NHS Quality Improvement Scotland

Health Technology Assessment Advice 4 ~ *December 2003*

The organisation of troponin testing services in acute coronary syndromes

Summary of recommendations

- NHS Quality Improvement Scotland recommends that troponin testing should be available in all hospitals receiving patients with suspected acute coronary syndromes (ACS).
- Troponin should be used in conjunction with clinical and electrocardiogram risk markers to inform diagnostic decisions and to assess risk and suitability for medical or invasive treatment in patients with suspected or diagnosed ACS.
- Both the timing and diagnostic value of troponin testing depend on clinical characteristics of patients. The timing of troponin testing should be in accordance with the criteria defined within this Advice.
- A troponin testing service should meet the needs of local clinical decision making. A troponin testing service may be laboratory based or provided at the point of care. The decision on the type of service offered will depend on local hospital requirements.
- All sites undertaking troponin testing should have the infrastructure for quality assurance and training.
- New protocols should be developed and existing protocols updated to take account of this Advice to ensure the appropriate and optimal use of troponin testing. All protocol use should be monitored.
- Further research should be undertaken in two areas in particular: firstly to investigate the effect of replacing 'any biochemical marker' by troponin in existing scoring systems and secondly to estimate the interaction between troponin level and the treatment with small molecule glycoprotein inhibitors licensed for use in the medical management of patients with non-ST elevation ACS.
- Health professionals should offer to discuss with patients their diagnosis and how it was made, treatment options, what may happen next and what to do if symptoms recur. Health professionals should check that patients and carers understand the information they have received.
- Health professionals should provide patients and carers with written information to reinforce oral communication and use the same clinical terms for the diagnosis throughout the patient's journey of care, including in primary care.
- Consensus on the definition of myocardial infarction is urgently required.

1 Introduction

HTA Report 4, Chapter 2

1.1 This Advice from NHS Quality Improvement Scotland is the outcome of a Health Technology Assessment (HTA) of the clinical and cost effectiveness of troponin testing for the management of patients presenting with ACS. The Assessment considered how troponin testing services could be organised optimally across Scotland. All HTAs consider patients' needs and preferences.

HTA Report 4, Chapter 3

1.2 Troponin testing is a biochemical test that identifies the presence and extent of myocardial cell death. Troponin testing is used in conjunction with other risk markers, such as clinical features and electrocardiogram (ECG) changes, to inform clinical decision making at various points along a patient's pathway for ACS. In patients presenting with chest pain, raised troponin levels can be associated with a number of cardiac-related conditions other than ACS. However, the HTA focused on the clinical- and cost-effective use of troponin testing in stratifying patients with symptoms suggestive of ACS according to their risk of adverse cardiac outcomes (such as death or non-fatal myocardial infarction). It also evaluated whether delivery of a troponin result in an appropriate timescale may provide therapeutic and psychological benefits to patients and/or economic benefits.

HTA Report 4, Chapters 4, 5, 6 and 7

1.3 This Advice is based on critical appraisal and analysis of evidence published in scientific literature and submitted by experts, professional groups, patient groups, manufacturers and other interested parties. This evidence has been interpreted for the Scottish setting by the Topic Specific Group of experts. The assessment process, evidence base, methodology, results and recommendations are described in detail in *Health Technology Assessment Report 4: The organisation of troponin testing services in acute coronary syndromes*. To help users of this Advice locate additional information provided in the HTA report, relevant sections are referenced in the margins of this document. The words which are in dark blue are defined in the Glossary.

1.4 The Advice represents the evidence-based views of NHS Quality Improvement Scotland. **Health professionals in NHSScotland should take account of this NHS Quality Improvement Scotland Advice and ensure that recommendations are implemented to meet clinical need**. However, this Advice does not override or replace the individual responsibility of health professionals to make appropriate decisions in the circumstances of their individual patient, in consultation with the patient and/or guardian or carer.

