

MEDICATION ERROR – DOES IT HAPPEN?

Abstract

"Any preventable circumstance that may result in inappropriate use of medication or patient harm while the medication is under the control of the health care professional, patient, or consumer" is defined as a medication error. Dispatching errors such as incorrect dispensing of medication, including dispensing of medication in the incorrect dose and dosage form, pharmaceutical duplication of the medication, and inappropriate labelling can also result in medication errors. Transcribing errors such as non-appropriate, non-rational, ineffective orders of medication can cause these errors. Failures in drug management in healthcare can cost millions of pounds annually and result in considerable morbidity and mortality. Despite receiving much attention, prescription and dispatching errors continue to be a common concern. The best strategy to improve the clinical condition of patients is through the development of a multi-access educational and preventative approach. By offering patients in hospitals medical support, clinical chemists reduce the likelihood that patients may make pharmaceutical mistakes. Clinical chemists have a direct responsibility to evaluate the medication charts in the ward by filling out the patient's pharmacotherapy monitoring form and reporting any issues with drug therapy. Many prescription and administration-related errors could be reduced with accurate and thorough medication reconciliation. The practise of transcribing "blanket" instructions, such as "resume pre-op medications," may make it more difficult to reconcile medications. These are particularly prone to inaccuracy and could result in ADR.

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I. INTRODUCTION

A medicine is a product that combines an ingredient with excipients or additives that have been shown to have medicinal or biological effects. A drug is an active substance that has a therapeutic effect.

A medication error is defined as "a breakdown in the delivery of care that may harm the patient or have the potential to harm the patient." A pharmaceutical error can occur at any stage of the therapeutic process, from prescribing a prescription through giving it to the patient. A medication error may result from improper prescribing of medications, including prescribing of medications that are not appropriate, rational, or effective. It may also result from improper dispensing of medications, including dispensing of medications in the incorrect dose and dosage form, pharmaceutical duplication of medications, and improper labelling. A medication error can occur during more than just the prescription and delivery of the medications. But incorrect medication administration, such as administering medication in the incorrect dose and dosage form, incorrect frequency, and incorrect route, can also result in medication errors.

Medication errors can be avoided by improving the rationality of prescribing medicines, through proper dispensing of medicines in the appropriate dose, dosage form, and also by providing proper patient counselling about the medication administration error can also be avoided. It is crucial to identify and correct medication errors where they may result in therapeutic failure or serious harm to the patient.¹

A medication error is defined as "a failure in the process of providing care that causes patient harm or has the potential to cause patient harm." When the word "failure" is used, it indicates that the care procedure has fallen short of a minimum acceptable level. The 'care process' is managing signs and symptoms or the causes of them, or researching or avoiding disorder or biological change.

It includes the substances described above as well as prescription drugs. Additionally, it could encompass a drug's production or preparation, prescription, transcription (if necessary), distribution, and administration, as well as the subsequent observation of its effects. The word "Harm" in the definition denotes "lack of benefit," which is a form of therapeutic failure. It doesn't say who commits the error—it could be a doctor, a chemist, a nurse, a carer, or someone else—or who is responsible for preventing errors.²

II. WHAT IS “MEDICATION ERROR”?

Medication errors are defined as "any preventable circumstance which may cause not appropriate use of medication or patient harm while the medication is within the control of the health care workers, patient, or consumer" by the FDA or National Coordinating Council for the Reporting and Prevention of Medication Errors (NCC MERP). Numerous research have identified the elements that contribute to medication errors, which are frequently categorised as patient and personal contributing factors.³ Medication errors can result in negative consequences like an increase in mortality, a lengthier hospital stay, and higher medical costs. Even though medication errors may be the fault of the majority of the medical staff.

