دائـــــرة الـصـــحـــة
DEPARTMENT OF HEALTH

ANALYSIS OF MEDICATION ERRORS

2023 REPORT

Pharmacovigilance Program
Research and Innovation Center
Department of Health (DOH)

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Introduction

This report serves as an annual report on pharmacovigilance medication errors reports for the year 2023. Medication error is defined as “any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of health professional, patient, or consumer".

Medication errors (ME) are a well-known risk factor for patients receiving medical, pharmacological, and paramedical interventions. The first steps in developing preventative methods to stop MEs from recurring are identifying them and determining their underlying causes. While MEs are sometimes easily identifiable to practitioners, in other circumstances they are not readily apparent and are subsequently reported as adverse drug reactions (ADRs).

Medication errors can be attributed to factors such as professional practice, supplies, procedures, environment, or systems. These activities may encompass the prescription and ordering of medications, the dispensing and distribution of drugs, the preparation and administration of treatments, the labeling, packaging, and naming of pharmaceutical products, communication and education regarding medications, and the monitoring of therapy.

As part of the DOH pharmacovigilance program, this report was compiled with the purpose of enhancing understanding and to increase awareness of the program's ability to improve patient safety by identifying and mitigating the main factors that lead to medication errors and, thus, alerting others to possible risks.

The aim is to:

- Obtain a unified database for medication errors to monitor safe medication management in the Emirate of Abu Dhabi.
- Enhance patient safety by identifying and mitigating the primary factors contributing to medication errors, utilizing customized preventive measures.
- Support actions to minimize the occurrence of preventable medication errors.

Methods

Pharmacovigilance network has been established across most health care facilities including hospitals, medical centers, and clinics. Each facility has a designated focal point that performs as a conduit for networking and communication. The data was obtained from medication error reports that were electronically submitted via the "Medication Error Report" reporting form on the Abu Dhabi DOH pharmacovigilance E-notification system. The reports were reviewed and investigated if required by pharmacovigilance team, analysis parameters were defined based on the available data in our database and WHO recommendations about ways to reduce medication errors.

Reporting is fundamental to detect medication safety problems. Preventing harm to patients during treatment and care is the most crucial knowledge in the field of patient safety.

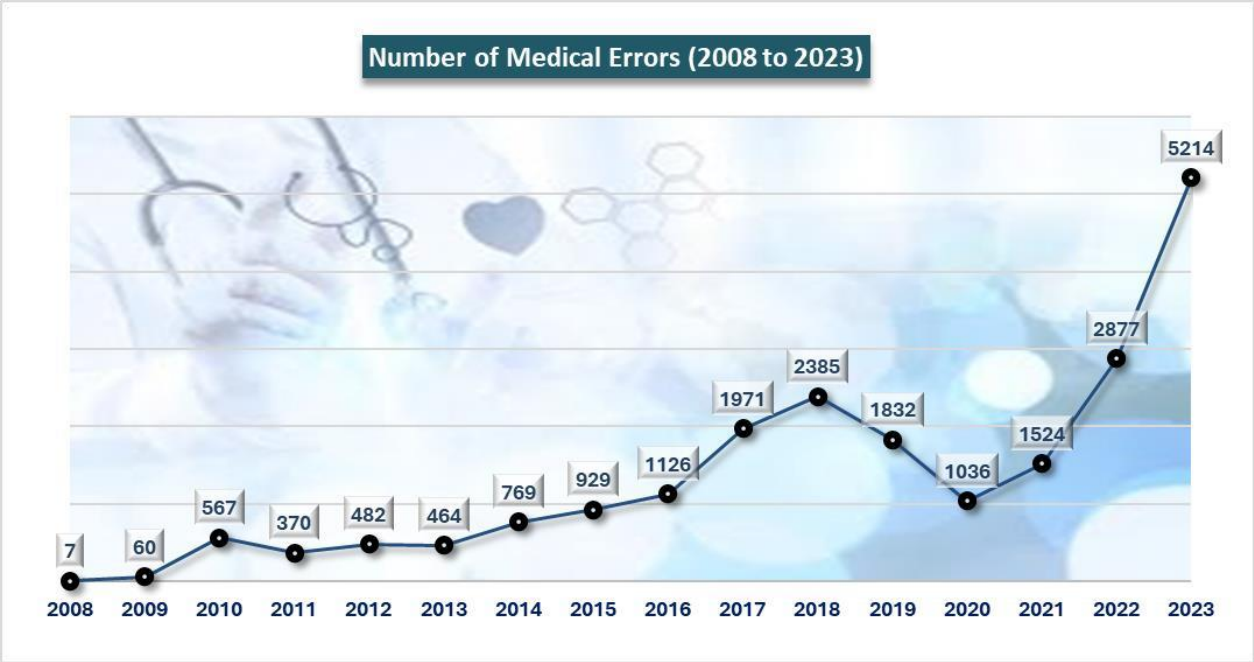
The essential role of a medication error reporting system is to enhance patient safety by learning from failures of previous events.

Medication errors are often provoked by weak systems and often have common root causes which can be generalized and corrected. Even though each event is unique, there are likely to be similarities and patterns in sources of risk which may otherwise go unnoticed if incidents are not reported and analyzed.