2 Advice

2.1 Recommended use of troponin testing

2.1.1 Troponin testing should be complementary to clinical and ECG risk markers to inform diagnostic decisions and to assess risk in patients with suspected ACS. However, troponin must not be a substitute for these risk markers. *(See 4.1.7)*

HTA Report 4, Section 4.2

2.1.2 Troponin should replace existing cardiac enzyme tests – including creatine kinase (CK) and its MB isoenzyme (CK-MB) and 'older' biochemical markers such as aspartate aminotransferase and lactate dehydrogenase – for any diagnostic, prognostic or management decisions in all patients with symptoms suggestive of ACS (although CK retains a role in assessing early re-infarction). *(See 4.1.2)*

HTA Report 4, Section 4.2.3.3

2.1.3 Troponin testing in combination with clinical and ECG risk markers should be part of a formal risk assessment system to assess prognosis and suitability for medical or invasive treatment and to guide the management strategy for patients with symptoms suggestive of ACS but without ST elevation.
(See 4.1.7 and 4.1.8)

HTA Report 4, Section 4.2.3.3

2.1.4 In low-risk patients with symptoms suggestive of ACS, a troponin test in combination with clinical and ECG risk markers should be used to inform a decision on whether or not to discharge. Where low-risk status can be confirmed, a cardiac stress test should be scheduled without delay to facilitate discharge and to identify if other investigations need to be undertaken. *(See 4.1.10)*

HTA Report 4, Section 4.1.1.3

2.1.5 In patients with symptoms suggestive of an acute myocardial infarction who would benefit from urgent reperfusion therapy[1] but in whom there is diagnostic uncertainty on ECG, a troponin test with a short turnaround time may provide additional diagnostic information and should be considered as part of therapeutic decision making. *(See 4.1.11)*

HTA Report 4, Section 4.2.3.3.2

2.1.6 Troponin testing should be part of routine clinical assessment in patients who have received urgent reperfusion therapy for an acute myocardial infarction. *(See 4.1.12)*

HTA Report 4, Section 4.2.3.3.2

1. Patients who are candidates for urgent reperfusion therapy present with symptoms suggestive of a myocardial infarction and in most cases with ST segment elevation on ECG, but some may present with confounding ECG changes, for example left bundle branch block.

2.2 Recommended timing of troponin measurements

HTA Report 4, Section 8.1.2.1

2.2.1 Troponin should be measured 12 hours after the onset of well-defined symptoms (when this can be reliably ascertained) in all patients with suspected or clinically diagnosed non-ST elevation ACS. If the onset of symptoms is difficult to establish, an appropriate surrogate for the timing of this measurement is 12 hours after admission. *(See 4.1.3)*

In patients with clear high-risk markers (for example, those with recurrent symptomatic ischaemia or unequivocal ECG evidence of ischaemia such as ST depression) who will clearly benefit from urgent pharmacological or interventional therapy, there is no clinical need for a troponin test prior to starting treatment.

HTA Report 4, Section 8.1.2.1

2.2.2 Troponin may be measured on admission in patients with suspected ACS in whom there is clinical diagnostic uncertainty due to the absence of high-risk clinical or ECG risk markers (for example, no ST depression, no history of diabetes, renal failure or previous myocardial infarction). If this test is negative, a further troponin measurement should be taken as indicated in Recommendation 2.2.1.[2] *(See 4.1.4)*

This recommendation is only advocated if hospitals have the resources available to change patient management when a troponin result is positive.

If this testing strategy is adopted, clear protocols that recognise the two-step troponin assessment should be introduced, adherence to their use monitored and deviations addressed.

HTA Report 4, Section 8.1.2.1

2.2.3 Troponin should be measured on admission in patients with symptoms suggestive of acute myocardial infarction who are being considered for urgent reperfusion therapy but in whom there is diagnostic uncertainty on ECG due to possible pre-existing confounding ECG changes (such as left bundle branch block).

This recommendation is only advocated in hospitals where a troponin testing service, either a laboratory or point-of-care service, can provide a test result with a short turnaround time and is compatible with clinical decision making. *(See 4.1.11)*

HTA Report 4, Section 8.1.2.1

2.2.4 Troponin should be measured 12 hours after admission in patients who have received urgent reperfusion therapy for an acute myocardial infarction. *(See 4.1.12)*

2. Note that if the first troponin measurement is 12 hours after the onset of symptoms, the second measurement can be omitted.

