

A study of drug utilization pattern in post-acute coronary syndrome (ACS) patients at tertiary care teaching hospital: a prospective unicentric study

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ABSTRACT

Background: The main objective of drug utilization research is to assess the rationality of drug use for specific disease. Long term survival in post-ACS patients depends largely on how well post ACS period is managed. Our aim is to record drug utilization pattern in post ACS patients after discharge and during follow-up visits.

Methods: Prospective unicentric study was conducted in 200 patients suffering from ACS at Cardiology OPD of GCS Medical College, Hospital and Research Centre, Ahmedabad. Prescriptions issued to study subjects at the time of discharge and during follow-up who had recently suffered from ACS were intercepted after consultation and data recorded as per WHO guidelines as how to investigate drug use. Data were collected in the structured proforma (Case Record Form-CRF) which includes patient's demographic details, registration number, diagnosis and the drug prescribed. Each prescription was analyzed using WHO core prescribing indicators to evaluate the rationality of the prescriptions.

Results: Out of 200, 104 (52%) suffered from unstable angina, 84(42%) suffered from STEMI and 12(6%) were suffered with NSTEMI. Male patients of 114(57%) were more prone to ACS than female patients of 86 (43%). Out of 200 patients, 193 (97%) received antiplatelet, 187 (94%) received antihypertensive, 184 (92%) received anticoagulants, 180 (90%) received lipid lowering drugs and 119 (60%) received Nitrates. As per WHO core prescribing indicators, the average number of drugs encountered per prescription was 7.96. The prescription showed a high usage of drugs from NLEM i.e. 72.20% in post-ACS patients. However the percentage of drugs prescribed by generic name was only 10.68%. The frequency of use of injectable preparations in post-ACS patients was found to be 17.84% which was in accordance with WHO reference value. Out of 17.84% injectable preparations, only 0.82% accounted for antibiotic injection.

Conclusions: Although generic prescribing indicator shows a low range of usage, it is interesting to notice that prescription pattern has a high usage of drugs from NLEM (78.2%) in ACS. Thus present study provides valuable insight about the overall pattern of drugs used in post-Acute Coronary syndrome.

Keywords: Acute coronary syndrome, Drug utilization, Drug use pattern, NSTEMI, NLEM, STEMI

INTRODUCTION

Cardiovascular diseases (CVDs) are the main cause of mortality globally and are the leading cause of death in India also. Several surveys conducted across the country over the past few decades have shown a rising prevalence

of major risk factors for CVD in Asian population. The problem of increasing risk factors for CVD in India is because of lack of surveillance system, proper diagnosis and appropriate treatment.¹

The term *acute coronary syndrome* (ACS) refers to any group of clinical symptoms compatible with acute myocardial ischemia and covers the spectrum of clinical conditions ranging from unstable angina (UA) to non ST-segment elevation myocardial infarction (NSTEMI) to ST-segment elevation myocardial infarction (STEMI). STEMI occurs by developing a complete occlusion of a major coronary artery previously affected by atherosclerosis. Unstable angina and NSTEMI are closely related conditions as their pathophysiologic origins and clinical presentations are similar, but they differ in severity. It is almost associated with rupture of an atherosclerotic plaque and partial or complete thrombosis of the infarct artery. A diagnosis of NSTEMI can be made when the ischemia causes severe myocardial damage that result in the release of a biomarker of myocardial necrosis into the circulation (cardiac-specific troponins T or I, or muscle and brain fraction of creatine kinase [CK-MB]). While in UA no such biomarker can be detected in the bloodstream hours after the initial onset of ischemic chest pain.² Patients with suspected acute coronary syndrome should be assessed immediately by an appropriate healthcare professional.

