RETROSPECTIVE ANALYSIS: TO ENHANCE PATIENT SAFETY BY MINIMIZING MEDICATION ERRORS IN TERTIARY CARE CARDIAC HOSPITAL

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ABSTRACT
To identify and measure the frequency of medication errors, to understand the causes for errors and best strategies to decrease medication error rate in a cardiac hospital New Delhi. The Retrospective study of 137 case files, was undertaken to find out the medication errors in new drugs to be included in hospital formulary and to study policy compliances, for the period of a month, February 2010. We studied 137 patient files and medication error related were reported most often at the stages of prescription– 32 cases (23.35%), 12 administration errors (8.75%), 9 documentation errors (6.56%), 7 transcription errors (5.1%). This study has demonstrated a whole range of different types of errors in different phases of medication use and documentation process. We have seen that handwritten prescriptions are associated with large number of errors. A combined effort is required by the physician’s, managerial staff, nursing staff and educational interventions to improve patient safety in hospital.

KEY WORDS: Retrospective analysis, Medication errors and Causes

INTRODUCTION
Medication use in healthcare services is an interdiscipli nary process which involves every aspect of medication process which includes doctor’s prescription, converting into transcription sheet, pharmacist’s review and finally administration of selected drugs to patients by nurses’. Medication errors have different severity of harms, starting from small injuries to death of the patients, since it involves life of a patient it has become a serious problem throughout the world and various studies have been conducted to enhance patient safety1 however most of these errors do not harm patients only a small fraction of errors have a effect on healthcare2. Medication errors are result of human errors and these errors may occur at the time of planning where original actions planned are not correct or at the time of execution of plans where planned actions are not properly executed3. We can certainly improve magnitude of these errors by strong policies and procedures not only it saves life of the patient but it also have a positive economic effect on healthcare systems. Reduction in medication errors is not beneficial to patients but it also useful for hospitals too, it reduces average length of stay in a hospital and also leads to increase in morale of medical staff and hence their working relationships improves and also relation with the patients4. In health care institutions the reduction of medication errors are at highest priority and the problem is properly documented5. Various strategies are adopted by healthcare institutions to tackle the problem of medication errors, some strategies focus on high level regular training of the staff while others focus on better error tracking and reporting systems ideally it should be a combination of both. Numerous innovative and integrated system have been designed like Failure Mode Effect Analysis(FMEA), Electronic Medical Records(EMR), Bar Coding Technology and Automatic Dispensing Machines(ADM), CPOE to abolish the medication errors but it can be prevented by putting a good integrated Medical Management System6. The aim of this study is to observe all the medication error incidents which occurred in a hospital during a medication use process and identify the possible reasons and ways to overcome the errors.

According to national coordinating council for errors in medication reporting and prevention (NCC MERP) a medication error is defined as “any preventable event that my cause or lead to inappropriate medication use or patient harm while the medication is in control of health care professionals, patient or consumer7. According to the potential to harm patients medication errors are of two types; near misses and actual errors, near misses errors do not directly harm the patients but have every potential if not corrected, other names given to such errors are close calls, all the Prescription errors, Transcription and Documentation errors are near misses errors and actual errors are errors which have potential to harm patients directly, is a wrong drug is administered or excess of dose is administered then these errors may cause harm patient health so all administration errors are actual errors8. Factors contributing to medication errors are

1. Wrong protocol adopted by physician’s while diagnosis
2. Exceeding maximum cumulative or individual doses
3. Omission errors
4. Wrong dose, route errors
5. Wrong time errors(by nursing staff)
Medication errors arises due to personal factors and the system factors, where system factor includes lack of appropriate rules, regulations and policies, inefficient error tracking system and personal factors includes lack of training, excess of workload, fatigue.

COMMONLY OCCURRING ERRORS

Prescription errors
It may be defined as errors which arise due to fault in the prescription charts made by physicians. These errors may be incomplete prescription e.g. column not filled properly which indicates dose, frequency, and route of administration. Incorrect information, illegible handwriting and none mentioning of details which may harm patients like inappropriate doses or directions, contraindications, drug allergies9, some common examples are–

Use of abbreviations (e.g. CPZ has intend meaning of pro-chlorperazine possible misrepresentation may be chlorpromazine).
Dispensing

Pharmacy is an important part of any healthcare organization. Whenever data is entered manually there are every chances of transcription error. A transcription sheet is an identical copy of physician's order in the patient chart, it includes incorrect or wrongful administration of a medication such as mistake in dosage or route of administration, use of outdated drugs, administration of drug at wrong time. These type of errors are committed by nursing staff of the hospital.