Data collation and analyses:

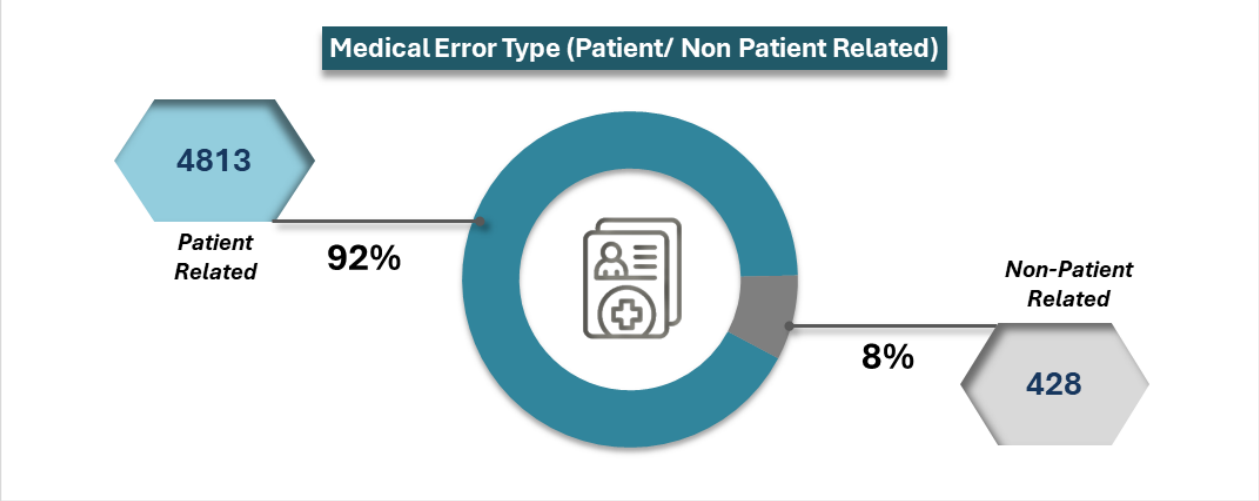
The data used for analysis was for the period between January to December 2023. Information used in this analysis was extracted in Microsoft® Excel files from ME DOH electronic reporting system and collated on patient's demographic information such as age, gender, severity classification, type of error, impact of the error, consequences, medication use process stage, and intervention were also collated.

In 2023, the pharmacovigilance program received 5241 electronically submitted ME reports, more than the average yearly reports received during the previous 15 years (i.e., 2008 to 2022) and included in this analysis. This notable rise can be attributed is due to workshops conducted by PV team and spread of awareness which resulted in increased reporting of healthcare professionals/facilities. As well as the vigilance of the focal points and awareness of their responsibilities in achieving and maintaining the reporting to PV program. Effective communication with focal points is vital for ensuring that medication errors are reported promptly.

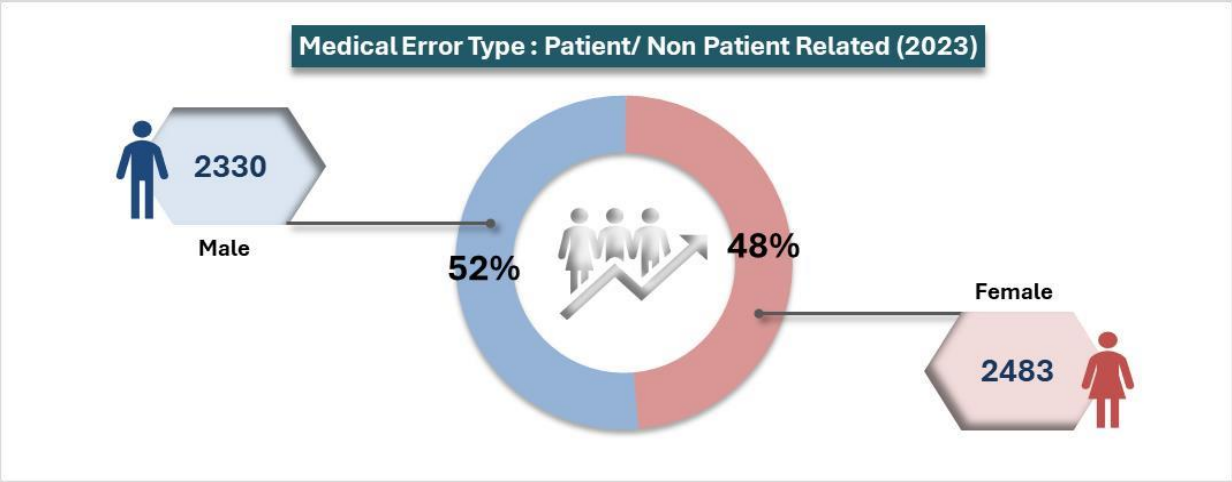


Results

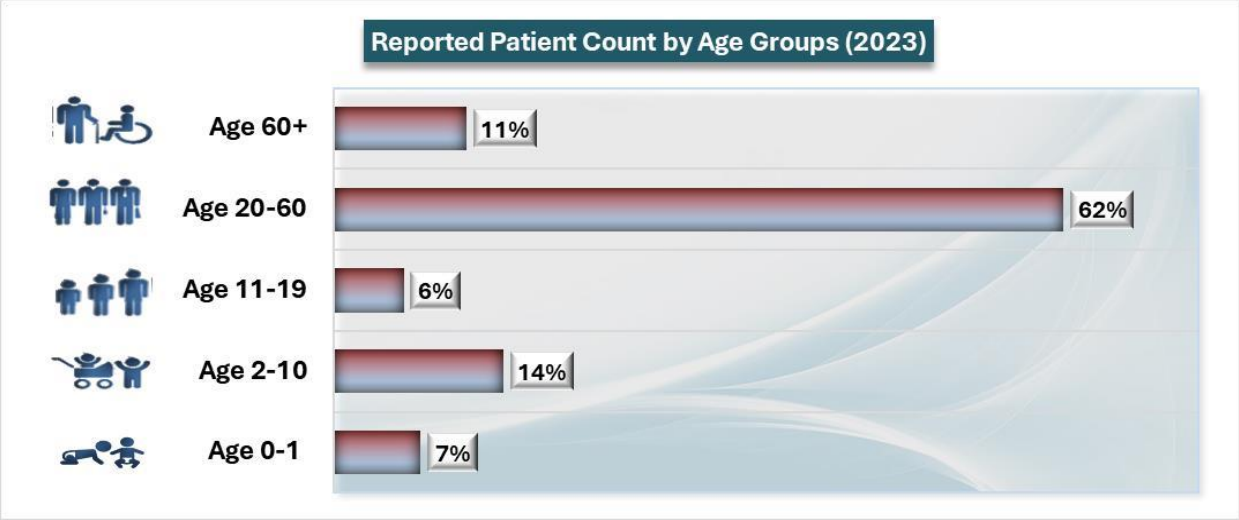
In total, 4813 ME reports were patient-related (92%), and patient demographics (age and gender) were provided.



