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MEDICATION ADMINISTRATION ERRORS INCIDENCE IN A TERTIARY CARE HOSPITAL: IS IT THE HIDDEN PART OF OUR HEALTH-CARE SYSTEM

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ABSTRACT
One of the most common major issues in health-care are known medication errors,which can 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 health-care professional, patient or consumer; according tothe National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP). Medication administration errors (MAEs) are particularly important in the intensive care unit (ICU) because ICU patients usually receive many drugs; majority of which are given parenterally. The present study aims to identify and assess the MAEs in patients admitted in ICU in a tertiary care hospital, and alsoassess the frequency and risk factors of such errors. Direct observation of medication administration was carried out on patients in the ICU of the hospital. MAEs were assessed by using Medscope Drug Interaction Checker Software and Phadke's criteria for the assessment of rationality of prescription orders. Among MAES, 23.09% omission errors, 18.02% wrong dose and 39.97% wrong rate of IV infusion errors were the major types of errors. The majority MAEs belonged to Category C (63.06%), Category E (21.93%), Category B (7.61%) and Category D (7.40%).WHO launched the "Medication without Harm" protocol in 2017, aiming to reduce severe, avoidable harm related to medications in all countries by 50% in the next 5 years. Early detection and intervention of MAEs help towards its realization, along with improvement of hospital-patient relationship; as well as reduce the cost of treatment and implement rational drug use.

KEYWORDS: Medication Administration Errors,Medscope Drug Interaction Checker, Phadke's Criteria.

INTRODUCTION
One of the most common major issues in health-care are known medication errors (ME). MEs in hospitals can help looking into serious morbidity or mortality and help significant reduction of medical treatment costs on the patient and health care system. According to the National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP).[1] "A medication error is 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, healthcare products, procedures and systems, including prescribing, order communication, product labelling, packaging and nomenclature, compounding, dispensing, distribution, administration, education, monitoring, use". The elderly and paediatric patients are more suspectable to medication administration errors (MAE) due to resistance to medication administration, physical weakness, requirement of complex medication regimes and lack of appropriatecalculation of dosages and strength for use in these group of patients.[2,3] MEs in the intensive care unit (ICU) are the highest risk for administration errors due tothe following factor–ICU patients usually receive many drugs; majority of these drugs are given parenterally and patient often are sedated and can't detect and correct possible errors themselves.[4] Astudy conducted in Malaysia shows that, the most common types of drug administration errors were found to be: incorrect time of administration, followed by incorrect drug preparation, omission errors and incorrect dose.[5] The prescription audit is the most important methods to ensure rational use of drugsin this case.[6]

Thus, the present study was conducted to identify and assess the MAEs occurring in patients admitted in ICU in

a tertiary care hospital, and also to assess the frequency and risk factors of such medication administration errors.

MATERIALS AND METHODS

The present cross-sectional study was conducted over a period of one year from February 2019 to January 2020, in the ICU at a tertiary care hospital. An average of 25 patients were admitted per day, either from the outpatient emergency units or transferred from wards of other clinical specialities to the ICU.

Exclusion criteria

1) Paediatrics patients and pregnant and lactating women were excluded from the study.
2) Patients admitted in ICU for day care services were also excluded from this study.

Data Collection

Eachpatient's admission charts and medication charts were reviewed and evaluated after 48 hours of the patient'sadmission to the ICU to find out any suspected medication errors.

Direct observation was carried out by researchers, who accompanied the staff nurse during medication administration. No patient interview or any kind of interaction was considered and only patient medicine cards were observed. All prescriptions at the time of the study were hand written. For MAEs patients were followed up till discharge and were assessed by using Medscope Drug Interaction Checker Software (Version 4.4) to find out the possible errors.

Phadke's criteria was using for the assessment of rationality of prescription orders.[7]

Prescribing errors were considered as any error which arose from treating physician or resident.

1. illegible, improper or inadequate documentation of patient details
2. prescribing drugs to which the patient has adverse history.
3. incorrect dose.
4. incomplete prescription or prescription of a contraindicated drug.
5. negligence about potential drug-drug interaction.
6. prescribing drug to a wrong patient, ambiguous order or overdose, wrong medication, wrong frequency or wrong route of administration.[8]

According to 2018 guidelines of NCCMERP, MAEs were categorised into nine categories as follows,[1]

Category A: Potential error, circumstances/events that have the potential to cause incident.

Category B: An error occurred but the error did not reach the patient.

Category C: An error occurred that reached the patient but did not cause patient harm.

Category D: An error occurred that reached the patient and required monitoring to confirm that itresulted in no harm to the patient and/or required intervention to preclude harm.

Category E: An error occurred that may have contributed to or resulted in temporary harm to thepatient and required intervention.

Category F: An error occurred that may have contributed to or resulted in temporary harm to thepatient and required initial or prolonged hospitalisation.

Category G: An error occurred that may have contributed to or resulted in permanent patient harm.

Category H: An error occurred that required intervention necessary to sustain life.

Category I: An error occurred that may have contributed to or resulted in the patient's death.

RESULTS

During this study, a total number of 8602 patient were enrolled initially. Among them, 284 patients were not included due to: discharge against medical advice (112), death (84), transfer to non-ICU units (88). Finally, a total of 8318 patients were included in the study, of which 4747 (57%) were male patients and 3576 (43%) of female patients. MAEs were not found in 1124 patients; among these patients, 525 were male and 599 were females.