1. **Types of “Medication Errors”:** The WHO categorization, which includes the following categories for drug errors: prescribing errors, dispensing errors, indenting errors, administration errors, and monitoring errors, was used to classify medication errors. The NCC for Medication Error Reporting and Prevention further states that we have taken the severity

- Administration errors,
- Prescribing errors
- Monitoring errors
- Dispensing errors
- Indenting errors

A medication error was typically shown as the administration of a medication dose that was not in accordance with the patient's medical record. Medication errors have been seen as system flaws, and the following categories of medication errors were established:

- **Non-Authorized Drug:** An unapproved medicine is one that is given to a patient despite never having been ordered for them.
- **Excess Dose of Medicine:** Any dose provided after the drug has been interrupted or after the drug has been terminated. Any dose given more than the total number of times the medical professional has ordered.
- **Miscellaneous Dose:** Any daily set dosage units that are quelled for the desired amount or strength (such as pills). However, any parenteral product has a set dose that must be less than 10% or must deviate from the recommended dosages. If, in the perceiver's opinion, any other dosage form was less than 17% of the precise dose. Therefore, the organization's recommended regimen for consistent usage should be followed when calculating dosage from measuring equipment and graduations. The calibrated injection syringes, oral fluid medicine cups, and drops on the provided dropper, on the other hand. Only when the dose needs to be quantitatively established by the doctor are inappropriate dose errors for creams, topical solutions, and similar medications counted.
- **Omission:** Failure to administer the recommended dosage each day. If no attempt was made to provide the correct dose, an omission error was also noted. If a patient refuses to take the medication, the assigned nurse will not address the potential of an error until the medication has been consumed. Errors were not included for dosages withheld in accordance with the prescription requirements, such as "nothing by mouth" before treatment. By comparing the dosages of medications that were administered at one time with those that should have been given based on written doctor's orders and treatment recommendations, omissions were found.
- **Wrong Route of Administration:** Medicine administered to a particular patient using a route other than that ordered. Doses given at the incorrect area, such as the left ear instead of the right ear, were included in this class.
- **Wrong Form of Medicine:** the administration of a dose that differs from what the doctor prescribed. An incorrect type of error has been recorded if an enteric-coated tablet was ordered but administered instead of a plain tablet.

The main unit of any data is the dose, which was defined as any dose that was shown to be provided or excluded. Only dosages for which a perceiver was knowledgeable about the preparation and administration of the medication were included.³

There are numerous "medication errors" that can occur anywhere in the health care system, including hospitals, smaller nursing homes, and dispensaries. We'll examine a variety of pharmacological errors, their causes, and solutions to stop them from happening in the future. Medication errors not only cost money, but they also cause patients to lose faith in the healthcare institution, lower patient satisfaction, and morale to decline among healthcare professionals who feel powerless to remedy the situation.⁴

Table 1: Categorization of Medication Error based on the harm score¹³

Category-A	Events or situations that could potentially cause error.
Category-B	Although error occurred, the patient was not affected.
Category-C	a mistake that affected the patient but had no negative effects (for example, omission mistakes)
Category-D	Error reached the patient, requiring observation to ensure no harm was done and/or intervention to halt the harm.
Category-E	Error occurred, prompting action, and it's possible that it contributed to the patient's brief damage or resulted in it.
Category-F	The patient required initial or prolonged hospitalisation due to a mistake that may have resulted in or caused the patient's temporary damage.
Category-G	An error occurred, which may or may not have contributed to the patient's permanent harm.
Category-H	An error occurred that required intervention to keep people alive.
Category-I	A mistake was made that might have contributed to the patient's demise or even caused it.

III. DETECTION OF MEDICAL ERRORS

By introducing processes or making systemic changes to the environment where errors are more likely to occur, incident analysis can be a valuable tool for learning about healthcare institutions and, hopefully, further efforts to improve patient conditions. Non-punitive event reporting is the main policy that medical professionals would put in place to try to reduce mistakes.⁶

If that is the case, it is crucial to document not only injuries but also near misses, which are defined as "any act that might have caused an injury or damage." Near misses are valuable tools to increase patient safety because they offer a more comprehensive explanation of the issue than merely the actual events do. Adverse reactions can only occur over a period of days, weeks, or months, and reports are occasionally made voluntarily because workers are unsure of namelessness, which is a drawback when using incident reporting to identify the causes of human error in medicine.⁶

1. Detection: Significant methods for locating adverse events include chart analysis, computerised tracking, injury detection, and scanning evidence for claims. Close monitoring, self-imposed notification (by doctors, chemists, nurses, patients, and other healthcare professionals), and study of medication records are the typical methods used to report medication errors.