2.3 Recommended sensitivity of equipment

2.3.1 All analysers new to the market should meet the European Society of Cardiology criteria on sensitivity and reproducibility (that is, ≤10% coefficient of variation at the 99th percentile of the normal population distribution of troponin). *(See 4.1.14)*

HTA Report 4, Sections 4.3.3.3.4.2 and 8.1.2.1

For all existing analysers, laboratories should work collaboratively with manufacturers to establish upper limits of troponin in patients without cardiac damage to form a cut-off limit that is appropriate for their patient group to assist in diagnosing acute myocardial infarction and in risk stratifying patients with non-ST elevation ACS.

2.3.2 Qualitative troponin readers should not be used to exclude myocardial damage in patients with symptoms suggestive of ACS. *(See 4.1.14)*

HTA Report 4, Sections 4.3.3.3.4.1 and 8.1.2.1

2.4 Delivery of a troponin testing service

2.4.1 A troponin testing service can be laboratory based or provided at the point of care[3]. The type of troponin testing service offered should be decided locally by laboratory, clinical and managerial staff working collaboratively to define the local requirements of a hospital.

HTA Report 4, Section 7.4

2.4.2 If a combination of laboratory and point-of-care assays is used to measure troponin, the testing methods must provide results on the same scale. If this is not possible, one type of service should be used exclusively to avoid clinical confusion about cut-off levels. *(See 4.1.14)*

HTA Report 4, Section 7.4.1.6.1

2.4.3 A troponin testing service should deliver a result in an appropriate timescale that meets the needs of the clinical decision maker. *(See 4.1.15)*

HTA Report 4, Section 5.4.4

2.4.4 Where troponin testing is only available on weekdays, implementing a weekend batch run service is recommended as a minimum service, provided that clinicians are available to act on the results.

HTA Report 4, Section 5.4.4

3. Note that most point-of-care analysers do not currently meet the sensitivity requirements to rule out myocardial damage or to be used in risk assessment.

2.5 Service requirements

HTA Report 4, Section 7.4.1.1

2.5.1 All laboratories responsible for troponin testing should attain Clinical Pathology Accreditation.

HTA Report 4, Section 7.4.1.2

2.5.2 All sites that undertake troponin testing (including point-of-care testing) should participate in an external quality assurance scheme.

HTA Report 4, Section 7.4.1.6.2

2.5.3 All users of point-of-care troponin testing should adhere to guidance by the Medicines and Healthcare products Regulatory Agency.

HTA Report 4, Section 7.4.1.6.2

2.5.4 All point-of-care troponin testing sites require the identification of a coordinator who is given responsibility for the service.

HTA Report 4, Section 7.4.1.6.2

2.5.5 All point-of-care testing services should be supported by laboratory staff.

HTA Report 4, Section 7.4.1.3

2.5.6 Only trained competent staff should perform troponin testing. Training and support from Managed Clinical Networks with regard to use of equipment and interpretation of the results should be offered on an ongoing basis for existing users and be provided for new users, especially for those in community hospitals where troponin testing may not be currently in use.

2.6 Development of protocols

HTA Report 4, Sections 7.4 and 8.1.2.4

Appropriate protocols should be developed and used by laboratory, clinical and managerial staff to make optimal use of the information provided by the troponin test result. This should include a protocol on equitable access to catheterisation facilities using evidence-based and transparent eligibility criteria.

2.7 Information needs

2.7.1 Health professionals should explain to patients and their carers what their diagnosis is, how it was made, the available treatment options, and what to do and who to contact if symptoms return after discharge. Health professionals should use consistent terms for the diagnosis and check to ensure that patients understand the information given to them.

HTA Report 4, Sections 6.6.2, 6.6.3 and 6.6.4

2.7.2 Health professionals need to provide a clear message to patients who are discharged as low 'short-term' risk that this status does not imply that they are free of heart disease and encourage them to make appropriate lifestyle changes.

HTA Report 4, Section 6.6.6

2.7.3 Written information should be provided to reinforce the content of oral communication between health professionals and patients and carers. Patient information leaflets on heart disease should be written in simple easy-to-understand language, include an explanation of the troponin test and be updated to include the term ACS. Alternative formats such as video, audio, large print or illustrations should also be available and the use of other languages should be considered.