The total number of submitted ME Patients related reports were higher for females (2483, 52%) than males (2330, 48%).

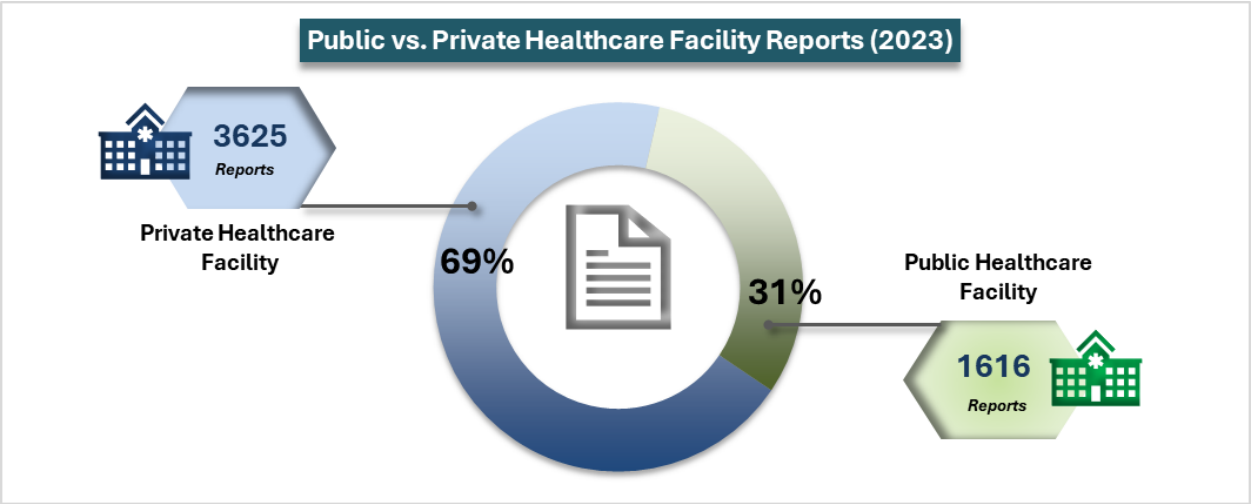


The percentage of ME reports in each age group is shown in the figure below. The patients' ages in the ME reports that were received varied from 0 to 100 years old and the majority of the patients (62%) belonged to the 20–60 age group, followed by (14%) for age groups 2- 10.



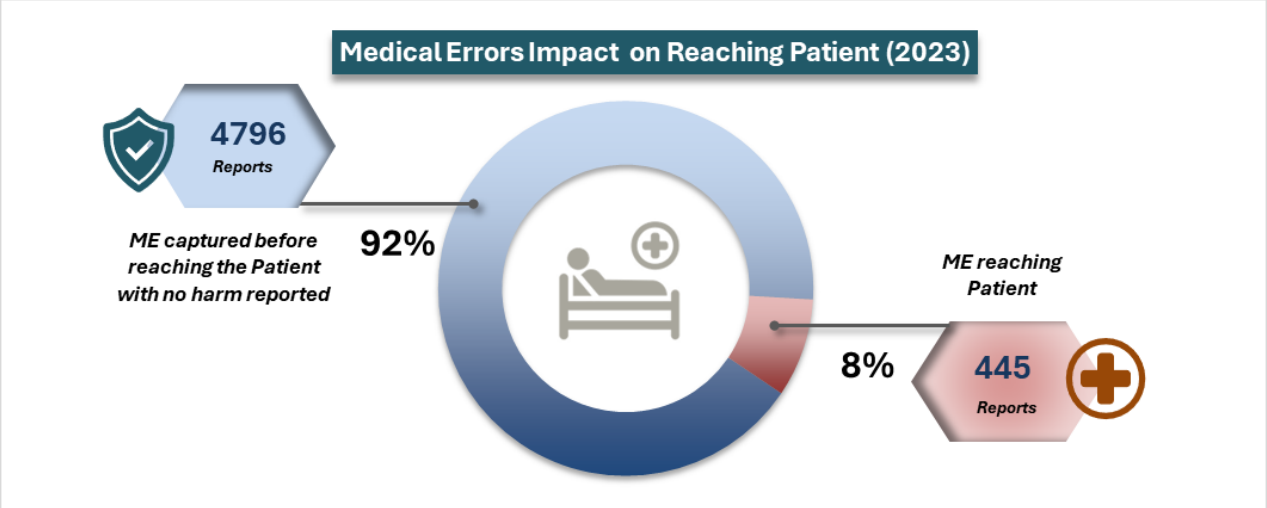
Facilities Reporting Medication Error

Based on data, 69% of the reports received from the private sector, compared to 31% from the public.



Impact of the Error

The percentage of reports based on the impact of error is shown in the figure below. 92% of errors were captured before reaching the patient and did not cause harm to the patient on the other hand 8 % of ME reports have reached the patient.



