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**Review Article**


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**MEDICATION ERRORS: A REVIEW**

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**ABSTRACT**

A recent report by the institute of Medicine estimated that as many as 98,000 people die in any given year from medical errors in hospitals alone. Medication errors, broadly defined as any error in the prescribing, dispensing, or administration of a drug, irrespective of whether such errors lead to adverse consequences or not, are the single most preventable cause of patient harm. The majority of medication errors occur as a result of poor prescribing and often involve relatively inexperienced medical staff, who are responsible for the majority of prescribing in hospital. The purpose of this paper is to review components of the medication use process and offer suggestions for transforming it into a safer system. Prevention strategies are suggested for improving medication use at each stage of the system. Decision criteria are proposed that can be used by administrators and healthcare providers to allocate resources for prevention strategies that will improve patient safety.

**Key words:** Patient safety, Medication errors, Healthcare, Safer system.

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**INTRODUCTION**

Medication errors are 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 the health care professional, patient or consumer. Such events may be related to professional practice, health care products, procedures and systems, including prescribing, order communication, product labeling, packaging and nomenclature, compounding, dispensing, distribution, administration, education, monitoring and use. [1]

- **Error in Medication**

"The administration of the wrong medication or dose of medication, drug, diagnostic agent, chemical, or treatment requiring the use of such agents, to the wrong patient or at the wrong time, or the failure to administer such agents at the specified time or in the manner prescribed or normally considered as accepted practice."

Barker and McConnell' have developed the following definitions for types of errors:

- "Omissions-any dose not given by the time the next dose (if any) is due."
- "Wrong dosage-any dose either above or below the correct dosage by more than five per cent."
- "Extra dose given-any dose given in excess of the total number of times ordered by the physician."

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- Unordered drug given-the administration to a patient of any medication not ordered for that patient."
- Wrong dosage forma-any dosage form which is not included in the generally accepted interpretation of the physician's order."
- Wrong time-any drug given 30 minutes or more before or after it was ordered, up to the time next dose of the same medication was ordered. 'Prn' orders are not included." [2]

#### • *Indian Scenario*

Medical error has not been the subject of serious examination in India and no major hospital is known to be systematically collecting statistics of its medical errors. NS Dixit, a noted heart specialist, is critical of the way medicines are dispensed and states that most medication errors in India occur because of illegible prescriptions; 'Incidal' the anti-allergy drug can be read as 'Indiral', a beta-blocker. The latter of which can produce strong reactions in asthmatic patients. Error checking becomes more difficult to trace as chemists avoid giving a bill listing the medicines, pharmacies often dispense medicines in the physical absence of a trained pharmacist and prescription drugs are routinely dispensed without insisting on a prescription.

While technology may not be the perfect solution for the Indian price sensitive market, it holds great promise for researching, identifying, reporting, and reducing medication errors. In particular, electronic medication transactions with proper systems design, implementation, and maintenance can contribute significantly to the prevention of medication errors. As of now, more research is required into the epidemiology of medication errors, with the hope that various reduction initiatives will gain strength from the recent surge of public interest. In the words of nineteenth-century essayist William Channing, "error is defined as the discipline through which we advance."

#### CONTRIBUTING FACTORS TO THE PROBLEM

The American Hospital Association lists these common factors that contribute to medication errors:

- Incomplete patient information (not knowing about patients' allergies, other medicines they are taking, previous diagnoses, and lab results).
- Unavailable drug information (lack of upto date warnings).
- Miscommunication of drug orders, which can involve poor handwriting, confusion between drugs with similar names, misuse of zeroes and decimal points, confusion of metric and other dosing units and inappropriate abbreviations.
- Lack of appropriate labeling as a drug is prepared and repackaged into smaller units.
- Environmental factors, such as lighting, heat, noise and interruptions, that can distract health professionals from their medical tasks.
- Failure to follow institution/facility policies and procedure.[1]

#### MEDICATION ERRORS IN PEDIATRIC PATIENTS

##### • *Challenges in Pediatrics*

The majority of medications prescribed to pediatric patients do not have US Food and Drug Administration (FDA) approval for use in pediatric patients. The FDA's Pediatric Studies rule, published in December of 1998, requires that new drugs important to the treatment of children or likely to be commonly used in children include labeling information for safe pediatric use. Despite this rule, little progress is being made to provide more information about pediatric drug use. The FDA estimates that more than half of the drugs approved every year are inadequately tested and labeled for use in pediatric patients. Unapproved, also known as off-label, use of medications does not imply improper use on the part of the prescriber. Contrary, children

should not be denied medication simply because the label says it is not approved for use in the pediatric population. [5,6]