HTA Report 4, Section 6.6.5

2.8 Audit

Audit data should be routinely collected from all patients with suspected or diagnosed ACS to allow thorough evaluation of the clinical and economic value of troponin. Data should include the number, timing and results of the troponin tests and the number of low-risk patients who were discharged within 24 hours of admission.

HTA Report 4, Section 8.2

2.9 Further research

HTA Report 4, Sections 4.2.3.3.4.1.2 and 8.2

2.9.1 The only prospective study on the interaction between troponin level and treatment with glycoprotein IIb/IIIa inhibitors was performed using abciximab which is not licensed currently in the United Kingdom (UK) for use in the medical management of patients with non-ST elevation ACS. This study showed no treatment effect. A similar study using small molecule glycoprotein inhibitors, such as eptifibatide and tirofiban which are licensed for this indication in the UK, should be performed. The study should estimate the effectiveness of using a troponin test to select patients for glycoprotein IIb/IIIa inhibition.

HTA Report 4, Sections 4.2.3.3.4.6 and 8.2

2.9.2 In existing scoring systems, the term 'biochemical marker' does not specifically refer to troponin but instead to any one of CK, CK-MB or troponin. As troponin is more specific and sensitive than CK or CK-MB, a prospective study to investigate the effect of replacing 'any biochemical marker' by troponin is desirable.

HTA Report 4, Sections 4.4.4.3.3.2 and 8.2

2.9.3 The combination of multimarker testing (including troponin) and rapid[4] methods of chest pain assessment to reduce the rate of admissions or to achieve early discharge of low-risk patients may appear attractive but the evidence base for their long-term safety is weak. A randomised controlled trial comparing rapid troponin-based chest pain assessment methods using well-defined protocols with existing assessment protocols should be undertaken. The trial should assess long-term safety and use rigorous follow-up methods.

4. The definition of 'rapid' varied among the studies but the time for assessment ranged from 90 minutes to 9 hours after presentation to hospital.

3 Budget impact

3.1.1 Annual costs of between £0.28 and £0.35 million would enable all district general hospitals and tertiary centres to perform quality-assured troponin testing with a maximum turnaround time of two hours in both patients with non-ST elevation ACS and patients with ST elevation myocardial infarction within approved protocols and to provide patient information leaflets.

HTA Report 4, Section 7.5.2.8

3.1.2 Adapting the service to measure troponin by a two-step testing strategy (that is, on admission and 12 hours later) by point-of-care testing in patients with suspected ACS but in whom there is diagnostic uncertainty would increase the annual costs to between £0.47 and £0.84 million, depending on whether sites have troponin I or T assays.

HTA Report 4, Section 7.5.2.4.2

3.1.3 The costs for 45 community hospitals to set up a troponin testing service (which includes purchasing equipment, training staff and developing protocols) are estimated to be £0.17 million, with the annual operating costs estimated at £0.12 million.

HTA Report 4, Section 7.5.1.2

3.1.4 Substantial reductions from these costs could be expected if sites are able to contract with manufacturers on a Health Board, regional or Scottish level, in order to increase the level of discounts available from manufacturers.

HTA Report 4, Section 7.5.2.8

4 Summary of clinical and cost effectiveness

HTA Report 4, Chapters 3 and 4

4.1.1 It is well established that cardiac troponins T and I are markers of myocardial cell death.

HTA Report 4, Sections 4.1.1.1 and 4.2.3.3.3

4.1.2 Cardiac troponins T and I have greater sensitivity and near absolute specificity for the detection of myocardial damage compared with CK and CK-MB. However, CK remains valuable in assessing early re-infarction because it has a short half-life unlike troponin whose levels remain elevated for at least 96 hours post damage. *(Supports Recommendation 2.1.2)*

HTA Report 4, Sections 4.2.3.3.5.2 and 8.1.2.1

4.1.3 Cardiac troponins are maximally sensitive for the period of 12 to 72 hours after the onset of symptoms. Therefore, measuring cardiac troponin to rule out myocardial damage is only effective at least 12 hours after the onset of symptoms. It is often difficult to establish when symptoms started, therefore for consistency and reliability, an alternative and appropriate reference point for the timing of a troponin measurement is on admission to hospital.[5] *(Supports Recommendation 2.2.1)*

HTA Report 4, Sections 4.2.3.3.5.2 and 5.3.2

4.1.4 There is some evidence that troponin testing on admission identifies approximately 50% of patients who will have a positive troponin result 12 hours later.

