Investigation of acute and chronic chest pain presenting in primary care

Systematic review and modelling of the investigation of acute and chronic chest pain presenting in primary care

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Executive summary

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Executive summary

Background

Chest pain is a common symptom in primary care, and may reflect coronary heart disease (CHD), as either an acute coronary syndrome (ACS) or exertional angina. Recent national guidance has emphasised the importance of inpatient assessment for the former and rapid specialist assessment for the latter. However, chest pain is a common symptom that is due to CHD in only a minority of cases, and specialist and emergency services would become swamped if everyone with chest pain was referred.

Objectives

Questions the review sought to answer were the following:

- What is the value of individual clinical features in the diagnosis of an acute myocardial infarction (MI)?
- How accurate are electrocardiogram (ECG) changes in the diagnosis of ACS?
- What is the most cost-effective way to manage patients presenting in the community with suspected acute MI?
- What is the value of a resting ECG in the diagnosis of CHD?
- What is the value of an exercise ECG in the diagnosis of CHD?
- How effective are rapid access chest pain clinics in the diagnosis of exertional angina?
- What is the impact of rapid access chest pain clinics (RACPCs) compared with other possible models of care in the investigation of exertional angina?

Methods

Data sources

MEDLINE, EMBASE, CINAHL, the Cochrane Library and electronic abstracts of recent cardiological conferences were searched for articles about the diagnosis of chest pain between 1966 and October 1999. Researchers identified from the National Research Register were surveyed and reference lists of relevant papers were checked.

Study selection (inclusion and exclusion criteria)

Studies were included if they involved

- patients with acute chest pain with data on the diagnostic value of clinical features or an ECG
- patients with chronic chest pain with data on the diagnostic value of resting or exercise ECG
- the effect of a RACPC.

Studies were excluded if they were solely concerned with the prognostic value of the test, if they used a case–control design or if, in the evaluation of chronic chest pain, they included >20% of patients with known CHD.

Data extraction (and assessment of validity)

Eligible papers were reviewed in duplicate. Data were extracted on inclusion criteria, sources of bias, patient demographics and test performance results. A third reviewer checked extracted data.

Data synthesis

Likelihood ratios (LRs) were calculated for each study, and pooled LRs were generated with 95% confidence intervals (CIs).

Simulation exercises

A Monte Carlo simulation was performed evaluating different assessment strategies for suspected ACS, and a discrete event simulation for the evaluation of models for the assessment of suspected exertional angina.

Results (research findings)

Acute chest pain: clinical symptoms and signs

No clinical features in isolation were useful in ruling in or excluding an ACS. The clinical features most helpful were pleuritic pain (LR+ 0.19, 95% CI 0.14 to 0.25) and pain on palpation (LR+ 0.23, 95% CI 0.08 to 0.30).

Acute chest pain: resting ECG

The presence of ST elevation was highly specific for MI, with LR+ 13.1 (95% CI 8.28 to 20.6). A

completely normal ECG was reasonably useful at ruling out a myocardial infarction (LR+ 0.14 (95% CI 0.11 to 0.20). 'Black box' studies of clinical interpretation of ECGs found very high LR+ (145 in the best quality study), but low sensitivity (LR– 0.58).

Simulation exercise of management strategies for suspected ACS

Point of care testing with troponins was cost-effective. Pre-hospital thrombolysis on the basis of ambulance telemetry was more effective but more costly than thrombolysis performed in hospital.

Chronic chest pain: resting ECG

Resting ECG features were not found to be very useful. Presence of Q-waves had LR+ 2.56 (95% CI 0.89 to 7.30). One study reported a high LR+ of 9.96 (95% CI 2.58–38.5) for QRS notching.

Chronic chest pain: exercise ECG

Presence of ST depression had LR+ 2.79 (95% CI 2.53 to 3.07) for a 1 mm cutoff and 3.85 (95% CI 2.49 to 5.98) for a 2 mm cutoff. The LR–s were 0.44 (95% CI 0.40 to 0.47) (1 mm) and 0.72 (95% CI 0.65 to 0.81) (2 mm). Other methods of interpreting the exercise ECG did not result in dramatic improvements in these results. The test performed better in men than women.

RACPCs

No true evaluative studies were identified. Weak evidence was found to suggest that these clinics might be associated with reduced admission to hospital of patients with non-cardiac pain, better recognition of ACS, earlier specialist assessment of exertional angina and earlier diagnosis of non-cardiac chest pain.

Simulation exercise of models of care for investigation of suspected exertional angina

RACPCs were predicted to result in earlier diagnosis of both confirmed CHD and non-cardiac chest pain than models of care based around open access exercise tests or routine cardiology outpatients, but were more expensive. The benefits of RACPCs disappeared if waiting times for further investigation (e.g. angiography) were long (6 months).

Conclusions

Implications for health care

- In patients in whom an ACS is suspected, emergency referral for further assessment in a specialist setting is justified.
- ECG interpretation in acute chest pain can be highly specific for diagnosing MI.
- Point of care testing with troponins is cost-effective in triaging patients with suspected ACS.
- Resting ECG and exercise ECG are of only limited value in the diagnosis of CHD.
- The potential advantages of RACPCs are lost if there are long waiting times for further investigation.

Recommendations for research

Relevant research questions include the following:

- What is the most appropriate model of care to ensure accurate triaging of patients with suspected ACS?
- What is the cost-effectiveness of pre-hospital thrombolysis in rural areas?
- What is the relative cost-effectiveness of RACPCs compared with other innovative models of care such as open access exercise testing?
- How should RACPCs be managed? (e.g. proportion of exercise ECGs performed; skill mix of staff; maximum waiting time from referral).
- What is the long-term outcome of patients discharged from RACPCs?

Publication

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