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Original Article

Comparative analysis of four established risk scores for prediction of in-hospital mortality in patients undergoing primary percutaneous coronary intervention

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Abstract: Objective: This study was conducted to compare the predictive power of Shock Index (SI), TIMI Risk Index (TRI), LASH Score, and ACEF Score for the prediction of in-hospital mortality in a contemporary cohort of ST-segment elevation myocardial infarction (STEMI) patients undergoing primary percutaneous coronary intervention (PCI) at a tertiary care cardiac center of a developing country. Methods: Consecutive patients diagnosed with STEMI and undergoing primary PCI were included in this study. SI, TRI, LASH, and ACEF were computed and their predictive power was assessed as the area under the curve (AUC) on the receiver operating characteristics (ROC) curve analysis for in-hospital mortality. Results: We included 977 patients, 780 (79.8%) of which were male, and the mean age was 55.6 ± 11.5 years. The in-hospital mortality rate was 4.3% (42). AUC for TRI was 0.669 (optimal cutoff: ≥17.5, sensitivity: 76.2%, specificity: 45.6%). AUC for SI was 0.595 (optimal cutoff: ≥0.9, sensitivity: 21.4%, specificity: 89.8%). AUC for LASH score was 0.745 (optimal cutoff: ≥0, sensitivity: 76.2%, specificity: 66.9%). AUC for the ACEF score was 0.786 (optimal cutoff: ≥1.66, sensitivity: 71.4%, specificity: 73.5%). Conclusion: In conclusion, ACEF showed sufficiently high predictive power with good sensitivity and specificity compared to other three scores. These simplified indices based on readily available hemodynamic parameters can be reliable alternatives to the computational complex scoring systems for the risk stratification of STEMI patients.

Keywords: STEMI, primary PCI, shock index (SI), TIMI risk index (TRI), LASH score, and ACEF score

Introduction

Ischemic heart disease (IHD) is the predominant cause of morbidity and mortality across the globe. ST-segment elevation myocardial infarction (STEMI) is the most common and life-threatening clinical manifestation of IHD [1]. A significant improvement in outcomes of patients with STEMI has been witnessed. Such improvements can be attributed to the wide adoption of primary percutaneous coronary intervention (PCI) and guideline-directed evidence-based pharmacological regimens and advancements in stenting and deployment techniques [1]. The acute event does not end with recovery for all STEMI patients, a significant number of patients face adverse outcomes from the acute event including a mortality rate ranging from 2.5% to 10% up to 30 days after the index procedure [2-4]. Hence, in clinical practice, the identification of patients at an increased risk of adverse events is crucial [5], it can provide an opportunity for a physician to adopt a more aggressive approach to curtail the burden of post-procedure adverse events [6]. A range of clinical indices and scoring criteria have been proposed but commonly used scores for the risk stratification of STEMI patients included the TIMI (Thrombolysis in Myocardial Infarction) risk score [7], the PAMI (Primary Angioplasty in Myocardial Infarction) [8], the GRACE (Global Registry of Acute Coronary Events) [9], and the CADILLAC (Controlled Abciximab and Device Investigation to Lower Late Angioplasty Complications) score to name a few [10].

The usefulness of these scores in day-to-day practice, especially in high-burden PCI centers, is limited due to the complexity of computation which are cumbersome and mostly required online calculators [11]. Therefore, several simple bedsides as well as invasive indices have been investigated for this purpose. The Shock Index (SI) and its multiple variants Age-adjusted SI and Modified SI (MSI) are primarily driven by the ratio of heart rate (HR) at presentation to systolic blood pressure (SBP), originally proposed for trauma patients, have shown to be a useful prognostic marker for adverse outcomes in STEMI patients [5, 6, 11-14]. Another amalgamation of HR, SBP, and age, namely the TIMI risk index (TRI), has also been reported as an important predictor of mortality after primary PCI [15]. The invasive measures such as left ventricular (LV) ejection fraction (EF) and LV end-diastolic pressure (LVEDP) have been considered to be theoretically superior to non-invasive parameters of hemodynamic status and these parameters can have better predictive value for the prediction of outcomes [11]. The LASH score which is computed based on LVEDP, age, SBP, and HR has shown good accuracy in predicting in-hospital mortality after primary PCI of patients over 60 years of age [16]. Similarly, the ACEF is another risk index based on age, creatinine, and EF of the patients, which showed sufficient predictive power for the prediction of in-hospital mortality after primary PCI among patients with STEMI complicated by cardiogenic shock (CS) [17]. The SI, TRI, LASH, and ACEF are the newly emerging indices that required validity assessment in a wide spectrum of STEMI populations, especially, later two indices have data reported in a subgroup of STEMI, one for over 60 years of age and the other for CS patients only. Therefore, this study aimed to compare the predictive power of SI, TRI, LASH, and ACEF for the prediction of in-hospital mortality in a contemporary cohort of STEMI patients undergoing primary PCI at a tertiary care cardiac center in a developing country.

