</b>		
Fair	20	10.0
Good	140	70.0
Excellent	40	20.0
<b>Educational Status</b>		
Diploma	75	38.0
Bachelor	120	60.5
Post-graduate	3	1.5
<b>Years of clinical experience</b>		
0-5	17	8.5
6-10	45	22.5
>10	138	69.0
<b>Years of attending nursing pharmacology course/s</b>		
<1	22	11.0
1-2	33	16.5
3-4	25	12.5
5-6		

The participant's working experience after graduation is mostly >10 years (69%) and has had mostly 1-2 years attending nursing pharmacology courses (60%). Table 2 presented that the nurses agreed that their inter-professional relationship was excellent with the ED head nurse (75.5%), physicians (78.0%), pharmacists (85.0%), and the family of the patients (89.5%). Nevertheless, the relationship between the nurses and their fellow staff nurses was perceived as the highest (90.0%).

**Table 2. Level of Nurses Relationship with ED Staff (n= 200)**

ED Staff	Poor n; %	Fair n; %	Good n; %	Excellent n; %
Head Nurse	0;0	0;0	49; 24.5 %	151; 75.5 %
Staff Nurses	0;0	0;0	20; 10.0 %	180; 90.0 %
Physicians	0;0	0;0	44; 22.0 %	156; 78.0 %
Pharmacists	0;0	0;0	30; 15.0 %	170; 85.0 %
Family of the patients	0;0	0;0	21; 10.5 %	179; 89.5 %

### Reasons to unlikely report medication errors

Results in Table 3 showed that when something happens to the child due to medication errors (M= 2.8, SD=1.00), the nurses perceived this as a major barrier to reporting. Other reasons for not reporting medication administration errors were ranked as follows: fears of the consequences (M= 2.8, SD= 1.05), fear of getting reprimanded (M= 2.7, SD= 1.04), reporting is so detailed and time consuming (M= 2.5, SD= 0.92), and blaming the nurses than the system (M=2.5, SD=1.03).

### Reasons to likely report medication errors

Participants will highly likely report medication administration error when the incident harms the child (M=2.9, SD= 0.39). The nurses will also report the errors when there are benefits (M=2.9, SD= 0.42). Having no fear from work retaliation (M=2.8, SD= 0.46), it is more likely to expect reporting. Other reasons include positive relationship with physicians (M= 2.8, SD=0.51), and if their identity is preserved as anonymous when reporting (M=2.8, SD=0.54).

## DISCUSSION

Pediatric patients are more sensitive to the effects of the drug compared to adults. Any significant changes in the recommended dosage will most likely show the untoward effects on the child. Based on the findings presented, the nurses will least likely report the error when the child's well-being is harmed by the drug. When the pediatric client manifest adverse reactions to the drug, this induces fear among nurses.

Hence, it is fear which served as the primary barrier to reporting medication errors by the pediatric emergency nurses. Fear can also be towards the consequences, punishment and being blamed for the error these nurses committed. When one commit mistakes, the person will expectedly suffer from the consequences of his action. In the study of Stratton *et al.* (2004), pediatric nurses identified the nursing administrators focus on the person who committed the mistake and not the flawed system which motivates them to conceal the fault. The nurses have the tendency to fear from getting reprimands thus they opted for self-preservation rather than getting into trouble and be standing out from the crowd (Walker & Lowe, 1998). Alduais *et al.* (2014) presented similar results among physicians and nurses from nine hospitals in Saudi Arabia that the fear of punishment loses nurses and physician's interest of reporting the medication errors. Disciplinary actions including job loss can affect the reporting rates. The fear of blaming was also common response of not reporting the medication errors. Staff nurses fear of being revealed and be labelled as someone who has made a medication error. Some of the results were similar to the studies conducted in the different hospitals in Saudi Arabia by Alduais *et al.* (2014), Aboshaiqah (2013), and Mohammad, Aljasser and Sasidhar (2015).

