Using early troponin I testing to improve cardiac care

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Quicker test results following suspected myocardial infarction reduce the time required to make decisions on treatment, allowing it to begin earlier and facilitating a well-planned discharge. This article describes how the introduction of early diagnostic testing allowed the timely treatment of patients admitted to a medical admissions unit with chest pain.

The evaluation of patients with suspected myocardial infarction in emergency medicine is a challenging and costly process (Zarich et al, 2001). Diagnostic tests, or the results of tests, often constitute significant bottlenecks in the care pathway, leading to long waits, communication problems and a lack of certainty and choice for patients (Department of Health, 2004a). However, the key objective of early diagnostic testing is to generate a result quickly so that the appropriate treatment can be implemented, leading to an improved clinical outcome for the patient and the most cost-effective use of health care resources (Price, 2001).

In light of this evidence the discharge coordinators at Queen Elizabeth II Hospital, East and North Herts NHS Trust audited the processes on a medical admissions unit. This revealed that one of the major delays in treatment and subsequent discharge for patients admitted with chest pain was caused by a long wait for blood tests to be undertaken and their results to be received. It was thought that changing this process would significantly reduce patient waiting times and therefore have a dramatic effect on the flow of patients though the system.

**Current practice**

A clinical audit of current practice was undertaken over a four-week period (Fig 1). The results showed that patients requiring a troponin I blood test to rule out acute myocardial infarction had to wait until at least midday to have blood taken on the normal phlebotomy round. In many cases the results were then not available until 5–6pm that day. For those who had a negative result this was then too late to carry out the exercise tolerance test they required, so they had to stay in hospital until the next day to have this investigation – or even all weekend if the blood test had been taken on a Friday.

These results highlighted a need to change the blood-testing process to ensure decisions regarding patient care could be made more promptly.

**Troponin I**

Troponins are a family of proteins found in skeletal and heart muscle fibres that help the heart muscle to contract. Troponin I tests only for the type of troponin found in the heart muscle. When a person has an MI the protein is released into the blood. Troponin levels remain high for longer than other substances traditionally used to test for an infarction.

**FIG 1. AVERAGE WAITING TIMES FOR BLOOD TEST RESULTS**

<table>
<thead>
<tr>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
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<tr>
<td>Pre-trial</td>
<td>6</td>
<td>5</td>
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<tr>
<td>Trial</td>
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<tr>
<td>Post-trial</td>
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such as CK and CK-MB. The troponin I test is particularly important if a person waits for more than a day to seek medical attention after experiencing chest pain. Normal troponin levels are <0.4 ng/ml, and even slight elevations indicate some damage to the heart. Troponin is not generally affected by damage to other muscles, so that intramuscular injection, trauma, strenuous exercise and medication that can damage muscle do not affect troponin levels.

Changing practice
The discharge coordinators discussed the possibility of changing blood-testing procedures with the ward manager of the medical admissions unit and the physician for emergency medicine. A date was set for a four-week trial in which nursing staff on the wards would take the blood.

The aim of the trial was to see whether taking blood earlier in the day had any effect on the patient’s journey and length of stay. Unnecessary waits appear to be one of the most common causes of patient anxiety and dissatisfaction in health care, and should be minimised by improving procedures wherever possible (DoH, 2003).

Results
The results of the trial were immediately apparent. When patients’ blood tests were taken at 9am, the results were available by noon (Fig 1). These patients were then able to undergo an exercise tolerance test that afternoon and be discharged on the same day if this was appropriate. This reduced their length of stay by at least 50 per cent.

The resulting earlier discharge from the medical admissions unit (Fig 2) has led to an increase in the number of medical and elderly care beds available, which in turn has reduced the need to place medical patients in surgical beds. The number of medical patients in surgical beds gradually declined over the trial period to lower numbers than had been experienced at the hospital for many years.

In turn, this change allowed elective surgical work to continue uninterrupted as bed managers could find beds for patients scheduled for surgery. Delays in finding beds on the medical admissions unit for patients transferred from the A&E unit also declined, enabling the A&E department to achieve the DoH four-hour targets (DoH, 2004b) more effectively, significantly reducing patient waiting times and dramatically improving the flow of patients through the system.

Although many staff in the hospital had been under the impression this improvement was caused by a reduction in the number of medical admissions, it has been established that the admission rate has been higher than in previous years.

Recommendations
The impact that this change had was immediately apparent and a recommendation was made to continue the new practice. However, due to constraints on nursing time, alternative ways of working needed to be established. A meeting was arranged with the phlebotomy services manager and the general manager for emergency medicine to discuss ways to tackle this issue. They agreed to provide the medical admissions unit with additional phlebotomy support for half an hour at 8am each morning for troponin blood tests only.

Conclusions
The patient journey and waiting times for people with suspected myocardial infarction have been minimised, enabling us to develop a more appropriately structured inpatient stay.

As stated by Zarich et al (2001), total length of stay is significantly shorter for patients who have early troponin measurements, resulting in reduced total hospital costs. The trial has therefore justified the small increase in phlebotomy provision for the medical admissions unit.

A small, simple change in practice has had a wide-ranging and positive effect on patient care within the hospital. The increase in early discharge has led to a reduction in medical patients in surgical beds, enabling medical nurses to care for them, leading to a greatly improved patient journey (Gallagher and Lynch, 2004).

REFERENCES


FIG 2. LENGTH OF HOSPITAL STAYS FOR PATIENTS WITH CHEST PAIN

![Diagram showing length of hospital stays for patients with chest pain](image-url)

**Keywords**: Cardiac care, Myocardial infarction, Troponin test

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