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DRUG UTILIZATION PATTERN IN CARDIOLOGY INTENSIVE CARE UNIT IN A TERTIARY HEALTH CARE INSTITUTION

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ABSTRACT: Aims and Objectives: To evaluate the current prescription pattern of drug utilization in patients admitted in cardiology intensive care unit (ICU) and to find out drug use indicators. **Methods:** It was a retrospective, observational hospital based study which was done for 6 months after obtaining permission from the institutional human ethics committee. The prescriptions of both genders and of any age groups suffering from any cardiovascular indication who were admitted in cardiology ICU were included. The parameters assessed were demographic profile of the patient, most common diagnosis, ICU outcome, number of days of ICU stay, most common group and number of drugs/prescription. **Results:** Data from 280 prescriptions were analyzed and it was found that 41-60 yrs patients were most commonly affected (53.6%), coronary artery disease (71.4%) is the most common indication. Most of the patients were discharged in improved condition (82.10%) with an average length of stay >5 days. Nitroglycerin (75.6%) is the most common drug used and at an average >12 drugs are used. **Conclusion:** Prescribing guideline is required to reduce the prevalent poly-pharmacy. The rational and cost effective prescribing can be promoted by conducting pharmaco-epidemiological studies.

INTRODUCTION: Worldwide, cardiovascular diseases are an important cause of morbidity and mortality [1]. The cost of these diseases in terms of human suffering and material resources is almost incalculable. The rising cost of healthcare has generated a growing interest in determining the effectiveness of various treatment modalities available to the patient suffering from cardio-vascular disease [2]. Therapeutics appears to be the first of the medical sciences to come into existence. Pharmacotherapy which means use of drugs for prevention and treatment of diseases is a major branch of therapeutics [3, 4].

Prescription order is an important therapeutic transaction between the prescriber and the patient [5]. So it should be scientifically legible, unambiguous, adequate and complete. Rational drug prescribing is defined as "the use of the least number of drugs to obtain the best possible effect in the shortest period and at a reasonable/justifiable cost" [6]. In the absence of a clear, comprehensive and rational drug policy, the production of pharmaceutical preparations in India is grossly distorted. Thus, Indian markets are flooded with over 70,000 formulations, compared to roughly 350 preparations listed on the WHO essential drugs list [7]. It has been well accepted that inadequate and irrational prescriptions could lead to serious consequences [8]. Irrational prescription of drugs is of common occurrence in clinical practice [9]. Errors in prescription are not uncommon and could be due to ignorance [10] or inadequate knowledge about the disease [11] and pharmacology of the drugs prescribed [12].

Erroneous prescriptions are recognized even in the tertiary care hospital [13]. Intensive care unit (ICU) patients are a heterogeneous group, who often suffer from severe illness, multiple organs dysfunction and coexisting medical disorders. Since most of the patients in the ICUs are critically ill and often suffer from multiple complications, polypharmacy becomes unavoidable. ICU services use higher economic resources due to frequent use of high priced drugs and antimicrobial agents. Due to availability of limited funds in developing countries, drugs should be prescribed rationally so that the available funds can be utilized optimally [14]. Hence studies conducted in different countries have acknowledged irrational drug use in the intensive care units and recommended interventions to improve the drug use pattern.

Recently an increased attention has been diverted to rational prescribing and drug utilization studies play a major role in this regard [14]. These studies not only detect flaws in the therapy, but also help to find out solution to rectify the same [15]. Monitoring of prescriptions by drug utilization studies can identify the problems and provide feedback to prescribers so as to create an awareness about irrational use of drugs [16]. So drug utilization research is an essential part of pharmaco-epidemiology which can provide insights into both the aspects of drug use and rational drug prescribing like pattern of use, quality of use, determinants of use and outcomes of use [2].

Here comes the role of the pharmacologist in conducting different studies in different clinical set ups to find out the irrational drug prescription and to give the feedback to the clinicians so as to modify the prescribing pattern and adopt rational means of prescription. So keeping in mind all these factors periodic evaluation of drug utilization in the ICU, longitudinal surveillance of drug use over a period of time are important for optimization of health care system, proper use of resources and making prescription policy [10].