If the variable costs of the point-of-care tests are less than £8.40 per test, it would be cost effective to measure troponin on admission and 12 hours later using point-of-care testing compared with a single troponin test 12 hours after admission using laboratory testing in patients with symptoms suggestive of ACS but with no high-risk clinical or ECG markers. *(Supports Recommendation 2.2.2)*

HTA Report 4, Sections 3.5 and 4.2

4.1.5 There is no evidence that either cardiac troponin T or I is superior for diagnostic decision making and for the assessment of risk and prognosis in patients with ACS. However, there is substantial variability between manufacturers' current troponin I assay results for a single troponin sample.

HTA Report 4, Sections 4.2.3.2, 4.2.3.3.1 and 4.2.3.3.2

4.1.6 There is evidence that patients with symptoms suggestive of ACS whose circulating troponin levels are raised are at increased short- and long-term risk of adverse cardiac outcomes (such as death or non-fatal myocardial infarction). Raised troponin levels may have greater prognostic value in certain subgroups of patients with ACS, for example in low-risk patients.

5. This was the consensus of the Topic Specific Group.

4.1.7 There is evidence that other markers such as ECG, chest pain, age and cardiac risk factors are predictive of cardiac outcome independently of troponin. Therefore, troponin levels are most effectively used in combination with clinical and ECG risk markers to inform diagnostic decisions and to assess risk and suitability for medical or invasive treatment. This may be done either as part of a formal protocol or a scoring system. *(Supports Recommendations 2.1.1 and 2.1.3)*

HTA Report 4, Section 4.2

4.1.8 A scoring system such as the Thrombolysis in Myocardial Infarction (TIMI) score or individual components of this score can be used to determine risk status. There is evidence that patients with non-ST elevation ACS defined as high risk by the TIMI score receive greater benefit from glycoprotein IIb/IIIa inhibitors, early invasive therapy and low molecular weight heparin than low-risk patients. The evidence that individual components of the scoring system, particularly troponin alone, can be used to select patients for therapy is less conclusive. *(Supports Recommendation 2.1.3)*

HTA Report 4, Section 4.2.3.3.4.6

4.1.9 There is no clear evidence to differentiate different rapid troponin-based approaches to chest pain assessment on the basis of long-term safety in emergency settings.

HTA Report 4, Section 4.4.4

4.1.10 In the absence of raised troponin and clinical and ECG risk markers, a cardiac stress test has high negative predictive value in low-risk patients with symptoms suggestive of ACS. The European Society of Cardiology recommends combining a cardiac stress test with other risk markers to provide diagnostic and prognostic information on underlying heart disease. *(Supports Recommendation 2.1.4)*

HTA Report 4, Section 4.1.1.3

4.1.11 There is evidence that the presence of confounding ECG changes, such as left bundle branch block, is a strong predictor of delayed thrombolysis mainly due to diagnostic uncertainty. A positive troponin test result may reduce the uncertainty associated with left bundle branch block and allow earlier appropriate treatment and thereby improved survival. *(Supports Recommendations 2.1.5 and 2.2.3)*

HTA Report 4, Section 4.2.3.3.2

4.1.12 There is evidence that a small proportion of patients presenting with symptoms suggestive of acute myocardial infarction receive an inappropriate diagnosis as a result of uncertainty in the interpretation of diagnostic tools. A positive troponin test result can help to confirm a diagnosis of a myocardial infarction.

