Evaluating the performance of high-sensitivity troponin-T in the emergency department during the COVID-19 pandemic

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To reduce emergency department (ED) chest pain observation and admission rates, a multidisciplinary task force designed and implemented a triage protocol using quantitative symptom scoring (HEART score) and biomarkers for myocardial damage. High-sensitivity troponin-T (hs-TnT) has been shown to be an effective tool in diagnosing patients with suspected acute coronary syndrome (ACS) in the ED.[1 2] The protocol risk stratified patients by HEART score and hs-TnT into low risk (HEART score 0–3 and normal hs-TnT in two separate measurements in 2-hour intervals), intermediate risk (HEART score 4–6 and hs-TnT <100 ng/L) and high risk (HEART score ≥7 or hs-TnT ≥100 ng/L).[2 3] Normal values of hs-TnT were defined according to the manufacturer labelling of sex-specific 99th percentile from healthy reference population (females <14 ng/L; males <22 ng/L). By the protocol, patients with low risk for ACS can be discharged with close follow-up. Patient with high risk for ACS would be admitted to the hospital for further workup while those with intermediate risk were to undergo same, or next day, cardiovascular imaging with subsequent decision to admit or discharge home. The protocol was implemented in March 2019.

The COVID-19 pandemic has seen increased demand for healthcare resources particularly in the ED with a need to steward resources and protect healthcare workers and patients presenting for care not related to COVID-19.[4 5] We aimed to evaluate the performance of the previously implemented ACS protocol in triaging patients in the ED during the COVID-19 pandemic and social distancing during the months of March and April 2020.

Data on presentation and discharge from ED of patients with chest pain or ACS rule-out were evaluated from 2015 through the end of April 2020 with the primary endpoint being rates of observation status. The analysis was performed in an urban, academic, high-volume healthcare system with annual ED visits and chest pain visits over 130 000 and 13000, respectively. Figure 1 summarises the results of our analysis.

Historically, our healthcare system's ED observation rate was ranging from 44% to 57% (average of 51%) for all chest pain encounters in the ED. In 2017, the implementation of a required (hard-stop) HEART score in the electronic medical record led to a small and statistically non-significant reduction in the observation rate ranging from 41% to 50% (average of 46%). After implementation of the combined hs-TnT and HEART score–based triage protocol in March 2019 (figure 1), the observation rate was reduced to a range of 23% to 36% (average of 29%), p<0.01. During the months of March and April 2020 (COVID-19 pandemic), a further reduction in the observation rate was noted, 17% and 10%, respectively (figure 1).

This analysis highlights two important practice points. First, by implementing a combined hs-TnT and HEART score–based triage protocol, one can achieve a significant reduction in the observation rate for patients presenting to the ED with chest pain. This is concordant with previously reported institutional experiences.[2 3] Second, this effect persisted, and indeed led to further significant reductions in the observation rate which was noted during the onset of COVID-19 pandemic months of March and April 2020. This translates into significant healthcare and resource saving which validates the use of such protocols.

It is important to acknowledge that the significant nationwide reduction in the number of ED visits during the COVID-19 pandemic may have influenced the results of this analysis. However, the analysis shows that the observation rate was reduced from 23% during February 2020 to 17% and 10% in the subsequent 2 months. Furthermore, patient and provider bias may have affected these results by the general avoidance of ED visits and

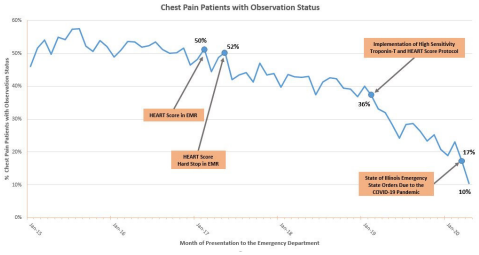

Figure 1 Trend in observation status rate from 2015 through April 2020. Events highlighted include HEART score implementation, adopting HEART score as a hard-stop, implementation of the high-sensitivity troponin-T and HEART score protocol, and the State of Illinois emergency state orders due to the COVID-19 pandemic. EMR, electronic medical record.

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hospitalisation out of concern for contracting COVID-19 in addition to the tendency to discharge patients as early as possible due to the pandemic situation. We assessed whether the initiation of this protocol led to unintended consequences. Mortality and readmission rates for myocardial infarction fluctuated, but did not increase over the period of this analysis. Mortality index during the period of this analysis ranged from 0.56 to 1.55, p=0.19. Finally, proper staff education and rational integration for emergency physicians into their clinical encounters were instrumental in the success of this implementation.

We conclude from this analysis that implementing a triage protocol in the ED using a combination of high-sensitivity troponin and HEART score can result in a significant reduction of the observation rate. This becomes especially valuable in crisis time like this unprecedented COVID-19 pandemic where the preservation of healthcare resources has become a national priority.

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