Cardiovascular medications among the critically ill patients of a tertiary care hospital: A drug utilization study

Sir

Cardiovascular disorders are one of the leading causes of mortality and morbidity. The patients admitted to the medical intensive care unit (MICU) represent a diverse patient population with variable demographic characteristics and admission criteria. A substantial proportion of patients admitted to the MICU with non-cardiac illnesses have associated cardiac co-morbidities. The critically ill patients represent a high risk population in whom judicious and appropriate pharmacotherapy can be life-saving while irrational use of medications can be life-threatening.

Prescription audits help to evaluate and recommend modifications in current prescribing practices of physicians to ensure rational and quality medical care.[1] Developing countries have limited funds available for health care and drugs. Drug utilization studies review the concordance of current drug prescription pattern with the treatment protocol.[1] This study aimed to evaluate the utilization pattern of cardiovascular drugs in a consecutive series of patients admitted to MICU.

A prospective observational study was carried out over a period of one year at St. John's Medical College Hospital, Bangalore, India. The study was approved by the institutional ethics committee before the conduct of the study. Consecutive

patients admitted to the MICU during the study period were included as the study population. Patients transferred to other units within a day of admission to the MICU were excluded. We reviewed all the patient prescriptions, and the details were recorded during that particular hospital stay on to a case record form. Descriptive statistical analysis was carried out using SPSS version 18. Individual cardiovascular drugs were classified based on WHO-ATC classification.

Totally 728 (81%) consecutive patients fulfilled the inclusion criteria. Male patients constituted 65% of the total. The mean and standard deviation (SD) for age was 49.2 ± 15.8 years. The common cardiovascular conditions in MICU patients included coronary artery diseases such as ischemic heart disease, hypertension, dyslipidemia, myocardial infarction and congestive heart failure. This finding implies that the majority of patients admitted to the MICU had chronic cardiovascular diseases.

Of the various cardiovascular drug classes, 40% and 20% of the drugs belonged to WHO essential drug list and complementary drug list, respectively. Sixty-eight percent of the drugs were prescribed by their trade names. Out of 1173 cardiovascular drugs prescribed, the top four drug classes were inotropes (478 patients), anti-hypertensives (337 patients), hypolipidemic agents (119 patients) and diuretics (114 patients). Among the drugs prescribed for hypertension, calcium channel blockers (amlodipine) were the most utilized drug class. Table 1 shows the utilization patterns of cardiovascular drugs in MICU.

Low molecular weight heparins (LMWH) were the frequently prescribed anticoagulants, Dalteparin (B01AB04) (119 patients

16.3%) being the commonest LMWH. Among the anti-platelet drugs, 153 (21%) patients were on low dose aspirin (B01AC06) and 95 (13%) patients on clopidogrel (B01AC04).

As regard the clinical outcome, 575 (78.9%) patients had their clinical condition improved and were transferred from MICU, while 94 patients (12.9%) died. The clinical outcome of 60 patients was not known as they were either discharged against medical advice or on the patients' requests.

Rational prescription is essential for better patient care. The first step in any intervention program to improve drug utilization is to assess the extent of the existing problem in prescribing. Male preponderance and mean age group of the patients were similar to the findings by Biswal et al.[2] The relatively high proportion of trade name prescriptions (68%). Many clinicians prefer prescribing by trade name due to the existence of numerous imitation drugs in the market. The prescriptions of cardiovascular medications were in line with the cardiovascular diagnosis in the patients.

About 40% of the cardiovascular drugs belonged to the WHO essential drug list. This observation was expected considering the severity of illnesses of the patients admitted to the MICU. The WHO essential medicines list is primarily intended to be aligned with standard treatment guidelines for the common medical conditions in the community and does not include those illnesses observed in the critically ill patients.

