



DRUG UTILIZATION STUDY AMONG PATIENTS FOLLOWING CARDIAC INTERVENTION IN THE INTENSIVE CARE UNIT OF A TERTIARY CARE HOSPITAL IN SOUTH INDIA.

Pharmacology

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ABSTRACT

Objective: To study and analyse the drug utilization pattern in patients after cardiac intervention in a coronary intensive care unit. **Methodology:** It is a prospective, cross sectional drug utilization study conducted in a tertiary care hospital in South India. After getting informed consent from the patient the prescription details were recorded from the patient's case record and the prescription pattern was analysed. The rationality of the prescription was assessed using the WHO core drug prescribing indicators. The drugs were categorised based on Anatomical Therapeutic Classification (ATC) and their defined daily dose (DDD) system. **Results:** Among the 108 patients enrolled in the study 68.51% were males and 31.48% females. Sixty percent of the patients were above the age of fifty. Diabetes mellitus was the commonest systemic comorbidity. An average of 10 drugs was prescribed in each prescription. 72.7% prescriptions had an injection and 50.9% prescriptions had an antibiotic prescribed. Percentage of drugs prescribed by generic name was 34.2% and from National Essential Drug List was 75.4%. **Conclusion:** Drugs prescribed per prescription is justifiable in the emergency situation and of lifesaving nature. Injections are essential in intensive care units as other routes of drug administration do not provide rapid onset of action. Antibiotics have been given to such post interventional patients in whom infection is likely to occur. Most of the drugs prescribed were from the National essential drug list. Drugs prescribed by generic name could be improved to achieve better rationality in prescribing.

KEYWORDS

Drug Utilisation Pattern, Prescription Analysis, Cardiac Intensive Care Unit, Prescribing Indicators.

INTRODUCTION:

Drug utilization research was defined by WHO as “the marketing, distribution, prescription and use of drugs in a society, with special emphasis on the resulting medical, social and economic consequences”.¹ The principal aim of drug utilization research is to promote rational use of drugs. For the individual patient, the rational use of a drug implies the prescription of a well documented drug at an optimal dose, together with the correct information, at an affordable price.²

Drug utilization studies provide information about patterns and quality of drug use, determinants of use like user, prescriber and drug characteristics and finally the outcomes in terms of health benefits and adverse effects. Drug utilization studies are essential to achieve rational drug therapy.³

Cardiac diseases are the most common cause of mortality worldwide. Management of cardiac emergencies have improved to a great extent with the development of newer technological and pharmacological innovations.⁴ The common cardiac interventions performed are percutaneous transluminal coronary angioplasty (PTCA), pacemaker implantation, coronary artery bypass graft (CABG), valve replacement surgeries and surgeries for congenital heart diseases. The patients after interventional procedures are monitored in the cardiac intensive care unit (ICU) for few days before they are shifted to the ward. These patients are prescribed analgesics, antibiotics, and other cardiac drugs after the intervention.

Though various drug utilization studies have been conducted in different population and settings in India, this study has been conducted specifically on post cardiac intervention patients in ICU.

Objectives:

1. To analyse the prescription pattern on post cardiac intervention patients in cardiac ICU based on WHO core drug prescribing indicators.

2. To categorize the drugs based on Anatomical Therapeutic Classification (ATC) and calculate the defined daily dose (DDD).

Methodology:

This study was conducted in a Tertiary Care Hospital in Chengalpattu district of Tamilnadu, South India, after getting approval from the Institutional Human Ethics Committee. It was a prospective, cross sectional drug utilization study.

Subject selection:

Inclusion criteria:

All patients in the ICU who have undergone cardiac interventions during the two months period from 1.06.2019 to 31.07.2019. The patients who underwent percutaneous transluminal coronary angioplasty, pacemaker implantation, coronary artery bypass graft surgery, valve replacement surgery and other surgeries for congenital heart diseases were included in the study irrespective of their age and sex.

Exclusion criteria:

Patients who underwent diagnostic procedures and those admitted in cardiac ICU for reasons other than cardiac interventions.

