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EDITORIAL
Coronary artery disease

Troponin measurement in routine clinical practice: the reality behind the guidelines

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This editorial refers to 'Rapid risk stratification of acute coronary syndrome: adoption of an adapted European Society of Cardiology 0/1-hour troponin algorithm in a real-world setting', by L.S. Couch *et al.*, https://doi.org/10.1093/ehjopen/oeac048.

The introduction of cardiac troponin (cTn) measurement produced a paradigm shift in the diagnostic approach to patients with suspected acute coronary syndromes (ACSs). Biomarker measurement, principally measurement of cTn, changed from a secondary diagnostic test to a central component of the diagnostic and treatment pathway. The end result was the redefinition of myocardial infarction (MI) which mandated cTn measurement as a requirement for diagnosis. There has been progressive improvement in the analytical sensitivity of cTn assays culminating in the development of high-sensitivity troponin assays. These assays have the ability to measure troponin at very low concentration (absolute sensitivity). Such measurements are also very reproducible (they have low imprecision). The practical consequence of these analytical characteristics is the ability to detect troponin changes very early in the release curve. A very large number of clinical studies of high-sensitivity cTn assays that have examined the ability of measurement on presentation and then subsequently at 1, 2, or 3 h from presentation to predict whether a patient is at high or low risk of subsequently developing an MI. Although often referred to as diagnostic algorithms, all are in fact predictive. Rule in predicts that on subsequent testing, the patient will have a diagnosis of MI. The rule out component predicts that if further testing where to be done MI would not be confirmed, so discharge can be expedited. Evidence-based review has concluded that this type of approach based on existing studies is safe and feasible.[1] The European Society of Cardiology (ESC) has recommended the use of rapid algorithms with a preference for the 0–1 h sampling regimen.

Validation of rapid algorithms has been retrospective and observational. There is little clinical trial data although two studies have been reported, one for rule out alone and one comparing the 0–1 algorithm with a non-standard 0–3 h pathway. To date, there has been little discussion of the feasibility of introducing rapid diagnosis into routine clinical practice outside of dedicated research departments. In this issue of the European Heart Journal Open, Couch *et al.*[2] report their experience of introducing the 0–1 h rapid algorithm into routine clinical use in the Emergency Department of a busy University Hospital. They have performed a retrospective case-based audit and identified all patients who had cTn requested, in this case cTnT, during two periods in 2020 and 2021. They have identified time of sampling, reason for request, diagnosis, and outcome. Their findings are interesting.

First, although chest pain was the most frequent presenting complaint, it was the reason for requesting in only 56.9% of cases with the second largest category of 'other' at 21.7% (see Table 1 in Couch *et al.*[2]). In addition, serial sampling did not occur in all patients, varying from approximately 35% in the low risk group and 70% in those at slightly higher risk (see Table 2 in Couch *et al.*[2]). There has been much discussion on the appropriateness of requesting cTn, and that significant requesting occurs in other categories of patients than chest pain will not be a surprise for clinical chemists. In a systematic study of troponin requests, it was noted that prior probability of suspected ACS was low and now the major cause of cTn elevation is Type 2 MI or myocardial injury.[3] Is this a misuse of troponin requesting? This is an interesting and unresolved question. Measurement of cTn remains an excellent test for ruling out ACS as well as myocardial injury in general. Elevation of cTn in clinical scenarios outside ACS is a useful marker of disease severity and the probability of underlying myocardial ischaemia often with atheroma.[4] Management strategies for this population remain unclear but should not result in reflex catheterization or necessarily a mandatory cardiological assessment. An optimal strategy for cTn requesting remains to be defined but lies somewhere between request in suspected ACS only and measure in all with pain between the knees and the nose.

Second, the median time for the second sample did not meet the current recommendations. Appropriate timing of samples and the

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timely delivery of results is challenging. Couch *et al.*[2] identified four key factors. These were clinician education, patient selection, the logistics of laboratory-based analysis, and departmental process. Ultimately, sampling at presentation and 1 h post presentation can only be achieved if a decision-making pathway utilizing the protocol is clearly defined and there are dedicated staff in a dedicated area to deliver it. This laboratory-based point of care testing (POCT) will never achieve a turnaround of, realistically, 30 min or less which is what is really required to deliver rapid algorithms. However, POCT systems are currently being studied which will deliver laboratory quality high-sensitivity cTn results using whole blood in 15–20 min.[5] Clinical assessment and cTn measurement with result availability within the timeframe of the first episode of physician–patient interaction therefore becomes feasible. Couch *et al.*[2] document improvement in the time taken for repeat sampling but do not present data on patient flow. Full realization of the potential of rapid protocols will require clinical process redesign[6] and POCT.

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