Hence the present study was planned to evaluate the current prescription pattern of drug utilization in patients admitted in cardiology intensive care unit and to find out drug use indicators that reflect possibilities of drug interaction and patient compliance. This study also made efforts to bridge the gap between clinical pharmacology, rational drug prescribing by giving some rational solutions if required.

MATERIALS AND METHODS:

Study Design: Hospital based observational and retrospective study.

Ethical Review: Study protocol was approved by the institutional ethics committee, No.MC/02/ 2015 /208, dated 05-12-2015.

Study Site: The study was carried out in intensive care unit (Cardiology ICU) of Gauhati Medical College and Hospital, Guwahati.

Study Duration: 6 months (1st June 2015-30th Nov 2015)

Sample Size: No. of prescriptions (280 patients) available during the study period were analyzed.

Patients: The study included patients admitted in intensive care unit (Cardiology ICU) of Gauhati Medical College and Hospital, Guwahati.

Patients presenting with different serious illness admitted in intensive care unit who fulfilled the inclusion and exclusion criteria were selected for the study.

Inclusion Criteria: Patient of any age group who were admitted in intensive care unit (Cardiology ICU).

Patient of both the gender (Male/Female) who was admitted in intensive care unit (Cardiology ICU).

Patient suffering from any medical or surgical cardiac indication who was admitted in intensive care unit (Cardiology ICU).

Exclusion Criteria: Patient suffering from any medical or surgical indication who were not admitted in intensive care unit (Cardiology ICU).

Efficacy: Measures of efficacy were proportions of patients whose outcome were recovered and were discharged in improved condition with the minimum use of drugs and hence minimum cost burden for them with no long term adverse reaction.

Study Procedure:

- Indoor case papers of the patients admitted in intensive care unit (Cardiology ICU) were collected from the medical record section of Gauhati Medical College and Hospital, Guwahati.

- Data was collected from the cardiology ICU where different cases from different departments were admitted.

- No activities were performed on the patients but only data have been collected from the case sheets in MRD.

- Relevant information of each patient regarding the patient particulars, presenting clinical features, past history were recorded in a predesigned Proforma I/ case record form (Annexure).

- Different parameters as described in data analysis regarding drug utilization and pharmaco-economic analysis were recorded in a separate Proforma II (Annexure) and drug use indicators were determined.

- For calculating the duration of hospitalization, the day of admission was included but the day of discharge was excluded. The diagnosis/ diagnoses recorded in the discharge summary were noted.

- Confidentiality of the data obtained from the patient case sheets was maintained throughout the study.

Data Analysis: The overall information generated was presented under the following headings:

➢ **Demographic:**
1. Age distribution
2. Sex distribution

➢ **Indication:**
1. Most common diagnosis
2. System involved

➢ **ICU stay:**
1. ICU mortality rate

2. ICU length of stay (LOS) greater than 7 days
3. Average ICU LOS
4. Average number of days on mechanical ventilation

➢ **Outcome:** Shifted to private ward/ discharged at request/ died/ shifted to general ward/ discharged against advice/shifted to special ward/discharged in improved condition.

➢ **Parameters Regarding Accessory Interventions in ICU:** Percentage of admitted patients who had undergone mechanical ventilation, PTCA and stenting, coronary angiogram, temporary pacemaker implantation, permanent pacemaker implantation, thrombolysis with streptokinase.

➢ **Drug Related:**
1. Total no. of Prescriptions and total no. of drugs.
2. Route of drug administered
3. No. of drugs per prescription (frequency)
4. Most common individual drug
5. Generic/ Brand name

RESULTS AND OBSERVATION: The data obtained from the analysis of 280 prescriptions was further condensed, subjected to statistical analysis and were expressed as proportions and Mean ± SEM.