Study details:

After getting informed consent from the patient, the prescription details were recorded from the patient's case record. Prescription pattern was analysed considering the drug name, route of administration, dose, frequency and duration of therapy. The drugs were categorized by ATC and the DDD was calculated. WHO core drug prescribing indicators like 1) average number of drugs per encounter (each prescription was considered as an encounter) 2) percentage of drugs prescribed by generic names 3) percentage of encounters with an injection 4) percentage of encounters with an antibiotic and 5) percentage of drugs prescribed from the National Essential Drugs list were considered to assess the rationality of the prescription.

Statistical analysis: Descriptive statistics was applied using SPSS software and Microsoft excel. Continuous data were expressed as mean $\pm$ S.D. Nominal data was expressed as percentage. No formal statistical hypothesis was tested.

Ethical issues: The study did not involve any intervention and data was collected from the prescription with the consent of the patient. The patient's information gathered was kept confidential and used only for research and publication without revealing the identity.

RESULTS:

During the two month study period a total of one hundred and eight patients were admitted in the cardiac intensive care unit following post cardiac intervention. Of the 108 participants, 74(68.51%) were males and 34(31.48%) females.

Frequency of age distribution of the participants:

Sixty four patients(59.25%) were above 50 years of age, thirty two patients(29.62%) in the age group of 41-50, four patients(3.7%) from 31-40yrs and eight(7.4%) were below 30yrs. Patients above 50 years were higher in number than the other age groups. Figure 1.

AGE DISTRIBUTION FREQUENCY

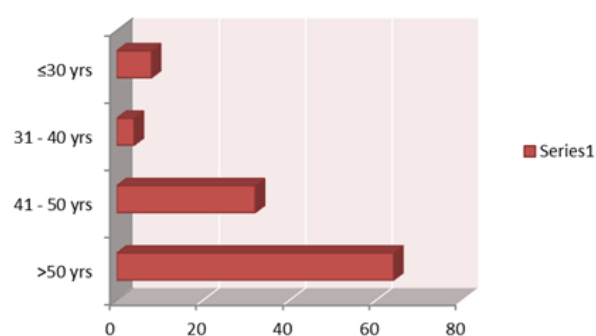


Figure 1: Age distribution Frequency

Comorbid diseases:

The most common co morbid disease was found to be type II diabetes mellitus and the least was tuberculosis. Forty patients (37%) had type I diabetes mellitus and 30(27.7%) had hypertension, 18(16.6%) dyslipidemia, 6 (5.55%) bronchial asthma, 6 (5.55%) hypothyroidism and 4(3.7%) patients had tuberculosis as associated comorbidity. It was observed that 44(40.7%) patients admitted to the cardiac ICU did not have any associated comorbidity. Figure 2.

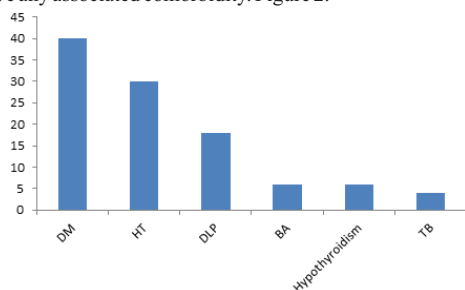


Figure 2: Comorbid diseases

Note: DM-diabetes mellitus, HT-hypertension, DLP-dyslipidaemia, BA-bronchial asthma, TB-tuberculosis.

Duration of stay in ICU

Fifty six patients (51.85%) were transferred from ICU to ward in 3 days, 24(22.22%) in 2 days, 20(18.51%) in 4 days and 2 patients (1.85%) each in 5, 6, 8 and 12 days. Figure 3.

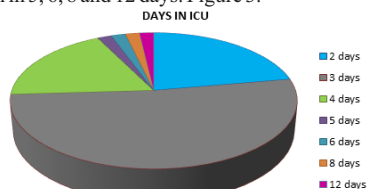


Figure 3: Number of days in ICU

Number of drugs per prescription:

Sixty eight patients (62.96%) were prescribed ten or more drugs in the cardiac ICU, 38 patients (35.18%) 5-9 drugs and 2 patients (1.85%) with less than 5 drugs. Figure 4.

