ASESSMENT OF FACTORS CONTRIBUTING TO IMPROPER DRUG USE IN AN INTENSIVE CARE UNIT AT A TERTIARY CARE TEACHING HOSPITAL

Cijy Thomas*, Rajeswari Ramaswamy1, Teena Nazeem1, Ahmadi Naaz1, Janet Jacob1, Dr. Susheela Shekar2

Krupanidhi College of Pharmacy, Chikkabellandur, Carmelaram Post, Varthur Hobli, Bangalore-560035.
2Medical ICU, MVJ Medical College and Research Hospital, Bangalore-562114.

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ABSTRACT
Although patient’s safety is increasingly recognized as an essential component in the practice of intensive care medicine, the complexity of processes and medical conditions dealt with makes the practice of this specialty vulnerable and prone to error. Aim of the study was to observe the prescribing practices in emergency department and to study the factors contributing to improper drug use. A 6 months, prospective observational study was conducted in the ICU of a tertiary care teaching hospital. Patient’s medication charts were observed for the prescribing practices and factors contributing to improper drug use. Out of 120 cases collected, 45% of the study subjects were females and 55% accounts for males. Among the prescriber related factors contributing to improper drug use, illegible handwriting (35.6%) and in administration related factors, improper recording (50%) were the highest. In transcribing related factors, drugs not ordered were the highest (20%) followed by discrepancy in drug name (12.5%) and route (0.8%). The study results show an association between the prescriber related illegible handwriting and discrepancy in transcribing the drug’s name, route etc that leads to errors. Indecorous recording related to the drug administration is a prominent factor that contributes to the improper drug use. Thus study results highlights the need of stringent policies and implementation of guidelines on prescription, transcription and administration of drugs which could lead to decreased errors and thereby improved patient care and thus improved quality of life.

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INTRODUCTION

The National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) defines a "Medication Error" as follows: "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, health care products, procedures, and systems, including prescribing, order communication, product labelling, packaging, and nomenclature, compounding, dispensing, distribution, administration, education, monitoring, and use [1].

Although patient’s safety is increasingly recognized as an essential component in the practice of intensive care medicine, the complexity of processes and medical conditions dealt with makes the practice of this specialty vulnerable and prone to error. In Intensive Care Unit (ICU) settings, preventable and potential Adverse Drug Events (ADE) are markedly higher in rate than other non-ICUs. This can be correlated to the high number of drugs, the intravenous administration of most of the drugs and the extent of organ failure, which can lead to errors [3]. Many factors, either intrinsic or extrinsic, influence the quality of health care in the emergency department. These include: High levels of activity, high cognitive load, high decision density, high levels of diagnostic uncertainty, inexperience of physicians and nurses, distractions, narrow time window and shift [3].

Prescribing and administering errors are the two most frequent types of medication errors [1]. Prescribing errors in critical care units are frequent, serious, and expected, since these patients are prescribed twice as many medications as patients outside critical care [4]. Almost half of all prescription errors in ICUs are due to following reasons: prescription writing is not according to the formulary, unclear medication order, nonstandard nomenclature and illegible medication orders [5]. Errors in prescription writing involve illegibility, inappropriate abbreviations; lack of important information includes date of prescription, dose, route, frequency of administration etc. [5].

Medication Administration Error (MAE) is defined as any difference between what the prescriber prescribed in original order, what the patient was supposed to receive and what the patient received [6]. Factors which leads to MAE are discouraged attitude for checking the patient’s identification before drug administration, the storage of identical preparations in same areas, and environmental factors like interruptions during the nurse’s drug round [7]. Inaccurate documentation and poor communication during change of shifts in the hospitals also contribute to Medication Administration Errors [8,9]. Transcription errors are defined as an identical copy of prescription in the medical records. This class of medication errors was categorized as discrepancy in drug name, drug formulation, route, dose, dosing regimen, omission of drug, drugs which were not ordered [10].

Several studies proposes that, including clinical pharmacists in ICU team has reduced the incidence of adverse events, reduced cost of medications and curtailed the length of ICU admission. The rationale for putting a pharmacist in an ICU is that those patients are sicker and thus require a greater complexity of care [5]. Hence, we aimed to observe the prescribing practices and to assess the factors contributing for improper Drug Use in the ICU.