Material and methods

Study population

Consecutive patients diagnosed with STEMI and undergoing primary PCI at the National Institute of Cardiovascular Diseases (NICVD) between August 2020 and July 2021 were included in this study. As per the Declaration of Helsinki, this study was approved by the ethical review board of the institution, and consent for participation in the study was obtained from all the participants with a detailed explanation of the purpose and processes of the study.

Inclusion and exclusion criteria

The primary inclusion criteria for the study were all adult patients (≥18 years), either gender, who were diagnosed with STEMI as per the definition given below and shifted to a catheterization laboratory for primary PCI within 12 hours of the onset of symptoms except patients in cardiogenic shock who were taken for primary PCI irrespective of symptom duration. Non-consenting patients and patients who needed multi-vessel intervention during the index procedure were excluded.

Data collection

Data regarding routine STEMI workup (12-lead electrocardiography (ECG)) at presentation along with demographic details and risk profile of the patient were obtained, this included age (years), gender, total ischemic time (minutes), presenting vitals (blood pressure (mmHg), and heart rate (bpm)), routine lab investigations (such as random plasma glucose level (mg/dL) and serum creatinine (mg/dL)), at presentation Killip class, arrhythmias, cardiac arrest, intubated, and type of myocardial infarction. All the primary PCI procedures were performed as per the standard management protocol for STEMI patients. Data regarding procedure characteristics and angiographic findings such as thrombus burden, infarct-related artery, and the number of involved vessels, hemodynamic parameters (left ventricular end-diastolic pressure (LVEDP) and left ventricular ejection fraction (LVEF)) were obtained.

Variables and definitions

Diagnostic criteria for STEMI were; "history of typical chest pain for at least 20 minutes" and presenting ECG finding of "ST elevation in at least two contiguous leads >2 mm in men or >1 mm in women in leads V2 to V3 and/or >1 mm in other contiguous chest leads or limb leads".

The shock index (SI) was calculated as a ratio of HR to SBP at the presentation to the emergency room [14]. The TRI was calculated as SI multiplied by the square of "age/10" [15]. The LASH score was computed as an addition of a score point of one against each of the four criteria namely; SBP <100 mmHg, HR >100 bpm, age >75 years, and LVEDP >20 mmHg [16]. The ACEF score was computed using equation "age/EF + 1 (when creatinine >2 mg/dL)" [17].

Data analysis

Collected data were entered and analyzed using IBM SPSS 19. Patients were stratified based on in-hospital survival status and clinical and procedural characteristics and in-hospital complications were compared between the two groups with the help of appropriate statistical tests.

Statistical tests and analysis

The independent sample t-test was applied for variables that were approximately normally distributed, otherwise, the Mann-Whitney U test was applied. Comparisons of most of the categorical response variables were made with the help of the Chi-square test, while in the case of lesser required expected cell frequency, the Fisher's Exact Test or Likelihood ratio test was applied, appropriately. The receiver operating characteristics (ROC) curve analysis was performed for the TRI, SI, LASH, and ACEF for the prediction of in-hospital mortality, and the optimal cutoff value was identified with the help of Youden's J statistic. The area under the curve (AUC), sensitivity, specificity, accuracy, positive predictive value, and negative predictive value along with corresponding 95% confidence intervals (CI) were obtained. All the analyses were performed with significance criteria of *p*-value <0.05.

