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REVIEW ARTICLE

Medication Errors - A Review

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ABSTRACT

In this present review article, regarding medication errors its definition, medication error problem, types of medication errors, common causes of medication errors, monitoring medication errors, consequences of medication errors, prevention of medication error and managing medication errors have been explained neatly and legibly with proper tables which is easy to understand.

KEYWORDS

Medication Error, Pharmaceutical Care, Adverse Drug Events

INTRODUCTION

The definitive purpose of goal of drug therapy is the achievement of defined therapeutic outcomes that improve a patient's quality of life while minimizing patient risk.[1] In health care system most often iatrogenic injuries occur. Recently medication error events received significant attention because of its substantial mortality, morbidity and additional health care costs. Many reports indicated that nearly one third of adverse drug events (ADEs) are associated with medication errors and are thus preventable.[2] There are inbuilt risks, both known and unknown, associated with the therapeutic use of drugs (prescription and non-prescription) and drug administration devices.[1]

Pharmaceutical care is the responsible provision of drug therapy for the purpose of achieving definite outcomes that improve patients' quality of life. Any suboptimum therapy leads to medication error.[3] 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 the health care professional, patient and consumer.[4]

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Medication Error Problem[5]

A. The 2000 Institute of Medicine (IOM) report To Err Is Human brought the problem of errors in medicine to national attention.

1. An estimated 44,000 to 98,000 deaths per year are caused by medical errors. Of those deaths approximately 7000 are the result of medication errors.
2. A call to action was given to improve patient safety.

B. In recent years, tragic medication errors have focused attention on concerns regarding patient safety.

1. A chemotherapy mix-up at a major cancer center resulted in the death of a patient from a fourfold overdose daily for 4 days.
2. A child accidentally received an intravenous rather than intramuscular dose of long-acting penicillin and died.
3. A compounding error resulted in death of a child who received a tricyclic

antidepressant at a dose 10 times greater than the dose prescribed by physician.

4. Mix-ups with heparin vials that had similar packaging, but different concentrations, resulted in overdoses causing serious injury and several infant deaths.

Types of Medication Errors[6]

1. Prescription Error

Type of prescription error	Examples
Wrong drug	Ordering enalapril for a patient with hyperkalemia (k:5.2) to control hypertension
Underdoes	Forget to readjust the dose of ranitidine for a patient with normal clearance of creatinin who previously had acute renal failure
Overdose	Forget to convert the dose of IV phenytoin to oral form (suspension) , patient received 100 mg IVQ8h ,then 100 mg oral suspension Q8h
Wrong dosage form	Prescribing the tablet of multivitamin instead of syrup of multivitamin for a patient with NG Tube
Wrong frequency	Ordering amikacin QD instead of Q24h
Forgot to order	Forgot to order another antiepileptic in place of topiramate for a patient with epilepsy, because topiramate was unavailable
Forgot to define the route of Administration	Forgot to define the route of administration of heparin as IV or SC
Monitoring	Prescribing therapeutic dose of heparin with checking PTT every other day despite out of therapeutic range of PTT
Interaction	Ordering imipenem with gancyclovir. This can lead to generalized seizure

2. Administration Error

Types of administration error	Examples
Omission	Forgot to administer atropine to a patient with cardiac arrest
Wrong time	Did not administer antibiotics on time
Under dose	Administration of heparin with lower dose due to wrong calculation of nursing
Upper dose	Administration of two vial of ciprofloxacin 200 mg instead of one vial
Wrong route	Administration of vitamin B12 IV instead of IM
Wrong drug preparation error	Didn't wash premature set containing ceftriaxon with normal saline, vancomycin added to premature set, precipitation occurred
Wrong administration-technique error	Didn't shake phenytoin suspension before administration

3. Transcription Errors

Types of transcription errors	Examples
Omission	Propranolol 10 mg TID has been prescribed however was not transcribed in nursing cardex
Wrong frequency	Ordering heparin 5000 IU Q12h transcribes as Q8h
Wrong dose	Prescribing tab ASA 100 mg transcribed as tab ASA 80 mg