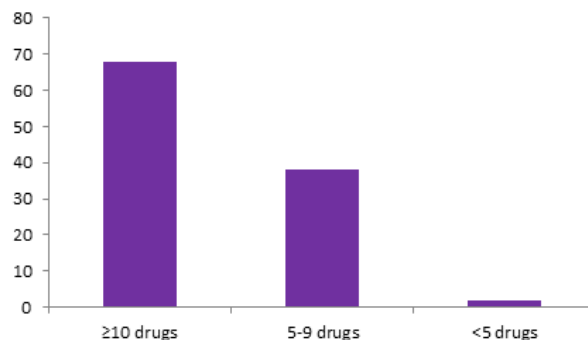


Figure 4: Number of drugs per prescription

Number of injections per prescription:

It was observed that 28 patients (25.92%) were not given any injections, 28(25.92%) were given 2 injections, 24(22.22%) were given 1 injection each, 16(14.81%) were given 3 injections, 10 patients (9.25%) were given 4 injections and 2(1.85%) were given 5 injections.

The number of injections varied from one to five. Some of the patients were not given any injection.

Number of antibiotics per prescription:

Fifty two patients (48.14%) were not prescribed any antibiotics, 34(31.48%) with one antibiotic, 12(11.11%) with two antibiotics and 10(9.25%) with three antibiotics.

Cardiac intervention done prior to ICU admission:

Of the 108 patients admitted to cardiac ICU, 66(61.11%) had undergone percutaneous transluminal coronary angioplasty, 18(16.66%) permanent pacemaker implantation, 12(11.11%) coronary artery bypass graft, 6(5.55%) balloon mitral valvotomy, 4(3.7%) valve replacements (mitral/aortic) and 2(1.85%) atrial septal defect closure. Figure 5.

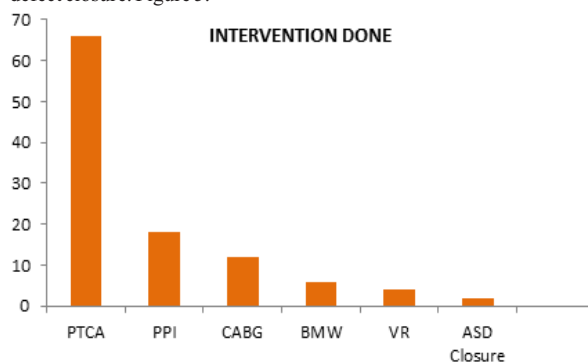


Figure 5: Interventions before ICU admission

PTCA-Percutaneous Transluminal Coronary Angioplasty, CABG – Coronary Artery Bypass Graft, PPI – Permanent Pacemaker Implantation, BMV – Balloon Mitral Valvotomy, VR – Valve Replacement, ASD– Atrial Septal Defect closure.

Prescribing Indices:

Table 1: Prescription analysis based on WHO Core prescribing indicators

WHO Prescribing Indices	Observed Values
Average number of drugs per encounter	10.1 $\pm$ 2.77
Percentage of drugs prescribed by generic name	34.2%
Percentage of encounters with an injection	72.7%
Percentage of encounters with an antibiotic	50.9%
Percentage of drugs prescribed from National Essential Drug List	75.4%

Anatomical Therapeutic Classification and Defined Daily Dose:

Table 2: ATC, DDD and PDD

Drug class	ATC	DDD	Number of patients	Percentage (%)	PDD
Atorvastatin	C10AA05	20mg O	80	74	40mg O
Enoxaparin	B01AB05	2 TU P	40	37	2 TU P
Aspirin	B01AC06	150mg O	48	44	150mg O
Clopidogrel	B01AC04	75mg O	66	61	75mg O
Furosemide	C03CA01	40mg P/O	64	59	40mg P/O
Metoprolol	C07AB02	150mg O	38	35	50mg O
Glyceryltrinitrate	C01DA02	5mg O	14	13	5mg O
Amlodipine	C08CA01	5mg O	12	11	5mg O
Paracetamol	N02BE01	3gm O	42	39	2gm O
Enalapril	C09AA02	10mg O	16	15	5mg O
Pantoprazole	A02BC02	40mg O	72	67	40mg O
Liquid paraffin	A06AA01	15gm O	62	57	15gm O
Digoxin	C01AA05	0.25mg O	4	4	0.25mg O
Ivabradin	C01EB17	10mg O	34	31	10mg O
Alprazolam	N05BA12	1mg O	56	52	0.5mg O
Trimetazidine	C01EB15	40mg O	6	6	70mg O
Amiodarone	C01BD01	0.2gm O	8	7	0.3gm O
Glymeperide	A10BB12	2mg O	40	37	2mg O

Note: ATC-Anatomical Therapeutic Classification, DDD-Defined Daily Dose, PDD – Prescribed Daily Dose, O-Oral, P-Parenteral, TU-Thousand Units.