#### • *Prescribing Errors*

Orders for pediatric patients often contain problems relating to poor handwriting, misused abbreviations, decimals, and poor calculations. Currently, preprinted orders, despite their own risk for errors, offer the best option to correct the issue of poor handwriting and misused abbreviations. In an editorial in Hospital Pharmacy, a controlled healthcare vocabulary was suggested as a solution to the problem of misused abbreviations and inappropriate use of decimals. [13]

#### • *Dispensing Errors*

Dispensing errors for pediatric orders are particularly perilous and can be partially explained by the relative lack of education pharmacists receive regarding medications and children. Pharmacists often overlook practical concerns, such as impossible to measure dose volumes (e.g. < 0.1 ml or odd doses like 0.34 ml) or unobtainable portions of capsules or tablets. It is not surprising that with very few drugs labeled for pediatric use, there are limited drugs provided in suitable drug formulations for children.

#### • *Administration Errors*

Although the 5 "rights" of medication administration (right patient, right drug, right dose, right route, and right frequency) are the basis of most education on drug administration and form the core for medication administration policies, the 5 rights are not inclusive of major sources of error, they may limit critical thinking, and they may not reflect current nursing practice. Medication administration is fraught with transcription misadventures, misinterpretation of orders, inappropriate timing of doses, drug-food interactions, and wrong doses secondary to dose preparation. [14,15,16]

## SUGGESTIONS FOR IMPROVING PATIENT SAFETY

The following suggestions can help to minimize errors in communication of drug orders:

#### • *Confusion Over Drugs With Similar Names*

- If the institution/facility has a formulary, consider whether drugs that look alike or sound like are allowed. If allowed, identify these as being "high-risk" and add extra steps to assure accurate ordering, dispensing and administration.
- If medications are stored in the office or hospital, label with both the generic and the brand name, if known.
- Don't store drugs with similar names alphabetically. Instead, store them apart from each other or in different locations.

#### • *Writing Of Prescriptions*

- Write in block letters, using upper-case (not cursive).
- Use the metric system (instead of the apothecary and avoirdupois systems).
- Avoid use of abbreviations and Latin directions for use (e.g., q.i.d., b.i.d.), and instead write it out, e.g., four times a day, twice a day.
- Use a leading zero if a number is less than one (0.1), and don't use a trailing zero after a decimal (5.0).
- Prescriptions should include: date, drug name, dosage, route of administration, frequency of administration, and signature and professional designation of authorized prescriber.

#### • *Written Medication Orders*

- Include all known patient allergies in admission and transfer orders. The designation "no known allergies" should be used as appropriate.

- Use only approved abbreviations as specified in the institution/facility policy.
- The institution/facility may have a policy on approved medication protocols that nurses may administer drugs as specified in the protocol. The institution/facility pharmacy should have a copy of the protocol.

• **Verbal Medication Orders**

- If there is an alternative, don't use verbal orders; instead use faxes, electronic mail or computerized physician order entry systems. Develop guidelines on the use of verbal orders, and who is authorized to provide and receive verbal orders.
- If possible, have a second person listen to the verbal order, especially if the receiver is inexperienced. Verbal orders may need to be clarified by the pharmacist.
- If verbal orders are used, the receiver should repeat the order to confirm understanding.

• **Transcription And Verification Of Medication Orders**

- The institution/facility should identify staff authorized to transcribe medication orders.
- The registered nurse (RN) is responsible for checking orders transcribed by a non-RN for accuracy. The RN initials or countersigns the signature of the non-RN transcribing the order as part of the verification for accuracy.

• **Medication Administration/Documentation**

- Document the evaluation of the patient response to the medication, when appropriate.
- Document any identified possible adverse reaction to the medications administered.
- Document explanation of any omitted doses.

- Nurses are only permitted to administer medications for specific doses as ordered while the patient is hospitalized. (Dispensing of medications by the nurse is not permitted by state and federal laws).

• **Medication Events Reporting And Analysis**

- Define a standard mechanism for identifying, reporting and analyzing medication events as well as a flow diagram for communicating the event.
- Include in the communication channel the office/committee on performance improvement/risk management and if appropriate, the office of claims and litigation.
- Define a system to address and manage an identified sentinel event.