Results

Baseline and clinical characteristics

A total of 977 patients were included in this study, 780 (79.8%) of which were male, and the mean age was 55.6 ± 11.5 years with 149 (15.3%) under 45 years of age. At presentation, 101 (11.4%) patients were in Killip class III/IV, 121 (12.4%) had arrhythmias, 59 (6%) were in cardiac arrest, and 130 (13.3%) were intubated. The in-hospital mortality rate was 4.3% (42). Patients who did not survived had higher mean age (59.9 ± 9.3 vs. 55.4 ± 11.5; P=0.014), higher median total ischemic time (470 [320-740] vs. 340 [240-480] minutes; P=0.001), higher median random glucose level (216 [151-320] vs. 155 [129-205] mg/dL; P<0.001), higher proportion of Killip class III/IV (42.9% vs. 9.9%), intubated (73.8% vs. 10.6%), arrhythmias (47.6% vs. 10.8%), cardiac arrest (26.2% vs. 5.1%) as compared to the patients who survived, respectively (**Table 1**).

Angiographic and procedural characteristics

Angiographic and procedural characteristics and post-procedure in-hospital complications stratified by the survival status of the patients are presented in **Table 2**. Non-survival was found to be associated with higher mean LVEDP (25.2 ± 8.5 mmHg vs. 18.3 ± 6.5 mmHg; P<0.001), lower mean LVEF (32.1 ± 9.9% vs. 41.3 ± 8.8%; P<0.001), higher proportion of IABP use (26.2% vs. 3.6%; P<0.001), three-vessel disease (76.2% vs. 28.9%), culprit left main (9.5% vs. 1.3%), thrombus grade V (83.3% vs. 53.9%), post-procedure TIMI flow < III (64.3% vs. 8.1%), and increased incidence of in-hospital complications, compared to the survived patients, respectively (**Table 2**).

Univariate analysis for mortality

The mean TRI was 29.2 ± 15.5 vs. 21.1 ± 10.9; P=0.002, mean SI was 0.8 ± 0.4 vs. 0.7 ± 0.2; P=0.020, mean LASH score was 1.3 ± 0.9 vs. 0.4 ± 0.7; P<0.001, and mean ACEF score was 2.1 ± 0.7 vs. 1.4 ± 0.5; P<0.001 among patients with and without in-hospital mortality, respectively. The receiver operating characteristics (ROC) curve analysis of TIMI risk index, Shock Index, LASH, and ACEF for the prediction of in-hospital mortality is presented in **Figure 1**.

Receiver operating characteristics curve analysis

The AUC for TRI was 0.669 [95% CI: 0.585 to 0.753] with an optimal cutoff value of ≥17.5, AUC for SI was 0.595 [95% CI: 0.498 to 0.691] with optimal cutoff value of ≥0.9, AUC for LASH score was 0.745 [95% CI: 0.664 to 0.826] with optimal cutoff value of ≥0, and AUC for the ACEF score was 0.786 [95% CI: 0.720 to 0.853] with optimal cutoff value of ≥1.66 (**Figure 1**). The sensitivity and specificity analysis of TIMI risk index, Shock Index, LASH, and ACEF-based criteria for the prediction of in-hospital mortality are presented in **Table 3**.

Table 1. Distribution of clinical and demographic characteristics of the study sample stratified based on survival status