HTA Report 4, Sections 4.2.3.3.2 and 5.3.1

The costs of undertaking a troponin test 12 hours after admission in patients considered to have an ST elevation myocardial infarction would be recovered within one year[6] if the level of misdiagnosis on ECG exceeds 2.2%. Cost savings would arise from avoiding the consequent interventions such as rehabilitation and prophylactic medication. *(Supports Recommendations 2.1.6 and 2.2.4)*

HTA Report 4, Section 4.3.3.1

4.1.13 Point-of-care analysers may reduce turnaround times for troponin results. Short turnaround times facilitate safe and early discharge of low-risk patients and earlier treatment of high-risk patients. However, there are no published randomised controlled trials demonstrating that point-of-care testing of troponin alone improves clinical outcomes compared with laboratory-based troponin testing.

HTA Report 4, Section 4.3.3.4

4.1.14 Few of the quantitative point-of-care analysers and none of the qualitative point-of-care troponin readers are sufficiently sensitive and precise to be used to rule out myocardial necrosis or for risk assessment. Few point-of-care analysers provide results that are comparable with laboratory analysers from the same manufacturers. *(Supports Recommendations 2.3.1, 2.3.2 and 2.4.2)*

HTA Report 4, Section 5.4

4.1.15 An economic model constructed to estimate the cost savings achieved by reducing turnaround time showed that savings could be achieved if the turnaround time is compatible with clinical need. The results apply to both types of troponin testing service. Combining continuously available clinical decision making and troponin testing is the most cost-effective scenario of those analysed. *(Supports Recommendation 2.4.3)*

6. Note that these costs exclude any cost from failing to diagnose patients accurately and from the risk of adverse events arising from prescribing drugs unnecessarily.

5 Implications

5.1.1 This Advice and HTA will contribute to the Scottish Intercollegiate Guidelines Network Coronary Heart Disease guideline review.

5.1.2 All NHSScotland hospitals receiving patients with suspected ACS should review current protocols for the management of ACS to take into account the guidance given in Sections 2.1, 2.2 and 2.6. Coronary heart disease Managed Clinical Networks should take account of this Advice.

5.1.3 All health professionals managing patients with symptoms suggestive of ACS should take into account the guidance about communication with patients given in Section 2.7.

5.1.4 All NHSScotland laboratory and point-of-care testing sites should review their current practices to take into account the guidance given in Sections 2.1, 2.2, 2.3, 2.4, 2.5 and 2.6.

5.1.5 NHS Boards should develop Action Plans to facilitate implementation of the HTA recommendations.

5.1.6 The National Advisory Committee on Coronary Heart Disease should develop national protocols for access to catheterisation facilities. These protocols should take into account guidance given in Section 2.6.

5.1.7 To assist compliance with protocols, a review of facilities, such as transport associated with inter-hospital transfers, beds in tertiary centres and catheterisation laboratory capacity, should be undertaken by NHS Boards and the Scottish Executive Health Department to identify where resources are insufficient.

HTA Report 4, Section 8.3

5.1.8 Consensus about the definition of myocardial infarction needs to be reached, and a working diagnosis of myocardial infarction should be established and implemented without delay across the UK. This will not only remove the confusion about the diagnosis of myocardial infarction but also ensure consistency of messages received by patients regarding their diagnosis.

HTA Report 4, Sections 3.2.2 and 8.3

HTA Report 4, Section 8.3

5.1.9 To maximise the potential of the HTA recommendations, barriers to implementation such as inequity of access to angiography facilities across Scotland, as outlined in the table below, need to be addressed.

Access of emergency admissions to angiography in hospitals with and without on-site facilities for angiography

	Total angina/acute myocardial infarction patients[a]	% of total patients undergoing angiography	Median delay from admission to angiography (days)	% of total patients undergoing PCI/CABG
Hospitals with on-site angiography facilities (n=11)	16 940			
Total		10.5	3	7.8
Range		3.2–21.8	1–8	1.6–15.9
Hospitals without on-site angiography facilities (n=33)	20 518[b]			
Total		4.6	7	4.0
Range		0.6–10.2	3–20	0.6–12.9

Source: Information and Statistics Division, 1999–2001 data
[a] Number of emergency admissions using ICD-10 codes (I20, I21, I24.8, I24.9 & I25.5). Emergency admissions were based on the admission type of the first episode within the continuous inpatient stay.
[b] n=35
CABG = coronary artery bypass graft, PCI = percutaneous coronary intervention

6 Review

NHS Quality Improvement Scotland will measure the impact of this HTA by:

- monitoring the data relating to troponin in the Scottish coronary heart disease dataset, once the dataset is developed

- updating the data collected from surveys completed by laboratories, cardiologists and community hospitals for this HTA in three years' time to identify changes in working practices.