Electronic ordering and charting, barcoding that links patients to medical data, and computerized medication delivery are a few of the new technologies that have entered the healthcare in recent years with the goal of eliminating prescription errors. These techniques have demonstrated potential in lowering the rate of drug errors.

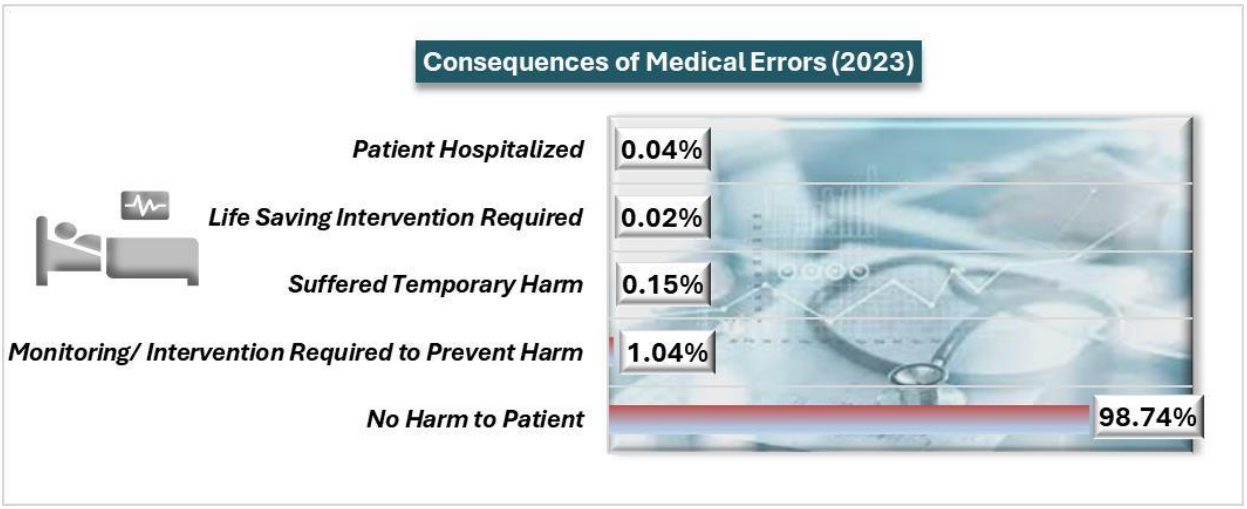
Health care organizations require systems to identify, report, analyze, and minimize the risk of medication errors since everyone, including patients and healthcare professionals, has a responsibility to play in maintaining medication safety. Establishing a culture of safety that is nonpunitive is crucial in order to promote open communication about disclosure of errors and near misses, to stimulate productive discussions, and to identify effective system-based solutions.

Quality control checks that are positioned strategically are also required. Errors are prevented before they reach patients by implementing basic redundancies that provide an independent double-checking mechanism for high-risk, prone to errors.

Consequences

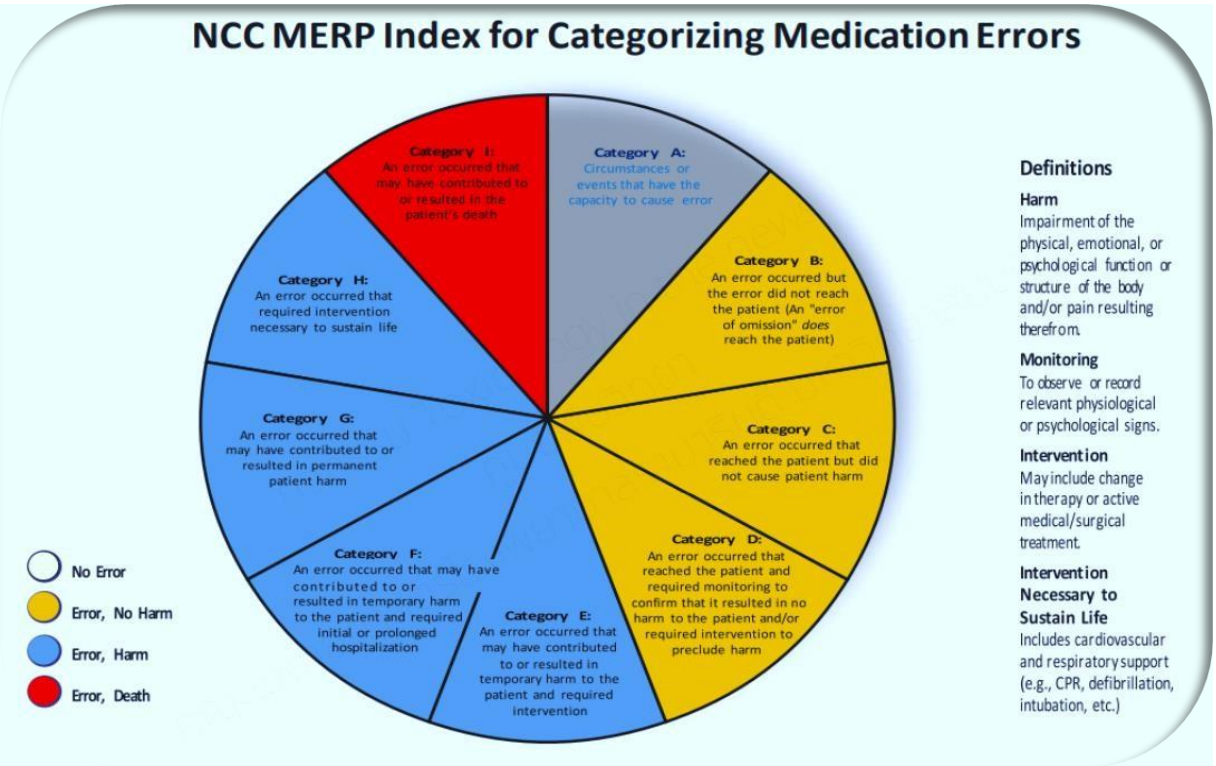
When categorizing errors, it is also beneficial to account for the consequences of those errors, including patient harm. DOH adapt the National Coordinating Council for Medication Error Reporting and Prevention categorizes the relationship between error and harm as (A) Circumstances or events that have the capacity to cause error, (B) An error occurred, but the error not reach the patient, (C) An error occurred that reached the patient but did not cause patient harm (D) An error occurred that reached the patient and required monitoring to confirm that it resulted in no harm to the patient and/or required intervention to preclude harm, (E) An error occurred that resulted in the need for treatment or intervention and caused temporary patient harm, (F) An error occurred that resulted in initial or prolonged hospitalization and caused temporary patient harm, (G) An error occurred that resulted in permanent patient harm, (H) An error occurred that resulted in a near-death event (e.g., anaphylaxis, cardiac arrest), (I) An error occurred that resulted in patient death.