	Total	In-hospital Mortality		*P*-value
		No	Yes	
Total (N)	977	935 (95.7%)	42 (4.3%)	-
Gender				
Female	197 (20.2%)	185 (19.8%)	12 (28.6%)	0.165[a]
Male	780 (79.8%)	750 (80.2%)	30 (71.4%)	
Age (years)	55.6 ± 11.5	55.4 ± 11.5	59.9 ± 9.3	0.014[b]
<45 years	149 (15.3%)	149 (15.9%)	0 (0%)	0.007[a]
45 to 64 years	585 (59.9%)	559 (59.8%)	26 (61.9%)	
≥65 years	243 (24.9%)	227 (24.3%)	16 (38.1%)	
Total ischemic time (minutes)	348 [240-480]	340 [240-480]	470 [320-740]	0.001[c]
Systolic blood pressure (mmHg)	130.9 ± 24.9	131.5 ± 24.3	116.3 ± 32.7	0.005[b]
Heart rate (bpm)	84.4 ± 20	84.3 ± 19.4	87.5 ± 30.4	0.496[b]
Random glucose level (mg/dL)	156 [130-209]	155 [129-205]	216 [151-320]	<0.001[c]
Serum creatinine (mg/dL)	1.0 ± 0.5	1.0 ± 0.5	1.1 ± 0.4	0.145[b]
Killip Class				
I	752 (77%)	738 (78.9%)	14 (33.3%)	<0.001[d]
II	114 (11.7%)	104 (11.1%)	10 (23.8%)	
III	70 (7.2%)	64 (6.8%)	6 (14.3%)	
IV	41 (4.2%)	29 (3.1%)	12 (28.6%)	
Type of myocardial infarction				
Anterior	513 (52.5%)	489 (52.3%)	24 (57.1%)	0.110[d]
Inferior	197 (20.2%)	194 (20.7%)	3 (7.1%)	
Inferior with RV	179 (18.3%)	167 (17.9%)	12 (28.6%)	
Inferio-posterior	54 (5.5%)	52 (5.6%)	2 (4.8%)	
Lateral	18 (1.8%)	18 (1.9%)	0 (0%)	
Posterior	16 (1.6%)	15 (1.6%)	1 (2.4%)	
Intubated	130 (13.3%)	99 (10.6%)	31 (73.8%)	<0.001[a]
Arrhythmias on presentation	121 (12.4%)	101 (10.8%)	20 (47.6%)	<0.001[a]
Cardiac arrest	59 (6%)	48 (5.1%)	11 (26.2%)	<0.001[e]
Co-morbid conditions				
Hypertension	562 (57.5%)	534 (57.1%)	28 (66.7%)	0.220[a]
Smoking	302 (30.9%)	294 (31.4%)	8 (19%)	0.089[a]
Diabetes mellitus	377 (38.6%)	353 (37.8%)	24 (57.1%)	0.012[a]
Family history of IHD	19 (1.9%)	18 (1.9%)	1 (2.4%)	0.570[e]
Prior PCI	70 (7.2%)	68 (7.3%)	2 (4.8%)	0.762[e]
History of CVA/TIA	19 (1.9%)	18 (1.9%)	1 (2.4%)	0.570[e]

a = Chi-square test, b = Independent sample t-test, c = Mann-Whitney U test, d = Likelihood ratio test, e = Fisher's Exact Test. RV = right ventricular, IHD = ischemic heart diseases, PCI = percutaneous coronary intervention, CVA = cerebrovascular accidents, TIA = transient ischemic attack.

Discussion

Considering the clinical implications of early risk stratification of STEMI patients, several risk stratification models have been developed and validated over the years [7-10]. The primary objective of these modalities is to give an early alert to the treating physician of expected adverse events, however, computational complexity and use of non-routine parameters make the clinical applicability of most of these scores challenging [11]. Hence, we conducted this study to compare the predictive power of four less computational complex and readily

Table 2. Distribution of angiographic and procedural characteristics and post-procedure in-hospital complications stratified by the survival status of the patients

