

To Evaluate the Frequency and the Factors Contributing to Medication Errors in Critical Care Areas of A Tertiary Care Hospital: A Prospective Observational Study

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Abstract:

Objective. Medication errors are unintended but prominent failures in prescribing, dispensing, and administering medications. This study aimed to evaluate the frequency of medication errors and to identify the various factors contributing to medication errors in critical care areas of the hospital.

Method. This study was a prospective observational in nature which was conducted in the critical care areas of a tertiary care hospital. A checklist was developed and data was collected by reviewing prescriptions, medication charts and observing nurses during medication preparation. The data collected was analysed and the frequency was calculated. In addition to this, the fisher's exact test was applied to depict a non-random association between frequency and factors found.

Results. Out of 300 medication orders studied, 4.7% had illegible handwriting in prescription and 3.7% had the wrong dose and drug name in the prescription and the factor responsible for the majority of these was non-adherence to policies and procedures. 2% of orders were not transcribed for the right dose and 1.7% were not transcribed for the right schedule. 1.4% errors were because of the wrong drug preparation technique. In 4.7% of cases, medication was not administered on time, and in 12% of cases, the charts were not timely signed. Certain miscellaneous factors had a significant relationship ($P < 0.005$) with prescription, transcription, and documentation error frequency.

Conclusion. The research findings indicate that the major factors responsible for errors in critical care areas are non-adherence to established policies and procedures and stressful working conditions. Therefore, effective strategies for policy implementation are necessary to enhance patient safety in critical care areas of healthcare settings.

Keywords: Medication Error, Critical Care, Intensive Care Area.

1. Introduction

The medications are used to get the desired therapeutic outcomes and to improve the quality of life of a patient. Critical care presents a substantial patient safety challenge because it is fast-paced, complex, and requires high-risk decision-making. Moreover, critically ill patients may be at more risk because of the instability of their illness and the frequent need for high-risk interventions and medications¹. A

medication error may be 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 healthcare professional, patient, or consumer². Errors are common in most health care systems and are reported to be the seventh most common cause of death overall. In the intensive care unit on average, patients experience 1.7 errors per day and nearly all suffer a potentially life-threatening error at some point during their stay. Medication errors account for 78% of serious medical errors in the intensive care unit³.

The frequency of medication errors in adult intensive care units can be as high as 947 per 1,000 patient-days, with a median of 105.9 per 1,000 patient-days. Medication errors are estimated to account for 78% of all medical errors in intensive care units, with an average of 1.75 medication errors per patient per day.⁴ In a healthcare team nurses are responsible for medication administration to the patients and is therefore considered as the key faulty component for medication errors. The findings of many studies showed that performance deficit, poor calculation competency, poor adherence to protocols, poor knowledge of medications and complacent behaviour of the nurses are the main reasons for medication administration errors. There are certain system-related causes for administration errors include physicians poor handwriting, similar packing of medications⁵ Communication barriers can also result in medication errors during every step within the medication administration process. In many cases, the physicians orally give medication orders, which can create errors because many drug's names sound alike and can be mispronounced.⁶

To improve patient safety healthcare providers should interrupt any medication errors before reaching the patient by adhering to the six rights of medication administration and reporting the medication administration error. The six rights of medication administration are the right patient, right drug, right time, right route, right dose and right documentation. Moreover, nursing and hospital managers should reduce the nursing staff workload, provide periodic training courses on the proper and safe administrations of medication and create a conducive environment for error reporting.⁷

2. Theoretical Framework/Theory/Literature Review

A total of 331 patient safety incidents were reported, involving 295 patients, representing an overall rate of 3.6% of these, 166 (50.2%) were documentation errors while 165 (49.8%) were clinical protocol/medication errors. An overall rate of 0–4.5% was reported across all five ambulance services, with a mean of 2.0%. These errors had no impact on patient care or the trial and were all resolved.⁸

Studies of paediatric wards using electronic charts generally reported a reduced error prevalence compared to those using paper, although there were some inconsistencies. Error detection methods impacted the rate of administration errors in studies of multiple wards, however, no other difference was found. Definition of medication error did not have a consistent impact on reported error rates.⁹ Medication errors and a high number of significant drug interactions; prescription phase had the highest mistake rate (71%) and cause of errors (68%); transcription stage had a more variable error typology. A significant correlation was observed between the presence of causes and contributing factors to an error during the prescription and the commission of errors during the nurse transcription, being the main risk areas the time of antibiotic administration, dilution errors, concentration and speed of administration of high-risk medications and the technique used for nasogastric tube drug administration.¹⁰ In the Intensive Care Units hospitalised patients receive more drugs than patients in

other units. Because of drowsiness or unconsciousness, Intensive care unit patients are not able to monitor and report the drug side effects: thus, in this unit, patients are most vulnerable to be exposed to medication errors due to care complexity, severe illness, and providing life-sustaining treatment. On average, Intensive care patients are exposed to 1.7 errors per day and medication errors account for 78% of life-threatening errors. Intensities of medication errors are minor, severe, and life-threatening leading to death.¹¹

The demand for safe reliable and evidence-based care is increasing now at the local region as well as at national levels. The developing countries are also becoming more aware and committed to providing safe healthcare to their citizens. So, this study aimed to check the frequency and factors of medication errors as applicable in the Indian context and improving patient's safety in critical care areas of the hospital.

Methodology

A prospective observational study was conducted in the critical care areas of a tertiary care hospital. 300 randomly selected medication charts were studied for errors using a disguised observational technique. The critical care area included in the study was the intensive care unit, medical intensive care unit, neonatal intensive care unit, medical intensive care unit, surgical recovery room, cardiac care unit, and neurology intensive care unit. Every staff involved in the medication management process was included in the study. Exclusion criteria were training staff, new employees, and non-clinical staff.

