

Incidence of Medication Errors in King Fahad Hospital Madina Saudi Arabia

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This study aimed to evaluate the incidence of medication errors over a period of one year in King Fahad Hospital Madina Saudi Arabia. This retrospective, cross-sectional study was conducted over a period of one year from 2018 January to 2018 December using patient's records. King Fahad Hospital in Madina was selected for the study center. Data collected include the number and types of errors, severity, location of errors, errors by profession, and errors occurred in the medical wards. Statistical analysis was carried out using statistical package for social science version 22. A total of two hundred and fifty-eight medication errors were reported during the study period. Among the reports 2567 (96.5%) of the errors were due to near misses, followed by transcribing errors 1597 (60%), ordering errors 928 (34.9%), duplicative therapy 765 (28.7%), wrong dose 454 (%). The most common procedures involve medication errors were wrong documentation 442 (16.6%), duration 168 (6.3%) wrong quantity 162 (6.4%). Majority of the medication errors were contributed by physicians (99.2%) and 0.7% of them were due to the pharmacist. In conclusion study findings reported that yet some kind of medication errors has been under reported and it was common in most hospital, further studies with intervention programs needed to control the incidence of medication errors in a Saudi hospital.

Keywords: Medication errors. Saudi hospital. Duplicative therapy. Ordering. Duration.

INTRODUCTION

It is a well-known fact that medication errors are associated with serious morbidity, mortality and leads to increased length of stay in hospitals which results in increased health care cost (Abdel-Latif, Abdel-Wahab, 2015). It has been shown that nearly 5% of all hospital admissions are attributed to adverse drug events and medication errors in developed countries and majority of the deaths are caused by medication errors (Mahmoud *et al.*, 2014). According to reports from institution of Safe Medication Practices (ISMP) thousands of deaths and millions of non-fatal injuries were contributed due to medication errors (Suyagh, Farah, Farha, 2015).

Medication errors occurs at any stage of the prescribing. According to The National Coordinating Council for Medication Error Reporting and Prevention Medication errors define as any preventable event that may cause or lead to inappropriate medication use by patient which may cause harm, while the medication is in the control of the healthcare professional, patient, or consumer. The prescribing, omission, unauthorized drug, improper dose, in the stage of administration known as administration errors which include the incorrect route of or giving the drug to wrong patient, extra dose or wrong dose (Tariq *et al.*, 2021; Aseeri *et al.*, 2020; Alolayan *et al.*, 2021)

Prescribing a drug therapy is the most common practice among healthcare professionals such as physician, which may result in patients improved quality of life (Bernard *et al.*, 2020). However earlier studies reported that possibilities of medication errors either in stage of prescribing or in communication with patients. Although

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MEs may occur during product labeling by pharmacist or, in the process of compounding, dispensing, distribution, and use (Almetwazi *et al.*, 2020). There were multiple factors reportedly found to contribute to MEs were large number of patients, limited number of physicians for patient's consultation, restricted time for consultation, lack of knowledge, and variation in drug names (i.e. brand vs. generic), and the unavailability patient records (Alsaleh *et al.*, 2017; Assiri *et al.*, 2018; Thomas *et al.*, 2019).

The prevalence MEs in Saudi Arabia was 8.1% most common justification for this errors were older age (≥ 65 years), being a male gender, and polypharmacy (use of ≥ 5 drugs). (Bates *et al.*, 1995). Similarly, another recent study by Aljasmii *et al.* in 2018 reported high prevalence of 60.1% of MEs among those 73.6% were major omission errors; 9.9% were minor omission errors and 17.1% were skill-related errors. In USA approximately 1.5 million peoples were exposed by medication errors (Koper *et al.*, 2013), in United Kingdom the prevalence was 12%, (Berdot *et al.*, 2012), while in it was Sweden 42 % (Parihar, Passi, 2008), in Mexico 58%, (Guthrie *et al.*, 2015). Additionally, literature suggested that in Australia about 2% and 3% of all hospital admissions are medication-related, which indicates that nearly 230,000 admissions annually in this country are caused by patients taking too much or too little of a medicine, or taking the wrong medicine which cost around 1.2billion dollars (Alomary *et al.*, 2016). In Qatar a recent previous study reported that 98.5% of the MEs occurred in the prescribing phase of the medication process while 58.7% of errors were due to computation and the most common medications documented in error reports were anti-infective agents (Pawluk *et al.*, 2017). Also there were limited or lack of studies published which measures incidence and types of medication errors in western Saudi Arabia, therefore this study was aimed to study the incidence and types of medication errors in tertiary teaching hospital, Madinah Saudi Arabia.