The HTA recommendations will contribute to other NHS Quality Improvement Scotland work to improve the outcomes and experiences of patients with suspected ACS.

As NHS Quality Improvement Scotland chooses broad topics for HTAs, it is likely that new evidence will emerge which bears on the specific recommendations on an ongoing basis. Rather than having a fixed review period, NHS Quality Improvement Scotland will determine the importance of new evidence and produce report addenda in which the evidence is analysed and any alteration to the recommendations is explained. If a major change is required, the *Health Technology Assessment Report, Advice* and *Understanding our Advice* will be rewritten.

7 Further information

- *Health Technology Assessment Report 4: The organisation of troponin testing services in acute coronary syndromes*

- *Understanding our Advice: The use of troponin testing in acute coronary syndromes*

- All NHS Quality Improvement Scotland documents are available in a variety of formats on request and from the NHS Quality Improvement Scotland website, **www.nhshealthquality.org**

Glossary

ACS	Acute coronary syndromes Acute coronary syndrome is a collective term for the spectrum of acute coronary disease associated with myocardial ischaemia. Clinical presentations recognised within this definition include unstable angina, non-ST elevation myocardial infarction and ST elevation myocardial infarction.
Angiography	An X-ray investigation of the blood vessels whereby a contrast medium is injected into the artery and a rapid series of X-ray recordings is made. In coronary angiography, it identifies the presence and extent of heart disease by assessing the arteries of the heart.
Biochemical markers	Proteins or enzymes (for example, myoglobin, creatine kinase [CK], its MB isoenzyme [CK-MB] and troponins T and I) that appear in abnormally elevated levels in the peripheral circulation as a result of cardiac tissue injury. They serve as indicators of cardiac tissue injury.
Cut-off	A boundary between a positive and a negative result.
High risk	Refers to patients at high risk of adverse cardiac outcomes (such as death or non-fatal myocardial infarction) within the short term. High-risk patients need urgent treatment.
Invasive therapy	Angiography followed by a surgical intervention such as percutaneous coronary intervention or coronary artery bypass graft, if appropriate.
Left bundle branch block	A defect in the heart conduction of the left bundle branch which is recognised as an ECG abnormality. When present, a diagnosis of recent myocardial infarction can be more difficult.
Low risk	Refers to patients at low risk of adverse cardiac outcomes within the short term. Low-risk patients do not need urgent invasive treatment.
Reperfusion therapy	Treatment that restores an adequate blood supply to the heart by administering thrombolytic drugs to break down clots in an artery (thrombolysis) and/or by surgical intervention such as percutaneous coronary intervention.
Risk assessment	The initial evaluation to assess whether or not a patient with chest pain is at low or high risk of adverse cardiac outcomes. It involves a careful medical history and a precise description of symptoms, a physical examination, an ECG and biochemical markers. The risk should be re-assessed regularly.

Risk markers	A clearly defined occurrence or characteristic that increases the possibility that a person will develop a disease or die from a disease he or she already has.
Scoring system	A scoring system is a simple quantitative tool for evaluating risk of death and cardiac ischaemic events. An example of a scoring system is the TIMI score.
Stress test	Usually an exercise test but some patients will require myocardial perfusion studies which may involve pharmacological stress.
TIMI	Thrombolysis in Myocardial Infarction The TIMI score for unstable angina/non-ST elevation myocardial infarction is graded out of seven and assigns one point for the presence of each predictor variable.
Troponin	A complex of proteins involved in the regulation of striated muscle contraction. Cardiac troponins T and I are biochemical markers of myocardial damage.
Turnaround time	Time from taking a blood sample to receipt of a troponin result by the decision maker.

NHS Quality Improvement Scotland

NHS Quality Improvement Scotland was set up to improve the quality of health care in Scotland. Its role is to set standards and monitor performance and provide NHSScotland with advice, guidance and support on effective clinical practice and service improvements.

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- Electronic
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