Adherence / Compliance to the Standard Guidelines for Management of Acute Coronary Syndrome – Tertiary Care Centre Study

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ABSTRACT

Introduction: Acute coronary syndrome (ACS) refers to a spectrum of clinical presentations ranging from those for ST-segment elevation myocardial infarction (STEMI) to presentations found in non–ST-segment elevation myocardial infarction (NSTEMI) or in unstable angina. Study aimed to investigate the current management of acute coronary syndrome patients at a tertiary care centre at Kakinada and focused on the guideline- adherence in the timing of invasive strategies or choice of conservative treatment options during admission and at the time of discharge.

Material and Methods: A retrospective, observational study included 290 patients who presented with history of acute chest pain to our hospital within 12–hours of symptom onset between January 2018 and December 2018 were included in the study.

Results: Patients were clinically followed for 12 months. A total of 290 patients, 260 ST elevation MI and 30 non-ST elevation MI were included. The median compliance index (percentage of optimal compliance with guidelines) was 0.96 (The value of p is 0.03301. The result is significant at $p < .05$.). By logistic regression risk score variable was independently related to mortality.

Conclusion: A clear relationship between the extent of guideline implementation, and 1-year mortality was shown and this relationship remained strong after stratification on the risk score at admission and the type of MI. This data emphasize the need for thorough implementation of guidelines to improve the outcome of patients suffering from acute MI.

Keywords: Guidelines; Myocardial Infarction; Acute Coronary Syndrome; Percutaneous Coronary Intervention

INTRODUCTION

Background: Acute coronary syndrome (ACS) is almost always associated with rupture of an atherosclerotic plaque and partial or complete thrombosis of the infarct-related artery.[1] Reperfusion therapy with the primary percutaneous coronary intervention (PCI) has become the current standard treatment of choice for STEMI patients only if they arrive within the ideal time. Primary PCI is defined as an intervention of the infarct-related vessel within 12–hours after the onset of symptoms and without prior thrombolytic therapy, primary PCI has been implemented in daily clinical practice and has become available for a broad range of patients. In a hospital with angioplasty facilities, primary PCI is considered to be superior to thrombolytic treatment for STEMI patients.[3] Door-to-balloon time (D2B) plays an important key role in the success of primary PCI.[2]

All the patients who underwent primary percutaneous transluminal (PTCA), if no contraindications should receive Beta blockers, Aspirin, Angiotensin Converting Enzyme inhibitors (ACEI), Angiotensin Receptor Blocker (ARB) drugs and counselling for life style modification at the time of discharge.

Study Objectives were to identify whether Aspirin was administered on arrival to the hospital for patients having an ACS in the absence of any absolute contraindication, to do Primary PTCA if it's within the window period and to detect whether ACEI or ARB were prescribed at discharge for patients who had an ACS especially for patients who have Left Ventricular Systolic Dysfunction (LVSD), to detect whether oral Beta-blockers were prescribed at discharge for ACS patients, to detect whether Aspirin was prescribed at discharge for ACS patients, to identify adult smoking cessation advice/counselling being given to ACS patients and to identify clinical outcomes of the patient in relation to risk factors.

MATERIAL AND METHODS

The study includes the adherence to standard guidelines for the management of ACS. Systematic sampling method was followed for a set of 290 patients. The enrolment of the patients was performed for six months period that have conformed diagnosis of acute myocardial infarction with or without ST segment elevation.

Inclusion criteria

- Patients above 18 years of age
- Patients with symptoms of chest pain with ECG & ECHO changes
- Co morbid conditions & Risk factors (HTN/DM2/CKD/ Smoking etc.,)
- High Risk for Acute Coronary Syndrome

Exclusion criteria:

- Patients below 18 years of age

Data collection

The data was collected from patient medical records and patient interview during their follow-up. The parameters

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like age, gender, risk factors, co-morbid conditions, initial presentation, risk assessment, definitive treatment and discharge advice are considered as variables for the analysis.

