Medication Errors and Drug-related Issues

Medication errors are a major cause of avoidable harm in health care systems globally and can occur at various stages of their use. In 2006, a report from the Institute of Medicine (IOM) titled 'Preventing Medication Errors' said, "In hospitals, errors are common during every step of the medication process—procuring the drug, prescribing it, dispensing it, administering it, and monitoring its impact—but they occur most frequently during the prescribing and administering stages."[1] Although medication errors are usually minor; but sometimes they can be serious. Since these errors can result in severe harm, disability and even death their timely detection is of the essence. In order to better understand medication errors, it is important to define the terms that describe them and classify them.[2]

SOME DEFINITIONS

- **Medical error:** "The failure of a planned action to be completed as intended or use of a wrong inappropriate or incorrect plan to achieve an aim."[3]
- **Sentinel event (major accidents):** "An unexpected occurrence involving death or serious physical or psychological injury or the risk thereof." Serious injury specifically includes loss of limb or function.[4,5]
- **Adverse event:** "An unintended injury or complication caused by medical management resulting in death, measurable disability or prolonged hospital stay."[6]
- **Adverse drug reaction: "**Any response that is noxious, unintended or undesired, which occurs at doses normally used in humans for prophylaxis, diagnosis, therapy of disease or modification of physiological function."[5]
- **Near miss (benign error):** "Any event or situation that could have resulted in an adverse outcome (accident, injury or illness), but did not, either by chance or through timely intervention."[7]
- **Medication error:** "A failure in the treatment process that leads to, or has the potential to lead to, harm to the patient."[2]

NEVER EVENTS

Never events are events, which should never happen in a health care setting. Examples include surgery performed on the wrong patient or wrong site surgery. They have been described as "the most egregious of patient safety incidents".[8] Although rare, they are very distressing to the patient with a substantial impact on the morbidity and mortality. Furthermore, they increase treatment costs due to prolonged hospitalization not only for the patient and also cause loss of revenue to the hospital.

The term "never events" now also encompasses in its scope, adverse events that are unambiguous (clearly identifiable and measurable), serious (resulting in death or significant disability), and usually preventable. There are now 29 "serious reportable events" that have been divided into 7 categories:[4]

1. Surgical or procedural events
2. Product or device events
3. Patient protection events
4. Care management events
5. Environmental events
6. Radiologic events
7. Criminal events

TYPES OF MEDICATION ERRORS

Medication errors can take myriad forms. Some common types of mistakes in medication are described below.

- **Prescribing:** Errors in prescribing include irrational, inappropriate and ineffective prescribing, underprescribing and overprescribing (prescribing faults) and errors in writing (illegible prescription).[2]
- **Omission errors:** Failure to give a scheduled medication dose.
- **Incorrect timing:** Medications should be administered at their scheduled times; failure to give a medication dose on time may cause either underdosing or overdosing. Food may also alter the absorption of some medications.[5]
- **Incorrect duration:** Taking medications for shorter or longer duration than has been prescribed.[5]
- **Administration errors:** Improper route of administration, giving the drug to the wrong patient, giving an extra dose of the drug, or administering drugs that are given IV at the incorrect rate, which may cause severe adverse drug reactions.[5]

- Use of inappropriate abbreviations, confusion of metric and other dosing units.
- Confusion between sound-alike drug names.
- Prescribing contraindicated drugs.
- **Monitoring errors:** Failure to follow-up or to consider the patient's liver and renal function or allergies or potential for drug-drug or drug-food interactions or not reviewing repeat prescriptions.
- **Compliance errors:** Not adhering to the protocol or rules or dispensing and prescribing medications.
- **Expired product:** Use of expired medications may occur because of their improper storage.[5]

CAUSES OF MEDICATION ERRORS

- **Distraction:** Physicians more often than not are multitaskers. Prescription writing is one among the several tasks they carry out every day such as examining their patients, prescribing investigations, taking daily rounds, assuring family members, etc. They may lack support staff. Overwork and the ensuing fatigue may sometimes cause a lapse of judgment leading to a medication error. Also, carrying out all these duties leaves them with insufficient time to counsel patients about medications.[5]
- **Environment:** Lack of proper lighting, heat/cold, and other environmental factors can cause distractions resulting in errors.
- **Memory lapses:** When the doctor knows that a patient is allergic, but fails to recall. This is often caused by distractions.
- **Distortions:** These occur from poor writing, use of abbreviations, misunderstood symbols or incorrect translation.
- **Lack of knowledge:** Lack of complete and up-to-date knowledge about the pharmacology of a drug, including its various names (generic and brand).
- **Incomplete patient information:** Lack of information about which medications a patient is allergic to, other medications the patient is taking, previous diagnoses or current lab results.
- **System problems:** Inappropriately labeled medications, lack of bar code scanning system, placing sound-alike drugs adjacent to one another.

