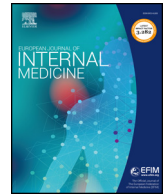




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Commentary

Risk stratification vs routine intensive care stay in non ST segment elevation myocardial infarction (NSTEMI)

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Non-ST-segment-elevation acute coronary syndromes (NSTEMI ACS) encompass a wide spectrum of clinical conditions characterised by acute ischemic symptoms, electrocardiographic signs of myocardial ischemia (which may or may not be evident), and elevation of the biochemical markers of myocardial injury: when troponin values are within normal range, the case will be defined as unstable angina, if this clinical entity has not been declared deceased after the introduction of high-sensitivity troponin measurements [1]. All three components of the syndrome may allow immediate risk stratification almost invariably in the emergency room [2-5]. From a clinical standpoint, this simple clinical approach, and existing Guidelines [6,7], should assist the attending physician in allocating each individual patient to the most appropriate pattern of care, including the opportunity and timing of invasive treatment and the admission to intensive care units (ICU) vs ward. Other readily available clinical and laboratory data, such as age, comorbidities, blood hemoglobin and serum creatinine allow immediate stratification of the iatrogenic risk of drug and interventional therapies [8]. A few mortality risk prediction scores have been derived from clinical trials and registries: among these, the ESC Guidelines recommend the GRACE score [9], also available as an online risk calculator (<http://www.gracescore.org/WebSite/default.aspx?ReturnUrl=%2f>). These scores are mostly focused on the ischemic risk, while providing little assistance for a comprehensive estimation of risk vs benefit of the whole clinical process of patient care.

In a recent issue of the European Journal of Internal Medicine, Patricia Guimarães and colleagues, from Samaritano Paulista Hospital, Sao Paulo, Brazil, reported on the characteristics and clinical outcomes of 1263 NSTEMI patients admitted to their hospital from 2014 to 2018 [10]. The mean patient age was 62 years. Almost 95% of the patients

were admitted to the ICU, as per routine at their hospital. The authors retrospectively defined complications requiring ICU care as cardiac arrest, cardiogenic shock, stroke, re-infarction, heart block requiring pacemaker placement, respiratory failure, sepsis or death. By using the Acute Coronary Treatment and Intervention Outcomes Network (ACTION) ICU risk score (which, however, was developed from a Medicare database of patients aged ≥ 65 years) [11], they also aimed to retrospectively identify NSTEMI patients who might not have needed ICU admission. The ACTION ICU risk score uses 9 variables on admission to predict the likelihood that an initially stable patients with NSTEMI will develop a complication requiring ICU-level care [11]. As shown in the Figure 1, the score is dominated by signs of heart failure, with the sum of symptoms, high heart rate and low systolic blood pressure accounting for 66% of the predictive information of the multivariable model. On the other hand, elevated troponin and ischemic ECG changes, though predictive of complications, were much less informative. At Samaritano Paulista Hospital, 70 percent of the patients had an ACTION ICU score of ≤ 5 , thus being at low risk, 92 percent underwent coronary angiography, and 57 percent revascularization. Complications were more common among older patients or those with higher levels of serum creatinine. The C-statistics for the ACTION risk score to predict complications in this patient sample was 0.55, that is much lower than the 0.72 of the original publication to which the same authors had been contributing with their patients.

Both the original ACTION ICU score publication [11] and the Samaritano Paulista data provide insight on the current management of NSTEMI ACS. Both of them confirm the wide spectrum of clinical complexity in NSTEMI ACS, ranging from very low-risk to very high risk of in-hospital complications. The Samaritano Paulista data confirm that

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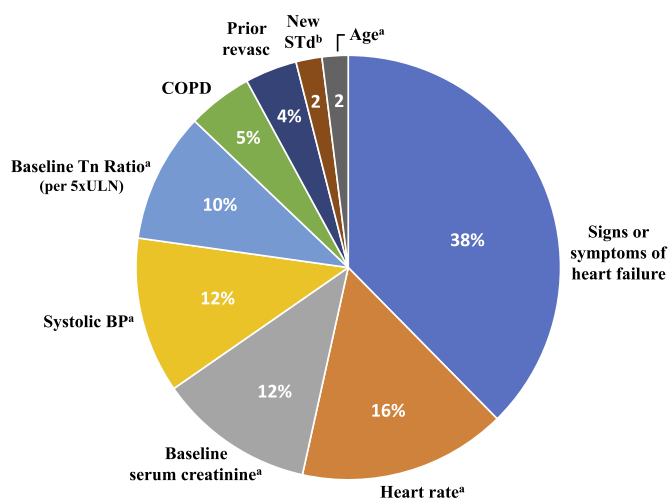


Figure 1. Independent predictors of in-hospital development of complications requiring ICU care (defined as cardiac arrest, shock, high-grade atrioventricular block, respiratory failure, stroke, or death). These variables are the components of the Acute Coronary Treatment and Intervention Outcomes Network (ACTION) ICU risk score [Ref 11]. Figures represent the percent predictive information accounted in the model by each variable, calculated as the proportion of the individual X^2 compared to the sum of all X^2 . ^aAnalysed as continuous variable: heart rate per 5 bpm; systolic BP per 10 mmHg; serum creatinine per 1 mg/dL; troponin per 5 x ULN. ^bvs T-wave inversion or transient ST-segment elevation, or none.

when a systematic invasive approach is used, “ischemic” variables (such as ST depression on the ECG and elevated troponin levels) are much less important than heart failure variables or markers of systemic impairment, such as serum creatinine levels. These latter variables should be properly considered as the current gatekeepers of ICU admission, where advanced ventilation and renal replacement therapies can be provided on time to prevent further deterioration. Multiorgan failure is not exceptional in NSTEMI complicated by cardiogenic shock and is associated with high mortality [12], and the modern ICU should be equipped to support multiorgan failure, as indicated by specific Consensus Documents [13].

The in-hospital and long-term outcome of NSTEACS has dramatically improved using a systematic invasive approach, even in elderly patients [14]. As commented on by Patrícia Guimarães and colleagues in their paper, “depending on bed availability” NSTEMI patients are still being often admitted to the ICU, and this is mostly a “political” choice. However, besides the cost of this approach [15], which may vary across different health care systems, restricting all NSTEMI patients in a ICU bed has a number of untoward effects, whereas a ward with telemetry and avoidance of constricted bedrest may be safer, allowing less anticoagulation and muscle deconditioning, issues that are not captured by most scores. Being aware of this risk-stratified patient management within the wide spectrum of ACS (including the uncomplicated STEMI cases managed by primary angioplasty), also allows prompt shift of “routine” medical practices to face real emergencies, as in response to the current COVID-19 outbreak in Lombardy – Italy, where in a matter of just a few days the whole regional emergency system had to be rearranged to increase the number of ICU beds dedicated to patients in

need of mechanical ventilation [16]. In these days, the network for time-dependent emergencies, such as STEMI and stroke was completely rearranged, placing most patients in subintensive beds, using the data provided by two decades of experience with risk stratification across the ACS spectrum.

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Declaration of Competing Interest

None

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