Baseline characteristics, risk factors and follow-up

The evaluation of patient's characteristics comprised of basic demographics, standard risk factors, as well as relevant co morbidities and medications at discharge. High-risk stratification was based on the Modified GRACE score in-hospital mortality as well as on electrocardiographic (ECG) analyses for the absence/presence of ST depression and/or T wave inversion. Additional risk evaluation for less acute risk (secondary criteria) was performed by the assessment of diabetes, renal insufficiency, reduced left ventricular ejection fraction (<40%), and of cardiac history in terms of prior myocardial infarction, recent percutaneous coronary intervention (PCI), or coronary artery bypass graft (CABG).

Statistical analysis:

The variables were analysed by the different statistical test. The data analysis was done by separating the deaths from the main set, The demographic data and risk factors of the population was created and the probability values are calculated for all the parameters. Comparisons of STEMI with NSTEMI were done using students T test with 95% confidence interval. The correlations were done between the parameters by the Pearson correlation coefficient at 95% Confidence Interval. Krunal Wallis test was performed to analyse the Risk factor association at 95% Confidence Interval. Separate logistic regression models were developed for the two continuous variables (compliance index and risk score) to test for a linear relationship with mortality. The event death and the grace risk were analysed.

RESULTS

The table-1 represents demographic data and the risk factor of the population along with their probability values. The probability values were analysed by using the student t test at 95% confidence interval. The t-value is 3.63451. The p-value is .000483. The result is significant at $p < .05$. The Pearson Correlation Coefficient is performed and the value of R is: 0.1905. Kruskal-Wallis Test for Risk factor association was performed for analysing the risk association with the event. The H statistic is 36.017 (4, N = 55). The p-value is < .00001. The result is significant at $p < .05$. This indicates that the result is significant and the null hypothesis is rejected and

Variable	STEMI	NSTEMI	p value
	n = 260	n = 30	
Age	58.6	58.4	0.000141
Male	215	18	0.000045
Female	48	9	0.000572
HTN	135	8	0.000073
DM2	110	16	0.000196
Family History	9	2	0.011201
Smoker	60	8	0.000571
CKD	21	9	0.036485
CAD in Past	15	3	0.007786

Table-1: Demographic data and risk factors of the population

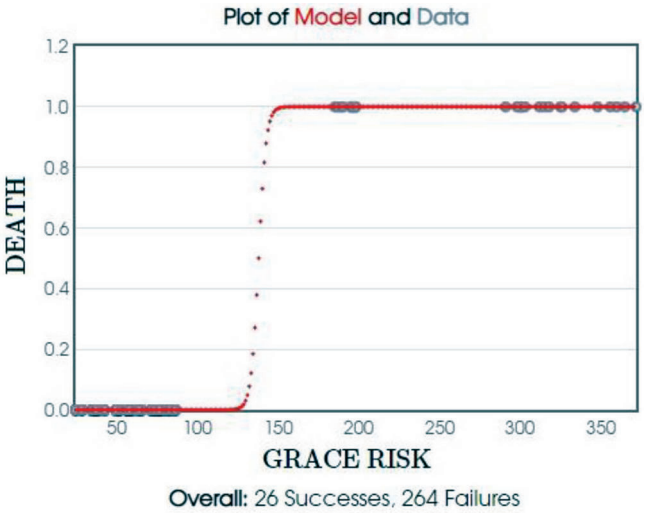

Figure-1:

	Eligible patient's n (%)	Actually treated n (%)	Ratio : actual/eligible
Reperfusion	260	250	0.961538462
ACE-inhibitors (discharge)	260	223	0.857692308
Aspirin/clopidogrel	260	250	0.961538462
Statins (discharge)	260	260	1
Beta-blockers	260	236	0.907692308

Table-2: Theoretical and actual management of patients with STEMI n = 260

	Eligible patient's n (%)	Actually treated n (%)	Ratio : actual/eligible
ACE-inhibitors (discharge)	26	15	0.576923077
Aspirin/clopidogrel (discharge)	26	26	1
Statins (discharge)	26	26	1
Beta-blockers (discharge)	26	15	0.576923077
Heparin	28	28	1
LMWH	28	28	1
GPIIb/IIIa inhibitors	26	20	0.769230769
Early invasive strategy	26	18	0.692307692
Revascularization with GPIIb/IIIa inhibitors	26	8	0.307692308

Table-3: Theoretical and actual management of patients with NSTEMI n = 30

the alternative hypothesis is accepted. This depicts that the parameters are considerably different.