**Table 3. Perceived likelihood to report medication errors**

Item	Not n; %	Minor n; %	Moderate n; %	Major n; %	Mean	SD	Rank
1. At our facility, the blame is on the individual than on the system as a potential reason for medication error	40; 20%	50; 25%	70; 35%	40; 20%	2.6	1.03	5
2. Others will think that nurses are not competent	30; 15%	70; 35%	70; 35%	30; 15%	2.5	0.94	7
3. Nurses think that errors are not important for reporting	40; 20%	20; 10%	120; 60%	20; 10%	2.6	0.92	4
4. If something happens to the client due to medication error, nurses will be blamed	30; 15%	30; 15%	84; 43%	56; 28%	2.8	1.00	1
5. Reporting medication errors require details and are time-consuming	40; 20%	56; 28%	72; 36%	32; 16%	2.5	1.00	8
6. Nurses are afraid to be reprimanded if they report medication errors	32; 16%	48; 24%	66; 33%	54; 27%	2.7	1.04	3
7. Nurses are afraid of the consequences if they report medication errors	32; 16%	44; 23%	64; 32%	60; 30%	2.8	1.05	2
8. If the medication error occurs but the effects were preventable, nurses does not have to report necessarily	40; 20%	56; 29%	60; 30%	44; 22%	2.5	1.05	6

**Table 4. Perceived likelihood to not report medication errors**

Item	Highly Unlikely n; %	Undecided n; %	Highly likely n; %	Mean	SD	Rank
1. If any of the 10 rights of drug administration were violated	21; 11%	29; 15%	150; 75%	2.6	0.66	6
2. If the reporting considers anonymity	31; 16%	30; 15%	139; 70%	2.5	0.75	7
3. If the harmful, or potentially could have been, to the patient	5; 3%	12; 6%	183; 92%	2.9	0.39	1
4. If reporting is beneficial	6; 3%	15; 8%	179; 90%	2.9	0.42	2
5. If nurse have no fear of retaliation	8; 4%	16; 8%	176; 88%	2.8	0.46	3
6. If the nurse has positive relationship with the ED nurse supervisor or clinical manager	12; 6%	18; 9%	170; 85%	2.8	0.54	5
7. If the nurse has positive relationship with the ED doctors	9; 5%	24; 12%	167; 84%	2.8	0.51	4

This study presents that fear hinders pediatric emergency nurses to report whereby eliminating the concept of work retaliation can help nurses accept the mistake and inform the organization and follow the protocol of reporting the error. Reporting errors which are free from blaming has also been recommended by McFadden (2006) to diminish fear. A positive relationship with physicians enhances the confidence of the pediatric emergency nurses to follow the operating procedures of reporting. According to McFadden (2006) and Hung *et al.* (2015), one of the recommended critical strategies in improving reporting of medical error system in the hospitals is partnership and the open discussion of errors.

Moreover, benefits were perceived by the pediatric emergency nurses as valuable to report errors as well. The pediatric emergency nurses wanted their identity be preserved as anonymous when reporting out of fear. Wakefield *et al.* (2001) found a strong association between the likeliness to report the error when in a group-oriented culture versus hierarchal or rational culture. In groups, nurses are people-oriented supportive and mutual trust is built. In contrast, the latter, controlling, efficiency and production are more given much value over the person. Frith (2012), agreed to mutual trust and a blame-free culture as a strategy. It is recommended that the reports made should not be used against the reporters or the culprit (Frith, 2012). Farag *et al.* (2017), showed that emergency nurses are more willing to report errors if they received feedbacks and when their emergency nurse managers

use transactional leadership. In this leadership, the nurse managers communicate and define expectations where errors are treated as expectations in most hospitals. Hung *et al.* (2015) added that the attitude of the nurse managers and staff likely influences nurses to report the errors. Thus, open communication and recognizing errors must be institutionalized in the hospitals. These study findings and recommended strategies aimed at reducing fear which consequently make errors reporting voluntary and perhaps become mandatory. The system of reporting medication errors has been perceived by the pediatric emergency nurses as too detailed which consumes a lot of time. According to Alduais *et al.* (2014), physicians and nurses in Saudi Arabia find the standard operating procedures relevant to medication practices as complex. The lack of clarity and proper orientation on medication administration are reasons to the poor adaptation of hospital employees to the protocol. Frith (2012) recommended clarity in the guidelines and procedures, clear forms and documents, and using computer systems as possible primary strategies. Nurses are recommended to be oriented and trained on the proper procedures and protocols other than reporting medication errors. Thus, this present study recommends establishment of concrete preventive strategies of the occurrence of medication errors by the organizations in the emergency units handling pediatric clients. In so doing, nurses will not suffer from the dilemma of reporting or not. According to several studies, educational preparation during college years can significantly impact the nurses' probability

of committing medication errors. Pre-registration nurses felt that more time should be allocated in nursing pharmacology course (Morrison- Griffith, 2002). In fact, most nurses claimed overall dissatisfaction towards pharmacology courses during their college years (King, 2004). Thus, the inadequate preparation among undergraduate nursing students to pharmacology courses predispose them to commit errors (Manias & Bullock, 2002). These studies do not indicate the exact nature of pharmacology of courses, but these findings are ample to propose that nursing education can greatly ensure medication-patient safety and improve nurse's knowledge and skills in medication practices (Page & McKinney, 2006).