PREVENTION OF MEDICATION ERRORS IN PRACTICE

Physicians must be encouraged to report medication errors. But this can be done only by providing a nonpunitive environment.[2] Measures that may reduce the odds of errors include use of electronic prescription systems, education and training, improving communication and involving clinical pharmacists.[9]

Pharmacovigilance

Pharmacovigilance or adverse drug reaction reporting is crucial to delivering quality patient care. The World Health Organization (WHO) has defined pharmacovigilance as "the science and activities relating to the detection, assessment, understanding and prevention of adverse effects or any other drug related problems".

In 1986, adverse drug reaction monitoring system was set-up in India under the direction of the Drug Controller of India. This marked the beginning of pharmacovigilance in the country. In 2005, the National Programme of Pharmacovigilance was launched, which was given the name Pharmacovigilance Programme of India (PvPI) in 2010.[10] PvPI is run by the Indian Pharmacopoeia Commission (IPC) as its National Coordination Centre (NCC) under the aegis of the Union Health Ministry.

The objective of establishing the PvPI was to generate country-wide data about adverse drug reactions by promoting reporting of adverse drug reactions. It encourages reporting of "all types of suspected adverse reactions with all pharmaceutical products irrespective of whether they are known or unknown, serious or nonserious and frequent or rare" (*Indian Pharmacopoeia Commission*). Its effectiveness, though is hampered by several challenges; under reporting is one such challenge.

Here are some examples of common prescription errors and how to avoid them.

- **Always spell the drug:** Sound-alike drugs can cause confusion. Always spell the drug if you are giving telephonic instructions.
  - E.g., the patient received Isoprin IV in place of Isoptin and nearly died.
  - E.g., Amlopress AT/80 mg; a hypertensive called up his family physician who asked him to take Amlopress AT but the patient took Amlopress 80 mg. After sometime he developed dizziness, flushing, palpitation, nausea, abdominal pain.
- **Never write 'U' to abbreviate the word 'units':** Do not write 'U' for units when writing prescription. Always write the complete word 'units'. It may be mistaken as zero. E.g., never write 4U insulin.

The patient may be given 40 units of insulin when the doctor actually meant just 4 units (4 U).

- **Misinterpreting decimal points**
  - **Never write the numeric after a decimal point:** The use of a trailing zero after a decimal point when writing prescription may lead to medication errors. For example, do not write 5.0 mg. There are chances that the patient may get 50 mg; 5.0 mistaken as 50 mg if the decimal point is overlooked.
  - **Always write the numeric 0 before the decimal point:** Always add a leading zero when writing dose of a drug, which is less than one. Lack of a leading zero may lead to a decimal point being missed. For example, never write .25 mg; instead write 0.25 mg. Otherwise there are chances the patient may take 25 mg in the first instance itself.
- **8-2-8 mistake:** The time interval should be written more clearly as 8 am 2 pm 8 pm. This may be mistaken as the number of tablets to be taken: 8 in the morning, 2 in the afternoon and again 8 at night.
- **Taking medicines with inadequate quantity of water or lying down immediately after taking the drug** can cause pill esophagitis by direct esophageal mucosal injury. It is commonly seen with drugs such as nonsteroidal anti-inflammatory drugs (NSAIDs), tetracycline, doxycycline, alendronate, antiviral drugs, iron supplements.
- **Prescribing liquid medications in teaspoons and tablespoons:** A teaspoon (tsp) can be confused with a tablespoon (tbsp). Their sizes may vary. Hence, all liquid medications should be prescribed in milliliters (mL) and they should be taken with a dosing device such as a small cup with mL markings.
- **Pill splitting:** Tablets that are not scored should not be split into two. They can crumble or are divided into unequal halves affecting the dose strength. Sustained or extended-release tablets and enteric- or film-coated tablets are generally not considered appropriate for tablet splitting. Film coating masks taste; therefore, splitting film-coated tablets may unmask the taste.
- **Some medicines need to be taken "before meals" or "on an empty stomach"** because food can prevent absorption of some medicines and reduce their effectiveness. For example, levothyroxine and rifampicin should be taken on an empty stomach.
- **Taking medicines with fruit juices:** Grapefruit, orange, and apple juices decrease the absorption of many drugs such as fexofenadine, cancer chemotherapy (etoposide), antibiotics (ciprofloxacin, levofloxacin), itraconazole, antihypertensives (atenolol), immunosuppressant (cyclosporine).

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