Common Causes of Medication Errors[1,7]

1. Ambiguous strength designation on labels or in packaging
2. Drug product nomenclature (look-alike or sound-alike names, use of lettered or numbered prefixes and suffixes in drug names)
3. Equipment failure or malfunction
4. Illegible handwriting
5. Improper transcription
6. Inaccurate dosage calculation
7. Inadequately trained personnel
8. Inappropriate abbreviations used in prescribing
9. Labelling errors
10. Excessive workload
11. Lapses in individual performance
12. Medication unavailable
13. Improper storage,
14. Packaging,
15. Unawareness of the staff regarding new medicines,
16. Fatigue,
17. Excessive prescribing,
18. Increased number or quantity of medicines per patient,
19. Frequency and complexity of calculations needed to prescribe, dispense, or administer a medicine
20. Lack of effective policies and procedures,
21. Verbal orders,
22. Poor lightening,
23. Noise,

Monitoring Medication Errors[1]

The difficulty in detecting errors is one of the hurdle in studying the problem effectively. Medication errors should be identified and documented and their causes should be studied in order to develop systems that minimize recurrence. Several error monitoring techniques exist (e.g., anonymous self-reports, incident reports, critical incident technique, and disguised observation technique) and may be applied as appropriate to determine the rates of errors. There are differences in the validity of data obtained by the various errors monitoring techniques or combined techniques. Medication errors should consider the following risk factors should be considered:

a. Work shift (higher error rates typically occur during the day shift).
b. Inexperienced and inadequately trained staff.
c. Medical service (e.g., special needs for certain patient populations, including geriatrics, paediatrics, and oncology).
d. Increased number or quantity of medications per patient.
e. Environmental factors (lighting, noise, and frequent interruptions).
f. Staff workload and fatigue.
g. Poor communication among health-care providers.

h. Dosage form (e.g., injectable drugs are associated with more serious errors).

i. Type of distribution system (unit dose distribution is preferred; floor stock should be minimized).

j. Improper drug storage.

k. Extent of measurements or calculations required.

l. Confusing drug product nomenclature, packaging, or labelling.

m. Drug category (e.g., antimicrobials).

n. Poor handwriting.

o. Verbal (orally communicated) orders.

p. Lack of effective policies and procedures.

q. Poorly functioning oversight committees.

Consequences of Medication Errors[9]

On a personal level, patients suffer longer hospital stays, loss of income, significant social and family disruption, additional financial costs, disability or even death. The financial and emotional burden also frequently extends to the patient's family. Medication error has significant consequences at a personal and corporate level.

Factors which contribute to the financial burden as a result of medication error include additional resources consumed, increased hospital stay and bed occupancy. The direct impact on the health care professional should not be overlooked.

Schelbred describes that after incidents of medication error, nurses reported feelings of guilt, fear, loss of clinical and self-confidence, difficulties regaining confidence, and fear of the consequences of disciplinary action and litigation. If court action is initiated, the financial burden to the employer or the individual can be significant.

Medication error may also effect in terms costs to the employer arising from re-education and training of the paramedic, support for the paramedic if stress or sick leave ensues, and redeployment to off-road duties if the paramedic does not regain his/her clinical confidence. Adverse outcomes from medication error may attract scrutiny from the media, which in turn can result in public loss of confidence in the abilities of paramedics. In a society that has low tolerance levels to medical errors and justifiably high expectations of safe medical care, the consequences of adverse outcomes can be costly at both corporate and personal levels.

