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Medication Errors Are Preventable

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Abstract

The National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) defines a "medication error" as "any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer. At many occasions a medication error can be caught or is rectified before its administration, thereby preventing harm to patient. This is referred as near miss medication error. Medication errors are broadly classified into prescription error, dispensing error and administration errors. And these errors have significant epidemiological as well as financial burden on healthcare infrastructure. Behavioural sensitization of the involved healthcare professionals can play a vital role in prevention of these medication errors. Also, initiatives at the administrative level of healthcare systems, especially with the implementation of technological tools like computerized physician order entry, barcoding etc. are proving to be a positive steps towards controlling this menace.

Introduction

The National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) defines a "medication error" as "any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer" [1].

At many occasions a medication error can be caught or is rectified before its administration, thereby preventing harm to patient. This is referred as near miss medication error [2].

Types of Medication Error

The process of medication use is subdivided into five important stages including prescribing, dispensing, transcribing, preparing and administering of which the processes of prescribing and administering of medication are most vulnerable stages for medication error [3,4]. Medication errors are broadly categorized into prescription error, dispensing-related error and errors-related to the administration of medication.

Prescription errors

Medical prescribing errors (MPEs) are one of the most common and well-studied causes of adverse events. MPEs occurs as a result of a prescribing decision or prescription writing process, and leads to an unintentional and significant (1) reduction in the probability of treatment being timely and effective and (2) increase in the risk or harm when compared with generally accepted practice" [5].

MPE can occur when physician writes a prescription without giving due consideration to patient profile or the involved drug's characteristics, ambiguity in writing prescription order (as in spelling, hand writing or non-standard abbreviations/nomenclatures) or failure to follow system's policies and drug specific instructions. So, errors in prescribing can be divided into irrational prescribing, inappropriate prescribing, and ineffective prescribing, under prescribing and overprescribing, and errors in writing the prescription [6]. Several studies have reported the incidence of prescription errors as high as 39% [7]. In a prospective study conducted in New Zeland, a total of 36,200 prescription chart were reviewed by ward visiting pharmacist and around 1.5% of prescribing errors were identified, of these 0.4% were serious medication errors. In another study, the most common form of prescription error was writing the wrong dose [8]. In six Oxford hospitals, the most common errors on prescription charts were writing the patient's name incorrectly and writing the wrong dose, which together accounted approximately 50% of all errors. In a hospital study in Norway only 7% prescription charts were correctly filled, where 79% had errors that posed minor potential health risks and 14% had errors that could have led to serious harm [9].

Dispensing errors

Generally, process of dispensing of medication also includes transcribing and verifying the medication in which mostly nurses and pharmacists are usually involved. There are few studies which have examined and reported the dispensing errors. However, because of their low incidence they are of lesser concern. In an inpatients study Roberts et al reported 11% of dispensing errors. As per study results, most common errors were due to wrong medicine supply, wrong strength, wrong directions for use, wrong quantity of medicine, and wrong calculation of drug usage. The most common causative factor for such errors was look alike and sound alike medicines [10].

Administration errors

It is the second most common (38%) medication error. Bates et al in 1995 reported 26% of preventable ADEs which occurred during the administration of medication [3]. This stage of medication use is crucial as associated with high risk. Responsibility of such errors lies with nursing staff for indoor patients and with physicians, dentists, pharmacists and patients themselves in outdoor patients [11,12]. The causative factor for administration error is similar to that of prescription and dispensing errors. In addition, it may also include

omission, wrong dose, wrong route, and wrong patient at wrong time. It may also occur due to technical reasons, e.g. while administering drug using viz nebulizers, infusion pump and MDIs. Patients' non-compliance is another reason for administration errors.

Pharmacoepidemiology of Medication Errors

Exact incidence of medication errors is difficult to access because only small number of errors is detected and even smaller number of errors is reported. In addition inconsistencies in error reporting, error reporting restricted to inpatient settings, most studies reported errors of commission not the errors of omission are other reasons lack of exact incidence. However, they may occur as frequently as 1 in every 20 prescriptions, and 5 in every 100 medication administrations of these 1 in every 100 medication errors results in patient injury [13].

