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A Comparison of Laboratory Automatic Troponin Testing Versus Point of Care Troponin

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Introduction

Cardiac Troponin is detected in the blood stream of patients with myocardial injury using sensitive and specific assays. The importance of using a precise assay that can measure Troponin at a very high percentile with a very low total imprecision will facilitate the diagnosis of MI on admission in acute coronary syndrome (ACS) and other non-STEMIs diagnosis. In this study we compared two different Troponin methodologies for validity.

Purpose

The purpose of this study was to demonstrate that there is no significant difference between the Emergency Department's Point of Care (POC) Troponin test (i-STAT) and the Automated Laboratory Troponin Analyzers. The goal of the study was to demonstrate that by using different methodologies, the presence or absence of a cardiac event will still be detected.

Methods of Implementation

A secondary analysis of retrospective data for six months, June 2012-December 2012, was conducted at a community hospital in Miami, Florida. The study included 1,567 subjects for whom Troponin tests were done using both methodologies on blood samples collected at the same draw or within 15 minutes of each other (the first 2 Troponin values for each other).

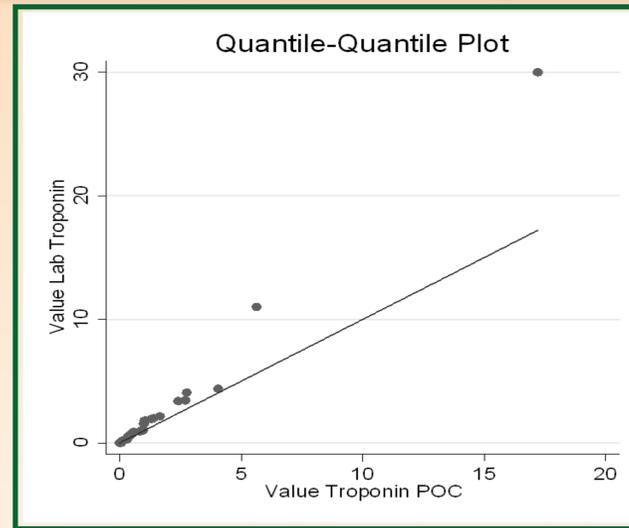


Figure 1:
Intraclass Correlation Coefficient for Troponin values for the two methodologies.

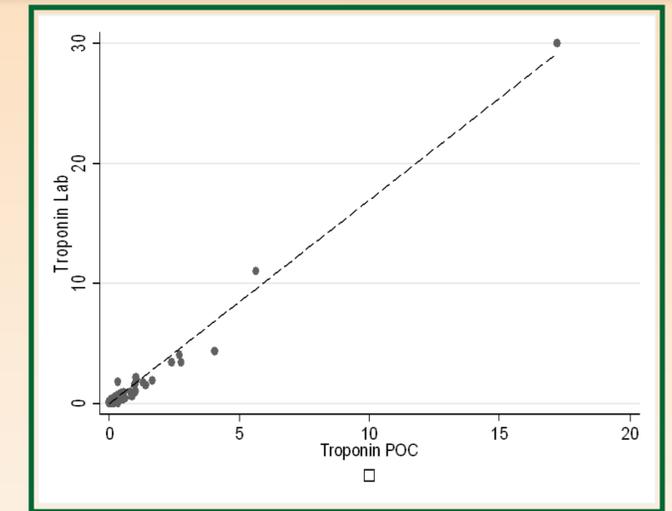


Figure 2:
Regression analysis to measure validity of the lab and POC Troponin methodologies.

Results

The exact value of the laboratory and POC Troponin are not expected to be the same. They are different methodologies with different calibration. The manufacturer's suggested cut-off values to consider elevated Troponin is 0.06 for the laboratory values and 0.08 for the POC values. Using the suggested cut-off scores 99 of the 1,567 subjects (6.3%) had an elevated laboratory Troponin and 82 of the 1,567 subjects (5.2%) had an elevated POC Troponin.

- Figure 1 demonstrates that the values of the Lab Troponins are systematically higher than the POC Troponin therefore it is not appropriate to compute an intraclass correlation coefficient (ICC) between the two values to estimate reliability. Instead we used regression analysis and validity coefficients.
- Figure 2 shows the pairs of Troponin values fall very close to the regression line between laboratory and POC Troponin. Overall the correlation between the two Troponin results was $r = 0.9627$ ($p < 0.0001$).

Depending on the cut-off values for Troponin, the sensitivity of the tests for detecting subjects with a principal diagnosis of MI varied between 54% and 64%, the specificity varied between 96% and 98%.

Discussion

For the first set of Troponin, the study showed that both methodologies, POC Troponin and automated Laboratory Troponin, can be trusted to perform equally. They both showed low sensitivity and high specificity in the diagnosing heart events. This demonstration of high-specificity cardiac Troponin testing true value will continue to help us in the early diagnosis of a cardiac event thus facilitating the speedy treatment of all true cardiac events thereby improving the patient's recovery and reduction of mortality.

The low sensitivity is probably due in part to the fact that the measures were only the first Troponin measurements for a patient. It is recommended to have serial measurements in patients suspected of having a heart event.

Nursing care continues to be validated by research based evidence. It is noteworthy to see that the results of this research has shown that early detection of increased Troponin level by a highly specific analysis on patients presented in the ED with chest pain has a valuable place in the early treatment of chest pain thus preventing mortality and decreasing morbidity in patients with cardiac events.