Pharmacotherapy of ACS

Standard guidelines recommend a door-to-balloon time-time from first medical contact to primary percutaneous coronary intervention (PCI) - of less than 90 minutes (according to the ACCF/AHA) or 60 minutes (according to the ESC) for patients presenting with STEMI. Significant reductions in mortality were noted between 1995 and 2015, largely attributed to reductions in time from symptom onset to first medical contact, greater use of reperfusion therapy, continuous multilead ST-segment monitoring, frequent measurement of vital signs and guideline recommended pharmacotherapy.³ The goal of pharmacological anti-ischemic therapy is to decrease myocardial oxygen demand (secondary to a decrease in heart rate, blood pressure, preload or myocardial contractility) or to increase myocardial oxygen supply (by administration of oxygen or through coronary vasodilatation). If, following treatment, the patient does not rapidly become free of ischemic signs or symptoms, immediate coronary angiography is recommended independently of ECG findings and cardiac troponin levels. In patients whose ischemic symptoms are not relieved by nitrates and beta-blockers, opiate administration is reasonable while waiting for immediate coronary angiography, with the caveat that morphine may slow intestinal absorption of oral platelet inhibitors.⁴

The efficacy of pharmacological therapy at symptom onset, throughout hospitalization, and at discharge is the important criteria for treatment of ACS.⁴ Various medications that impact the function of coronary disease include nitrates (intravenous, oral, and topical), beta blockers, calcium channel blockers, ranolazine therapy, warfarin/new anticoagulants, angiotensin-converting enzyme inhibitors, angiotensin receptor blockers,

aldosterone, diuretics, statins, and other lipid-lowering medications, nonsteroidal anti-inflammatory drugs, insulin, oral hypoglycemics, influenza, and pneumococcal immunizations.⁵

Primary objective of this study is to know the drug utilization pattern in acute coronary syndrome patients.⁶ Drug utilization services practically appreciated in different clinical setting, health care management programs, hospitals and communities by considering therapeutic drug class and disease condition to assess the fundamental part of patient care system.⁷ The World Health Organization (WHO) regarded drug utilization as promotion, distribution, prescribing pattern and use of drugs within health care organization with main emphasis on therapeutics, societal and financial consequences.⁸

METHODS

This is a prospective unicentric study conducted in 200 patients suffering from Acute Coronary Syndrome (ACS) at Cardiology OPD of GCS Medical College, Hospital and Research Centre, Ahmedabad. The study protocol was approved by the Institutional Review Board Committee. Prescriptions issued to study subjects at the time of discharge and during follow-up who had recently suffered from ACS (unstable angina, ST elevation and non-ST elevation acute myocardial infarction diagnosed by biochemical test or ECG) were intercepted immediately after consultation and data recorded as per WHO guidelines as how to investigate drug use. Data were collected in the structured proforma (Case record form- CRF) which includes patient's demographic details, registration number, diagnosis and the drug prescribed. Each prescription was critically analyzed using WHO prescribing indicators to evaluate the rationality of the prescriptions.

Assessing prescribing indicators include

- A. Names, dose, dosage regimen, duration of all drug prescribed.
- B. Average number of drug per prescription (encounter)
- C. % of drug prescribed by generic name.
- D. % of encounters resulting in prescriptions of an antibiotic
- E. % of encounters resulting in prescriptions of an injection
- F. % of drugs prescribed from National List of Essential (NLEM).

Assessment parameters

Patterns of different drug use (antiplatelets, Beta blockers, ACEIs /ARBs, Statins, anticoagulants etc.).

A statistical analysis was done by using the SPSS software-version 21 and Microsoft excel.

RESULTS

Out of 200, male patients of 114(57%) were more prone to ACS than female patients of 86 (43%) (Table 1).

Table 1: Gender distribution of ACS.

Gender	Number	Percentage (%)
Male	114	57
Female	86	43

104 (52%) suffered from unstable angina, 84 (42%) suffered from STEMI and 12 (6%) suffered from NSTEMI (Figure 1).

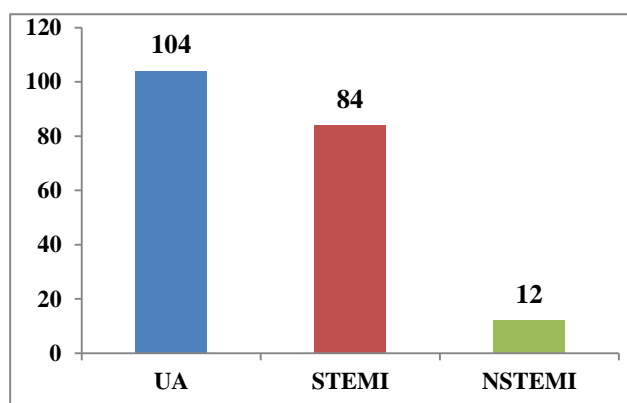


Figure 1: Incidence for different types of ACS.