Data collection and analysis

Data was collected by developing a checklist separately for frequency and factors, frequency, and factors were included under prescription, transcription, preparation, administration, documentation, and miscellaneous headings. 300 randomly selected medication orders were studied and a checklist was filled. Out of 300 medication orders, 50 were studied for preparation.

The data collected was then analysed and frequency was calculated. Fisher's exact test was applied to the data set to see non-random association between frequency and factors and results were tabulated.

Results and Discussion

In this study, illegible writing and wrong drug names and doses were responsible for prescription error in 4.7% (n=14) and 3.7% (n=11) cases respectively. The doctor's name and signature were not on the prescription in 3% (n=9) cases. In prescription error, nonadherence to policies and procedures comes out as a major factor responsible for 10% (n= 31) errors and it shows a significant relationship ($P < 0.05$) with the prescription error frequency.

For transcription error in 2% (n = 6) cases the nurse transcribes the drug for the wrong dose whereas in 1.7% (n = 5) cases they transcribe it for the wrong schedule. The main factor responsible for this was that the dose and the schedule were not written as per the guidelines whereas some other factor was also associated and shows the significant relationship ($P < 0.05$) with the transcription error frequency

Whereas in preparation error, 1.3% (n = 4) cases the cause was that medication was not prepared using proper technique and the solvent was not compatible for that drug. In 0.3% (n = 1) case the dose was

not the same as prescribed. The factor behind this is that nurses do not have proper knowledge of the medication preparation process.

The cause for administration error in 4.7% (n=14) cases was that the medication was not administered on time it was given after the scheduled time, in 3% (n = 9) cases the medication was not given in the right dose. In administration error factor responsible for error was wrong time administration in 13 cases in this medication was given after the window period and in 9 cases dose given was different than the prescribed and these factors showed a significant relationship ($P < 0.05$) with administration error frequency.

In documentation 12% (n = 36) error was because the charts were not signed and whereas 1.3% (n= 4) error was because required post-dose monitoring was not done. The major factor was that the doctor and nurse did not sign timely. The verbal orders were not signed within time in few cases. In documentation error, the factor responsible for error was that charts were not signed due to excessive workload and no proper knowledge about hospital policy and these factors have a significant relationship with documentation error frequency.

In miscellaneous error, 1.7% (n=5) errors were due to memory lapse and in 0.3%(n= 1) case scenario mild drug reaction occurred to the patient, and these factors have a significant relationship ($P < 0.05$) with preparation, transcription, documentation, miscellaneous error frequency. Nurses can forget to give medication if there is no proper documentation about the schedule of drugs and drugs reaction can happen because of wrong transcription or preparation.

Discussion

To improve the patient safety in critical care areas of hospital medication management process need to be improved. There is a need to implement strategies such as medication standardization, computerized physicians' orders, medication reconciliation, adequate staffing, and pharmacist's involvement in medicinal preparations. Clinical Pharmacist should be appointed in these areas of hospital to ensure safety of patient. Nurses have an integral role to play in medication safety as patients spend most of their time with them inside any critical care area. Proper training about medication management policy to both doctors and nurses is need of the hour. During medication preparations, the dose and schedule should be double-checked to ensure patient safety and get the desired outcome. It is also significantly important that medication is administered at right time. Here nurse to patient ratio plays a role generally for critical care areas 1:1 ratio is preferred for ventilated patients whereas a 1:2 is a ratio for the non-ventilated patient.¹² Documentation of the medication should be done simultaneously so there is no confusion. And reporting of medication error should be done without fear. Training and education about medication safety should be provided to the staff involved in medication management. Nurses can be asked to attend mandatory job training and the outcome of the training should be assessed. There should be a proper feedback system in place to ensure the reporting of medication errors. Every staff member involved in drug administration should be encouraged to sign the chart on time. And oral orders should be signed within the time mentioned in the policy. Good supervision is also required to ensure patient safety.

Good communication between staff involved in medication management is needed. Verbal orders should be avoided and all orders should be documented on patient files promptly to ensure patient

safety in the process. Double-checking by another nurse or doctor can overcome slips and lapses and there should be an emphasis on the accuracy of the medication process. If the writing is illegible, and the nursing staff is not able to transcribe nurse must not give the medication because she knows what medication it is she should always call the prescriber to confirm the drug or dose.

Conclusion

The findings of the study suggested that even after the 1:1 nurse-patient ratio in critical care areas medication errors are still prevalent. Major factors responsible for medication errors was non-adherence to policy and procedures and lack of proper documentation. Medication error in critical care increases the cost of treatment and cause potential harm to the patient. Hence it becomes very important to provide training to nurses about medication management, preparation and safety. Numerical calculations training can also play a significant role in reducing medication errors in neonatal critical care units. Hospitals should not entirely depend upon an individual's memory and an appropriate system should be in place to reduce errors and improve patients safety.

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Conflict of interest:

There is no conflict of interest regarding the publication of this paper.

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The authors whose names are mentioned in the article certify that they have no involvement in any organization or entity with any financial interest in the subject matter or materials discussed in this manuscript.

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Table

Table 1: total number of errors present in the Critical care Areas.

Type of error	Total number of errors	Percentage of error
Prescription	35	11.6%
Transcription	12	4%
Preparation	9 out of 50	18%
Administration	23	7.6%
Documentation	42	14%
Miscellaneous	8	2.6%