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Editorial

A Decision Support System is Needed for Rapid Triage of Chest Pain Patients Using High Sensitivity Troponin Testing-Based Algorithms

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Cardiovascular disease is a leading cause of mortality and morbidity worldwide. In 2013, an estimated 8.14 million people died from acute myocardial infarction (AMI) globally.[1] Emergency department (ED) is the main portal of entry for patients with acute chest pain symptoms. Approximately 10% of all emergency department (ED) patients presented with chest pain complaint.[2] However, only 13-23.6% of these patients are finally diagnosed with AMI.[3] Patients with segment (ST) elevation MI (STEMI) could be rapidly recognized by electrocardiogram (ECG) exam, but patients with non-ST elevation MI (NSTEMI) could not be efficiently excluded or included by contemporary cardiac troponin assays. Contemporary troponin assay could not detect the presence of cardiac troponins in the peripheral circulation until 6 to 8 hours after the onset of MI.[4] Therefore, patients presenting to the ED with chest pain usually require serial troponin measurements over 6 to 8 hours before the possibility of MI can be safely excluded. Failure in early detection results in higher rate of complications and mortality. The delay in ruling out MI constitutes a major cause of ED crowding, and the delay in ruling in MI may lead to poor prognosis. It has been shown early evidence-based management, including antiplatelet treatment and revascularization, may decrease mortality, shorten hospitalization, and improve overall outcome.[5]

The introduction of high sensitive cardiac troponin (hs-cTn) assays in 2010 has shown promise to enhance the accuracy and efficiency of MI diagnosis in the ED tremendously.[6] These assays measure cTn in the single digit range of nanograms per liter, about 10- to 100-fold lower than the contemporary cTn assays.[7] This has led to the development of several hs-cTn-based accelerated diagnostic algorithms to triage patients with suspected acute coronary syndromes (ACS) efficiently and safely.[6] Several accelerated diagnosis algorithms, such as 0-, 1-, or 2-hour algorithm, have been developed and implemented based on the high sensitivity nature of new generation troponins.[8-10] One such promising algorithm is the 0/1-hour algorithm recommended by the European Society of Cardiology (ESC).[11] This algorithm combines assay-specific cutoff values of hs-cTn at presentation and the absolute 1-hour changes (0-1 delta) to rapidly rule out or rule in patients with NSTEMI. Thus, clinical decision could be made for patients who presented to the ED with suspected AMI or ACS in just 2 to 3 hours after ED presentation. Although concern has been raised regarding the safety of the 0/1-hour algorithm in patients with renal dysfunction, in a recent work, Twerenbold R showed the 0/1-hour algorithms using either high-sensitivity cardiac troponin T or troponin I can rule out MI rapidly and safely.[12] In addition, recent studies have shown combining HEART score or combining hs-cTnT and hs-cTnI may further enhance the accuracy of the rapid diagnosis algorithm.[13,14]

Despite the rapid development of various high sensitivity troponin testing based accelerated diagnosis system, the implementation of the newly developed algorithms in ED have been slow. One of the big obstacle is the complexity of the algorithms that include several cutoff values of troponin at several time points. The addition of scoring systems and multiple markers strategy further complicates the decision process. Because the hospital central laboratory conventionally reports only the test results with reference value, an emergency physician therefore, has to memorize the complex algorithms. The 1-hour algorithm is a very good example that a clinical decision support system will help clinicians make evidence-supported decisions. A decision support system will help remind the various time points for blood sampling and also pro-

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vide reference cutoff values of troponin tests at different time points.[15] In addition, the system can also remind the physician with the update prognosis data in different decision groups and automatically calculates TIMI, GRACE or HEART scores. Up to date, such system is not commercially available, but the design and implementation of such system in the laboratory information system is not technically difficult. We call for the design of such a system to help emergency physicians make evidence-based decision in the era of information tsunami.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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