Cost-effectiveness of myocardial perfusion imaging with SPECT in the emergency department evaluation of patients with unexplained chest pain

Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
Myocardial Perfusion (MP) imaging with single photon emission computed tomography (SPECT) in the evaluation of patients with unexplained chest pain.

Type of intervention
Diagnosis.

Economic study type
Cost-effectiveness analysis.

Study population
Patients attending the emergency department of a community hospital with a diagnosis of unexplained chest pain, as determined by the attending cardiologist on the basis of a non-diagnostic electrocardiogram, normal cardiac enzyme levels (when available), and a non-diagnostic history and physical examination. The authors reported that "In general, patients with a known prior myocardial infarction were excluded from the study; however if a high clinical suspicion for acute ischemia existed, a resting MP image was obtained".

Setting
Hospital emergency department. The economic study was carried out in the USA.

Dates to which data relate
The dates associated with the effectiveness and resource use data were not stated. The price date was not stated.

Source of effectiveness data
Effectiveness data were derived from a single study.

Link between effectiveness and cost data
The costing was undertaken prospectively on the same patient sample as that used in the effectiveness study. The unit costs for the type of service received by the study sample were derived from data for a different patient sample from that used in the effectiveness study.

Study sample
50 patients (31 men, 19 women, aged 26 - 79 years) with unexplained chest pain were included in the study. No power calculations were reported.
Study design
Case series study (each subject acted as his/her own control). The duration of the follow-up was 9-12 months after presentation. The loss to follow-up was not stated.

Analysis of effectiveness
The principle used in the analysis (intention to treat or treatment completers only) does not apply to the design employed by this study. The primary health outcomes used in the analysis were changes in the cardiologist's patient management plan after MP imaging with respect to the plan before the MP imaging, and correct diagnoses of cardiac/non-cardiac chest pain as confirmed by follow-up. Physician diagnostic confidence was also documented using a 1-5 scale, with higher numbers indicating more confidence in diagnosis.

Effectiveness results
Physician diagnostic certainty in the current working diagnosis of cardiac versus non-cardiac chest pain was estimated to increase from 2.92 to 4.52 after MP imaging, with a positive confidence improvement of 1.6 units (p<.0001). The use of MP imaging altered management decisions in 69% (n=34) of patients. Twenty-four* of those cases were sent home. Sixty percent of patients had a normal MP image, with 87% of such cases being subsequently discharged and the rest admitted to hospital. In turn, 15% of patients with abnormal results were discharged and the rest admitted to hospital. Follow-up data showed no adverse cardiac events in patients discharged after a normal rest MP image. Notably, one patient who would have been discharged was admitted to the hospital after a positive image and later, at the cardiac care unit, observed to have elevated cardiac enzyme levels indicative of acute myocardial infarction. *Reviewer's note: It is clear from careful examination of the table used to summarise the study results that the authors’ reported figure of 29 of such cases was a misprint.

Measure of benefits used in the economic analysis
The measures of benefits were cases of non-cardiac chest pain which avoided hospitalisation and additional cardiac chest pain adequately diagnosed.

Direct costs
The hospital cost of combined rest and stress MP imaging was included in the study. Although quantities were analysed separately, the costing was performed at a highly aggregated level and the unit costs (comprising important resource use information themselves) were derived from a patient sample of 381 admissions for unexplained chest pain during the 6 months before the start of the study (no date given). The quantity/cost boundary adopted was the hospital. The price date was not stated.

Currency
US dollars ($).

Sensitivity analysis
No sensitivity analysis was carried out.

Estimated benefits used in the economic analysis
Forty-eight percent (n= 24)* of patients with non-cardiac chest pain as determined from follow-up observations avoided unnecessary hospitalisations after MP imaging. A two percent (n=1) proportion of the total sample had a correctly changed management plan from discharge to hospital admission due to cardiac chest pain, and 18% (n=9) of patients had a changed plan which still left them unnecessarily in hospital although under less intensive care relative to their original plan. *See the 'effectiveness results' section above.
Cost results
The reduction in hospital costs achieved by managing the 50 patients in the effectiveness study after knowing the results of the MP imaging relative to the management planned by the cardiologist before the MP imaging was $39,296.18, or $785.92 per patient.

Synthesis of costs and benefits
The costs and benefits were not combined since the intervention turned out to be the dominant strategy.

Authors' conclusions
Performing MP imaging in patients with unexplained chest pain while in the emergency department is cost-effective.

CRD COMMENTARY - Selection of comparators
A justification was given for the comparator used.

Validity of estimate of measure of benefit
By not documenting the dates when the effectiveness study was conducted, the relevance of the study results to current practice may be obscured. Also, as the authors noted, the small sample size of the study is likely to lead to lack of sufficient numbers to observe clinically significant differences in benefits between the strategies investigated. Results should therefore be considered with caution. Adequate details of the costs were not given (price date).

Validity of estimate of costs
It should be noted that, although the main quantities of resource use were reported (length of stay), the costing exercise was performed to a highly aggregated level, which implied strong assumptions regarding the generalisability of resource use data embodied in the unit costs used in the analysis. These unit costs were based on resource use from a different patient sample (observed 6 months before the effectiveness study started) from that used in the effectiveness study.

Other issues
According to the authors this is the first economic evaluation of the topic in question. The issue of generalisability to other countries was not addressed.

Implications of the study
Results should be interpreted with caution due to the study's small size and the assumptions implied by the highly-aggregated level of the costing in the study. Further, no information was given about dates associated with the data.

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None stated

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