CADTH

October 2013

CADTH Optimal Use Project in Brief

High-Sensitivity Cardiac Troponin for the Rapid Diagnosis of Acute Coronary Syndrome in the Emergency Department

Condition

Acute coronary syndrome (ACS) occurs when there is a sudden decrease in blood flow to the heart — called myocardial ischemia. ACS may be due to heart attack (myocardial infarction [MI]) or unstable angina. Heart attacks can be further classified into two types — segment elevation myocardial infarction (STEMI) and non-STEMI, depending on the electrocardiogram (ECG) findings. Symptoms and signs of ACS include chest pain, nausea, sweating, and cardiac arrest.

Technology

Troponin is a protein found in muscle cells, like those in the heart. During a heart attack the muscle cells in the heart are damaged from lack of oxgen and they release troponin into the bloodstream. How much troponin is released depends on the amount of damage to the heart. A blood test can be performed to measure the amount of troponin in the blood and the change in troponin levels over time can help to diagnose a heart attack. In Canada, there are two cardiac troponin tests available: cardiac troponin T and cardiac troponin I. High-sensitivity versions of these have recently become available. The traditional versions of the test are called conventional cardiac troponin tests. As of March 2013, conventional cardiac troponin T tests had been discontinued in Canada and replaced with high-sensitivity cardiac troponin T; conventional cardiac troponin I tests remained available, and high-sensitivity cardiac troponin I was not yet available.

Issues

High-sensitivity cardiac troponin tests may help to diagnose heart attacks earlier and lower the risk of missing someone who is having a heart attack. But they may also lead to overdiagnosis — indicating that a patient is having a heart attack when they are not. These false-positive results are concerning to hospitals and patients because they could lead to unnecessary procedures, referrals, and hospitalizations. Clinical experience is greater with the conventional cardiac troponin tests and it is unclear how the newer high-senitivity tests should be interpreted clinically.

Methods

A review of the evidence comparing how well the tests perform in diagnosing ACS in the emergency department, together with a clinical and cost-effectiveness evaluation, was undertaken to help inform decisions about their use. An expert committee made recommendations based on the systematic review and economic analysis, as well as a Canadian Agency for Drugs and Technologies in Health (CADTH) Rapid Response report on point-of-care cardiac troponin testing, a CADTH Rapid Response report appraising current clinical practice guidelines, and a CADTH Environmental Scan report on current cardiac troponin test use in Canada.

Key Messages

For the diagnosis of ACS:

- Continue to use your institution's current cardiac troponin assay — unless there are factors making a change in assay necessary.
- If a change in cardiac troponin assay is indicated, choose conventional cardiac troponin I.

Note: The end of a capital equipment contract or life cycle is an example of when a change in assay may be necessary.

Results

Clinical: High-sensitivity troponin I yielded the highest sensitivity for the diagnosis of acute MI, and conventional troponin T had the highest specificity. No information on the effects of the various troponin tests on quality of life, readmission rates, and time in the emergency department until the diagnosis of MI was identified.

Economic: High-sensitivity troponin T is predicted to have the highest expected per patient costs ($2,186), followed by high-sensitivity troponin I ($2,082) and conventional troponin I ($2,018). The base-case economic analysis estimated the incremental cost-effectiveness ratio of high-sensitivity troponin T compared with conventional troponin I to be $119,377 per quality-adjusted life-year.

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