MATERIALS & METHODS

STUDY DESIGN:
Prospective – Observational Study

STUDY PERIOD:
6 months

STUDY POPULATION:
All emergency cases, either directly admitted or shifted from various wards to the Medical Intensive Care Unit (MICU) were included in the study.

Inclusion Criteria:
Patients with age 18 and above who were admitted in the ICU.

Exclusion Criteria:
Patients who are admitted in ICU for less than one day.

STUDY SITE:
Intensive Care Unit, of a Tertiary care Teaching and Research Hospital in Bangalore.

LITERATURE REVIEW:

An extensive literature survey has been carried out regarding Factors contributing for improper Drug Use in the Intensive Care Unit. The literatures supporting the study were gathered from Medscape, PubMed, Science direct, Cochrane Library, Lexi comp etc.
HUMAN ETHICAL CLEARANCE:
Ethical Clearance was obtained from Ethical Committee of the study Hospital. (Central Research/MVJ MC& RH/04/2015)

METHOD:
The study has been conducted in all inpatients in the ICU and who were satisfying the Study Inclusion criteria were taken up in the study after taking an Informed Consent (IC). Patient’s medication charts were reviewed to observe the prescription practices and assessment has been done using World Health Organisation (WHO) indicators and the factors contributing for improper Drug Use in ICU were identified.

WHO Prescription indicators\(^{[11]}\):
- 1) The average number of drugs prescribed per encounter
- 2) Percentage of drugs prescribed by generic name
- 3) Percentage of encounters in which antibiotics were prescribed
- 4) Percentage of encounters with injection prescribed
- 5) Percentage of drugs prescribed from Essential Drug List (EDL)

RESULTS
Figure – 1.

![Gender Categorisation](image)

Figure. 1 displays the gender categorization, where the majority (55\%) were male patients and 45\% female patients.

Figure- 2

![Age Categorisation](image)

Figure 2 shows the age categorisation, majority of the subjects (55\%) belongs to the age group of >50 years and the least number of subjects (13.37\%) were from the age group of 31-40 years.
Figure 3 illustrates the cases according to System wise classification; in this respiratory cases were on the higher side with 33.3%. Not much less than this 20% were comes under others category. Accordingly 16.6% were belongs to the category of endocrine cases.

*Others- Fever, Polyarthritis, Urinary Tract Infection (UTI), Viral Meningitis, Dermatitis, Peripheral sepsis, Peripheral Neuropathy, Hepatitis.

Figure 4 shows WHO Prescribing Indicator; average no of drugs per prescription for which the study results(9.7) shows greater deviation from the standard range(1.6-1.8) point out the degree of polypharmacy.
Figure 5 shows the percentage of antibiotic encounters where the standard ranges from 20.0% - 26.8%. The study results falls within the range (20%) highlights the judicious prescription of antibiotics.

Figure 6 shows the percentage of encounters with injection, in which the study results (42.6%) shows greater deviation from the standard range (13.4% - 24.1%) reveals the level of using costly forms of drug therapy.
Figure 7 shows the percentage of drugs prescribed in generic name for which the study results shows 86.8% whereas the standard gives 100% reveals the non-adherence to the standard policies.

Figure 8 shows the percentage of drugs included from Essential Drug List, the study results gives 84.8% where as the standard is 100%. This reflects the deviation of practices from the national drug policy.
Figure 9

Figure 9 shows factors contributing to improper drug use – prescriber related factors, in which Illegible handwriting 40% being the highest followed by Inaccurate drug history taken (32.50%), abbreviations used (20%) and use of decimal points in (7.50%).

Figure 10

Figure 10: shows the route of administration specified; 91.3% of drugs were specified with routes whereas 8.7% were not specified with route of administration.
Figure 11 shows the dose accuracy of the drugs prescribed, where majority of the drugs are prescribed with accurate dose (78.3%) and 21.7% accounted for inaccurate dosing.

Figure 12 shows the frequency specified in which majority of the drugs were prescribed with frequency (96.1%) and 3.9% were not prescribed with frequency.
Figure 13 shows administration related factors in which improper recording (50%) being the highest followed by dose omission (37.5%) and wrong time administration (12.5%).

