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#### **Research Paper**



# Evidence Based Strategies to Prevent Medication Errors in Community Pharmacy

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Abstract: Medication errors commonly occur in various settings such as hospitals, care units, and community pharmacies. These errors occur either at the prescription or dispensing levels or while drug administration can compromise patient's health and safety. Hence minimizing the errors and preventing them is significant. Several strategies have been put in place to prevent the errors. Most of them are based on the earlier error reports and records. Learning from the errors forms an effective base in preventing the medication errors. The different medication errors and strategies that ensure patient safety at the community pharmacy level are discussed in this review.

**Keywords**: Medication errors, patient safety, healthcare quality, drug dispensing, patient counseling, regulatory compliance, electronic prescribing, risk management

# I. INTRODUCTION

Providing safe and correct medication to patients is of utmost importance when it comes to patients' safety. In the entire map of prescribing, dispensing, and administering medications, there are several points where errors may occur, putting patient safety at stake. Medication errors are mistakes that typically are made while writing prescriptions, preparing, distributing, and administering the medications to patients. The medication errors are preventable mistakes if there is a proper strategy for error-free working. (1, 2)Hence, preventing the medication errors at various points is an important step every community pharmacy setting needs to practice. In pharmacies, there is a need to follow harmonized rules and regulations to carry good pharmacy practices.(3).

As mentioned in a research work, in the United States (U.S.) 1.5 million medication errors occur every year and around 171 errors occur per hour. These include the errors in non-hospital and hospital settings. Out of the different medication errors occurring, almost 93.5 % errors result in health conditions that require prolonged treatment, around 5.8% errors may cause some kind of deformities or disabilities, and 0.5% errors may result in death. Therefore, there is a need to report the medication error incidents so that proper preventive strategies can be led down to prevent and control these errors and enhance patient safety.(1)

Pharmacists are the front face of the community pharmacy setting. Hence, it is the role and responsibility of pharmacists to prevent any kind of medication errors happening in the setting. Increased awareness at the pharmacist level, identification of medication error, and proper patient counselling and education by pharmacists can help in the prevention of some medication errors.(4)Medication errors are not only responsible for jeopardizing patient health but they also increase the economic burden on the health care system. In the U.S. there has been significant progress in reducing and preventing the medication errors occurring at the hospital setting level with the help of error reports and improved patient safety practices. However, the challenge lies at the outpatient settings such as community pharmacies, where there is no such reporting system in place, which can provide regulations to prevent such errors. The community pharmacies are an important part of the healthcare system in the U.S. and they serve millions of patients at the outpatient level by dispensing the necessary medication.(1)

The present review focuses on the different types of medication errors that typically occur in a community pharmacy setting and how strategies can be designed based on earlier experiences to minimize and prevent these errors to ensure patient safety. It is important that the community pharmacies share their first-hand experiences of medication errors so that they can help the pharmacies to build strategies that can help with the identification, management, and prevention of medication errors.

#### II. WHAT ARE MEDICATION ERRORS?

It is important to make a note of the possible medication errors that commonly are experienced in a community pharmacy setting. A proper report of these errors can then be used to draw strategies for preventing most of the errors. Medication errors contribute to commercial and professional risks in the pharmacist's work. The errors encompass several categories such as incorrect presentation of a medical product, the way a

prescription is written, misinterpretation of a prescription, wrong way of dispensing the medication, and incorrect administration of the medication. No matter at which level the error is occurring, it is threatening to the patient's safety and well-being.(3)

According to a study, the researchers involved in abrainstorming session identified 35 medication errors that could possibly occur in a community pharmacy. For the ease of understanding, we have categorized these errors into different subcategories as shown in Figure 1 and discussed below:(3)



Figure 1. Medication errors and their types

#### 2.1 Prescription errors:

Prescription errors exist in every healthcare setting and contribute to the most avoidable category of medication errors. These errors involve mistakes in prescription that may be related either to indications for which the medication is prescribed, contraindications, allergies to the medication, or prescriptions involving a wrong dose of the drug. Some common prescription errors as discussed in a review article are related to misinformation of patients, suchas name, age, gender, and weight of the patient. The most common prescription error is illegible handwriting that makes it difficult for a pharmacist to read and dispense the correct medication.Some errors occur as discontinued medication is not updated in the system, while others result from use of a different metric system or due to wrong directions for use of the medication. (3, 5)

#### 2.2 Dispensing errors:

Ina pharmacy, the pharmacist is responsible for dispensing the accurate dose of the prescribed medication. Errors that this level may occur due to wrong medication being dispensed, dispensing the wrong dose of medication due to miscalculation, dispensing a medication that is already expired, or has a damaged packaging. An error may occur due to resemblance in commercial name that results in dispensing the wrong product, having a resemblance to the name of the medication. Having wrong information of a patient in the medical record, and dispensing a wrong dosage regimen to a patient are different dispensing errors that may occur.(3, 6) According to a study carried out in a community pharmacy in the United Arab Emirates, it was noted that the most common dispensing error was dispensing the wrong quantity of medication.(7) In a Lebanese community pharmacy, omission of additional warning instruction during dispensing and incorrect or incomplete directions for use topped the list of dispensing errors.(8)

