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Letter to the Editor

Is the use of risk scores an indicator of guideline adherence for patients with acute coronary syndromes? Insights from the EYESHOT Registry ☆

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With the increasing number of new treatment options for patients with acute coronary syndromes (ACSs), early risk stratification seems to be critical for the optimal management of these patients [1]. Indeed, current guidelines for the management of non-ST elevation (NSTE)-ACS [1] recommend the use of the GRACE (Global Registry of Acute Coronary Events) [2] and the CRUSADE (Can Rapid Risk Stratification of Unstable Angina Patients Suppress Adverse Outcomes with Early Implementation of the ACC/AHA Guidelines) [3] risk scores for the assessment of ischemic and bleeding risk, respectively.

Since risk scores are not widely adopted in clinical practice it has been postulated that their use may be considered as an indicator for quality of care in a "real world" scenario [6]. Therefore, using data from the multicentre, prospective, nationwide EYESHOT (EmploYEd antithrombotic therapies in patients with acute coronary Syndromes HOspitalized in iTalian cardiac care units) registry [4], we sought to examine if the employment of an objective risk assessment is a marker of adherence to the current guidelines in patients hospitalized for an ACS.

We divided our population into 2 groups: (1) patients for which both the ischemic and the bleeding risk scores were evaluated and (2) patients for which neither the ischemic nor the bleeding risk score were evaluated.

Using variables collected on the CRF, we also re-calculated the GRACE and the CRUSADE risk scores of those patients included in the registry, for which the data were available, according to the published nomograms [2,3]. Based on current guideline recommendations [1,5], we identified the following parameters for assessing guideline adherence for ST-elevation myocardial infarction (STEMI) patients: 1. percentage of patients undergoing primary percutaneous coronary intervention (PCI) with a door-to-balloon time ≤ 90 min; 2. percentage of patients undergoing primary PCI with a door-to-balloon time ≤ 60 min (for PCI capable centers only); 3. percentage of patients treated with clopidogrel at discharge among patients receiving oral anticoagulation therapy (OAT); 4. percentage of patients receiving clopidogrel at discharge among patients treated with thrombolysis; 5. percentage of patients receiving prasugrel or ticagrelor at discharge (excluding those treated with OAT or thrombolysis); 6. percentage of patients treated with dual antiplatelet therapy (DAPT) at discharge; 7. percentage of patients treated with aspirin at discharge; and 8. percentage of patients who received early (≤24 h from admission) coronary angiography among patients treated with thrombolysis. In addition, we considered the following variables for patients with NSTE-ACS: 1. percentage of patients receiving DAPT before coronary angiography; 2. percentage of patients treated with DAPT at discharge; 3. percentage of patients treated with aspirin at discharge; 4. percentage of patients receiving PCI and treated with prasugrel or ticagrelor at discharge (excluding those also receiving OAT); 5. percentage of patients treated with ticagrelor at

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discharge (excluding those receiving OAT), among those managed without revascularization; 6. percentage of patients treated with fondaparinux during hospitalization; 7. percentage of patients with positive troponin and/or ECG changes undergoing coronary angiography within 24 h; and 8. percentage of patients with a re-calculated GRACE risk score ≥ 140 undergoing an early (≤24 h) invasive strategy.

During the 3-week study periods, a total of 2585 consecutive patients were enrolled in 203 ICCUs across Italy. We excluded from the present analysis 252 patients who had been evaluated with only ischemic or bleeding risk scores. Among the remaining 2333 patients, 1110 (47.6%) were evaluated by physicians using both GRACE and CRUSADE risk scores (755 with an initial diagnosis of NSTE-ACS and 355 with STEMI), while 1223 (52.4%) did not receive any objective risk assessment (630 with NSTE-ACS and 593 with STEMI).

Baseline clinical characteristics and variables of the 2 groups are summarized in Table 1.

Patients evaluated by risk scores less frequently underwent coronary angiography (84.9% vs 90.8%; $p < 0.0001$) and PCI (64.6% vs 69.4%; $p = 0.01$) compared to patients in whom the risk was evaluated, while the rate of coronary by-pass during the index hospitalization did not differ between the two groups (2.3% vs 1.6%; $p = 0.25$).

The median CRUSADE risk score re-calculated for the total population was 29 (IQR 18–44): 25 (IQR 15–39) for STEMI and 32 (IQR 18–48) for NSTE-ACS patients ($p < 0.0001$). The median GRACE risk score for the overall population was 149 (IQR 126–174): 150 (IQR 131–174) for STEMI and 148 (IQR 122–174) for NSTE-ACS patients ($p = 0.0007$). Notably, there was no disagreement between the high risk declared by the physician and the high risk derived from the re-calculated risk score, with the exception for the group of NSTE-ACS patients, where a significant discordance was observed for the bleeding risk calculation (McNemar test, $p = 0.007$).