Compliance with guidelines: compliance index

The compliance score was the ratio of actual treatment to theoretical treatment. The theoretical treatment score was calculated for every patient, taking into account the type of MI, the treatment eligibility criteria, and the existence of contraindications to drugs or treatments. A rating of 0 was used in the case of specified contraindications; otherwise the score was calculated as follows:

(i) STEMI: we attributed one point for the use of reperfusion therapy (primary or rescue percutaneous coronary intervention or thrombolysis) in patients admitted within the first 12 h after onset of symptoms. One point each was given for early (within the first 24 h) prescription of aspirin (or clopidogrel in cases of contraindication to aspirin), beta blockers, ACE-inhibitors (only in patients with heart failure and/or left ventricular dysfunction or the presence of diabetes plus one major risk factor), and statins (See Table:2). (ii) NSTEMI: we attributed one point each for: early use of GP IIb/IIIa inhibitors, early invasive strategy (coronary angiography and/or revascularization within 48 h), heparin [unfractionated or low molecular weight heparin (LMWH)], beta-blockers, aspirin (or clopidogrel), ACE-inhibitors (same indication as for STEMI), and statins (See Table:3). Possible contraindications were defined for all treatments.

Intervention	n = 290	n %
PCI	188	64.5
CABG	26	8.9
POBA	13	4.4
TPI	10	3.4
Thrombolysis	18	6.2
Medical management	19	6.5
Death	16	5.5

Table-4: Definitive / Final treatment for ACS patients

Management of patients with STEMI

The theoretical and actual management of the patients with NSTEMI was analysed using student t test at 95% Confidence Interval. The value of t was -2.510497. The value of p was 0.03301. The result was significant at $p < 0.05$. This indicates that the result was significant and the null hypothesis was rejected and the alternative hypothesis is accepted. This depicts that the parameters are considerably different (table-2).

Management of patients with NSTEMI

The theoretical and actual management of the patients with NSTEMI was analysed using student t test at 95% Confidence Interval. The value of t was -2.752989. The value of p was .01247. The result was significant at $p < .05$. This indicates that the result was significant and the null hypothesis was rejected and the alternative hypothesis is accepted. This depicts that the parameters are considerably different (table-3).

The final / definitive treatment was done with different interventions. The PCI intervention was used for maximum of the 188 patients i.e. 64.5% (table-4).

Logistic Regression for Grace Risk and mortality

Risk factor association was performed for analysing the risk association with the event. The event success was considered as 1 and failure as 0. The result showed that H

	ICD 10	ASPRIN with IN 24 HRS	n %	ASPIRIN at discharge	n %	ARB/ACEI at discharge	n %	B Blockers at discharge	n %	Smokers	Cessation of smoking counselling	n %
Jan	18	18	100	18	100	14	77.78	15	83.33	2	2	100
Feb	26	26	100	26	100	21	80.77	24	92.31	5	5	100
Mar	21	21	100	21	100	17	80.95	19	90.48	8	8	100
Apr	54	54	100	54	100	45	83.33	50	92.59	12	12	100
May	30	30	100	30	100	25	83.33	27	90	10	10	100
Jun	11	11	100	11	100	8	72.73	9	81.82	1	1	100
Jul	19	19	100	19	100	16	84.21	15	78.95	4	4	100
Aug	28	28	100	28	100	21	75	22	78.57	5	5	100
Sep	23	23	100	23	100	20	86.96	20	86.96	6	6	100
Oct	25	25	100	25	100	22	88	21	84	5	5	100
Nov	14	14	100	14	100	11	78.57	12	85.71	7	7	100
Dec	21	21	100	21	100	18	85.71	17	80.95	3	3	100
	290	290	100	290	100	238	82.07	251	86.55	68	68	100

Table-5: Admission and discharge criteria - pharmacotherapy

statistic was 36.017 (4, N = 55). The p-value was < .00001. The result was significant at p < .05. This indicates that the result was significant and the null hypothesis is rejected and the alternative hypothesis is accepted. This depicts that the parameters are considerably different.

