High-Sensitivity Cardiac Troponin and ED Length of Stay: A Before and After Study

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INTRODUCTION

- In the United States, chest pain is the second most common chief complaint among patients presenting to the emergency department (ED), representing over 7.3 million annual visits.[1]
- High-sensitivity (hs) cardiac troponin (cTn)has the potential to improve the care of patients with chest pain. Hs-cTn assays have superior diagnostic accuracy in patients with chest pain compared to conventional cardiac troponin (c-cTn) assays..[2]
- Large multi-center European studies have shown that use of hs-cTn is associated with decreased ED length-of-stay (LOS), decreased hospital admissions and decreased cardiac stress testing, providing promising evidence to refute these concerns. [3-6]
- Little data are available regarding the effects of hs-cTn assays on ED operational metrics and patient diagnoses in an American population.

METHODS

- We conducted a retrospective, observational, before-and-after study of two matched six- month periods of consecutive adults (≥18 years) who presented to the ED with a chief complaint of chest pain, with periods before (9/1/2017-2/28/18) implantation and after (9/1/18-2/28/19) implementation of hs-cTn (Gen 5 TnT, Roche Diagnostics, Indianapolis, IN) on 6/18/18.
- Troponin testing was performed at the discretion of the treating physician, with institutional order sets for serial cTn at 0 and 3 hours before implementation and 0, 1, and 3 hours after hs-cTn implementation.
- Abstracted data from electronic medical record:
  - Patient demographics
  - Patient flow time stamps (e.g. ED disposition)
  - Troponin collection dates, times, and results
  - ED diagnoses,
  - Clinical and laboratory data
- Analyses were conducted using Stata 14 (StataCorp LP, College Station, TX)

OBJECTIVES

In this study, we compared ED operational metrics and ACS diagnoses before and after our institution's transition from conventional c-cTn to hs-cTn.

- Our primary outcome was ED LOS, defined as interval from ED arrival to ED departure.
- Secondary outcomes included diagnosis of myocardial infarction (MI) and time to disposition.

TABLES

Table 1. Characteristics of all patients with a chief complaint of chest pain by troponin group

Characteristic	Conventional	High-Sensitivity	All
Total Patients	1589	1616	3205
Median Age	54 (39, 65)	55 (41, 66)	55 (40, 65)
Male Gender	796/1589 (50%)	826/1616 (51%)	1622/3205 (51%)

Continuous variables expressed as medians (Q1, Q3) and categorical variables as proportions (%).

Table 2. Primary and secondary outcomes by troponin study group

ED Metric	Conventional	High-Sensitivity	P	OR/LC [95% CI]
ED LOS (Primary Outcome)	391 (267-576)	403 (272-592)	0.165	14 [-6, 34]
Rate of Admission	528/1461 (36%)	473/1483 (32%)	0.016	0.83 [0.71, 0.96]
Rate of Discharge	866/1461 (59%)	952/1483 (64%)	0.006	1.23 [1.06, 1.43]
Diagnosis of STEMI	32/1461 (2%)	33/1483 (2%)	.946	1.0 [0.6, 1.7]
Diagnosis of NSTEMI	56/1461 (4%)	56/1483 (4%)	0.939	0.9 [0.7, 1.4]
Diagnosis of UA	25/1461 (2%)	27/1483 (2%)	0.820	1.1 [0.6, 1.8]
Diagnosis of any ACS	116/1461 (8%)	118/1483 (8%)	0.982	1.0 [0.8, 1.3]

ACS, acute coronary syndrome. ED, emergency department. LC, linear coefficient. LOS, length of stay. OR, odds ratio. STEMI, ST elevation myocardial infarction. NSTEMI, non-ST elevation myocardial infarction. UA, unstable angina.
[1]All time units are in minutes.
Continuous variables expressed as medians (Q1-Q3) and categorical variables as proportions (%). Comparisons between categorical variables performed using logistic regression and outputs are reported as odds ratios (OR) and 95% confidence intervals (95%CI).
Comparisons between continuous variables performed using linear regression and outputs are reported as linear coefficients and 95%CI.

RESULTS

- We studied 1,589 visits (before) and 1,616 visits (after) for chest pain.
- In both study periods, 92% (1462/1589 and 1483/1616) of patients underwent cTn testing.
- Median age and sex ratios were similar between study periods.
- There was no difference in median ED LOS between the before (391 [IQR 267-576] minutes) and after (403 [IQR 272-592] minutes) periods (adjusted mean difference 9 min, 95% CI -6 to 34).
- Admission rate was lower in the after period (36% vs. 32%; adjusted odds ratio 0.83, 95% CI 0.71-0.96).
- No difference in MI diagnosis rate (8% vs 8%; adjusted odds ratio 0.98, 95% CI 0.81-1.3) was observed between the two periods.

CONCLUSIONS

Use of hs-cTn was not associated with changes in ED LOS or MI diagnosis rate but was associated with decreased admission rate from the ED

LIMITATIONS

- Single study center
- Retrospective study
- Difficult to differentiate whether the effects were caused by the introduction of a new algorithm or a result of the implementation of hs-cTn.

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