The chart analysis is retrospective and is based on pertinent references (medical charts, laboratory records, drug data, and administrative data). It can be strengthened by utilising computerised evidence, such as electronic medical records (EMR), computerised physician order entry (CPOE), and computer-integrated stimuli.

This method's drawbacks include the difficulty of educating reviewers (pharmacists, nurses, and testing assistants), as well as the required financial and human resources. Additionally, the consistency of reporting and reviewers' capacity to identify effects affect the results.¹²

- 2. Computerized Monitoring System:** Computerised tracking is the current iteration of "self-imposed pharmacist reporting" (pharmacy logs). Pharmacists find order errors, fix them and finish a report. As a result, drug failures that appear before side effects do should be stopped. Errors in prescribing and dispensing can be quickly discovered if CPOE is in use. Advanced software has made it easier to combine laboratory and clinical findings with Clinical Decision Support Systems (CDSS), including the identification and mitigation of undesirable effects. CPOE systems enhance protection, but they must be used in conjunction with CDSS. Information technology integration is costly, crucial for safety, but it can also result in new, unrecognised risks.
- 3. Administrative Database:** Lists of 9th Edition "Screen International Classification of Diseases Administrative" Codes for statistics use. Patient safety indices and adverse event adjusted rates are calculated from a variety of discharge outcomes. However, detrimental effects are not accurately identified due to a lack of clinical records.

The underlying, highly illogical motivations for the action and the presence of a small number of local claims limit the value of the monitoring of data on claims. Additionally, incidental events must be closely watched, because roughly one-third of claims lack evidence of errors. For negative consequences, data on utterances have a positive predictive benefit of around 50%, of which only about 18% indicate to a drug's source.

The only method available for identifying drug management problems is direct examination. A licenced nurse oversees the administration of medications, records each action, and then contrasts the results with the doctor's initial recommendations. It is crucial to instruct the observer and go to different units in order.¹²

- 4. Reporting Systems:** Significant unintentional occurrences and deaths must be reported if this is in force, and only those events on the "sentinel event list" must be reported. Root cause analysis entails the quick submission of a narrative report of the incident to the central organisation that conducts annual statistical analyses, records all adverse effects and drug failures, and responds to queries for quality management.

There are 2 Safety-Oriented Levels of Reports:

- Voluntary reporting needs to be private, responsible-free, and confidential. A basic standard form is required to aid in reporting and review. The implementation of corrective actions, daily reporting, and feedback are all crucial. While prescription errors and near-misses are frequently reported, unfavourable effects are hardly ever documented.

- Growing numbers of studies are a result of increased incidence capture, not generally reflecting poor practise. The benefits of voluntary notification include the identification of flaws in operating and latent systems, validation of the existence of sensitive procedures, the removal of causative elements, and the spread of a safety culture.

In general, an increase in research does not indicate unethical behaviour but is linked to greater event recording. The results of voluntary notification include the identification of flaws in both active and latent processes, confirmation of the responsiveness of procedures, the removal of contributing elements, and the development of a protective culture.¹²

5. Information Technology (IT) Processes in Medication Management System: "Clinical decision-making" can be a challenging process that depends on a person's capacity to pay close attention, memorise, recall, and analyse vast volumes of information—all weak points. Information technology systems can organise data, identify connections between them, and change access to certain portions of the data. Sometimes a practitioner is aware of information (such a patient's allergies, a drug-food or medication-drug interaction, or a drug recall warning), but is unable to recollect it while transcribing or prescribing. The 'knowing-doing' gap can be effectively closed by information technology processes,⁷ by showing the associated data to the doctor as they are making a choice.

6. Computerized Physician Order Entry (CPOE): Due to the fact that the majority of "Medication Errors" occur during the prescription process, CPOE with patient-specific decision assistance may be a potentially effective strategy for enhancing patient safety. Prescription mistakes typically involve utilising the wrong medication or dosage type, calculating doses incorrectly, failing to check for allergies, and failing to adjust dosages in patients with hepatic or renal insufficiency. CPOE systems work by (i)ensuring that the medication order is clear and full, with all necessary information, such as route, dose, and dosage type; (ii)evaluation of issues such as drug allergies and drug-food/drug interactions; (iii) calculating dose adjustments based on medically supported characteristics such as weight or renal function; (iv) determining appropriate laboratory baseline values for patients using anticoagulants, such as platelet count and the international normalised ratio; (v) examining potential drug-laboratory interactions, such as warning the doctor of a low potassium (K+) concentration when captopril and digoxin are prescribed; and (vi) improving the doctor's knowledge of current drug information, such as the necessity of avoiding rofecoxib after it had been withdrawn by the business organisation.