Demographic:

TABLE 1: AGE DISTRIBUTION OF THE ADMITTED PATIENT IN ICU

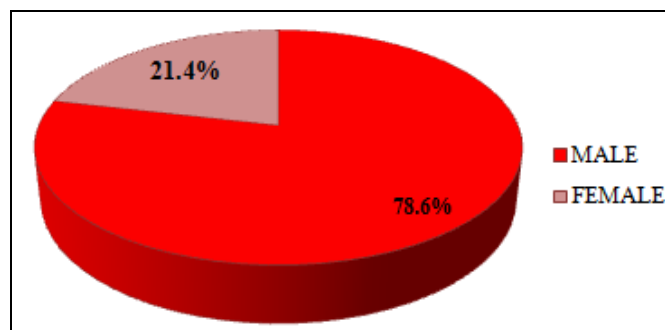| Age group (in years)	Percentage of patients (%)
<20	1.9
21-40	5.1
41-60	53.6
61-80	36.3
>80	3.1

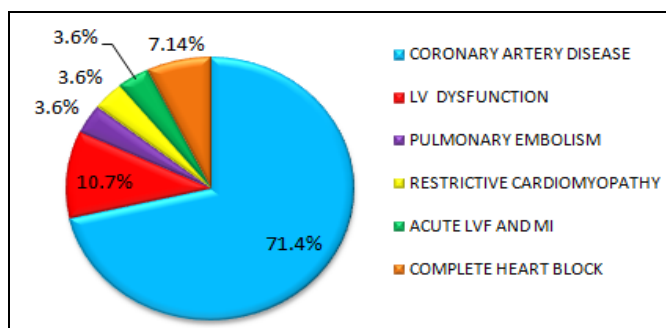**FIG. 1: GENDER DISTRIBUTION OF THE ADMITTED PATIENT IN ICU**

FIG. 2: MOST COMMON DIAGNOSIS IN CARDIOLOGY ICU

TABLE 2: SYSTEM WISE INVOLVEMENT OF PATIENTS IN CARDIOLOGY ICU

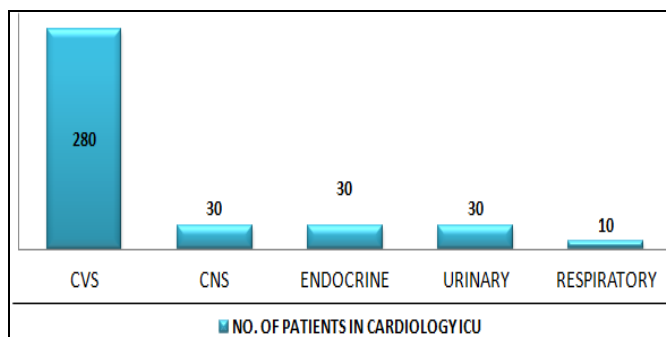| System wise involvement	No. of Patients in Cardiology ICU	Percentage of patients
1 System	210	55.9%
2 Systems	40	21.9%
3 Systems	30	14%
＞ 4 Systems	0	8.1%

FIG. 3: SYSTEM WISE INVOLVEMENT IN CARDIOLOGY ICU

ICU Stay:

TABLE 3: PARAMETERS REGARDING CARDIOLOGY ICU STAY

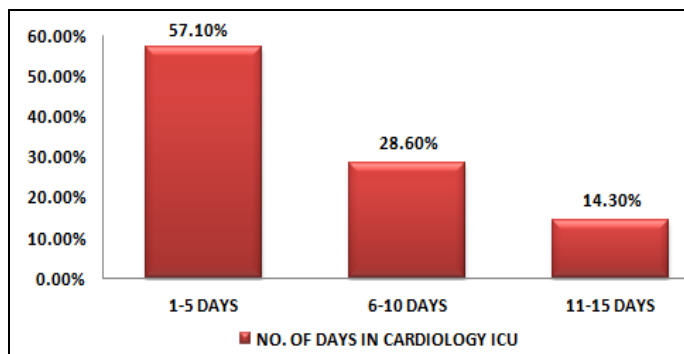| S. no.	Parameters	Results (N=280)
1	Average length of stay (Los)	5.3±3.46 days*
2	ICU mortality rate (%)	6%
3	Average no. of days on mechanical ventilation	0 days
4	ICU length of stay > 7 days (%)	25% (70)