#### 2.3 Administration errors:

These errors typically are a part of inpatient settings. However, in community pharmacy, medication may be administered to pediatric patients or the elderly. Some administration errors may also occur on the part of patients due to incorrect or inadequate instructions given by the pharmacists. Some common administration errors include using a wrong technique of administration or giving a wrong dose. Administration of wrong dose or concentration of medication to children due to miscalculation of weight of the patient can cause serious problems.(3, 6)

With the advancement in technology, some community pharmacies may have barcode systems for medicines, automated filling machines for dispensing of the medicine into the designated packaging, and an e-prescription instead of manual writing. However, even with the advances in technology, errors may occur. For instance, if the pharmacist bypasses the prescription safety instruction and types it manually, an error may occur. There is a need to double check the e-prescriptions and the medication delivered based on that prescription to minimize dispensing of the wrong prescription.(9)

# III. EVIDENCE-BASED STRATEGIES TO PREVENT MEDICATION ERRORS

To develop strategies for minimizing medication errors, it is necessary to understand the types of errors occurring.

#### 3.1 Importance of prevention of medication errors

Medication errors, although they represent failure of the drug treatment process and put the patients at risk, are accidental. Prevention of these errors can help in dispensing correct drugs and ensure patient safety. It is the joint efforts of doctors, healthcare professionals, pharmacists, and patients at all levels of medication delivery that can help in avoiding such errors from occurring. It is necessary to develop a work culture in the community pharmacy that identifies the challenges involved in working and takes steps to minimize errors for patient safety.(10)According to the EU regulations to help prevent the medication errors, evidence-based strategies must be formed and followed. For such strategies, it is necessary to facilitate the process of reporting of such errors and learn from them.(11)Highly trained staff in community pharmacy can also avoid errors while dispensing drugs belonging to the opioid category that are associated with serious consequences if given in a wrong way.(12)Furthermore, minimizing medication errors is a difficult task and well-defined strategies that are based on experiences from already reported errors can help.

#### 3.2 Strategies implemented in minimizing medication errors:

The heads of medicine agencies came up with an action plan based on the recommendations of an international stakeholder workshop in 2013. They planned a good practice guide on medication errors as a step to prevent medication errors.(11)

#### **3.2.1 Reporting of errors:**

For successful prevention and interception of error if it occurred, it is necessary to have an efficient reporting and recording system in place. Reporting of errors assists in getting an insight into the causes of errors and helps minimize the risks that lead to the error.(13) The best example is reporting the adverse events due to medication errors in pharmacovigilance reports. This helps in identifying the errors that result in serious adverse effects.(11)

### 3.2.2 Communication between National Competent Authorities and Patient Organizations:

It is necessary to implement effective communication between the authorities and patient organizations so that pharmacists can learn from the errors that occur daily. It is evident that an increased communication regarding medication errors in the UK between the National Health Services (NHS) and the Medicines and Healthcare products Regulatory Agency (MHRA) resulted in better reporting and learning from medication errors.(11)

#### **3.2.3 Developing a terminology for reporting of errors**

The MedDRA, which is internationally used for clinical practices by doctors, pharmacists, and regulatory authorities, has developed a good coding practices guide for medication errors. To learn from the already occurred errors, it is necessary to be able to retrieve information regarding how and why the errors occurred. For this, a good coding practice that helps with the use of terminologies that can categorize errors will help in a significant reduction of the errors as it will facilitate easy retrieval of data. These terminologies will help identify errors that may cause potential harm to patients.(11)

#### 3.2.4 Preventing errors using LifeCycle Approach

It is necessary to document errors at each stage of the Lifecycle of any medical product to prevent and minimize the medication errors. For example, the United States Food and Drug Administration (USFDA) has issued guidelines for safety instructions concerning product design, labels on the cartons to minimize some medication errors that may occur due to faulty labels. This helps in making significant changes with dates, strength of medication, or any other instruction that changes due to a change in manufacturer or any other reason. Updating changes during every stage of medication, whether formulation, packaging, marketing, or dispensing, helps in the prevention of medication errors.(11)

#### **3.2.5 Preventing errors in pediatric patients:**

Medication errors in pediatric patients have a common occurrence and may arise at different levels. The patient information for the pediatric patient, such as weight, age, and body surface area, needs proper checking as the dosage depends on the neonate's or child's characteristics. Moreover, their pharmacokinetic profile is different from thatof young children and adults. As a result, a wrong dose can result in serious adverse effects. To prevent these errors, the following steps can be implemented:(11)

- Double check all the patient information.
- Double check the dose calculation.
- Use calibrated and dose-specific syringes to deliver accurate dosage.
- Use adequate naming, labelling and packaging that easily helps to distinguish between medicines used for adults and children, even if the name is slightly different.