• **Guidelines Relative To The Safe Use Of Medications In Hospitals**

This document represents one of the most important contributions made by the Society to and safeguard the care of hospitalized patients. Practitioners and students alike are urged to review its contents thoroughly and immediately proceed to implement its recommendations. for the convenience of both, the Guidelines Relative to the Safe Use), Medications in Hospitals is hereby presented in full detail.[2,4]

• **Preamble**

The Board Of Trustees Of The American Hospital Association and the Executive Committee of the American Society Of Hospital Pharmacists in 1957 adopted the following significant position:

• **Labeling And Medication Containers :**

- Drug labeling should be performed by a pharmacist or under the supervision of a pharmacist. Prescription labels and pharmacy stock labels should be used only by the hospital pharmacy.
- The pharmacist should be consulted and should make recommendations concerning labeling, containers and storage of

- housekeeping items, insecticides, cleaners, and such.
- Medication labels should be typed or machine-printed . Labeling with pen or pencil, use of adhesive tape or china marking pencils should be prohibited. A label should not be superimposed on a label.
  - The label should be legible, easily read, and free from erasures and strikeovers. It should be firmly affixed to the container. The label for stock containers should be protected from chemical action or abrasion.
  - Labels should bear the name, address, and telephone number of the hospital.
  - One order or prescription should be filled and labeled at a time.
  - The following or similar accessory labels and caution statements should appear where indicated:
    - Poison
    - Not to be taken internally c. Shake well before using
    - For external use only
    - For the eye
    - For the nose
    - For the ear
    - Refrigerate at 2\*-IO'C (35--50-F) i. Refrigerate after reconstitution
    - Warning: Not for injection
    - Do not use after
    - Not to be swallowed in.
    - Keep out of reach of children
    - Keep from freezing
    - Keep below freezing
    - Caution: Potent Drug
    - Research Drug
    - Nonproprietary name

**Note for information of Staff:**

Prescription or order for (Proprietary Name) filled as per formulary policy, contents are same basic drug as prescribed, but may be of another brand.

- Nonproprietary name

Note for information of staff:

Contents may be used, per formulary policy, to fill prescriptions or orders for any

of the following brands of the same basic drug:(Proprietary Name, Brand 1) (Proprietary Name, Brand 2) (Proprietary Name, Brand 3)

- Note change in color, size, or shape
- Other accessory labels providing special information such as dosage, side effects, or contraindications for investigational drugs may be used where necessary.

• **Labeling And Dispensing In-Patient Prescriptions :**

- In addition to the recommendations outlined in Section I, the in-patient prescription labels should bear, as a minimum, the following information:
  - Patient's full name
  - Nonproprietary and/or proprietary name of the drug actually dispensed
  - Strength
  - Date of issue
  - Name or initials of dispensing pharmacist
- The prescription or in-patient order should have noted thereon, at the time dispensed, the source and batch identifying number Of the medication and the initials of the dispenser. <sup>14</sup>
- For in-patient self-care medications, label as in Section III.

• **labeling and dispensing out-patient prescriptions :**

- Medications to be dispensed to in-patients who are being discharged should be returned to the pharmacy for relabeling.
- The out-patient prescription label should bear the following information:
  - Patient's full name
  - Prescription identification number
  - Specific directions for use
  - Date of issue
  - Name or initials of dispenser
  - Name of prescribing physician
  - Where physician requests or hospital policy dictates, identity and strength should be on the label
  - A "Keep out of reach of children" label
  - Name, address, and telephone number of hospital
- Prescriptions should have noted thereon, at the time dispensed, the source and batch

identifying number of the medication and the initials of the dispenser.

- An identifying check system to insure proper identification of out-patients should be established.[2,3]

## SUMMARY AND CONCLUSION

The legal literature is replete with cases of injury or death caused by errors in the administration of medications. These unfortunate incidents are not restricted to occurrences within hospitals, but also in doctor's offices., clinics, retail pharmacies and in the home. Because the hospital pharmacist is the best judge of whether or not safe practices are being followed in the handling storage, administration or dispensing of drugs and related products, he must assume the mantle of responsibility for the development of the required policies for adoption by the administration and the hospital's board of trustees.

Medication errors often occur when the nurse preparing the medication is distracted by the passing personnel, is unable to read adequately due to poor lighting or is forced to go to several different cabinets to gather the materials necessary for the administration of the drug.

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Problems of medication safety are now the grave concern of the many persons involved with patient care. These include the hospital trustee, the physician, the administrator, the pharmacist, the nurse, and others. The multiplicity of drugs, the increased number and kinds of medications prescribed per patient, the increased number of both inpatients and outpatients who are being treated, and the ever-changing concepts of medical care make it mandatory that a system of safe medication practices be developed and maintained to insure that the patient receives the best possible care and protection. This project is to collect literature on ways to reduce the risk and injury to patient caused by medication error.