*Values represented as Mean ± SD

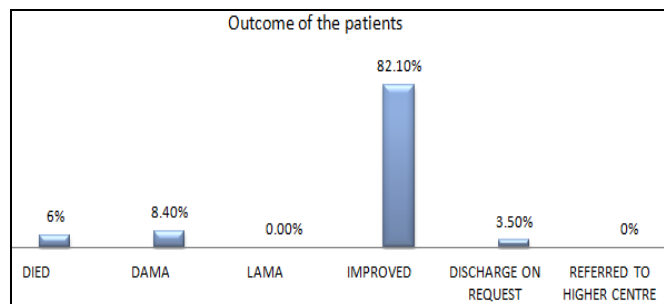**FIG. 4: ICU LENGTH OF STAY IN CARDIOLOGY ICU**

Outcome:

FIG. 5: OUTCOME OF THE PATIENTS ADMITTED IN CARDIOLOGY ICU

Parameters Regarding Accessory Interventions in ICU:

TABLE 4: ACCESSORY INTERVENTIONS IN ICU

S. no.	Parameters (Cardiology ICU)	No. of Patients (%)
1	PTCA and stenting	120 (42.9%)
2	Coronary angiogram	160 (57.1%)
3	Temporary Pacemaker Implantation	20 (7.14%)
4	Permanent Pacemaker Implantation	20 (7.14%)
5	Thrombolysis with streptokinase	20 (7.14%)

Drug Related:

TABLE 5: BASIC DATA REGARDING DRUG USAGE IN CARDIOLOGY ICU

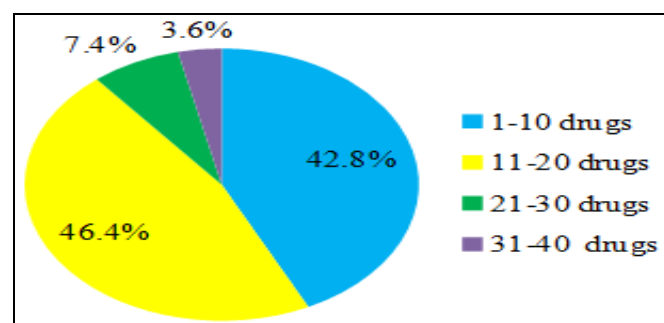| S. no.	Basic Data	Cardiology ICU
1	Total no. of drugs	3480
2	Total no. of patients taking the drugs in ICU	280
3	Average no. of drugs per prescription	12.4±2.34 drugs per prescription
4	No. of drugs with generic name	270(7.8%)
5	No. of drugs with brand name	3210(92.2%)

FIG. 6: FREQUENCY OF DRUGS/PRESCRIPTION IN CARDIOLOGY ICU

TABLE 6: FORMULTION OF DRUGS USED IN CARDIOLOGY ICU

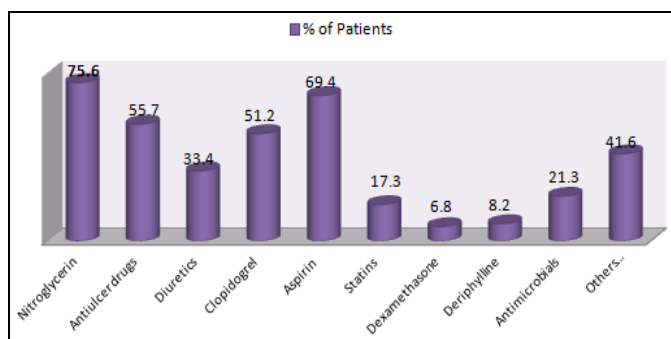| S. no.	Formulation of drugs	% of Drugs in cardiology ICU (N=3480)
1	Oral	2100 (60.3%)
2	Sublingual	200 (5.7%)
3	Intravenous	720 (20.7%)
4	Subcutaneous	300 (8.6%)
5	Intramuscular	60 (1.7%)
6	Inhalational	100 (2.9%)

FIG. 7: MOST COMMON GROUP OF DRUGS

DISCUSSION: A patient admitted to a cardiology ICU went through a complex and multistep medication use process which presents as a challenge to the attending doctors because of the prevalence of potential medication error. But for medication error healthcare professionals are not solely responsible but it's the failure of the health care system which should also be taken into account. These medication errors are most common and frequently harmful to patients and health care system too. So it should be addressed and required studies to be carried out in different institutions for timely monitoring and for providing feedback. However due to adoption of new standards, technologies and policies in different steps of medication use process, very soon healthcare system will see improvements that will be converted to provide better patient care with rational use of medication.

