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Title: Assessment of acute chest pain in the community - A descriptive study of community cardiac troponin testing

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## Introduction:

Chest pain is a common reason for presentation at clinics and hospitals throughout the world. When patients present with chest pain, the doctor needs to judge the likelihood that their pain is caused by a heart problem as these patients may require urgent hospital admission. When heart muscle loses its blood supply and gets damaged (for example in a heart attack), the muscle cells release troponins and their levels rise in the blood and can be measured. Studies have shown that measuring troponin levels in patients with chest pain in ED helps safely rule out heart causes of pain in some patients, but we are less clear whether the test works well in patients who present to their GP. In Canterbury, GPs can request this test. Previous audits show that up to 500 tests were ordered per month in Canterbury primary care despite there being limited information available on how reliable the test is in this setting.

## Aim:

The main areas of interest in this project were to assess:

- The number of tests that were done
- The proportion of test results that were above the normal range
- The test's accuracy at detecting a major cardiovascular event (MACE).

Initially, this study also aimed to assess the efficacy of troponin testing when used in conjunction with a scoring system called the Emergency Department Acute Chest Pain Score (EDACS). However, due to EDACS needing to be extracted manually from patients' record, their effect could not be analyzed within the timeframe of this studentship.

## Impact:

It is hoped that the findings from this research will be used to redesign the current guidelines used for this blood test in Primary Care. Not only will this lead to better use of resources, but it also ensures that patients receive appropriate care.

## Method:

A retrospective cohort study was used. Data was obtained from the two main laboratories in Canterbury (Canterbury Health Laboratories and Southern Community Laboratories), and some exclusion criteria were applied. Tests that were excluded were:

- those ordered in a hospital setting,
- those that had missing information
- Subsequent tests ordered for a person who presented multiple times.

Baseline characteristics regarding the type of people who received troponin testing and the trends in the use of the test were analyzed using this information.

ICD-10 codes (which represent different diagnoses and procedures) were used to extract MACE data from hospital discharge forms. The MACE data enabled the characteristics of the test to be assessed.

## Results:

A total of 20,544 tests were ordered in the community between April 2013 and November 2016. This averaged at 478 tests per month. Only 1,771 (8.6%) of these tests were positive.

The age range of those who were tested was 1-102 years old (0.7% 0-18yo, 11.3% 19-40yo, 38.8% 41-60yo, 13% 81+yo). There was a fairly even distribution between the genders (52.5% female, 47.5 male) but a majority of those who received testing were European (83.7% European, 3.9% Maori, 1.7% Pacific, 3.6% Asian, 0.8% Other, 6.2% ethnicity not available).

Within 3 days of testing, there had been 70 admissions for MACE in Christchurch public hospital. 46 (65.7%) of these had a positive test while 24 (34.3%) had a negative test result. This means that for patients whose chest pain was caused by a heart problem, in 65% of cases the test gave a positive result (this is known as the sensitivity of the test). Those whose pain was not caused by a heart problem had a 91% chance of getting a negative result. Of those patients with a positive test result, 2% turned out to have a heart problem. Almost 100% of those who had a negative result did not have a heart problem.

## Conclusion:

The number of tests ordered was similar to that of previous audits. The high number of true negatives show that this test has potential to be used to confirm that a MACE is not occurring rather than to detect it in the first place. It is suspected that this is how the test is used in primary care. It would be beneficial to carry out further research centred on the factors that drive physicians to order this test and whether the result alters management.

The sensitivity of 65% could be controversial as it implies that 35% of people with a MACE in the community are at risk of not being detected. It is important to emphasise that these are only initial results. It is possible that a person presenting to the clinic with the early stages of MACE may not have had troponin levels high enough to yield a positive result and were later admitted with a MACE. It is also possible that some people who were clearly having a MACE may have been directly referred to the hospital without testing being carried out. These factors have the potential to increase the number of false negatives and decrease the number of true positives, overall affecting the sensitivity of the test. All of these options must be further assessed and described before the characteristics of the test can be confidently reported. This project has started to lay a foundation for describing the use and impact of troponin testing in the community. Hopefully, the gap in the evidence can be filled, enabling well-informed clinical decisions and better outcomes for all involved.