#### **3.2.6 Preventing errors in geriatric patients:**

Similar to pediatric patients, medication errors are common in geriatric patients and can cause adverse effects if proper precautions are not taken. In the elderly, polypharmacy is a significant problem that may cause medication errors at the prescribing and administration of drug levels. Furthermore, impaired vision, less efficient working of hands and fingers all contribute to dosing errors. Opening child resistant containers may also be a problem. These errors can be avoided by:(11)

- Providing prefilled medication wherever possible.
- Packaging in easy-to-use yet safe containers.
- Special counselling by the community pharmacist.

#### **3.2.7 Preventing prescription errors:**

Evidences show that errors made by prescribers contribute largely towards medication errors. Common evidences of prescription errors show prescription errors in the pediatric population due to wrongly calculated doses that result in prescribing higher than normal doses.(14, 15) A Norwegian study shows that the prescription errors were revealed when the patient came to the community pharmacy with the prescription. Paper-based prescriptions errors evident from the study include unclear and illegible handwriting on the prescription, more than 5 drugs in one prescription, a change of medication on prescription without the signature of the prescriber at the change, and lack of one or more medications in the stock.(14) Considering these evidences, strategies suggested in different community pharmacy levels are summarized as follows:(16)

- Educating the prescribers through meetings, seminars, and guiding them for making prudent prescriptions.
- Inclusion of computerized alert systems to minimize prescription errors.
- Implementation of guiding tools to make prescribing error-free.
- Encouraging multidisciplinary involvement where the pharmacist is involved while making a prescription to ensure patient safety during patient care.

#### 3.2.8 Preventing dispensing errors:

Dispensing errors commonly occur due to the supply of a wrong medication, wrong dose, or choosing the wrong strength of medication. In the U.S., the community pharmacies reportedly show 1.6% of dispensing errors. That means this type of error occurs in 4 in 250 prescriptions that come to the community pharmacy. A study in the Netherlands showed that maximum errors in dispensing were associated with the wrong strength of the medication. An example of such an error is confusion between 3.75 mg and 0.375 mg of pramipexole that results in dispensing the wrong amount of drug. Such issues are serious and result in several adverse effects.(17)Pharmacist fatigue and overload may contribute to dispensing errors. Human errors can be prevented by training, proper relaxation, and education in safe and correct dispensing practices.(18, 19)Dispensing errors are preventable with the implementation of evidence-based strategies. The following strategies may help in preventing dispensing errors.

#### 3.2.9 Using bar code scanners:

The bar code scanners ensure that the drug displayed on the computer screen is the same as the drug selected from the dispensing shelf. This avoids the dispensing of wrong medication due to the confusion of the name of the medication.(17)

#### **3.2.10 Tall man lettering:**

Several countries have implemented the Tall man lettering to avoid confusion between the similar spelling names of drugs. The Tall man lettering highlights the differences that typically are unseen in the lookalike names of medications. For example, for a prescription mentioning dexamethasone, tall man lettering will pop up a window saying 'Caution for drug name confusion: DexamethaSONe or dexamphetAMINe?' In a single click, the pharmacist can choose the correct medication and prevent a potential error.(17)

#### 3.2.11 Alert systems:

As the community pharmacist enters the prescription details into the system, the alerts in the Patient Information system (PIS) warn the pharmacist or the pharmacy technician regarding the confusion in name and

strength of the medication. For the effectiveness of the alert system, it is necessary to use it strategically since frequent alerts may cause unnecessary fatigue to pharmacists.(17)

#### 3.2.12 Failure mode and effective analysis (FMEA)

This is a strategic solution to reduce the dispensing errors. It allows to identify the failures at different steps of dispensing. A team works to find the potential failure spots. After this, they scrutinize each failure to find out the possible cause of the error and then suggest corrective actions. While investigating the causes of the failures or errors, the errors are ranked according to the effects they show in patients. Depending on the severity of the effects, the remedial actions are suggested. This method helps in identifying the potential risks and safety issues in a community pharmacy setting.(20)

#### 3.2.13 Prevention of administration errors

Administration errors occur when the wrong route of administration is chosen or the wrong dose is administered, and children may be mostly affected if the person administering the medication mistakenly gives a wrong medication. Proper education and counselling by community pharmacists can help prevent medication administration errors. Community Pharmacist can help prevent this error using the following strategies:(3)

- Make a schedule for the patient with timing and frequency of drug administration.
- Make pictograms, drawings, or make schemes to educate the caretakers how to administer certain medications
- Put stickers indicating important instructions while taking medication.
- Suggest use of mobile apps to remember drug administration timings
- Use alarms or an alert system to take medication on time.

#### **IV. CONCLUSION**

Medication errors may put the patient'swellbeing at risk if corrective action is not taken. The errors may occur at the prescription, dispensing, or while administering the medication. Reporting of errors and learning from them helps in making strategies to prevent the errors. Pharmacist education and proper patient counselling alongwith use of some advances in technology can help minimize medication errors. Simple things like minimizing clutter, verifying orders, avoiding multitasking, organizing storage, and reducing the work stress can help pharmacists to minimize errors in their work. The risk minimization strategies are powerful tools of quality assurance in community pharmacy that ensure patient safety through prevention of medication error.

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