With claimed mistake reductions of 55%–83%, the CPOE process, out of all the systems used in the pharmaceutical process, has the most significant effect on lowering medication errors. Other studies have demonstrated a considerable decrease in the harmful effects of antibiotics, a shorter hospital stay, and a change in the dosage of psychotropic medications in older patients.

7. Medication Management Process for Older Adults: One of the most important aspects of caring for elderly people may be managing their medications. Among elderly persons,

polypharmacy is prevalent and dangerous. Pharmacotherapy management for these patients must be systematic-based and take into account their unique goals.

As the patient ages, medications started for appropriate indications may need to be regularly monitored. As the patient ages, renal function declines, their functional status changes, and the goals of their therapy change, other medicines may occasionally become unnecessary or even dangerous.

Older persons are more likely to have several illnesses and take more than one or two medications, which raises the likelihood of negative treatment results. The number of medications taken by a person may play a role in adverse drug reactions, non-adherence, financial burden, drug-food interactions, and negative consequences.

- According to the National Health and Nutrition Examination Survey, the prevalence of polypharmacy grew from about 8.2% to 15% between 1999 and 2011.
- The addition of extra medications to successfully address disease targets may result from the adoption of guidelines-based treatment for certain diseases.
- Taking OTC pharmaceuticals and nutritional supplements along with prescription medications increases the risk of side effects in older persons in the United States.
- Additionally, drugs are frequently prescribed to elderly patients based on research done on younger people with unremarkable co-morbidities. It is difficult to adapt medical recommendations based on these findings to elderly patients who have co-morbidities and functional disability.
- ADR risk may be increased by aging-related pharmacodynamic and pharmacokinetic changes.

8. Various Guidelines For Avoiding Medication Error: These protocols and guidelines are intended to give clinical chemists and nursing professionals useful advice and the best methods for managing and preventing patient damage from drug errors in the context of a healthcare organisation. Acute care settings are where these protocols are primarily designed to be used because of the unique collaboration structures that have been built on the hospital grounds. Medication mistakes can occur at any time.

- **Provision for safe Use of Medication Practices:** Drug safety must be prioritised at the organisational and departmental levels, and a procedure must be put in place to support safe drug use practises. The governing body needs to have a thorough plan that includes a leader in drug safety, important components to set up a framework for safe use of medicine, and a successful strategic plan. The medication safety system's error evaluation and reporting procedure is a crucial component; its ultimate goal is to enhance patient wellbeing and prevent patient harm.¹⁰

9. Procurement and Selection: Choosing the right medicines to store at the institution is a part of the procurement and selection of medicines. Divided into

- **Formulary Management and Evaluation:** A well-designed form system will direct doctors in ordering the most affordable and secure medication to treat a certain illness or medical condition.
- **Safety-Alert Monitoring:** The evaluation of a medicine's safety does not finish when a substance is included in the form. The clinical pharmacy team ought to be actively

involved in assessing the decisions regarding the purchase and replacement of all therapeutic commodities.

- **Medication Deficiency Management:** There should be a process in place at hospitals for the supply-chain and pharmacy departments to communicate shortfalls. A method for communicating medicine shortages may be in place in hospitals' clinical pharmacy departments. When there are several shortages, the pharmacy department should be crucial in monitoring and creating a crucial plan in close coordination with the necessary medical professional and various health-system committees.
- **Storage:** The danger of medication errors can be reduced with proper medication storage in the pharmacy, shop, and hospital facilities. Nomenclatures that are unclear shouldn't be employed. The same drug nomenclature should be utilised throughout the whole medication usage process in all hospital databases, employing differentiation and screen alerts for medications that may represent a risk of potential errors, according to Pharmacy Innovation.¹¹