Due to the number of medication errors that occur and the potential for serious outcome in the emergency departments with pediatric clients, it is crucial that these nurses report error in a timely and efficient manner. Reducing the barriers and nurturing the motivators toward reporting medication errors will ensure safety in the clinical settings. Frith (2012), recommended that reporting should be made mandatory in such a way that the policy encourages nurses to concede to the mistake in order to promote patient safety. Providing feedbacks and an open discussion of the errors were strategically recommended by McFadden (2006) and Frith (2012). Whether the nurses are the source of error, a contributor, or an observer, the hospitals rely on nurses as the front-line staff to recognize and report errors in drug administration.

The study was limited to descriptive and without creating predictions. Though there were no predicted outcomes, the findings fill the gap in the literature by describing perceptions of the pediatric emergency nurses at one point in time which could be considered as another limitation. The samples were limited to one region in Saudi Arabia and that the results could be influenced by several factors. The use of survey tool limits the responses of the nurses; thus other methods are recommended. Though threats to the study's validity existed, this study represents a preliminary exploration into these important research questions. The study further commends exploring correlation or regression analysis between the perceived barriers and motivators to reporting medication errors with the demographic profiles of the nurses. The health care system of Saudi Arabia has been described as multi-cultural and female-dominated. These perhaps may serve as intervening factors to the perception of nurses towards reporting medication errors.

## Conclusion

Research and participation of the administrative organization may address issues on accountability and fear which are barriers to reporting medication errors among pediatric emergency nurses. Education and training on medication administration procedures in emergency situations among pediatric patients is recommended to advance competencies, improved decision-making, and reduce errors. Policies must be enhanced to create a flawless system on reporting medication errors so that pediatric emergency nurses are mandated or driven to voluntarily report medication errors without fear within a blame-free clinical environment. Patient safety programs can be strengthened through timely, accurate and comprehensive reporting, ultimately ensuring the highest quality of pediatric nursing care during emergency situations.

## REFERENCES

- Aboshaiqah, A. 2013. Barriers to Medication Administration Errors as Perceived by Nurses in Saudi Arabia. *Middle-East Journal of Scientific Research*. 17 (20): 130-136.
- Alduais, A.M.S., Mogali, S., Al Shabrain, B., Al Enazi, A., Al-awad F. 2014. Barriers to reporting medical errors in public hospitals in Riyadh city: A survey-study. *Journal of Nursing and Health Science*. 3 (5): 72-85.
- Aljhadey, H., Mahmoud M.A., Hassali M.A., Alrasheedy, A., Alahmad, A., Saleem, F., Sheikh, A., Murray, M., Bates, D. 2014. Challenges to and the future of medications safety in Saudi Arabia: A qualitative study. *Saudi Pharmaceutical Journal*. 22: 326-332.
- Aspden, P., Wolcott, J. A., Bootman, J. L., & Cronenwatt, L. R. (Eds.). 2007. Preventing medication errors: Quality chasm series. Washington DC: National Academies Press.
- Blank, F., Tobin, J., Macomber, S., Jaouen, M., Dinoia, M., Visintainer, P. 2011. A "back to basics" approach to reduced medication errors. *Journal of Emergency Nursing*. 37:141-7
- Blank, F., Tobin, J., Macomber, S., Jaouen, M., Dinoia, M., Visintainer, P. 2011. *Journal of Emergency Nursing*. 32 (2): 141- 137.
- Chua, S. S., Chua, H.M. et al. 2010. Drug administration errors in pediatric wards: A direct observation approach. *European Journal of Pediatrics*. 169(5), 603-611.
- Croskerry, P., Shapiro, M., Campbell, S., LeBlanc, C., Sinclair, D., Wren, P., Marcoux, M. 2004. Profiles in patient safety: medication errors in the emergency department. *Academic Emergency Medicine*. 11:289-99.
- Farag, A., Blegen, M., Gedney-Lose, A., Lose, D., Perkhounkova, Y. 2017. *Journal of Emergency Nursing*. 43 (3): 246-254.
- Frith, K.H., Anderson, E., Fan, T., Fong, E.A. 2012. Nurse staffing is an important strategy to prevent medication errors in community hospitals. *Nursing Economics*. 3 (5): 288-294.
- Gimenes, F.R., Marck, P.B., Atila, E.G., de Boroli Casiani, S.H. 2015. Engaging nurses to strengthen medication safety: fostering and capturing change with restorative photographic research methods. *International Journal of Nursing Practice*. 21: 741- 748.
- Hughes, R., Edgerton, M. 2005. Reducing Pediatric Medication Errors: Children are especially at risk for medication errors. *American Journal of Nursing*. 105 (5): 78- 84.
- Hung, C., Chu, T., Lee, B., Hsiao, C. 2015. Nurses' attitude and intention of medication error reporting. *Journal of Clinical Nursing*. 25: 445-453.
- Institute of Medicine. 2006. Preventing medication errors. Washington, DC. Retrieved from <http://www.nationalacademies.org/hmd/~/media/Files/Report%20Files/2006/Preventing-Medication-Errors-Quality-Chasm-Series/medicationerrorsnew.ashx>
- Kaufmann, J., Laschat, M., & Wappler, F. 2012. Medication Errors in Pediatric Emergencies: A Systematic Analysis. *Deutsches Ärzteblatt International*, 109(38), 609-616. <http://doi.org/10.3238/arztebl.2012.0609>
- King, R.L. 2004. Nurse's perceptions of their pharmacology educational needs. *Journal of Advanced Nursing*. 45 (4): 392-400.
- Koren, G. 2002. Trends of medication errors in hospitalized children. *Journal of Clinical Pharmacology*. 42 (7): 707-710.