Among the parameters selected for assessing clinical guideline adherence we observed few differences between patients receiving or not an objective risk stratification by physicians during hospitalization (Fig. 1).

In this "real-world" study of a broad spectrum of consecutive patients with ACS, we found that the assessment of ischemic and bleeding risk by validated risk scores is not associated with an increased adherence to practice clinical guidelines.

Although numerous studies have also suggested that calculating risk scores help to guide treatment decisions and improve the process care [6–8], patients' risk is still underused in clinical practice [9]. Therefore, we hypothesized that the employment of risk assessment might be considered as a quality process measure and an indicator of guideline adherence. Our data do not confirm this hypothesis and suggest that the use of risk stratification may depend on physicians' habits, geographic location and type of hospital where the patient is admitted but do not seem to impact on the choice of the appropriate strategy and on quality of care for patients with ACS.

In conclusion, contemporary use of recommended risk scores for the evaluation of both ischemic and bleeding events in ACS appears suboptimal. Even when established risk scores are employed during hospitalization for ACS, a better adherence to clinical guidelines is not achieved compared to standard care. Our findings underscore the inadequate adherence to current guidelines and emphasize the need for identifying reliable quality indicators in the real world and innovative strategies for improving health care in ACS.

Conflict of interest

The authors report no relationships that could be construed as a conflict of interest.

Table 1
Baseline clinical characteristics.

	Overall n = 2333	Use of risk scores n = 1110	No risk scores n = 1223	p value
Age, years (mean ± SD)	69 ± 13	69 ± 13	68 ± 13	0.002
Age ≥ 75 years, n (%)	854 (36.6)	437 (39.4)	417 (34.1)	0.008
Initial diagnosis, n (%)				<0.0001
STEMI	948 (40.6)	355 (32.0)	593 (48.5)	
NSTE-ACS	1385 (59.4)	755 (68.0)	630 (51.5)	
Female, n (%)	737 (31.6)	356 (32.1)	381 (31.2)	0.63
BMI, kg/m^2 (mean ± SD)	27 ± 4	27 ± 4	27 ± 5	0.28
Risk factors and comorbidities, n (%)				
Familiar history of CAD[a]	581 (30.3)	305 (33.4)	276 (27.5)	0.005
Active smokers	669 (28.7)	295 (26.6)	374 (30.6)	0.03
Dyslipidemia[a]	1041 (50.4)	526 (53.5)	515 (47.6)	0.008
Diabetes mellitus	668 (28.6)	344 (31.0)	324 (26.5)	0.02
Treated hypertension	1443 (61.9)	723 (65.1)	720 (58.9)	0.002
Renal dysfunction/dialysis	345 (14.8)	175 (15.8)	170 (13.9)	0.20
Severe COPD	133 (5.7)	64 (5.8)	69 (5.6)	0.90
Peripheral artery disease[a]	335 (15.1)	179 (17.1)	156 (13.3)	0.01
Cardiovascular history, n (%)				
Previous stroke/TIA	188 (8.1)	85 (7.7)	103 (8.4)	0.50
History of angina	310 (13.3)	169 (15.2)	141 (11.5)	0.009
History of major bleed	150 (6.4)	89 (8.0)	61 (5.0)	0.003
History of heart failure	115 (4.9)	70 (6.3)	45 (3.7)	0.003
Previous MI	474 (20.3)	240 (21.6)	234 (19.1)	0.14
Previous PCI	411 (17.6)	210 (18.9)	201 (16.4)	0.12
Previous CABG	171 (7.3)	88 (7.9)	83 (6.8)	0.29
Hemodynamic parameters				
Killip classes II–IV, n (%)	522 (22.4)	285 (25.7)	237 (19.4)	0.0003
Ejection fraction, % (mean ± SD)	49 ± 10	49 ± 11	49 ± 10	0.36
Atrial fibrillation, n (%)	175 (7.5)	88 (7.9)	87 (7.1)	0.46
Hb, g/dl (mean ± SD)	13.5 ± 2.0	13.5 ± 2.0	13.5 ± 1.9	0.61

BMI: body mass index; CABG: coronary artery by-pass grafting; CAD: coronary artery disease; COPD: chronic obstructive pulmonary disease; Hb: hemoglobin; MI: myocardial infarction; NSTE-ACSs: Non-ST-elevation acute coronary syndromes; PCI: percutaneous coronary intervention; STEMI: ST-elevation myocardial infarction; TIA: transient ischemic attack.
[a] Percentages evaluated on pts with data available (family history of CAD for 1916 pts; dyslipidemia in 2066 pts; peripheral artery disease for 2219 pts).