10. Prevention Strategies for Medication Errors: Failures in drug administration cost the healthcare industry millions of pounds annually and significantly increase morbidity and mortality. Despite receiving much attention, prescription and dispatching errors continue to be a common concern. The best strategy to improve the clinical condition of patients is through the development of a multi-access educational and preventative approach. It is important to emphasise the importance of healthcare professionals collaborating and encouraging people to become more aware about their medications. You can reduce medicine dispensing errors by fostering a culture of safety. Hospitals could devise some preventative measures to stop drug errors. Some of these strategies include:

- Check the dosage, method, and frequency of all the high-alert drugs listed twice.
- If you have questions regarding the medication or dosage, consult the hospital pharmacist or clinical pharmacist.
- Don't administer the medication even if you think you know what it is if the prescription is illegible.
- Call the medical professional to confirm the medication or dose.
- Verify the medication dosage calculation to ensure that the patient is given the appropriate therapeutic dose of the medication.
- Request a second set of eyes to review your calculations.⁵

IV. ROLE OF CLINICAL PHARMACIST IN MANAGING MEDICATION ERRORS

Clinical pharmacist provide therapeutic treatment to patients inside the healthcare system, reducing the potential dangers of pharmaceutical errors. Clinical chemists must complete the patient's pharmaceutical therapy monitoring form and report any relevant pharmaceutical therapy difficulties in order to check the medication charts in the ward or ICU. Medical errors may result from the use of paper in medical records rather than computerised medication registration, non-availability of the medical document or medical record for clinical pharmacists in the pharmacy, patient overload in teaching hospitals, concurrently working physician, pharmacist, and nurse overloads, and non-availability or lack of treatment protocol.

Clinical pharmacist should be involved in nearly every aspect of the drug cycle, from delivery to administration, to reduce medication errors and improve patient care. This can be

accomplished by participating in specific rounds of clinical chemist prescription and evaluating various pharmaceutical interventions.⁷

1. How Can We Avoid Prescribing Error?

Clinical pharmacist checked the medical records for prescription errors before discussing them with the senior doctor in charge. Additionally, the clinical pharmacist participated on ward rounds. Clinical chemist interventions significantly reduced prescription errors, resulting in a safer pharmaceutical process.⁸

The purpose of medication reconciliation is to stop drug errors such as omissions, duplications, dose errors, or medication. At every change in the course of treatment, new medications should be prescribed or existing orders should be revised. Changes in the community, programme, practitioner, or level of care are examples of care transitions. This process includes 5 steps:

- Develop a list of on-going medications;
- Develop a list of medicines to be prescribed;
- Compare the medications on the two lists;
- Make clinical decisions based on the comparison;
- Communicate the new list of drug to appropriate caregivers and the patient.

Many prescription and administration-related errors could be reduced with accurate and thorough medication reconciliation. The practise of transcribing "blanket" instructions, such as "resume pre-op medications," may make it more difficult to reconcile medications. These have a significant likelihood of mistake and could cause ADR.⁹

V. CONCLUSION

A medication error is defined as a breakdown in the pharmaceutical administration procedure that could hurt the patient or has the potential to do so. A medication error may result from a prescription error such as an inappropriate, illogical, or ineffective medication order. It may also result from a dispatching error such as improper medication dispensing, including dispensing the medication in the incorrect dose and dosage form, pharmaceutical duplication of the medication, and improper labelling. In this instance, it was done by creating scenarios and selecting those that would be errors. It doesn't say who commits the error—it could be a doctor, a chemist, a nurse, a carer, or someone else—or who is responsible for preventing errors. Additionally, it entails a drug's production or compounding, prescription, transcription (if necessary), distribution, and administration, as well as the ensuing monitoring of its effects. The sole definition that categorises all error scenarios and only error scenarios is the description above, slightly changed. As with any technical definitions, various Medication Errors explanations have been put to the test. The word "harm" also denotes "lack of benefit" in the definition, which is a form of treatment failure. A medication error must be recognised and corrected in cases where it could result in therapeutic failure or significant patient harm. This can be done by improving the rationality of the prescription of the medication, avoiding errors in dosage, and giving patients the right information about the medication. The primary methods for recognising adverse occurrences are chart analysis, computerised tracking, injury detection, and scanning evidence for claims. The analysis of the chart is retrospective and is based on pertinent references. The

difficulty of training reviewers and the required financial and human resources are drawbacks of this strategy.