At DOH PV electronic reporting system, total of 5175 (98.7 %) of the ME reports received had the consequence of “No Harm To patient”, where 55 patients (1%) Monitoring/ Intervention to prevent harm was required and 8 patients (<1%) suffered temporary harm. Two patients (<1%) were required Lifesaving intervention and 1 patient was hospitalized. None of the medication errors caused death.



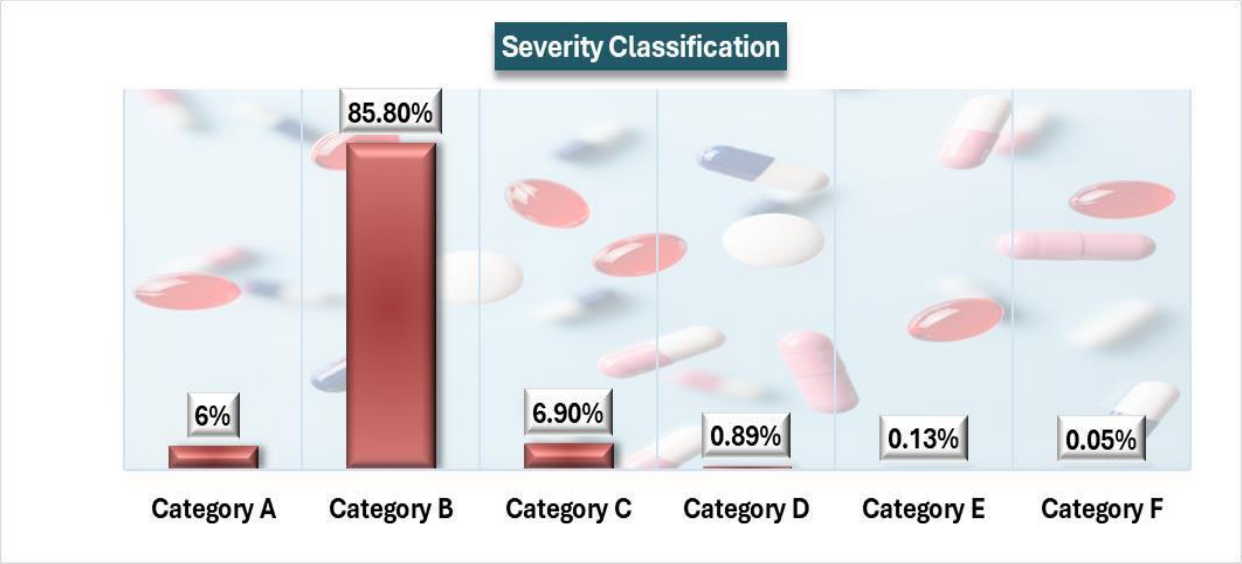
Severity Classification

Errors were categorized using National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP Index) following DOH standard for reporting medication errors.



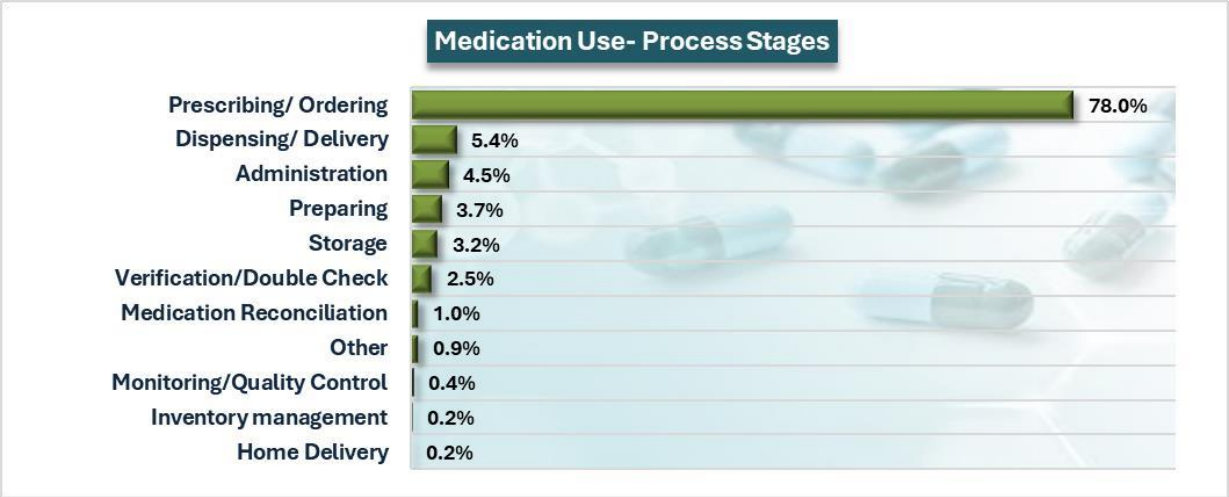
The severity classification in 4499 (85.8 %) of the ME reports were classified as category B " An error occurred but did not reach the patient" which was followed by 366 (6.9%) category C reports with the severity classification of "An error occurred that reached the patient but did not cause patient harm" .There were 319 (6%) reports received for category A "Circumstances or events that have the capacity to cause error " " An error occurred that may have contributed to or resulted in temporary harm to the patient and required intervention". Total 47 (0.89%) reports of ""An error occurred that reached the patient and required monitoring to confirm that it resulted in no harm to the patient and/or required intervention to preclude harm" are categorized as Category D.