Pharmacoeconomics

Medication errors are undoubtedly harmful and puts financial burden to patients, their families, hospitals, healthcare providers and insurance companies. They affect about 44,000 to 98,000 lives/year in US alone, which is far more than the lives affected due to AIDS. The Institute of Medicine report also estimated that more than 70,000 lives are lost per year as a result of medication errors. In USA nationwide hospitals financial burden due to medication error has been found to be between 17-29 $ billion per years [14].

Detection of Medication Errors

Medication errors are mainly detected by voluntary reporting by patients, direct observation of actual patient care of inpatients, pharmacy procedures like attending medical rounds or comparison of medication administration record to physician orders, by returned doses to pharmacy, urine testing or tracer drug analysis and comparison of drugs removed from automated dispensing device with that of physician orders, although the system of voluntarily reporting of medical errors is often incomplete and underreported.

Detection and reporting of medication error is the most important component to design the strategies to prevent such errors. Fear of disciplinary procedures for reporting errors has been identified as one of the barrier in detecting and reporting medication error. The establishment of a blame-free, non-punitive environment can overcome such barrier. Health care professionals and patients should be encouraged to report the medication errors, including near-misses. The objective of analysis of medication error is to investigate and detect the underlying factors/root-cause of non-reporting and/or underreporting of medication errors. They should also be encouraged and involved in data collection, cause charting, root cause identification and recommendation generation and implementation. The process development may improve the steps involved in the treatment process [15].

A medication error reporting system should be readily accessible, with clear information on how to report a medication error, and reporting should be followed by feedback. Combination of these methods may improve the reporting of medication errors [16].

Measuring Extent of Medication Errors

The medication errors are categorized based upon the algorithm developed by NCC MERP into nine categories from A to I (Table 1). Category A indicates circumstances or events that have capacity to cause medical error and with increasing category, propensity of the medical error to translate into direct patient harm increases. Categories A to D indicate no harm to the patient, whereas categories E to I indicate definite harm to the patient with category I indicating possible death because of the medication error [1].

Category	Example
A (No actual error occurred)	Ideal situation
B (Actual error occurred but did not reach the patient)	Prescribing error rectified either by nurse or pharmacist
C (Actual error reached to the patient)	Prescribed or dispensed wrong medicine (look-alike or sound-alike medications)
D (The outcome of the error required monitoring)	Self-limiting pharmacological actions of medicines e.g. tachycardia following higher dose of atropine for pre-anesthetic medication
E (The outcome of the error required intervention)	Toxic dose of digoxin causing arrhythmia required to be managed by phenytoin
F (The outcome of the error required prolong hospitalization)	Paracetamol overdose resulting in hepatotoxicity
G (The error resulted in permanent harm)	Intra-arterial administration of thiopentone resulting in gangrene of the limb
H (The error required intervention to sustain life)	Administration of penicillin to already hypersensitive patient to penicillin
I (The error resulted in patient death)	Intra-arterial administration of adrenaline in patient of CAD

Table 1: NCC MERP categories for medication errors

Prevention of Medication Errors

Eliminating the aforementioned causes for prescribing, dispensing and administration errors is the first most step towards controlling medication errors. In addition, the NCC MERP has put forwarded certain recommendations to check these medication errors like those related to human errors (as in writing prescription orders or other at risk behaviors by healthcare professionals) or those related to packaging, labelling, dispensing and administration errors [1].

Role of healthcare system in preventing medication error

Developing and implementing the fool-proof policies to combat medication errors, periodic training of staff and work distribution as per qualification, tracking of prescription orders, interdepartmental

communication, standardization of doses and frequencies, preparation and drug distribution system can result in obviate errors in medication use [17].

Role of information technology

Emerging technologies like computerized physician order entry (CPOE) or smart cards, CPOE with clinical decision support systems, automated drug utilization review system, automated drug dispensing system, bar coding, clinical pharmacy information system can provide patient care with high accuracy, efficiency and promising advancement [18-22]. However, in spite of many studies advocating use of these tools to lessen medication errors, their implementation in routine healthcare practice is still inadequate [23].

Conclusion

Medication errors are becoming a major threat to patients' safety. They lead to increased morbidity and mortality rates, cost of treatment and at times hospitalization. Therefore identifying the causes of medication errors and developing need based strategies viz. educational and managerial level interventions and incorporating new information technologies in the existing healthcare system may prove to be viable, cost-effective and sustained option to prevent medication errors.

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