- Kosits, L.M., Jone, K. 2011. Interruptions experienced by registered nurses working in the emergency department. *Journal of Emergency Nursing*. 37 (1): 3-8.
- Manias, E., Bullock, S. 2002. The educational preparation of undergraduate nursing students in pharmacology: Perceptions and experiences of lecturers and students. *International Journal of Nursing Studies*. 39 (7): 757-769.
- McFadden, K.L., Stock, G.N., Gowen, C.R. 2006. Exploring strategies for reducing hospital errors. *Journal of Healthcare Management*. 51 (2): 123- 135.
- Mohammad, A., Aljasser, I.A., Sasidhar, B. 2016. Barriers to Reporting Medication Administration Errors in an Accredited Hospital in Saudi Arabia. *British Journal of Economics, Management and Trade*. 11 (4): 1-13.
- Mohammad, I. 2014. Medical errors on the rise. Retrieved from <http://www.arabnews.com/news/519806>.
- Morrison-Griffith S., Snowden M.A., Pirmohamed, M. 2002. Pre-registration nurse education in pharmacology: is it adequate for the roles that nurses are expected to fulfil? *Nurse Education Today*. 22: 447-546
- Page, K., McKinney, A. 2006. Addressing medication errors-The role of undergraduate nurse education. *Nurse Education Today*. 27: 219-224.
- Rinke, M.L., Bundy, D.G., Velasquez, C.A., Rao, S., Zerhouni, Y., Lobner, K., Blanck, J.F., Miller, M.R. 2014. Interventions to Reduce Pediatric Medication Errors: A Systematic Review. *Pediatrics*.134 (2), 338–360.
- Scott, B.M., Considine, J., Botti, M. 2014. Medication errors in ED: Do patient characteristics and environment influence the nature and frequency of medication errors? *Australasian Emergency Nursing Journal*. 17: 167- 175.
- Stratton, K., Blegen, M., Pepper, G. and Vaughn, T. 2004 Reporting of medication errors by pediatric nurses. *Journal of Pediatric Nursing*. 19 (6), 385-392.
- Thomas, E.J., Studdert, D.M., Burstin, H.R., Orav, E.J., Zeena, T., Williams, E.J., Howard, K.M., Weiler, P.C., Brennan, T.A. 2000. Incidence and types of adverse events and negligent care in Utah and Colorado. *Medical Care*.38:261-71.
- Wakefield, B. J., Blegen, M. A., Uden-Holdman, T., Vaughn, T., Chrischilles, E., & Wakefield, D. S. 2001. Organizational culture, continuous quality improvement, and medication administration error reporting. *American Journal of Medical Quality*. 16: 128 – 134.
- Walker S.B., Lowe, M.J. 1998. Nurses' views on reporting medication incidents. *International Journal of Nursing Practice*. 97-102.

\*\*\*\*\*