	Total	In-hospital Mortality		*P*-value
		No	Yes	
Total (N)	977	935 (95.7%)	42 (4.3%)	-
Left ventricular end-diastolic pressure (mmHg)	18.6 ± 6.7	18.3 ± 6.5	25.2 ± 8.5	<0.001[b]
Left ventricular ejection fraction (%)	40.9 ± 9.1	41.3 ± 8.8	32.1 ± 9.9	<0.001[b]
Intra-aortic balloon pump used	45 (4.6%)	34 (3.6%)	11 (26.2%)	<0.001[e]
Number of vessels involved				
Single vessel disease	359 (36.7%)	355 (38%)	4 (9.5%)	0.001[a]
Two vessel disease	316 (32.3%)	310 (33.2%)	6 (14.3%)	
Three vessel disease	302 (30.9%)	270 (28.9%)	32 (76.2%)	
Culprit coronary artery				
Left main	16 (1.6%)	12 (1.3%)	4 (9.5%)	0.011[d]
LAD: Proximal	335 (34.3%)	317 (33.9%)	18 (42.9%)	
LAD: Non-Proximal	166 (17%)	164 (17.5%)	2 (4.8%)	
Left circumflex	113 (11.6%)	110 (11.8%)	3 (7.1%)	
Right coronary artery	334 (34.2%)	319 (34.1%)	15 (35.7%)	
Diagonal	10 (1%)	10 (1.1%)	0 (0%)	
Ramus	3 (0.3%)	3 (0.3%)	0 (0%)	
Pre-procedure TIMI flow				
0	548 (56.1%)	513 (54.9%)	35 (83.3%)	<0.001[d]
I	181 (18.5%)	176 (18.8%)	5 (11.9%)	
II	159 (16.3%)	159 (17%)	0 (0%)	
III	89 (9.1%)	87 (9.3%)	2 (4.8%)	
Thrombus Grade				
G1	40 (4.1%)	38 (4.1%)	2 (4.8%)	0.001[d]
G2	49 (5%)	49 (5.2%)	0 (0%)	
G3	236 (24.2%)	235 (25.1%)	1 (2.4%)	
G4	113 (11.6%)	109 (11.7%)	4 (9.5%)	
G5	539 (55.2%)	504 (53.9%)	35 (83.3%)	
Pre-balloon used				
Not done	546 (55.9%)	534 (57.1%)	12 (28.6%)	<0.001
Dottering	403 (41.2%)	374 (40%)	29 (69%)	
Balloon done	28 (2.9%)	27 (2.9%)	1 (2.4%)	
Mean vessel diameter (mm)	3.5 ± 0.3	3.5 ± 0.3	3.5 ± 0.3	0.979[b]
Total lesion length (mm)	27.6 ± 11.8	27.6 ± 11.7	28 ± 14.1	0.840[b]
Fluro time (minutes)	15.3 ± 8.3	15.2 ± 8	19.1 ± 13	0.003[b]
Contrast volume (ml)	120.1 ± 37	120.3 ± 37.1	116 ± 36.2	0.461[b]
Post-procedure TIMI flow				
0	8 (0.8%)	5 (0.5%)	3 (7.1%)	<0.001[d]
I	24 (2.5%)	15 (1.6%)	9 (21.4%)	
II	71 (7.3%)	56 (6%)	15 (35.7%)	
III	874 (89.5%)	859 (91.9%)	15 (35.7%)	
Risk scores				
TIMI Risk Index	21.4 ± 11.3	21.1 ± 10.9	29.2 ± 15.5	0.002[b]
Shock Index	0.7 ± 0.2	0.7 ± 0.2	0.8 ± 0.4	0.020[b]
LASH Score	0.5 ± 0.7	0.4 ± 0.7	1.3 ± 0.9	<0.001[b]
ACEF Score	1.5 ± 0.5	1.4 ± 0.5	2.1 ± 0.7	<0.001[b]

Post-procedure in-hospital complications				
Access site complications	5 (0.5%)	5 (0.5%)	0 (0%)	>0.999[e]
Bleeding	9 (0.9%)	5 (0.5%)	4 (9.5%)	<0.001[e]
Arrhythmia	41 (4.2%)	30 (3.2%)	11 (26.2%)	<0.001[e]
Cardiogenic shock	34 (3.5%)	19 (2%)	15 (35.7%)	<0.001[e]
Stent thrombosis	20 (2%)	15 (1.6%)	5 (11.9%)	0.001[e]
Contrast-induced nephropathy	98 (10%)	86 (9.2%)	12 (28.6%)	0.001[e]
CVA/TIA	4 (0.4%)	4 (0.4%)	0 (0%)	>0.999[e]

a = Chi-square test, b = Independent sample t-test, d = Likelihood ratio test, e = Fisher's Exact Test. LAD = left anterior descending artery, TIMI = Thrombolysis in Myocardial Infarction, LASH = LVEDP Age SBP and HR, ACEF = Age Creatinine and Ejection Fraction, CVA = cerebrovascular accidents, TIA = transient ischemic attack.