DISCUSSION

A total of 290 patients were included in the study. The mean age of the study population was 58.45±1.83 years. There was a male predominance [233 (80.34%) patients]. Different risk scoring systems for patients with ACS have been published, usually based on the results of randomized studies and limited to patients with either NSTEMI[10] or STEMI.[11] In our study, the risk score was based on the Modified GRACE score. The GRACE 2.0 ACS Risk Calculator implements the revised GRACE algorithms for predicting death or death/myocardial infarction following presentation with an acute coronary syndrome (ACS). GRACE (the Global Registry of Acute Coronary Events) is an international observational programme of outcomes for patients who were hospitalized with an ACS in the 10 years from 1999. GRACE includes nearly 250 hospitals in 30 countries, and enrolled a total of 102,341 patients. Participating physicians receive confidential quarterly reports showing their outcomes side by side with the aggregate outcomes of all participating hospitals. The GRACE Risk Score has been extensively validated prospectively and externally.[12] In our study Risk factors such as hypertension [143 (49.31%) patients] were observed in majority of the population followed by diabetes [126 (43%) patients] and smoking [68 (23%) patients].

The current AUC (Appropriate Use Criteria) rate revascularization as "appropriate care" for patients presenting within 12 hours of the onset of STEMI or up to 24 hours if there is clinical instability. For STEMI patients presenting more than 12 and up to 24 hours from symptom onset but with no signs of clinical instability, revascularization was rated as "may be appropriate," indicating that many on the technical panel consider it reasonable to revascularize such patients. Furthermore, non culprit artery revascularization at the time of primary PCI was rated as "may be appropriate," but because this is an emerging concept on the basis of relatively small studies, clinical judgment by the operator is encouraged.

For STEMI patients initially treated with fibrinolysis, revascularization was rated as "appropriate therapy" in the setting of suspected failed fibrinolytic therapy or in stable and asymptomatic patients from 3 to 24 hours after fibrinolysis. In the setting of suspected failed fibrinolysis, the need for revascularization is usually immediate, whereas in stable patients with apparent successful fibrinolysis, revascularization can be delayed for up to 24 hours. For stable patients >24 hours after fibrinolysis, revascularization was rated as "may be appropriate." Revascularization soon after apparent successful fibrinolysis is supported by data and guideline recommendations about the management of patients transferred from centres where PCI is not available. Non culprit artery revascularization during the index hospitalization after primary PCI or fibrinolysis was also rated as appropriate and reasonable for patients with 1 or more severe stenosis and spontaneous or easily provoked ischemia or for asymptomatic patients with ischemic findings on non invasive testing. In the presence of an intermediate-severity non culprit artery stenosis, revascularization was rated as "appropriate therapy". For patients who are stable and asymptomatic after primary PCI, revascularization was rated as "may be appropriate" for 1 or more severe stenosis even in the absence of further testing. The only "rarely appropriate" rating in patients with ACS occurred for asymptomatic patients with intermediate-severity non culprit artery stenosis in the absence of any additional testing to demonstrate the functional significance of the stenosis.

For patients with NSTEMI/unstable angina, and consistent with existing guidelines and the available evidence, revascularization was rated as "appropriate care" in the setting of cardiogenic shock or in a patient with intermediate- or high-risk features. For stable patients with low-risk features, revascularization was rated as "may be appropriate." Decisions around the timing of revascularization, management of multivessel disease, and concomitant pharmacotherapy should all be on the basis of evidence from the relevant practice guidelines**.** The effectiveness of both fibrinolytic therapy and primary PCI diminishes with the passage of time [16,18]; however, the ability of PCI to produce a patent infarct-related artery is much less time-dependent.[17] Thus, PCI is generally preferred for patients who arrive at the hospital late after the onset of symptoms (>3 hours). In contrast, clinical trials have shown that early initiation of fibrinolytic therapy (within the first 2-3 hours after the onset of symptoms) may lead to outcomes that are similar to or better than those achieved with PCI.[19-20]