The frequency of the MAEs were calculated by using the following formula:[3]

$$\text{Frequency of MAEs} = \frac{\text{Number of Significant MAEs} + \text{Non} - \text{Significant MAEs}}{\text{Doses given} + \text{Doses Ordered but not given}} \times 100$$

The details of the MAEs types with their percentage (%) are depicted in Table 1.

Table 1: Various Types of Medication Administration Errors (MAEs).

Serial Number	Types of Errors	Percentage of Errors (%)
01	Omission Error	23.09
02	Wrong Patient	Not Observed
03	Wrong Time	02.91
04	Wrong Dose/ Quantity/ Strength	18.02
05	Wrong Route of Administration	03.91
06	Wrong Drug (Medication given)	04.49
07	Wrong Rate of Infusion	39.97
08	Administration after discontinuation order	07.61

Administration of drugs in patients is a very critical stage in drug use process, because it's directly related to adverse drug events or sub-therapeutic outcome in patients. In the present study, the most common type of errors observed were wrong rate of IV infusion (39.97%), failure to administer or failure to record the administration errors marked as omission errors (23.09%). These are closely followed by improper dose, quantity and strength errors (18.02%). Similarly, wrong drug, which is the drug other than the prescribed one and wrong time (e.g., dose was given in evening instead of morning) are 4.49% and 2.91% respectively. Also, wrong route of administration, like oral instead of IV infusion, accounted for 3.91% of MAE. However, alarmingly, 7.61% patients were found to be getting medication after discontinuation of the medication order. Medication administration to the wrong patient was not observed in this study.

To assess the severity of the MAEs in patient, themajor outcomes are represented graphically in Figure 1 as per NCCMERP Taxonomy.

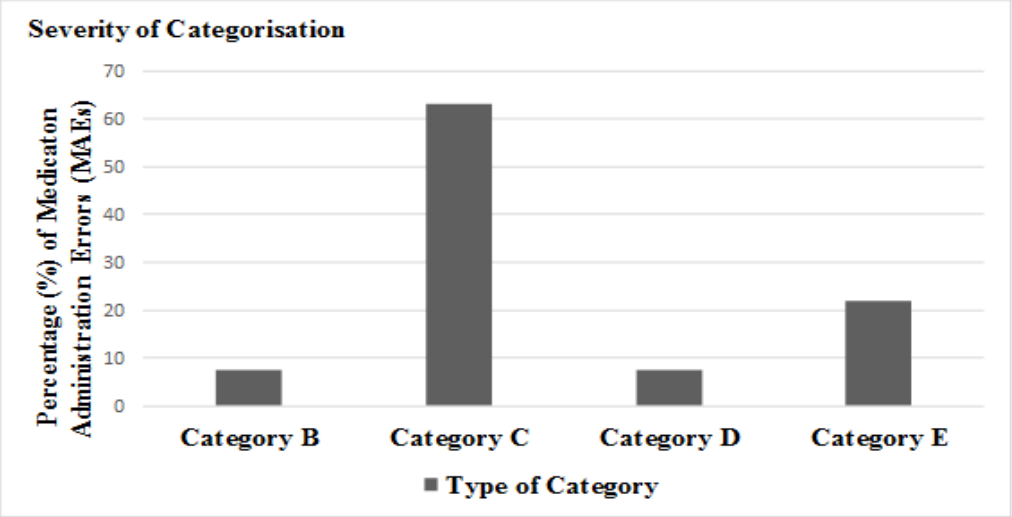

Figure 1: Graphical Representation for Categorisation of Medication Administration Errors (MAEs).

The MAEs were analysed and classified in to various categories. Most of the errors were Category C (63.06%), Category E (21.93%) and Category B (7.61%) followed by the Category D (7.40%). Major deviation in other categories were not observed during these study period.

DISCUSSION

MAEs monitoring and assessment are an important job for health-care workers in hospitals. Unfortunately, there is a huge gap of monitoring of MAEs in South East Asian Countries. Sometimes, the MAEs have the potential to cause temporary or permanent harm in patients. Keeping all these in mind, this study was conducted to assess the type and frequency of MAEs in ICU of tertiary care hospitals.

The total number & categories of common MAEs identified corroborates with other studies showing that the lacunae of negligence are common factors all over the world. Wrong rate of infusion, omission errors and wrong dose/ quantity/ strength administration of medicine/ drugetc. has been documented in the studies, showing that IV fluid administration is involved with wrong rates Worldwide.[9,10] The reason for inaccurate fluid administration is poor communication, mislabelling of IV fluid, limitations in knowledge of dosing etc. Busy schedule, limited manpower, urge to complete work as early as possible and missing double check/ cross checking of medication orders can lead to these types of MAEs.[11] Also, a small percentage of MAEs identified were hazardous for patients requiring extra attention and withdrawal of already limited resources.

In March 2017, WHO launched the "Medication without Harm" protocol, which is a global patient safety initiative aiming to reduce severe, avoidable harm related to medications in all countries by 50% in the next 5 years.[12] MAEs in patients is very critical to identify efficacy of drug treatment process because it is directly related to adverse drug events or sub-therapeutic outcome in patients.

CONCLUSION

In conclusion, it can be argued that early detection and intervention of MAEs will improve the therapeutic outcomes and reduce the patient's risk of adverse effects, along with improvement of hospital-patient relationship and goodwill; as well as reduce the cost of treatment& mismanagement of resources, including human resources. It will also improve the rational use of drugs by health-care professional and the quality of health-care system.

Ethical Approval

Ethical Committee clearance was obtained from Institutional Ethical Reviewed Board of Hospital before commencement of study. Informed consent was obtained from all individual patients included in this study.

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Competing interests

The authors declare that they have no competing interests.

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