METHODS

Study design and setting:

This is a retrospective, cross-sectional study. The data were extracted from medication errors form,

which is filled by hospital pharmacist in King Fahad Hospital Madina, Saudi Arabia. The pharmacist reviews all inpatient prescriptions that arrive at the inpatient pharmacy before dispensing them. If a medication error is found, the medication errors form will be filled out also, complete the rest of the patient information from the computer system of the hospital. Prior to the initiation of study ethical clearance was obtained from the Institution Ethics Committee General Directorate of Health Affairs in Madinah (IRB/451/H/03-M084)

Data source

Data regarding medication errors were collected over a period of one year starting from January 2018 to the end of December 2018. The data were transferred to an Excel sheet. Variables that were extracted from the system were: category of medications involved in the event, MEs by profession, stages of medication error, type of medication error, and action taken after the error occurred. The incident form will then be reviewed by one researcher and clinical pharmacist who are appointed for look over the data collection and who are in charge and will be ended by sending feedback as well as classifying and grading the incident.

Statistical analysis:

Descriptive statics were performed using frequencies and percentages. A chi-square test was used to find out the difference between the variables and a significance level of 0.05 was used for statistical testing. The SPSS statistical package version 22 (SPSS Inc., Chicago, IL, USA) was used for statistical analysis.

RESULTS

We identified a total of 2658 MEs during one-year period. The majority of the MEs were 2567 (96.5%) were identified as near misses and (n=91) 3.4% were found errors. Most MEs in this study were occurred in transcribing stage 1597 (60%). while 928 (34.9%) occurred in ordering stage, however the remaining MEs were found 194 (7.2%) in administration stage (Table

I). This study found that duplicative therapy was the highest ranking of the MEs 765 (28.7%), followed by wrong frequency 457 (17.1%), wrong dose 454 (17%), wrong documentation 442 (16.3%), wrong duration 168 (6.3%), wrong quantity 162 (6.09%). Furthermore, a detailed description of different stages of medication errors was reported in Table II. In this study majority of the MEs were near misses 96.8%, where 99.2% of MEs were contributed by physicians while 0.1% were by nurses and 0.7% were occurred due to pharmacist. (See Table -II). Antibiotics were ranked first in causing medication errors (53.4%) followed by vitamins and minerals (41.3%), proton pump inhibitors (37.4%), Analgesics and anti-inflammatory (33.4%) and anti-diabetics (22.7%). A detailed description of number and frequencies of drug class caused MEs were given in Table III. In this one-year study most of the MEs were reported in august, where errors were 14 (0.5%), and near misses were 347 (13%), similarly the second highest number of near misses were in October 291 (10.9%) followed by September 282 (10.6%).

TABLE I - Types and Stages of Medication Errors (N=2658) over a one-year period

| Variables | Frequency (n) | Percentage (%) |
|------------------------------------|---------------|----------------|
| Types of medication errors | | |
| Errors | 91 | 3.4 |
| Near misses | 2567 | 96.5 |
| Errors in medication stages | | |
| Ordering | 928 | 34.9 |
| Administration | 194 | 7.2 |
| Transcribing | 1597 | 60 |
| Storage | -- | -- |
| Dispensing | 5 | 0.1 |
| Preparation | 1 | 0.03 |

TABLE II - Categories of MEs (n=2658)

| Categories of medication errors | Frequency (n) | Percentage (%) |
|---------------------------------|---------------|----------------|
| Duplicative | 765 | 28.7 |
| Wrong dose | 454 | 17 |
| Wrong dosage form | 22 | 0.8 |
| Wrong frequency | 457 | 17.1 |
| Drug interaction | 25 | 0.9 |
| Wrong documentation | 442 | 16.6 |
| Wrong Duration | 168 | 6.3 |
| Wrong administration | 36 | 1.5 |
| Missed medications | 10 | 0.3 |
| Wrong medications | 48 | 1.8 |
| Incomplete element | 1 | 0.03 |
| Wrong quantity | 162 | 6.09 |
| Wrong preparation | -- | ---- |

TABLE III - Medication that responsible for MEs

| Drug class | Frequency (n) | Percentage % |
|----------------------------------|---------------|--------------|
| Antibiotics | 1421 | 53.4 |
| Anti Anginal drugs | 421 | 15.8 |
| Anti-epileptics | 389 | 14.6 |
| Antiemetic | 651 | 24.5 |
| Analgesics and anti-inflammatory | 889 | 33.4 |
| Proton pump inhibitors | 996 | 37.4 |
| Ant diabetics | 592 | 22.7 |
| Anti-thyroid | 189 | 7.1 |
| Anti-coagulants | 398 | 14.9 |
| Vitamins and minerals | 1098 | 41.3 |
| Antifungal | 298 | 11.2 |
| Hypertensive | 498 | 18.7 |
| Others | 511 | 19.2 |

DISCUSSION

We sought to critically identify the types and prevalence of medication errors over period of one year in ministry of health hospital Al Madinah, Saudi Arabia. We identified 3.4% of errors and majority 96.5% of near misses in this study. The current situation in this study indicating that, yet now there is lack of reporting of MEs in current hospital settings, which may contribute to a serious life-threatening surveillance. Although the presence of MEs in the current study revealed that lack of adequate knowledge and awareness of medication errors reporting in the current health care setting might be the contributing factor. Even though earlier reports from both Arabian countries and other international countries reported lack of awareness and knowledge about national adverse reactions and MEs reporting in health care setting. (Abdel-Latif, Abdel-Wahab, 2015, Mahmoud *et al.*, 2014; Suyagh, Farah, Farha, 2015; Alsaleh *et al.*, 2017).