B-Blockers should be administered to patients with STEMI regardless of the planned reperfusion strategy. β-Blockers decrease the rates of recurrent ischemia and reinfarction among patients receiving concomitant fibrinolytic therapy.[8-9] In a recent study of patients treated with either fibrinolytic therapy or PCI, β-blockers substantially reduced the rates of all-cause mortality, cardiovascular mortality, and recurrent nonfatal MI.[7] Several large randomized trials of Angiotensin-converting enzyme (ACE) inhibitors administered to patients with STEMI, as well as a meta-analysis, have found statistically significant decreases in mortality rates.[6] The greatest reduction in the mortality rate occurred within the first 5 days after an MI; this finding underscores the importance of early treatment. Aspirin should be given as early as possible to all patients with suspected STEMI, at a dose between 162 and 325 mg (to be chewed), and its administration should be continued indefinitely at a daily dose of 75 to 162 mg.[21] The ISIS-2 (Second International Study of Infarct Survival) trial conclusively showed the efficacy of aspirin in reducing mortality rates among patients with evolving acute MI.[22] In the absence of contraindications, lipid-lowering therapy with statins should be initiated for all patients with UA/NSTEMI, regardless of baseline LDL cholesterol levels. If the LDL cholesterol concentration is 100 mg/dL or higher,

cholesterol-lowering therapy should be initiated or intensified with the goal of achieving an LDL cholesterol concentration lower than 100 mg/dL. The LIPID (Long-Term Intervention with Pravastatin in Ischaemic Disease) trial demonstrated that, compared with placebo, pravastatin achieved a 26% reduction in mortality rates (*P*=.004) for patients with UA, as well as statistically significant reductions in the incidence of subsequent MI, coronary revascularization, and stroke.[23] The PROVE IT (Pravastatin or Atorvastatin Evaluation and Infection Therapy)-TIMI 22 trial found that, compared with moderate lipid lowering after ACS with standard-dose pravastatin (40 mg/d), intensive lipid lowering with high-dose atorvastatin (80 mg/d) achieved a 16% reduction in the primary composite end point of all-cause death, MI, UA requiring rehospitalisation or revascularization, and stroke.[24] The benefit was linked to statistically significant reductions in both LDL cholesterol and CRP concentrations.[25]

Possible contraindications were defined for all treatments: Thrombolysis: stroke within the previous 6 months, previous intracranial bleeding, active bleeding, systolic blood pressure 180 mmHg. Angioplasty: severe renal failure (Creatinine clearance below30 mL/min). Beta-blockers: bradycardia, 50 b.p.m., systolic blood pressure below 80 mmHg, sign of heart failure (Killip class .1), left ventricular ejection fraction (LVEF) below 0.35, atrioventricular (AV) block on ECG, history of chronic obstructive lung disease or peripheral artery disease. ACE-inhibitors: severe renal failure with Creatinine clearance 30 mL/min Aspirin or clopidogrel: active gastric bleeding GPIIb/IIIa inhibitors: thrombocytopenia: 100 000/ dL Statins: history of previous intolerance.

All patients in all the months who arrived with chest pain (Table 5) and fit into ACS have received Aspirin on arrival [290 (100%) patients] and All patients in the months of Jan'18 and Dec'18 who arrived with chest pain and fit into ACS were advised Aspirin at discharge [290 (100%) patients]. The months in which few patients were found not to be advised ACEI/ ARB at discharge was due to normal to mild LV function, low BP, hypokalemia, DAMA & death [238 (82.07%) patients]. The patients who had a history of smoking have been counselled on smoking cessation upon discharge [290 (100%) patients].

Study limitations

This study does have few limitations as this is not a comparative study with other hospitals. Secondly, our work represents a retrospective study, and is therefore subject to the limitations of such analyses. Third, the data are derived from a single-centre, which limits the extension of the applicability of the results. In addition, we analyzed only the 12-months mortality. Therefore, it is not possible to extend the results beyond the acute phase and to other major cardiovascular events.

CONCLUSION

The above study reveals that the adherence / Compliance to the standard guidelines for Management of Acute Coronary Syndrome (ACS) were found to be as per the targeted standards. Few patients did not meet the standards which were due to a documented clinical indication and those who had low BP & other contraindications were considered for standard treatment at follow up. A clear relationship between the extent of guideline implementation, and 1-year mortality was shown and this relationship remained strong after stratification on the risk score at admission and the type of MI. This data emphasize the need for thorough implementation of guidelines to improve the outcome of patients suffering from acute MI.

Recommendations

Learning with practicing cardiologists and clinicians through CME's, Clinical meetings, updating the new standard protocols in Emergency Room, Cath Lab and CICU was recommended. Holding classes and discussions with junior doctors, technicians & nurses were recommended to help improve the compliance to the standard guidelines.

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