

## Pediatric Nurses' Medication Error: the Self-reporting of Frequency, Types and Causes

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### Abstract

#### Background

Medication errors (MEs) are the most common types of medical errors which effecting on pediatric safety. For decrease MEs, we should to have information about difference aspects of MEs. We have no study which assessed the frequency, types and causes of MEs made by pediatric nurses, in Iran.

#### Material and Methods

This was a cross-sectional study, which performed on 53 Pediatric Nurses. Data were collected by a self-structured questionnaire for assessment of MEs contained 3 parts: 1- one question about the fact that, do you had MEs in past 3 months; 2- types of MEs occurred (12 items); 3- causes of MEs from nurses' perspective (20 items). The MEs in past 3 months gathered through pediatric nurses' self-report. Descriptive statistics and Chi-square test were used for analysis. Data were analyzed using the SPSS.

#### Results

The majority of participants were female (77.3%), and initial (novice) nurses (33.9%). The results showed that, 31 (58.4%) of nurses were reported at least one MEs history and totally, 131 MEs were occurred in past 3 months. Most prevalent of MEs types were reported: wrong dose (36.6%) and wrong drug preparation (14.5%). Also, most prevalent of MEs causes from Nurses' perspective were reported: poor medication knowledge (96.2%) and poor calculation skills (73.5%).

#### Conclusion

With using of this study results, we can program for prevention/decrease MEs and enhancing pediatric safety. On the basis of this study, actually we should enhancing level of nurses knowledge by education and to carry out special courses for pediatric nurses.

**Key Words:** Drug events, Medication errors, Nurses, Pediatric, Self-report.

\*Please cite this article as: Miladinia M, Zarea K, Baraz Sh, Mousavi Nouri E, Pishgooie AH, Gholamzadeh Baeis M. Pediatric Nurses' Medication Error: Self-reporting of Frequency, Types and Causes. Int J Pediatr 2016; 4(2): 1439-44.

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Received date Dec 25, 2015 ; Accepted date: Jan 22, 2016

## 1- INTRODUCTION

Medication errors (MEs) are among the six categories of medical errors (1-3), and actually those are the most common types (approximately 19.4% of all medical errors) (3-6). Medication error definition is every preventable event that may lead to use of inappropriate medication or patient injury while the medication is in the control of the health care professional (2, 7). MEs are one of the most common causes of iatrogenic damages, which causing patients' mortality and morbidity around the world, and also those are preventable (4, 8). MEs have much direct and indirect costs for health systems (9). The annual costs of problems induced drugs, are approximately more than 150 billion dollars in the America (but, we have no valid statistics of total cost in Iran) (2). In addition, MEs causing decrease patients' trust to the caring teams (for example: non-compliance to drug therapy, treatment methods, educational plans and etc.) (10, 11).

MEs effecting on pediatric safety (12) and are more common in children than other populations (4, 13). Also, pediatric have a much higher risk of injuries induced MEs than adults patients (approximately 10-fold) (12). Pediatric are vulnerable when medication errors occurring. The reasons are including: variations in weight and age, immature physiological buffering systems, quick changes in the drugs' pharmacokinetic, poor knowledge about the correct toxic and therapeutic dosage in children (2, 4, 7, 12).

Nurses spend approximately 40% of their time for medication therapy, therefore they have a key role for reduces MEs and increase patients' safety (9). Prevention of MEs is essential for improving patients' safety and quality of care (14). For programming to decrease MEs by nurses, we should to will have information about difference aspects of MEs. However, some

studies were assessed MEs of nurses or nursing students in Iran, but these studies performed in other wards (ICU, CCU, medical, surgical) or some these studies considered some the aspects of MEs (frequency or types or causes). Hence, we have no study which assessed the frequency, types and causes of MEs made by pediatric nurses in, Iran. Therefore, this study aimed to assess the frequency, types and causes of MEs made by pediatric nurses in Ahvaz, South-west of Iran.

## 2- MATERIALS AND METHODS

### 2-1. Study design and population

This investigation was a cross-sectional study, which performed on 53 Pediatric Nurses of 5 Hospitals affiliated to Ahvaz Jundishapur University of Medical Sciences, Iran during 2014. The inclusion criteria consisted:

- ❖ nurses administering and dispensing medications,
- ❖ nurses working full-time in the pediatric ward,
- ❖ nurses whom have at least 1 year experience in pediatric ward.

Of 96 Nurses who were working in general pediatric wards, 68 nurses had the inclusion criteria and were invited which, 55 of them consented to participate in this investigation (during the study, 2 nurses excluded, because they changed their wards). Finally information of 53 nurses analyzed.

### 2-2. Measuring tools

Data were collected by a demographic characteristics form and a self-structured questionnaire for assessment of MEs contained 3 parts: 1- one question about the fact that, do you had medication errors in past 3 months; 2- types of medication errors occurred (12 items); 3- causes of medication errors from Nurses' perspective (20 items). The questionnaire was structured based on the international

literatures. With using Cronbach's alpha, the reliability of this questionnaire was measured 0.78. Also, the validity was obtained through content validity.

### 2-3. Methods

In this study medication errors in past 3 months gathered through pediatric nurses' self-report. This investigation was approved in the Ethics Committee of the Ahvaz Jundishapur University of Medical Sciences, South-west of Iran.

### 2-4. Data analyses

Descriptive statistics [mean, standard deviation(SD), frequency] and Chi-square test were used for analysis in this study. Data were analyzed using the Statistical Package for the Social Science (SPSS version 16, Chicago, IL, USA). A P-value less than 0.05 was considered significant.