There were Seven (0.13 %) reports received for category E "An error occurred that resulted in the need for treatment or intervention and caused temporary patient harm " and Three (0.015%) reports for category F " An error occurred that may have contributed to or resulted in temporary harm to the patient and required initial or prolonged hospitalization". No category G, H or I errors were reported during 2023.



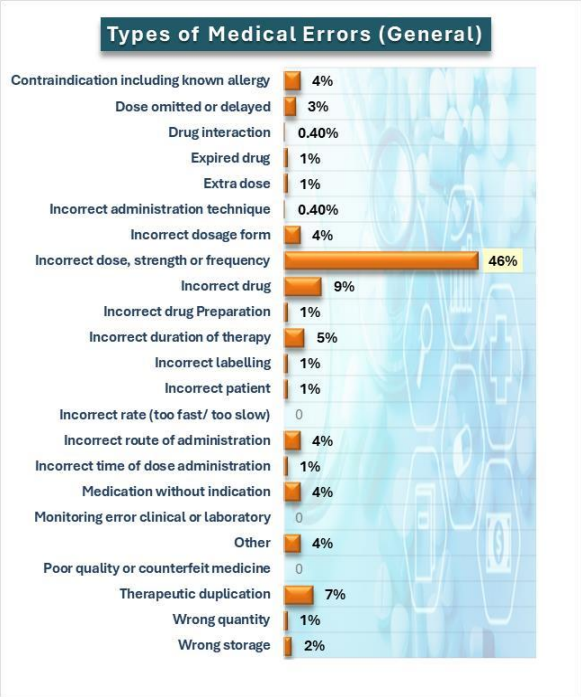
Medication Use and Process Stages

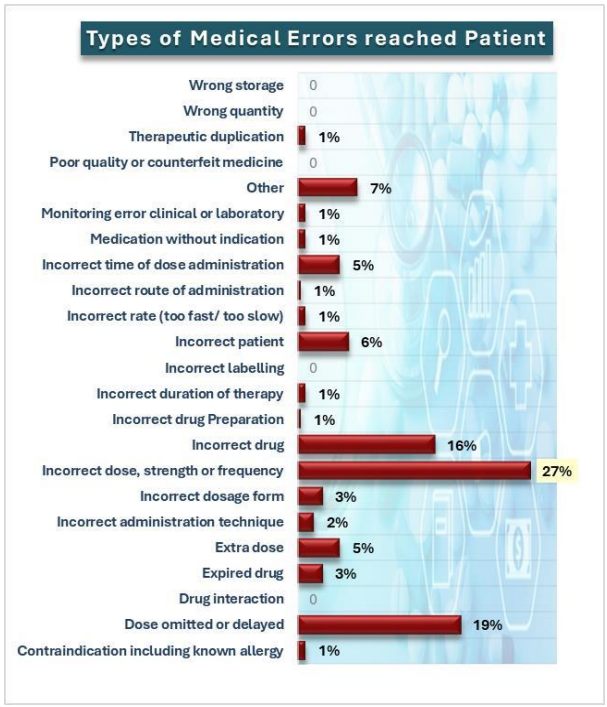
Medication errors can occur at many steps in patient care, from ordering the medication to the time when the patient is administered the drug. In general, medication errors usually occur at one of these stages: Prescribing/ Ordering, Dispensing/ Delivery, Administration, Preparing, Monitoring/Quality Control, Storage, Inventory management, Medication Reconciliation, Home Delivery and Verification/Double Check. In 2023 ME submitted reports 78 % of the reported medication errors occurred at the stage of Prescribing/Ordering the medications. The below figure reflects percentage of medication error in each medication use- process stages.