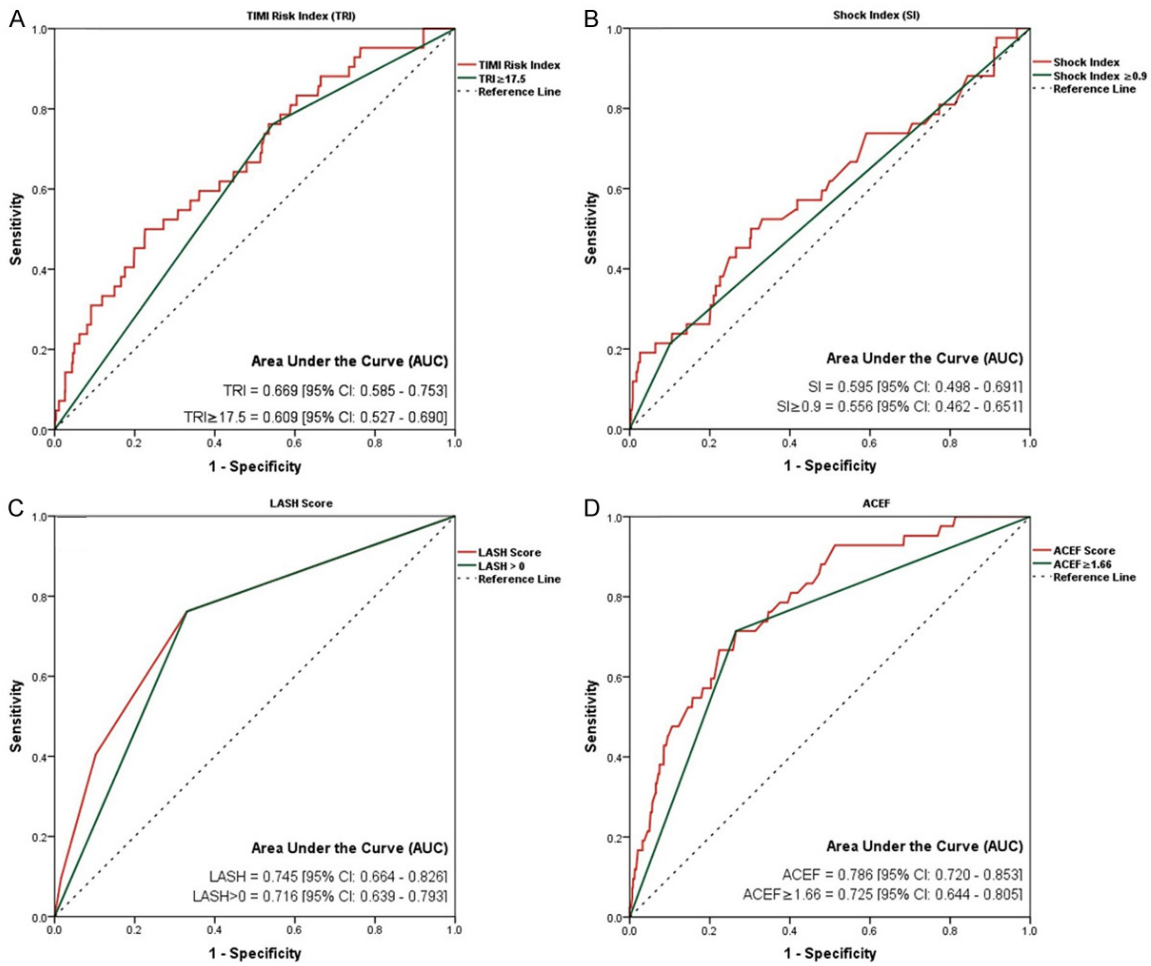

Figure 1. The receiver operating characteristics curve analysis of TIMI risk index, Shock Index, LASH, and ACEF for the prediction of in-hospital mortality after primary PCI.

available risk indices for the prediction of in-hospital mortality in a contemporary cohort of STEMI patients. In the study of 977 patients with an in-hospital mortality rate of 4.3%, the ACEF score was shown to have comparatively better predictive power with balanced sensitivity and specificity than SI, TRI, and LASH scores. TRI and LASH scores were observed to be more sensitive than specific, while, SI was more specific and less sensitive in identifying patients at an increased risk of in-hospital mortality. Other than the four risk indices, the in-hospital mortality was found to be associated with Killip class III/IV, presentation arrhythmias, cardiac arrest, intubation, higher mean age, higher median total ischemic time, higher median ran-

Table 3. Accuracy analysis of TIMI risk index, Shock Index, LASH, and ACEF for the prediction of in-hospital mortality after primary PCI

	TRI ≥17.5	SI ≥0.9	LASH ≥0	ACEF ≥1.66
Sensitivity	76.2% [60.5% to 87.9%]	21.4% [10.3% to 36.8%]	76.2% [60.6% to 87.9%]	71.4% [55.4% to 84.3%]
Specificity	45.6% [42.3% to 48.8%]	89.8% [87.7% to 91.7%]	66.9% [63.8% to 69.96%]	73.5% [70.5% to 76.3%]
Positive Predictive Value	5.9% [5.0% to 7.0%]	8.6% [4.9% to 14.8%]	9.4% [7.9% to 11.1%]	10.8% [8.9% to 13.1%]
Negative Predictive Value	97.7% [96.1% to 98.7%]	96.2% [95.6% to 96.8%]	98.4% [97.3% to 99.1%]	98.3% [97.3% to 98.9%]
Accuracy	46.9% [43.7% to 50.1%]	86.9% [84.6% to 88.9%]	67.3% [64.3% to 70.3%]	73.4% [70.5% to 76.1%]

TRI = TIMI Risk Index, SI = Shock Index.

dom glucose level, IABP use, three-vessel disease, culprit left main, high thrombus grade, and sub-optimal post-procedure TIMI flow grade.