### 3- Results

Demographic variables of participants are shown in (Table.1). Finally information of 53 nurses of 5 pediatric wards of 5 hospitals analyzed. The results of this study showed that, the majority of participants were female (77.35%), and initial (projective) employment status

(33.96%). Also, many of nurses were unsatisfied of their job (47.16%) (Table.1). The study results showed that, 31 (58.49%) of nurses were reported at least one medication error history and totally, 131 MEs were occurred in past 3 months.

Types of MEs occurred and causes of MEs from nurses' perspective are shown in (Table.1 and 2) respectively. In our investigation, most prevalent of MEs types were reported: wrong dose (36.64%), wrong drug preparation (14.50%) and wrong infusion velocity (11.45%) (Table.2); also, most prevalent of MEs causes from nurses' perspective were reported: poor medication knowledge (96.22%), poor calculation skills (73.58%), nurses' fatigue (58.49%) and many medications on multiple patients (52.83%) (Table.3).

Results showed that a significant relationship was found between MEs occurred and gender ( $P=0.02$ ). MEs occurred more frequently in females than male. Also, there was a significant relationship between MEs occurred and employment status ( $P=0.003$ ). MEs occurred was higher in the Initial (novice) nurses.

**Table 1:** Demographic variables of nurses

Variables	Mean $\pm$ SD
Age (years)	31.05 $\pm$ 4.14
Gender	
Male	12(22.64%)
Female	41(77.35%)
Experience in pediatric ward	
Mean of years	6.35 $\pm$ 5.19
Job satisfaction	
Yes	28(52.83%)
No	25(47.16%)
Employment status	
Formal	15(28.30%)
Covenant	9(16.98%)
Contract	11(20.75%)
Initial (novice)	18(33.96%)

**Table 2:** Types of medication errors occurred

Types	Number (%)
Wrong dose	48(36.64%)
Wrong patient	3(2.29%)
Wrong drug type	9(6.87%)
Wrong administration technique	4(3.05%)
Wrong time	7(5.34%)
Drug omission error	11(8.39%)
Wrong infusion velocity	15(11.45%)
Extra dose	1(0.76%)
Wrong drug preparation	19(14.50%)
Drug-drug interaction	0(0.00%)
Wrong diluent	5(3.81%)
Other types	9(6.87%)
Total	131 medication errors reported

**Table 3:** Causes of medication errors from Nurses' perspective

Types	N (%) of Respondents choosing
Poor medication knowledge	51(96.22%)
Poor clinical skill	16(30.18%)
Nurses' incorrect attitude	17(32.07%)
Nurses' fatigue	31(58.49%)
Lack of nurses	43(81.13%)
Physician with illegible handwriting orders	17(32.07%)
Inaccurate verbal orders	8(15.09%)
Look-alike packaging and labeling of drugs	12(22.64%)
Similar sounding and looking names of drugs	8(15.09%)
Carelessness, forgetfulness and inattention	22(41.50%)
Poor calculation skills	39(73.58%)
Many medications on multiple patients	28(52.83%)
Following inadequate	3(5.66%)
Transcription inaccurate	12(22.64%)
Use of drug abbreviation name	13(24.52%)
Nonmetric units used	10(18.86%)
Stress during emergency situation	6(11.32%)
Wards difference routine	16(30.18%)
Lack of information about patient or disease (for example: lack of information about contraindicated)	3(5.66%)
Other causes	8(15.09%)

#### 4- DISCUSSION

This study results demonstrated that, prevalent of medication errors is high in the pediatric nurses (58.49% of nurses reported MEs during 3 months). Also, study by Stratton et al. ( ) showed that, medication errors in pediatric units is prevalent and 67% of pediatric nurses

reported MEs (12). This study findings showed that, most prevalent types of medication errors was wrong dose (36.64%). Also, "wrong dose" was the most prevalent type of MEs in pediatric wards in the studies by Nori et al. (33%), Al-Jeraisy et al. (22.1%) and Cimino et al. and these studies are consistent with the our investigation (4, 7, 15). Also, study by

Philips et al. (2001) explained administration of the incorrect dose of drug is the most prevalent type of error causing in death (16). In a systematic review, Miller et al. (2007) suggested, standardization of recommended drug doses and what doses are in error for pediatric are an essential and first step to enable caregivers and prevent of medication errors (17). Hence, we should programming for increase knowledge to the decrease wrong dose during administration phase of drug.

Also, most prevalent of MEs cause from nurses' perspective were poor medication knowledge (96.22%). But, in the study by Karen et al. (2004), the distractions and interruptions were the most prevalent of MEs causes (50%) (12). It may be due to difference in health system, educational system and etc. Although, some studies suggested training in both knowledge of children medication therapy and the causes of medication errors and how to resolve them can decrease the rate of errors (18-21). Also, Guidelines for preventing medication errors in pediatrics (America), suggested increasing medication knowledge is one of the basic dimensions of decrease MEs and its very important (22). Hence, increase knowledge can be decrease MEs in the pediatrics.

## 5- CONCLUSION

The results of this investigation showed that, most prevalent type and cause of medication errors were wrong dose and poor medication knowledge, respectively. Therefore, with using of this study results, we can program for prevention/decrease medication errors and enhancing patient safety. On the basis of this study, actually we should enhancing level of nurses' knowledge by educating especially we should to carry out special courses for pediatric nurses. Therefore, educational methods and tools to prevent MEs must be developed. Also, we should attention to the

other aspects which causing MEs such as lack of nurses, nurses' attitude, low wages, too. Further studies should to focuses on solutions for decrease MEs in pediatric.

## 6-ABBREVIATION

- Medication errors (MEs);
- Number (N), Percent (%);
- Standard deviation (SD).

**7-CONFLICT OF INTEREST:** None.

## 8- ACKNOWLEDGMENT

This investigation was supported by Center Research Committee of Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran. The authors also thank the all pediatric nurses in Ahvaz, Southwest of Iran.

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