Prevention of Medication Error[1,9]

According to McGovern the ten „golden rules for the safe administration of medication are:

- Administer the right drug
- Administer the drug to the right patient
- Administer the right dose
- Administer the drug by the right route
- Administer the drug at the right time
- Teach the patient about the drugs they are receiving
- Take a complete patient drug history
- Find out if the patient has any allergies
- Be aware of potential drug/drug interactions
- Document each drug administered

Managing Medication Errors

Determination of the causes of medication errors should be coupled with assessment of the severity of the error. While quality management processes should include programs to decrease the incidence of all medication errors, effort should be concentrated on eliminating the causes of errors associated with greater levels of severity. There should be established mechanisms for tracking drugs or drug classes that are involved in medication errors. Correlations between errors and the method of drug distribution should also be reviewed (e.g., unit dose, floor stock, or bulk medications; premixed or extemporaneously compounded products; and oral or injectable products).

These processes will help identify system problems and stimulate changes to minimize the recurrence of errors. Quality improvement programs should provide guidance for patient support, staff counselling and education, and risk

management processes when a medication error is detected. Incident reporting policies and procedures and appropriate counselling, education, and intervention programs should be established in all hospitals. Risk management processes for medication errors should include pharmacists, physicians, and nurses, in addition to risk management specialists, legal counsel, and others as appropriate.

The following actions are recommended upon error detection.

1. Any necessary corrective and supportive therapy should be provided to the patient.
2. The error should be documented and reported immediately after discovery, in accordance with written procedures. For clinically significant errors, an immediate oral notice should be provided to physicians, nurses, and pharmacy managers. A written medication error report should follow promptly.
3. For clinically significant errors, fact gathering and investigation should be initiated immediately. Facts that should be determined and documented include what happened, where the incident occurred, why the incident occurred, how the incident occurred, and who was involved. Appropriate product evidence (e.g., packaging and labeling) should be retrieved and retained for future reference until causative factors are eliminated or resolved.
4. Reports of clinically significant errors and the associated corrective activities should be reviewed by the supervisor and department head of the area(s) involved, the appropriate organizational administrator, the organizational safety committee (or its equivalent), and legal counsel (as appropriate).
5. When appropriate, the supervisor and the staff members who were involved in the error should confer on how the error occurred and how its recurrence can be prevented. Medication errors often result from problems in systems rather than exclusively from staff performance or environmental factors thus, error reports should not be used for punitive purposes but to achieve correction or change.
6. Information gained from medication error reports and other means that demonstrates continued failure of individual professionals to avoid preventable medication errors should serve as an effective management and educational tool in staff development or, if necessary, modification of job functions or staff disciplinary action.
7. Supervisors, department managers, and appropriate committees should periodically review error reports and determine causes of errors and develop actions to prevent their recurrence (e.g., conduct organizational staff education, alter staff levels, revise policies and procedures, or change facilities, equipment, or supplies).
8. Medication errors should be reported to a national monitoring program so that the shared experiences of pharmacists, nurses, physicians, and patients can contribute to improved patient safety and to the development of valuable educational services for the prevention of future errors. Reporting programs are intended to track trends and inform practitioners, regulators, and the pharmaceutical industry of potential product and system hazards that have a documented association with medication errors.

CONCLUSION

Maximum errors were committed during routine situations and were unforced .Weight-based dosing, equipment failures or inadequacy, clerical mistakes in, carelessness and a lack of training and experience were important causes of these errors.[9] Medication errors increases cost, significantly prolongs hospital stay and increase the risk of death almost 2-fold.Several easily identifiable factors associated with large populations of medication errors includes inadequate knowledge regarding drug therapy, such as age, impaired renal function and drug allergy , need for calculation of drug dose, specialized drug formulation characteristics and medication prescribing nomenclature. Other most

common factors contributed to medication error include lack of drug information, incorrect diagnosis, drug-drug related reactions, dose miscalculations, incorrect drug administration and lack of patient education, miscommunication of drug order resulting from poor handwriting, missing information when the drug is packed into smaller units, external factors such as interruption, work load, job related stress, improper training or education and sound-alike look alike packaging of medications.[4]

Hence the findings can be helpful in minimizing certain medication errors.

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