Type of errors

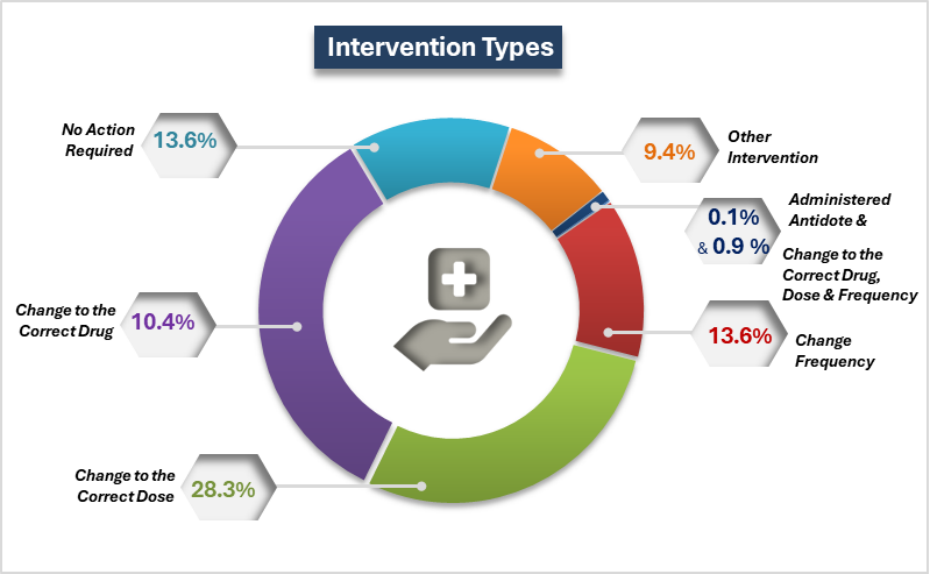
Type of medication errors in general (total) **Number of reports: 5241**	**Type of medication errors that reached Patient** **No. of reports: 445**
Out of this Number 5241 the most reported type of error was "incorrect dose, strength or frequency" with a percentage of (46%), followed by “Incorrect drug” error types (9%), “Therapeutic duplication “error types (7%), Incorrect duration of therapy” “error types (5%) and “Incorrect dosage form “, “Incorrect route of administration “, “Medication without indication “ and “Other “(4% each).	Total of 445 (8%) errors reached the patient, out of this number "incorrect dose, strength, or frequency" was the highest type of error that reached the patients (27%).



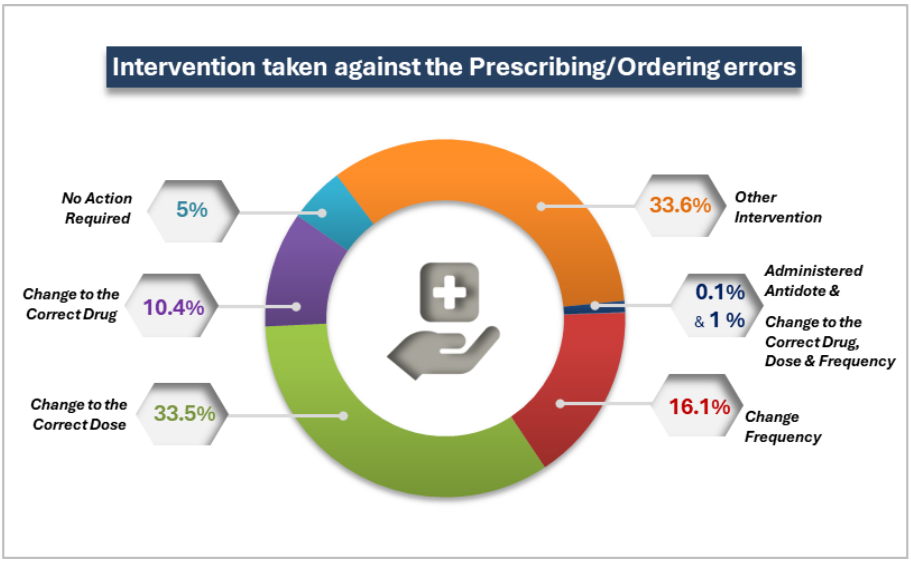


Interventions

The highest intervention reported was “Other Intervention” with 33.6 %, followed by “Change to the correct dose” 28.3 %, followed by “Change frequency” 13.6%, “No action was required” 14% and “Change to the correct drug” 9.4%. Some ME reports involved more than one intervention. For example,” change frequency; Change to the correct dose” less than 1%.



Interventions taken against Prescribing Errors, as 78% of the medication errors reported in 2023 were Prescribing/Ordering Errors. The below figures present the interventions taken in general and intervention taken against the Prescribing/Ordering errors.



Top Reporting Facilities

A Total of 115 different healthcare facilities (including different healthcare facility branches) had reported ME during the year 2023. The accumulative percentage of reporting facilities to PV program increased during 2023 (97%) compared to previous year (2022 was 93%). Below graph reflects the Top 15 reporting facilities\Branches.

Recommendation & Action Plan for Facilities

Medication use is a complex process involving a variety of practitioners and many steps, with the potential for serious error and patient harm. Identifying and addressing the risks are important.

The Institute for Safe Medication Practices identified the following areas as common causes of medication errors during the medication use process:

- Failed communication: handwriting and oral communications, especially over the telephone, drugs with similar names, missing or misplaced zeros and decimal points, confusion between metric and apothecary systems of measure, use of non-standard abbreviations (Table1), ambiguous or incomplete orders.
- Poor drug distribution practices
- Complicated or poorly designed technology
- Non-pharmacy staff access to drugs
- Workplace environmental issues that contribute to elevated job stress
- Dose miscalculations.
- Lack of patient information
- Lack of patient comprehension of their therapy

Table 1. Commonly Misinterpreted Medical Abbreviations		
Abbreviation	**Intended Meaning**	**Possible Misinterpretation**
U	Units	Mistaken as a zero or a four (4) resulting in overdose.
µg	Micrograms	Mistaken for "mg" resulting in a 1,000-fold overdose.
QD	Every day	The period after the "Q" has sometimes been mistaken for an "I," and the drug has been given QID rather than daily.
QOD	Every other day	Misinterpreted as "QD" or "QID." If the "O" is poorly written, it looks like a period or an "I."
SC or SQ	Subcutaneous	Mistaken as "SL" (sublingual) when poorly written.
TIW	Three times a week	Misinterpreted as "three times a day" or "twice a week."
D/C	Discharge; also discontinue	Patients' medications have been prematurely discontinued when "D/C" was intended to mean "discharge" versus "discontinue."
HS	Half strength	Misinterpreted as the abbreviation "HS" (hour of sleep).
cc	Cubic centimeters	Mistaken as "U" (units) when poorly written.
AU, AS, AD	Both ears; left ear; right ear	Misinterpreted as the abbreviation "OU" (both eyes); "OS" (left eye); "OD" (right eye).