Drug administration is a high risk area in healthcare institutions. Nursing staff should follow the golden rule of 5R’s ‘five rights’ (giving the right dose of the right drug to the right patient at the right time by the right route)\(^4\). The most common factors which contribute to this problem are individual characteristics and system issues, individual characteristics include lack of knowledge of the patient, about patient diagnosis, lack of training, non-follow of hospital policy, procedures, not checking medications against transcription sheet and system issues are excess of workload on nurses, rotation shifts, total no of patients per nurse, interruptions due to excess of noise, poor lightning in the premises.

Documentation errors

Documentation is any written or electronically generated information about the patient that describes the care or service required by the patient. High rate of medication errors highlight the importance of reduction in medication errors\(^1\). Medication errors are main cause of mortality in the hospitals. A medication error can take place any time in patient care from the time of physician’s prescription to the time it is administered by the patient\(^2\). Proper documentation has advantages that it facilitates easy auditing which is necessary too from management point of view, it promotes good nursing communication and thus help in reduction in medication errors.

Example of documentation errors includes non-availability of prescription sheet or transcription sheet in the patient file, or drug given to patient but not signed by nursing staff.

STRATEGIES TO DECREASE MEDICATION ERROR RATES

In healthcare systems the ultimate goal of any organization is reduction in medication errors\(^3\). Medication errors are main cause of mortality in the hospitals. A medication error can take place any time in patient care from the time of physician’s prescription to the time it is administered by the patient\(^2\). Proper documentation has advantages that it facilitates easy auditing which is necessary too from management point of view, it promotes good nursing communication and thus help in reduction in medication errors.

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Strategies against transcription errors - Transcription errors happen in hospitals very often and it causes dispensing and administration errors, categories were omissions, wrong dose or interval, requesting drug more than the patient’s need, alternative drug, and unauthorized medication. The transcription errors can be avoided by providing better working conditions for the transcriptionist, by providing routine training programs, by introduction of new technologies.

Strategies against dispensing errors - Dispensing is not the only job in which pharmacist is indulged in medication process but his role is much more than just dispensing. The pharmacist can guide other staff persons and also the nurses about the safe administration of drugs to patients. Every hospital aims at providing high quality care to its customers so it is important duty of pharmacists to have a balance between professional and customer related standards.

Past studies have shown that with the introduction of central hospital pharmacies the dispensing errors rates have declined when used against automated dispensing cabinets.

Some possible strategies are:
- Introducing safe systematic procedures for dispensing medicines in the pharmacy.
- Look like and sound like drugs should be placed at different places.
- Pharmacist should check prescription before dispensing drugs.
- There should be a double check system before dispensing of drugs.
- Staff should be professionally competent and trained to dispense the medications.
- Introduction of prescription tracking system
- High risk drugs should be dispensed with great cautions using a special kind of labels

Introduction of information system in the pharmacy may be a useful step in reducing the dispensing errors and to increase productivity of pharmacist and other staff members.

Strategies against administration errors
A drug administration error is variation between printed or handwritten physician’s orders and medication received by patient. Drug administration errors may be minimized by the following:
- Checking patients identity before administrating drugs
- Having dosage calculations checked independently by another healthcare professional before the drug is administered or computerized calculation sheets specially designed for this purpose
- Having the prescription, the drug and the patient in the same place so they can be checked against one another
- Ensuring that medication is given at the correct time
- A double check system should be mandatory; it may be useful in terms of patient safety.
- Do not administer drug doses from previously opened packages.
- Provide extra training and supervision to nurses, interns, ward boys who are associated with drug delivery

There are some nursing care models introduced to minimize the administration orders in hospitals which includes process of double checking where two nurses check the medication order prior administration drugs to patients, an introduction to Medication Administration Review Committee (MARS), it involves formation of interdisciplinary committee who review all the cases reported in hospital and try to find out the root cause for the problem.

MATERIALS AND METHODS

Data collection - Data collection was done through approaches that cover all aspects of medication process. The data was collected from the discharged files of the patients at the medical record department (MRD) of the hospital. Discharged patient files were studied for medication errors in Prescription, Transcription, Administration, and documentation processes. A self-made medication error form was prepared and filled for every file inspected in which every aspect of medication error was studied. Handwritten prescription charts were studied and checked whether drugs names were written legibly by the physician, route-frequency of the medications were properly mentioned, prescriptions date and time were properly recorded, dosage form mentioned or not? After physician handwritten preview, transcription sheets were reviewed for any deviation between handwritten prescription and online prescription, whether data was entered correctly as described in the prescription sheet. Administration errors were observed in terms of time of administration of drugs to patients whether drugs were administered to right patient on right day, right time, through right route as was prescribed by the physician. Documentation errors were observed for checking sister’s signature was present on the computerized sheet, transcription sheet is available or not, if a drug was not given at a particular time then possible reason was mentioned by the sister or not.