The present study was planned to identify the prevailing drug utilization trend in the Cardiology ICU of GMCH, Guwahati. Drug utilisation has been defined as "the marketing, distribution, prescription and use of drugs in a society with special emphasis on the resulting medical and social consequences." In the year 1968, WHO has already established DURG *i.e.* Drug utilization research group, to monitor these studies and to prescribe guidelines [7]. The present study included patients who were admitted to the cardiology ICU for any cardiac complaints for a period of 6 months. Our findings showed that out of 280 patients admitted to the cardiology ICU, the maximum number of patients were in the age bracket of 41-60 years (53.6%) **Table 1**. This disturbing trend of a progressive decline in the affected age group has been noted by other authors too and is well documented in literature [9]. Many factors have been implicated in this decline

including early detection [16], stressful lifestyle [17] *etc*. It has been observed that a clear majority of 78.6% were males **Fig. 1**. This is in concordance with earlier findings stating a similar epidemiological trend. According to our study, coronary artery disease (71.4%) is the most common indication resulting in ICCU admission **Fig. 2** with the involvement of only 1 system (55.9%), mostly CVS **Table 2**.

In our study, we noted that most of the patients were discharged in improved condition (82.10%) **Fig. 5** with the average duration of stay of 1-5 days to be about 57.10% **Fig. 4**. Also we see that approximately 86% of our patients were discharged within 10 days, stressing on the need for early ambulation post deleterious CVS events [18].

Many interventions were also done in cardiology ICU, coronary angiogram was performed in 160 patients and were intervene with PTCA and stinting in 120 patients, pacemaker implantation in 40 patients and thrombolysis is also done by streptokinase in 20 patients **Table 4**. Timely and prompt intervention leads to a lower ICU mortality of 6% as compared to other studies **Table 3**.

From our study, we concluded that an over whelming 46.4% of patients required the daily administration of 11-20 drugs **Fig. 6**, 42.8% of patients required 1-10 drugs per. 92.8% drugs were prescribed by brand name **Table 5**. The use of so many concomitant drugs leads to polypharmacy which results in drug interaction, adverse reactions, direct and indirect medication cost ultimately causing drug related morbidity. But it is a preventable problem by physician and clinical pharmacologist through variety of interventions such as reducing the number of drugs, doses, facility, drug cost, adverse drug reaction, hence increasing patient adherence and improving patient quality of life. It has lead to emerging themes like simplification of doses / FDC, computerized prescribing and medication review.

In our study we found that 75.6% of patients were prescribed nitroglycerin, followed by aspirin in 69.4% patients and antiulcer drugs in 55.7% patients **Fig. 7**. Gastritis was the most common adverse event encountered and was closely followed by headache. Use of aspirin as one of the

most commonly employed drug in the ICCU has direct correlation with the elevated complaints of gastritis noted amongst the patients [19] which leads to antiulcer drugs as the 3rd most common group of drugs to be used. Headache has been mostly attributed to the use of IV nitroglycerin in 20.7% of patients. Headache is a documented adverse effect of nitrates and can often be severe and debilitating. Oral route (60.3%) is the most common route used in ICU followed by Intravenous route **Table 6**. The present study also highlights the shortcomings in treatment by emphasising on the irrationalities in prescription. A higher than normal dose of nitroglycerin was used, this in turn resulted in the adverse effect of headache and hypotension which was observed in these cases.

CONCLUSION: For the success of rational drug use, improved communication with professional and population is required. The rational and cost effective prescribing can be promoted by conducting Pharmacoepidemiological studies. Another way is by educating and training the doctors by organizing medical education programmes along with public education regarding the need for rational prescribing. Social pharmacology and pharmacoeconomics should also be included in the medical curriculum to promote rational drug prescribing. Hence the requirement of better planning (diagnosis), objective setting (treatment) and materials (availability and cost of drugs) is the need of the hour.

CONFLICT OF INTEREST: No conflict of interest.

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