Preventing medication errors requires specific steps to ensure safety at each stage of the pathway from ordering to administrations. **A) Prescribing/ Ordering:**

Prescribing error is the most serious of all types of medication error as, unless detected, it may be repeated systematically for a prolonged period.

Prescribing error Occur at the time a prescriber orders a drug for a specific patient. Errors can include the selection of an incorrect drug, dose, dosage form, route of administration, length of therapy, or number of doses. Other prescribing errors include inappropriate rate of administration, incorrect drug concentration, and inadequate or incorrect instructions for use.

The highest number of medication errors reported in the medication use process stage in 2023 was in the process of Prescribing/ Ordering (78%). Change to correct dose was the highest intervention taken for the Prescribing/ Ordering errors (34%).

Prescribing errors could be due to knowledge deficit by prescribers or could be due to mistakes/ lapses occurring while prescribing (e.g. selection errors in the system). Understanding the cause of errors will help in taking appropriate and effective remedial actions. These elements are not captured in our system; however, the facilities should consider them.

Prescribing Error Recommendations:

Before prescribing:

- Evaluate the patient's health status and review all existing drug therapy before prescribing new or additional medications.
- Assess the patient thoroughly, making sure the drug is appropriate and not contraindicated.
- Always ask if the patient is allergic to any drugs; if this is not already documented, write it down.
- Take into consideration any medication the patient is already taking, checking there are no interactions.
- Consider alternative therapies and discuss these with the patient.

When prescribing:

- Check that you are prescribing the correct medication to the correct patient.
- Use generic drug names rather than brand names. Type or write out instructions and avoid using unapproved abbreviations.
- Limit the number of as-needed orders for the same therapeutic indication and provide clear directions regarding the order and symptom hierarchy in which as-needed medications are to be used.
- Verify that the patient's dosage, frequency, and mode of administration are suitable and proper. Give both the start and review dates.
- Avoid unnecessary zeros (for example, 1.0 mg), which may be misread, and make sure the units you use are correct.
- If in doubt, refer to appropriate reference.
- Make sure your prescription is legible and easy to read.
- Describe to the patient what you are prescribing and why; this will improve compliance and clear up any confusion regarding how and when to take medication.

After prescribing:

- Monitor any unprecedented reactions.
- Ensure that blood drugs levels are monitored, or schedule additional testing if necessary.
- Regularly review the drug's indications. As a result, patients are kept from taking unnecessary drugs.

B) Dispensing/ Delivery:

Dispensing includes all the activities that occur between the time the prescription is presented in a pharmacy and the time the medicine is supplied to the patient .The medication supply stage (It

involves “the review of a prescription and the preparation, packaging, labelling, record keeping and transfer of the prescribed medicine including counselling to a patient, ” includes reviewing and processing the order, compounding/ preparation of the drug and dispensing the drug in a timely manner.

Dispensing/ Delivery Recommendations

During processing of order (typing, picking, and packing):

- Should ensure that the prescription is valid, according to relevant legislation.
- Interpret prescription carefully to identify any ambiguity or safety concerns.
- Do not hesitate to contact the prescriber for any illegible or ambiguous order.
- Remind prescriber to avoid using dangerous abbreviations when detected on order Check that you are entering the correct order into the correct patient profile.
- Do NOT ignore warnings or alerts on allergy, drug interactions, contra-indications when entering order into the computer system.
- Make sure drug label information contains the correct patient’s name, drug, strength, quantity, dosage instructions and cautionary instructions.
- Make sure to affix the correct drug label onto the correct medication.
- Always counter-check drug assembled against the prescription order and NOT drug label.
- Make sure information is provided to ensure safe and appropriate use of the medicine.

During dispensing

- Make sure you are dispensing the right medication to the right patient.
- Always inquire about the patient's allergy history.
- Consider any medications the patient is currently taking, including Traditional Chinese Medicine, to identify potential drug-drug interactions.
- Caution patient on possible food-drug interactions
- Inform the patient in detail about the purpose of the medication, how and when it should be taken, and potential side effects.
- Keep up-to-date references, including on-line version, easily accessible for quick reference check when in doubt.

C) Administration:

The administration stage (administering the prescription) includes administering the right medication to the right patient, in the right manner and administering the medication only when indicated.

Administration Recommendations

Before administration:

- Check that you are taking the correct medication chart for the correct patient.
- Interpret the order carefully before preparing the drug for administration.
- Check that the pharmacist has reviewed a new drug order before administering.
- Check for any drug allergy or ambiguous order.
- Do not hesitate to contact the prescriber for any illegible or ambiguous order.
- Check that you are preparing the correct drug for the correct patient.
- Always get a double-check for correct drug, dose, route, and time of administration before administering the drug
- Make sure to counter-check the drug prepared against the order before administering Label all infusion sets and lines.
- Be familiar with all the different administration sets and devices available in the inventory.

During administration:

- Check that you are administering the correct drug to the correct patient.
- Advise patients on the possible adverse drug reactions that they may experience during and after administration.
- Encourage patients to express any discomfort or problems experienced during drug administration.

After administration:

- Document promptly on the medication chart the time that the drug is administered.
- Patient education of the prescribed medication.

Limitations

One of the main limitations of ME data analysis is that it is based on the healthcare facilities/professionals' reports. Many submitted reports had no data under the fields "impact of error, consequence and intervention.

System should not allow submission of reports with incomplete mandatory fields. Allowing facilities to add "comments" option under intervention and "Other" option under type of error, leads to unreliable data analyses.

These options should not replace one of the drop lists choices and should be an add-on only. Underreporting and poor-quality reporting are also major challenges facing pharmacovigilance program.

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