Study Design - A retrospective observational single centered study was performed to detect the medical errors and to evaluate success of medical error prevention programmes, it doesn’t involve any direct supervision of the patient files, the study involves the review of written prescription chart by physician, transcription sheet, and medical administration record sheet to check giving of each dose by the nurses. The study protocol was reviewed and approved by the Institution Review Board and Committee on Human Research. The survey was approved by the hospital’s clinical audit and quality department of Fortis Escorts Heart Institute New Delhi, that provides inpatient treatment under mainly secure conditions for patients who have cardiac problems. Medication errors result from the deviation from hospital policy, these medications errors are classified into two groups, actual errors and near misses, actual errors are administration errors which directly harm the patients while near misses includes prescription error, transcription error and documentation errors which directly do not provide any harm to patient safety. The Retrospective study was undertaken to find out the medication errors in hospital in case of new drugs to be added in hospital formulary for the period of one month, February 2010. Study includes 137 patient’s files.

RESULTS

During the study period a total of 137 discharged files were studied for medication error. Table 2 shows stages in medication use process during which the errors occurred. Medication errors related were reported most often at the stages of prescription- 32 cases (23.35%), 12 administration
This study has demonstrated a whole range of different types of errors starting from prescription and ends up with proper documentation of the patient files; we have seen that handwritten prescriptions are associated with large number of errors. These results are important not only for the welfare of patients and the economics of the health care system but also for the future role of pharmacy personnel in hospitals.

A combined effort is required by the physician’s, managerial staff, nursing staff and educational interventions to improve patient safety in hospital by minimizing medication error rate in hospital. We hope that these results will lead to awareness of healthcare issues to initiate safety movements and open up training aspects to reduce medication errors and will result in notable improvements in patient outcomes.

**DISCUSSION**

High rate of medication errors are cause of concern for healthcare institutions not only it affects the health of the patients but it also affects economic status of the hospital. Medication error free environment is almost impossible to achieve as we are humans and human do errors but these errors can be prevented before they cause any harm to patients. It is moral responsibility of each and every person who is directly or indirectly associated with healthcare institutions to play their role effectively and if any error is happened or detected by them it should be reported as early as possible to top officials. Important findings in this study was that out of 137 files examined 60 errors were reported and a majority was prescription errors (23.35%), transcription errors (5.1%), and administration errors (8.75%), documentation (6.56%). The data shows that prescriptions errors occur most and some of the most frequent errors showed absent information in the prescription, such as dose and administration route. This study shows that prescription errors are common in Fortis Escorts New Delhi. The most common errors are not mentioning of route of administration and illegible handwriting by some doctors. This result is important because prescription error is starting point, if it is not corrected it gives invitation to other errors. When presence of generic name is studied in the prescription it was found that in many cases drug names were written as brand names which are against hospital policy. According to results missing doses in drug administration were found to be other major error in hospital and the main errors were omission of drug doses on prescribed time and best way of avoiding this error is introduction of double-check system and it’s the best way to curb medication errors in drug delivery.

**STUDY LIMITATIONS**

This study was conducted for short period of time; it was conducted on 1 month cases in case of new drugs which are under observation, to be included in hospital formulary. It was not a generalized study, it was conducted on new drug cases, there are chances that may be doctors are not used to prescribe the medications and nurses have no experience to administer drugs but this fact is not acceptable in patient care. weather drugs are new or older medication errors are not acceptable at any cost.

**CONCLUSION**

This study has demonstrated a whole range of different types of errors staring from prescription and ends up with proper documentation of the patient files; we have seen that the total cases of medication errors = 60

**REFERENCES**


Table 1: Indication and types of transcription errors

<table>
<thead>
<tr>
<th>Type of errors</th>
<th>Indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Omission</td>
<td>When drug is prescribed but not mentioned in transcription sheet</td>
</tr>
<tr>
<td>Wrong interval</td>
<td>When prescribed dose interval were not reached to patient correctly</td>
</tr>
<tr>
<td>Alternative drug</td>
<td>Medications are replaced by pharmacists without physician’s approval</td>
</tr>
<tr>
<td>Wrong dose</td>
<td>Example 10mg instead of 100mg of ofloxacin tablet</td>
</tr>
</tbody>
</table>

TABLE 2 Percentage of medication errors at various stages

<table>
<thead>
<tr>
<th>Type of errors</th>
<th>No of cases</th>
<th>% of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prescription</td>
<td>32</td>
<td>23.35</td>
</tr>
<tr>
<td>Transcription</td>
<td>7</td>
<td>5.1</td>
</tr>
<tr>
<td>Administration</td>
<td>12</td>
<td>8.75</td>
</tr>
<tr>
<td>Documentation</td>
<td>9</td>
<td>6.56</td>
</tr>
</tbody>
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