Figure 14 shows the transcription related factors, out of which drugs not ordered gives the highest percentage (40%) followed by discrepancy in drug name (29.1%) and discrepancy in dose (11.6%) followed by omission of drug (8.3%), discrepancy in dosing regimen (5.8%) and discrepancy in route (5%).

DISCUSSION

A Prospective Observational study was conducted for a period of 6 months in the MICU of a tertiary care teaching hospital. In this study, 120 cases were collected, among this according to the gender categorisation 55% were male patients and 45% were female patients. As per the Age-categorization, it was observed that the patients mainly enrolled were above the age of 50 years and majority with the complaints of multiple organ dysfunctions. During the study, 120 cases were observed on a seasonal basis where initially the cases on Poisoning, Exacerbation of Chronic Obstructive Pulmonary Disease (COPD), Uncontrolled Diabetes Mellitus, whereas in the later stages the cases were mostly Diabetic Ketoacidosis and Hypertensive Emergencies.
Patient’s medication charts were observed and assessed with WHO Prescribing Indicators, which assess the rationality of the prescriptions. WHO recommends standard ranges for each prescribing indicators. For average no. of drugs prescribed per encounter, the standard ranges between 1.6-1.8. In a similar study conducted in South Ethiopia the average number of drugs prescribed per encounter was 1.9 in comparison to ours which showed a value of 9.7 which shows a greater deviation linked to higher degree of polypharmacy. The percentage of encounters in which antibiotics prescribed was 58.1% whereas our data results showed it to be 20% which was within the standard range (20.0% to 26.8%) highlights the judicious prescription of antibiotics and that of injections were 38.1%, as compared to ours 42.6%, which is higher than the standard (13.4% to 24.1%) shows the level of using costly forms of therapy. The Percentage of drugs prescribed by generic name and from an essential drug list was 98.7% and 96.6%, respectively wherein our results showed it as 86.8% and 84.8% which was lower than the standard (100%) which links to the non-adherence to the national drug policies.[11]

Medication charts were also analysed to identify the factors related with the Physician which contributes to improper drug use. One of the most important factors would be illegible handwriting followed by inaccurate drug history taken and use of abbreviations that needs a stringent policy to be followed to reduce it and thereby medication errors.

Medication administration related factors were observed in the study site among nurses who were solely responsible for the medication administration. It was noted that drugs were either given in wrong time or wrong dose, which was prominent especially at the times of duty change between the staff nurse. Errors were even noted in the documentation where, either the medication was given and not entered or there had been a change in the regimen ordered by the physician and was not followed up accordingly. At instances some charts showed absence of medication administration is either due to patient’s negligence or socioeconomic burden for affording the same, but the reason for missed dose was not documented clearly. Thereby Improper recording of the administration of drugs was found to have a higher impact in comparison to dose omission and incorrect time of administration of the drug.

Transcription related factors were observed for the medication orders given. It was done by the nursing staff who were responsible for the medication intending process. Study results shows that in a higher rate, the drugs which were not ordered by the physician were intended by the nursing staff according to the patient’s ill conditions using the knowledge from their experience and later informed the same to the concerned physician.

Errors were occurred while transcribing the medications from the physician’s order for intending the medications. Results shows that errors were happened during transcribing the name, dose, route and dosing regimen of the drugs which happened mainly due to the illegible handwriting in the physician orders. In the later stage of study, this problem was solved by appointing a duty doctor in the ICU who helped the nursing staff in clearing their doubts regarding transcribing. In certain cases omission of doses of drugs has been observed mainly because of the drug unavailability in the pharmacy, and due to the negligence of the patient because of the socioeconomic burden.

CONCLUSION

The result highlights the need of stringent policies and implementation of guidelines on prescription, administration and transcription of drugs which could lead to decreased errors and thereby improved patient care and thus improved quality of life. For recommended future research a study can be carried out to evaluate the efficiency of current system to prevent improper drug usage.

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AUTHORS’ STATEMENT

There is no conflict of interest

LIST OF ABBREVIATIONS

1. ICU: - Intensive Care Unit.
3. ADE: - Adverse Drug Event.
4. MAE: - Medication Administration Error.
5. MICU: - Medical Intensive Care Unit.
8. EDL: - Essential Drug List.
10. COPD: - Chronic Obstructive Pulmonary Disease.
REFERENCES