EDITORIAL

Rapid diagnosis of acute myocardial infarction

Diagnóstico rápido de infarto agudo de miocardio

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Over the last decade, intense collaboration between physician scientists and the diagnostic industry has enabled game-changing innovation in the rapid diagnosis of acute myocardial infarction (AMI). (1–12) High sensitivity cardiac troponin (hs-cTn) assays enable reliable measurement of cardiac troponin (cTn) concentrations in the normal range, thereby increasing substantially the diagnostic accuracy for AMI already with the first blood drawn at presentation to the emergency department (ED). (1–12) This was a prerequisite for the development and maturation of early rule-out and rule-in strategies for AMI into clinical practice worldwide. While the first iteration was complex and required the combination of a biomarker panel, the electrocardiogram, and a clinical risk score, allowing the safe rule-out of AMI in only 10% of patients with acute chest pain, the latest iterations including the European Society of Cardiology (ESC) 0/1h-algorithm are simple, as they are based on hs-cTn concentrations only, and allow the safe rule-out AND/OR rule-in of AMI in about 75% of patients. (13-21)

The ESC 0/1h-algorithm is a combination of the single measurement approach with the original 0/1h-algorithm. (5, 7, 22–25) It has all the advantages of the single measurement approach (speed and simplicity), but further extends the number of patients eligible for triage towards rule-out of AMI to those patients with low hs-cTnT/I concentrations at presentation and NO relevant change (rise AND/OR fall) in hs-cTnT/I concentrations after 1 h. It also adds the possibility to triage patients towards rule-in of AMI using high initial hs-cTnT/I concentrations and/or relevant changes in hs-cTnT/I after 1 h. The ESC 0/1h-algorithm has been derived and validated for all currently available hs-cTnT/I assays, with unique data-driven cut-off values for each assay to achieve a sensitivity and negative predictive value of 99% or higher. (5, 7, 22–26) It is recommended by the ESC guideline for the management of acute coronary syndromes in patients without persistent ST-segment elevation with a class I recommendation, (13) and has recently been shown to be superior to 0/3h-protocols in both a randomized controlled trial and in a large diagnostic study with central adjudication of final diagnoses. (10, 27) Safe and effective implementation into clinical routine has also been documented. (9) Median length of stay in the ED was shown to be reduced to about 3 h, with about 70-75% of patients discharged directly from the ED. The proportion of patients who developed a major adverse cardiac event within 30-days after ED discharge was extremely low (0.1%), further documenting the very high safety of the clinical application of the ESC 0/1h-algorithm. (5, 7, 10, 22–26, 28)

The study by Cortes et al. on patients with diabetes mellitus extends and corroborates prior work on special populations. (30) Among 1,140 patients presenting with acute chest pain and without ST-segment elevation to the ED, 124 patients (10.8%) had diabetes. None of the patients triaged towards rule-out of AMI (40.3%) presented myocardial infarction at 30 days. Sensitivity and negative predictive value were similar in patients with and without diabetes, but the proportion of patients in the rule-out group was lower in diabetics (40% vs. 72%). The overall accuracy of the algorithm to rule in patients was comparable. The authors concluded that the ESC 0/1h-algorithm performed well also in patients with diabetes, although more patients remained in the observe zone. This observation is in full agreement with another study in patients with diabetes mellitus, as well as studies focusing on other populations with a high prevalence of comorbidities that are associated with increased baseline concentrations of hs-cTnT/I such as the elderly and patients with renal dysfunction. (3,32-34)

The work by Cortes and et al. also contributes to our knowledge regarding another aspect of care: implementation. Patients were successfully managed according to the ESC 0/1h-algorithm. (30) Interdisci-

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plinary and interprofessional "troponin teams" representing emergency medicine, cardiology and laboratory staff, as well as doctors and nurses, should be trained in centers considering the implementation of this innovative algorithm, to define the standard operating procedures related with patient identification, blood sampling, transport of blood to the central laboratory, scanning of the tube in the lab, sample centrifugation and analysis, and how to report back the results to the clinician. Pilot sites such as the one by Cortes et al. will have a key role in educating and motivating colleagues worldwide to get involved in this important task to provide patients with valuable medical care.

Conflicts of interest

None declared.

(See authors' conflicts of interest forms on the website/ Supplementary material)

Ethical considerations

Not applicable.

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