Patients are primarily given pharmacological treatment by clinical chemists, which lowers the likelihood of drug errors. After reviewing the patient's medication chart and filling out the pharmacotherapy monitoring form, the clinical pharmacist reports any drug-related issues. Clinical chemists should do special ward rounds and keep an eye on any medication administration. The goal of these protocols is to give chemists suggestions for the management and protection of patients from various harm brought on by medication errors. Various guidelines and protocol are available for medication errors. These include formulary assessment and administration, selection and procurement processes, monitoring of safety alerts, and management of drug shortages, among others. Medical errors can be avoided with careful medication storage in both the pharmacy and hospital settings. The goals of detecting Medication Errors include the following:

- To reduce harm from drug errors, encourage a culture of safety.
- Increased reporting of medication mistakes and instances involving potentially dangerous drug use.
- Examine and comprehend the core causes, analyses, and contributing elements of drug errors.
- Educate medical professionals on the systemic causes of drug mistakes and its preventative strategies.
- Provide guidance on how to make system-based, company-wide improvements to prevent pharmaceutical mistakes.
- Respond to potentially harmful circumstances before medication mistakes occur.

REFERENCES

- [1] J.K. Aronson, Medication errors: what they are, how they happen, and how to avoid them, *QJM: An International Journal of Medicine*, August 2009;102(8):513–521,
- [2] Aronson JK. Medication errors: definitions and classification. *British journal of clinical pharmacology*. 2009 Jun;67(6):599- 604.
- [3] Cloete L. Reducing medication errors in nursing practice.*Cancer Nursing Practice*. 2015 Feb 9; 14(1):12-18.
- [4] Eisa-Zaei A, Hiremath SR, Prasad S. Comprehensive evaluation of medication errors incidence at a tertiary care hospital. *Erasmus*. 2018 Feb;19.
- [5] Barker KN, Flynn EA, Pepper GA, Bates DW, Mikeal RL. Medication errors observed in 36 health care facilities.*Archives of internal medicine*. 2002 Sep 9;162(16):1897-903.
- [6] Tariq RA, Vashisht R, Sinha A, et al. Medication Dispensing Errors And Prevention. [Updated 2020 Nov 17]
- [7] La Pietra L, Calligaris L, Molendini L, Quattrin R, Brusaferrò S. Medical errors and clinical risk management: state of the art. *Acta otorhinolaryngologica italica*. 2005 Dec;25(6):339.
- [8] Namdar H, Khani E, Pourrashid MH, Entezari-Maleki T. Effects of Adding Pentoxifylline to Captopril on Primary Hypertension: A Pilot Randomized Clinical Trial. *The Journal of Clinical Pharmacology*. 2020 Feb;60(2):181-7.
- [9] Kessemeyer N, Meyn D, Hoeckel M, Reitze J, Culmsee C, Tryba M. A new approach on assessing clinical pharmacists' impact on prescribing errors in a surgical intensive care unit.*Int J Clin Pharm*. 2019 Oct;41(5):1184-1192.
- [10] Billstein-Leber M, Carrillo CJ, Cassano AT, Moline K, Robertson JJ. ASHP guidelines on preventing medication errors in hospitals.*American Journal of Health-System Pharmacy*. 2018 Oct 1;75(19):1493-517.
- [11] P. Pronovost, "Medication Reconciliation: A Practical Tool to Reduce the Risk of Medication Errors," *Journal of Critical Care*, Vol. 18, No. 4 (December), 2003: pp. 201-205.

- [12]Montesi G, Lechi A. Prevention of medication errors: detection and audit. *British journal of clinical pharmacology*. 2009 Jun;67(6):651-5.
- [13]Paul P, Nath R, Gadre S, BP SK, Ray S. A Prospective Study: Effect of Medication Error in a Tertiary Care Hospital. *Journal of Current Medical Research and Opinion*. 2022 Aug 4;5(08):1284-90.