The majority of the cardiovascular drugs were prescribed to patients for their co-existing cardiovascular co-morbidities. Cardiovascular drug utilization was observed for both prophylaxis (anticoagulants, anti-platelet agents, hypolipidemics) as well as for therapeutic cardiovascular indications. Cardiovascular diseases are a combination of risk factors resulting in clinical events that increase morbidity and mortality. Current guidelines in preventive cardiology focus primarily on the management of major cardiovascular risk factors through dietary and lifestyle modifications, and prophylactic use of various drugs.[3]

Inotropes were the most widely used cardiovascular drug category. Noradrenaline (30.2%) followed by dopamine (22.7%) were the most frequently utilized inotropes as the most common primary diagnosis was sepsis (septic shock). This finding was in concordance with the reports of Biswal et al.[2] and Sakr et al.[4] Noradrenaline is favored in shock secondary to sepsis as it is believed to have more potent vasoconstrictor effects in sepsis-mediated vasodilation and also improves urine output and creatinine clearance in patients with septic shock.[4] This could explain the higher utilization of noradrenaline observed in the present study since sepsis was the most common primary clinical

Table 1: Utilization pattern of cardiovascular drugs in the MICU (except anti-hypertensives)

Drug group	Drug	ATC code	No. of prescriptions (n=728)
Inotropes	Noradrenaline	C01CA03	220 (30.2)
	Dopamine	C01CA04	165 (22.7)
	Dobutamine	C01CA07	70 (9.6)
	Adrenaline	C01CA24	23 (3.2)
Hypolipidemic	Atorvastatin	C10AA05	109 (15)
	Simvastatin	C01AA01	8 (1.1)
Diuretics	Furosemide	C03CA01	91 (12.5)
	Spironolactone	C03DA01	13 (1.8)
Anti-anginals	Isosorbide mononitrate	C01DA08	42 (5.8)
	Diltiazem	C08DB01	25 (3.4)
	Nitroglycerine	C01DA02	22 (3)
	Nicorandil	C01DX16	8 (1.1)
Anti-arrhythmics	Amiodarone	C01BD01	21 (2.9)
	Verapamil	C08DA01	2 (0.3)
Cardiac glycosides	Digoxin	C01AA05	16 (2.2)
Peripheral vasodilators	Pentoxifylline	C04AD03	8 (1.1)

MICU=Medical intensive care unit

diagnosis. Evidence is still lacking as regard the use of inotropes and vasopressors in the critically ill. Large prospective randomized trials, such as the Sepsis Occurrence in Acutely Ill Patients (SOAP) group, are being carried out with vasopressors that would answer several relevant clinical questions.

Drugs for hypertension were the second most frequently used cardiovascular drug category as hypertension (30.4%) was the common co-morbidity in the study. Atorvastatin 109 (15%) was the most commonly used hypolipidemic agent. Statins are known for their primary and secondary cardiovascular prevention. In addition, recent studies have reported the pleiotropic effects of statin therapy in prevention and treatment of sepsis in the ICU setting.[5]

Furosemide was the major diuretic prescribed among the critically ill with acute renal failure (ARF) and congestive heart failure. Diuretics represent one of the most commonly used agents in the ICU to maintain renal function and decrease the requirements for renal support. A meta-analysis by Ho & Sheridan in 2006 concluded that the diuretics do not provide any clinical benefit in patients with ARF, but studies on diuretics-associated mortality and morbidity among critically ill are still lacking.[6]

Most patients in the MICU have venous thromboembolism (VTE), which is a major risk factor that warrants the use of thromboprophylaxis to prevent VTE and also to decrease the complications of thromboembolic disease. LMWHs were the anticoagulant of choice in our study in concordance with Geerts et al.[7] This observation was dissimilar to the findings of Biswal et al.,[2] where equal proportions of patients received both LMWH as well as unfractioned heparin. Both LMWH and unfractioned heparin are equally efficacious in preventing DVT, but LMWH was preferred in the present study due to the lower incidence of ADRs such as thrombocytopenia and also laboratory monitoring is not essential.

The use of anti-arrhythmic agents was marginal (3%), probably due to reversion of arrhythmias and cardiac arrest carried out primarily using external defibrillators. Infrequent utilization of thrombolytic agents was observed as those patients requiring thrombolytic therapy would be usually shifted to the CCU for further management and thus not available for inclusion in the analysis in the present study.

CONCLUSION

A wide spectrum of cardiovascular drugs was used from various drug classes. Cardiovascular drug utilization was observed for prophylaxis as well as for therapeutic indications. Continuous prescription audit in the MICU would give insights into the current practices and feedback for rationalizing prescribing practices. Longitudinal surveillance of ICU drug use can be undertaken with the aim of creating a drug utilization database.

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