DISCUSSION:

Coronary artery disease is the most common cause of death globally as per the WHO: cause-specific mortality, estimates. 16.59% deaths around the world are due to cardiac disease and is the first cause of death followed by stroke (10.16%) and chronic obstructive pulmonary disease (5.35%)⁵. India is experiencing a shift from communicable to non-communicable disease as the leading cause of death. The most prominent non-communicable disease is cardiac disease which accounts for 28.1% deaths in India.⁶

Emergency cardiac interventions are lifesaving many a times. After interventions patients are monitored in coronary intensive care units for a few days during which they are administered with essential drugs.

In the current study among the 108 participants 68% were males and the rest females. This suggests that males are more prone for cardiac emergencies and similar observation was made by Madhuri D Kulkarni et al. with 63.51% males and 36.49% females.⁷ This is due to the fact that oestrogen has a favourable lipid profile in women of reproductive age group. Women have an equal chance of developing cardiac morbidities after menopause due to reduction in the effect of endogenous oestrogen.

With regards to the age distribution, 59% of the patients were above 50yrs of age. This signifies the increase in incidence of coronary events with advancing age. The mean age of patients enrolled was 53.79 which was comparable with previous studies.^{7,9}

Among the comorbid diseases associated with coronary events, it was observed that type II diabetes mellitus was the commonest comorbidity and was found to coexist in 37% of the patients followed by hypertension in 28% patients. The results were in concordance with the study done by Saranya KL et al. who reported hypertension (35.2%) and type 2 diabetes mellitus (29.6%) as the frequent comorbid condition.⁹ Diabetes mellitus and hypertension are common systemic disorders that predispose to sudden cardiac emergencies, coronary artery disease.

The duration of stay in cardiac intensive care unit for 52% of the patients was found to be 3 days. The mean stay in cardiac ICU was found to be 3.06 days which was comparable with studies done by Madhuri et al and Patel et al.^{7,10}

With regards to number of drugs prescribed, 63% of the patients were given 10 or more drugs per day. The mean of drugs prescribed per day was 10.18.(Table 1) Previous drug utilisation studies conducted on coronary intensive care units showed similar results with Madhuri D Kulkarni et al. reporting 10.93 drugs per prescription⁷, Adhikari et al. 12.4 drugs per prescription¹¹, Saranya KL et al 9.09 drugs per prescription⁹ and Pendhari et al. 9 drugs per prescription.⁸

Average number of prescriptions with an injection was found to be 72.7%(Table 1) in comparison with 88% observed by Pendhari et al.⁸

The percentage of prescriptions containing an antibiotic was 50.9%(Table 1).The most common cardiac intervention performed was percutaneous transluminal coronary angioplasty. Percentage of drugs prescribed by generic name was 34.2% and the percentage of drugs prescribed from National Essential Drug List was 75.4%. (Table 1)

Among the drugs prescribed 61.11% drugs had a similar prescribed and recommended defined daily dose.(Table 2)

The most commonly prescribed group of drugs were hypolipidaemic drugs (Statins -74%) and proton pump inhibitors (67%) followed by antiplatelets (Clopidogrel - 61% and Aspirin – 44%), diuretics(59%), antianxiety drugs(52%) analgesics (39%), anticoagulants(Low molecular weight Heparin - 37%) and antidiabetic agents (37%).(Table 2)

From the current study it was observed that cardiac interventions were required more among men and beyond 50 years of age. Statins were commonly prescribed group of drugs. Average number of drugs per prescription was ten and is definitely justifiable in a lifesaving situation. More than seventy five percent of drugs were prescribed from the National essential drug list. The drugs prescribed by generic name could be enhanced among the physicians to increase the rationality.

CONCLUSION:

Cardiac interventions are lifesaving in many cardiac emergencies and needs monitoring in intensive care units after intervention. An average of ten drugs per prescription was observed and hypolipidaemic drugs were the commonly prescribed group. Most of the drugs prescribed were from the essential drug list and prescribing drugs with generic name could be improved.

Acknowledgement:

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Conflict of Interest:

The authors have declared nil conflict of interest.

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