Two troponins, one troponin, none... the dawn of troponin-less decision aids

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Received: 2 December 2021 / Accepted: 7 December 2021

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Keywords Acute coronary syndromes · Biomarkers · Sensitivity and specificity · Troponin

Our approach to the diagnosis of acute coronary syndromes (ACS) in the Emergency Department (ED) has undergone a genuine revolution over the past 2 decades. Gone are the days when suspicion of ACS would routinely lead to patients undergoing serial troponin testing over prolonged periods, often with routine telemetry and inpatient imaging thereafter. The advent of high-sensitivity cardiac troponin (hs-cTn) assays enabled us to safely reduce the time interval between serial samples to as little as 1 h. Many patients can now have ACS ruled out following a single blood test, either using very hs-cTn low cut-offs or using validated decision aids such as the HEART score [1], Troponin-only Manchester Acute Coronary Syndromes (T-MACS) decision aid [2], or the Emergency Department Assessment of Chest Pain Score (EDACS) [3].

In this issue, O'Rielly et al. have reported an external validation of a modified HEART score, named the HEAR score, in which a HEAR score of ≤ 1 could allow ACS to be ruled out without any troponin testing [4]. By scoring elements of a patient's history, ECG, age, and risk factors for cardiovascular disease, the external validation study presented in this issue suggests that the HEAR score could

instantly 'rule out' ACS in 18% of patients, achieving a sensitivity of 99% (95% CI 96–100%). This is an important advance for emergency physicians, since it allows the physician to safely withhold troponin testing in patients who are unlikely to have an acute coronary syndrome. Because many of these patients are young and otherwise healthy, they may not require blood testing at all. In turn, this reduces the time spent in the ED and helps address ED crowding.

This study is now one of several validating the HEAR score, which appear to consistently show high diagnostic sensitivity [5]. Like the HEART score, the Troponin-only Manchester Acute Coronary Syndromes (T-MACS) decision aid can be used to 'rule out' ACS following a single measurement of hs-cTn in the ED [3]. Calculators such as MDCalc (<https://www.mdcalc.com/troponin-manchester-acute-coronary-syndromes-t-macs-decision-aid>) are a great way to calculate the T-MACS score. T-MACS has also recently been modified to produce a version that does not require troponin testing [6]. A recent validation study suggests that the History and ECG Manchester Acute Coronary Syndromes (HE-MACS) decision aid could rule out 13.5% of patients with a reported sensitivity of 100% (95% CI 92–100%) [7].

While ED visits for chest pain increase each year, the proportion of chest pain patients diagnosed with illness decreases [8]. A rapid rule-out strategy for ACS is more helpful now than ever before. Perhaps, the greatest impact could be seen by deploying these decision aids at the front door of the ED, for example as part of a 'rapid assessment' model (sometimes referred to as 'Doc in the box') whereby clinicians provide an initial assessment upon a patient's arrival. If the history and ECG could be used to identify a proportion of patients who do not require blood testing to 'rule out' ACS, then some patients could be discharged quickly, unburdening crowded EDs. Other important uses

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could relate to environments where cardiac troponin testing is not readily available, for example urgent or urgent care centres or for patients receiving an emergency ambulance response in the pre-hospital environment. In such contexts, troponin-less decision aids such as HEAR or HE-MACS could rapidly obviate the need for patients to be transported to hospital, or triage the urgency of transport, freeing up emergency medical services for those who most need them.

With a wealth of data from observational studies in the EDs, it is now time to study the real-world impact of implementing ED decision aids. Should implementation be successful, we will have witnessed another important step change in our approach to the diagnosis of ACS: the introduction of dynamic evidence-based risk stratification, where validated decision aids are used to guide clinical decision-making based on the available information at any given time point. At each stage of the patient journey and even with what we would ordinarily consider to be incomplete information, decision aids will identify some patients who can safely exit the testing pathway, while determining the next required investigation for those who have not had the diagnosis ‘ruled out’. The dawn of an exciting new era of dynamic risk stratification is here.

Acknowledgements Richard Body’s institution has received research grants from Abbott Point of Care and Roche Diagnostics and has received donation of reagents for research from Alere, FABPulous BV, and Siemens Healthineers. Richard Body has undertaken consultancy with Roche, Siemens, Abbott, Beckman Coulter, LumiraDx, Aptamer Group, Creavo, and Radiometer. Kerstin de Wit has received a research grant from Bayer.

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