The ACEF score was primarily developed to predict the risk of mortality in cardiovascular surgery patients but it has been tested and proven an effective marker of adverse events in various clinical settings. For instance, Çinar T et al. [17] reported good predictive power for the prediction of in-hospital mortality of patients with cardiogenic shock. It was found to be non-inferior to GRACE and TIMI scores in predicting in-hospital complications and mortality of STEMI patients without coronary intervention [18]. Similar to our observations, in recent years, it has shown substantial potential as a marker of acute kidney injury and adverse cardiac events in STMEI patients [19-21]. Considering the less computational simplicity of ACEF and the fact that it can be calculated using readily available parameters in the STEMI setting coupled with balanced sensitivity and specificity makes it a reasonable marker for risk stratification of STEMI patients.

Second, on the podium is the LASH score, it was originally developed for risk stratification of STEMI patients of ≥60 years of age [16]. Even though in the parent study, a marginally lesser predictive power of LASH score against TIMI score was reported with an AUC of 0.795 vs. 0.881, respectively, LASH score ≥3 was found to be associated with a significantly higher risk of in-hospital mortality and need of inotropic support and mechanical circulatory support in STEMI patients of ≥60 years of age [16]. Our study also showed a reasonable discriminating potential with an AUC of 0.745 and a threshold value of ≥0 had a sensitivity of 76.2% and specificity of 66.9% in discriminating in-hospital mortality in STEMI setting in general regardless of age. However, one minor but substantial drawback of the LASH score inclusion of LVEDP in its calculation, even though, LVEDP is a reliable invasive measure of hemodynamic status but in the race against time in the management of STEMI, routine measurement of LVEDP during the procedure can be debatable.

Third on the podium is the TRI, in our study showed moderate predictive power with an AUC of 0.669 and threshold value of ≥17.5 and had reasonable sensitivity (76.2%) but low specificity (45.6%). It is an almost decade-old concept that showed good potential for the rapid initial triage of patients with STEMI in the InTIME II sub-study [22]. Later on, it has been tested in a wide spectrum of acute coronary syndrome for the assessment of short- as well as long-term risks of adverse events [15, 23, 24]. Lastly, the SI, a simple ratio of HR to SBP showed the least discriminating power compared to TRI, LASH, and ACEF with an AUC of 0.595 and the threshold SI of ≥0.9 had low sensitivity (21.4%) but good specificity (89.8%) in identifying STEMI patients at the risk of in-hospital mortality. SI and its modified variants namely Age-SI, Modified SI (MSI), Age-MSI, and STEMI-SI have been extensively studied in recent years in various clinical settings [5, 6, 12, 14, 15, 25-31]. Unanimously, the modified versions of SI have added substantially to the discriminating abilities of the base index [5, 6, 12, 15, 25-29]. Hence, further studies are warranted to evaluate the modified variants of SI for the prediction of in-hospital mortality of STEMI patients in our population.

This observational study was conducted on the prospectively collected data from a sufficient number of patients, however, single-center coverage remains the main limitation of this study. Secondly, invasive measures such as LVEDP and LVEF may have inter-operator variability. Further large-scale multicenter prospective studies are warranted to identify a reliable risk stratification index for STEMI patients.

Conclusions

In conclusion, ACEF showed sufficiently high predictive power with good sensitivity and specificity compared to the other three scores. The LASH score certainly showed predictive potential with the inclusion of invasive hemodynamic parameters, further studies are warranted to calibrate this score for STEMI patients of all ages. The TRI is another significant prognostic indicator that can be adopted in case of the non-availability of laboratory investigations and LVEF. Despite its simplicity, the SI showed the least predictive power, further studies are needed to evaluate its modified variants. In a nutshell, these simplified indices based on readily available hemodynamic parameters can be reliable alternatives to the computational complex scoring systems for the risk stratification of STEMI patients.

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Disclosure of conflict of interest

None.

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