In this study we identified 96.5% of the MEs (near misses), which is still better than to similar previous study where author reported 99.38% MEs from the investigated patients accounts. (Almetwazi *et al.*, 2020). Although among the identified MEs in this study majority (28.7%) of were due to duplicative therapy in the treatment, while 17.1% of were due to wrong dosage and dosing frequency, while previous study reported 35% of MEs were due to the wrong dose, followed by unauthorized prescription (15.69%), and duplicate therapy (8.68%) (Almetwazi *et al.*, 2020). Although two studies reported that inappropriate prescribing was the most common form of medication errors in the hospital setting (Assiri *et al.*, 2018; Thomas *et al.*, 2019). However earlier data suggested that MEs are common in hospitalized patients at a rate of 5 per 100 medication prescriptions. (Bates *et al.*, 1995). However, studies also suggested that medication errors were more common among pediatric population.

The prevalence of MEs in this study was comparable to previous study published in BMJ Open in 2018, where 94%, of the MEs were reported (Assiri *et al.*, 2018). Similarly, another study published in family practice journal in 2013 reported a comparable prevalence of 93.5%, of MEs (Koper *et al.*, 2013). However, the prevalence of MEs in this study were much higher than

previous studies among Indian patients in Ahmadabad state of India (36% of MEs) (Patel *et al.*, 2016), in France (27.6% of MEs) (Berdot *et al.*, 2012), among pediatric patients 68.5% (Parihar, Passi, 2008). Interestingly in United Kingdom reported a very low prevalence of MEs 4.4% (Guthrie *et al.*, 2015). In Bahrain it was 65%, (Alomary *et al.*, 2016) in Ethiopia a recent study indicated that a prevalence of was 75.1% MEs (Dedefo, Mitike, Angamo, 2016). According to previous studies MEs were not only account for life threaten and also accounted for increased healthcare costs and hospital readmissions.

Although in this current study medication related errors were the most common, and duplicative therapy is the most prevalent one 28.7% followed by dose related errors (17%). These results were quite similar to previous study by Alomary *et al.* in 2016 who reported that dose-related errors were the most prevalent form of MEs 229(28.9%) report, followed by medication-related errors (duplicated,) with 211(26.6%). Similarly, Dedefo, Mitike, Angamo, in 2016 evaluated the incidence and determinants of medication errors in West Ethiopia using a sample of 233 patients and reported that Most medication errors were dosing errors (118; 23.0 %), followed by wrong drug (109; 21.2 %) and wrong time of administration (79; 15.4 %). Therefore, it is essentially important to provide training initiatives to health care professionals including pharmacist and physicians to improve physicians' prescribing skills, adherence to the essential drugs list and use of the national formulary to reduce medication errors in the health care setting.

This study found that MEs were mainly comprise of transcribing stage 60% (n=1597) of all errors with most of them being responsible by doctors. However previous study reported that most of the preventable MEs were found in ordering stage (56%) and administering (24%) process (Bates *et al.*, 1995). Although another recent study in 2018 conducted over a period of six months using a total of 700 prescriptions, where 42% medication errors were identified, out of which half of the MEs (52.33%) were found in prescribing stage, while slightly less than half (41.66%) were reported in administration stage (Eisa-Zaei, Hiremath, Prasad, 2018.) Previous study also found about 4.66% of MEs was in monitoring stage and 1.33% was in dispensing stage. In addition to this most common types

of MEs were documentation errors (43.2%), and wrong time administration of medicine (13.6%) of medication errors. Similarly, in our study (17%) of the errors were related to wrong dose, while 16.6% of them were due to wrong documentation, about 6.3% of MEs were due to wrong duration followed by wrong medication (1.8%) and wrong time or frequency of administration. The difference between current study results and previous one might be due to difference could be that the MEs rates are related to physician's experience or involvement of other health care professionals such as pharmacist or nurses and the hospitals where the studies took place had different proportions of family doctors vs. other health care professionals.

CONCLUSION

In conclusion study results revealed that current settings found number of Medication errors which were mainly in transcribing and ordering stages and duplicative therapy was the most common MEs. It is essentially important about providing continuous medical education for junior and senior physicians implementing strategies for adequate practice and dispensing is vital. Additionally, well structure dispensing and prescribing format should be implemented through ministry of health to prevent possibilities of medication errors in the hospital setting.

CONFLICT OF INTEREST; -

There was no conflict of interest among the authors.

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