Age wise categorization of the patients

Cardiac disorders progresses with the advancing age. When categorized age-wise, maximum number of patient (25.5%) were from the age group of 51-60 years, followed by 24 % from the age group of 61-70 years. There was significantly lower number of patients in the younger age i.e. 2.5% in the age group of 21-30 years and 2% in the elderly age group of 81-90 years (Table 2).

Table 2: Age wise distribution for incidence of ACS in study population.

Age group	Incidence	Percentage (%)
21-30	5	2.5
31-40	19	9.5
41-50	40	20
51-60	51	25.5
61-70	48	24
71-80	32	16
81-90	4	2
91-100	1	0.5

Drug use pattern in ACS

Branded prescribing dominated by 89% i.e. 1422 among 1592 drugs prescribed and only 10.68% i.e. 170 among 1592 drugs were prescribed by generic name (Table 3).

Table 3: Drug use pattern in ACS.

Type of Drug	Frequency	Percentage
Branded Drugs	1422	89.32
Antibiotics	13	0.82
Injectables	284	17.84
NLEM	1245	78.20
Generic Drugs	170	10.68

The number of encounters with antibiotics was 13 (0.82%). Injectable drugs accounted for 284 (17.84%) of total encounters. The average number of drugs prescribed per encounter was in between 6-8. The percentage of drugs prescribed from national EDL was 1245 drugs i.e. 78.20%.

Table 4: Results of drug use patterns in ACS with WHO prescribing indicators.

Prescribing Indicators assessed	Standard derived or ideal ⁹	Percentage
Average number of drugs per encounter	1.6-1.8	7.96
Percentage of encounters with an injection prescribed	13.4-24.1	17.84
Percentage of encounters with an antibiotic prescribed	20.0-26.8	0.82
percentage of drugs prescribed in generic name	100	10.68
NLEM	100	78.2

Category wise prevalence of major drug classes in ACS

All patients received different classes of cardiac drugs. Out of 200 patients, 193 (97%) received antiplatelets, 187 (94%) received antihypertensives, 184 (92%) received anticoagulants, 180 (90%) received lipid lowering drugs and 119 (60%) received Nitrates (Table 5).

Table 5: Category wise prevalence of various drug classes in ACS.

Most commonly prescribed group of drugs	No. of patients received out of 200	%
Antiplatelets	193	97
Antihypertensive	187	94
Anticoagulants	184	92
Lipid Lowering Drugs	180	90
Nitrates	119	60

DISCUSSION

In our study we analyzed 200 patients of ACS during the period of two years. Out of 200, male patients were more

prone to ACS than female patients while prevalence of unstable angina was more compared to STEMI and NSTEMI. When categorized age-wise, maximum number of patient was from the age group of 51-60 years and significantly lower numbers of patients were from the elderly age group of 81-90 years. Branded prescribing dominated over generic name.

The average number of drugs per encounter was found between 6 to 8 in our study which are deviated from the standard prescribed. The frequency of polypharmacy was higher in this hospital setting. One possible explanation is that, in tertiary care, patients seek expert advice from a health professional for very specific complaints, resulting in increased number of drugs per prescription.⁹ High prescription rates increases the risk of adverse drug reactions and drug interactions which affects the patient's quality of care. Frequency of use of antibiotic preparations was found to be very low (0.82%) in ACS in comparison with WHO reference value. In present study we can observe that generic prescribing indicator shows a low range of usage at 10.68%, resulting in a chance for errors and polypharmacy. Generic prescribing is beneficial as it reduces the cost of drugs. However, it is interesting to notice that prescription pattern has a high usage of drugs from NLEM (78.2%) in ACS (Table 4).

The present study provides valuable insight about the overall pattern of drugs used in post-acute coronary syndrome. Extensive patient education, early assessment and aggressive treatment by multidisciplinary team represent the best approach to the management of high risk patients with cardiovascular disease. Clinical and economic outcomes demonstrate the reduction of cardiac complications, length of hospital stay and cost.¹⁰ Physicians should be motivated to prescribe drugs with generic name so as to reduce the cost of therapy. The primary purpose of NLEM is to promote rational use of medicines considering efficacy, safety and cost.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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