Cost-effectiveness of thallium-201 versus technetium-99m-sestamibi in the detection of coronary artery disease

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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
Cardiac imaging in detection of coronary artery disease using as agents thallium-201 (201TI) or technetium-99m-sestamibi (99mTc-sestamibi).

Type of intervention
Diagnosis.

Economic study type
Cost-effectiveness analysis.

Study population
Patients undergoing either 201TI or 99mTc-sestamibi cardiac imaging.

Setting
The setting for the cost information was a 450-bed private hospital in the United States and the economic study was carried out in the United States.

Dates to which data relate
Cost information was based on 1993 contract year pricing. The effectiveness data was based on a review of studies published between 1989 and 1992.

Source of effectiveness data
The effectiveness data were based on a review of the literature.

Link between effectiveness and cost data
The costing was undertaken retrospectively and based on effectiveness data obtained from the literature.

Outcomes assessed in the review
The outcomes assessed were the sensitivity and specificity of the two tests.

Study designs and other criteria for inclusion in the review
Not stated.
Sources searched to identify primary studies
Not stated.

Criteria used to ensure the validity of primary studies
Not stated.

Methods used to judge relevance and validity, and for extracting data
Not stated.

Number of primary studies included
Seven studies were included in the review.

Methods of combining primary studies
Not stated.

Investigation of differences between primary studies
Not stated.

Results of the review
The authors concluded that the sensitivity and specificity of the two agents were very similar and, therefore, that 99tce-sestamibi and 201TI provide similar diagnostic information on the presence or absence of coronary artery disease. Diagnostic agreement between the two agents ranged from 85% to 93% and this diagnostic comparability increased when protocols include reinjection of 201TI for resting images.

Measure of benefits used in the economic analysis
Detection or ruling out of CAD by the two alternative agents was the outcome measure used in the economic analysis. Since the effectiveness analysis showed no difference in effectiveness between 201TI and 99mTC-sestamibi, the economic analysis was based on differences in costs only.

Direct costs
Cost information for each radiopharmaceutical was obtained from a 450-bed private hospital in the United States and was based on 1993 contract year pricing. Only the differential costs between 201TI and 99mTC-sestamibi were relevant and, hence, included. Kit costs, kit preparation and quality control time, and decay costs were included. It was estimated that an additional 10-30 minutes of the patient interaction and preparation time was incurred by the technologists with patients receiving 99mTc-sestamibi studies when compared to patients receiving 201TI studies. This differential time was included in the analysis. Costs associated with physician's time and consultation and dictation services were considered to be the same for both agents. The costs attributed to 201TI were based on a one day, stress-rest protocol where patients were given 2.5mCi of 201TI during the stress phase and reinjected 3.5 to 4 hours later with 1.0mCi. The 99mTc-sestamibi patients followed a one-day, rest stress protocol with a resting administration of 10mCi and a stress-phase, 5 hr later, using an additional 20mCi.

Indirect Costs
Indirect costs were not considered.

Currency
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Sensitivity analysis
Four different scenarios were presented which varied the number of patients per MIBI kit, the radiopharmacist’s time and wage per hour, and the nuclear medicine technologist’s time and wage per hour.

Estimated benefits used in the economic analysis
Not applicable.

Cost results
The differential costs per study were presented as cost of 99mTc-sestamibi/cost of 201TI. When 201TI was used, either one day before calibration date or on the day of calibration, it was much less expensive for detection of CAD than 99mTc-sestamibi (under the various scenarios the range of the differential costs was -$6.56 to $227.96), especially when cardiac scheduling was light (one or two patients; range $81.88 to $258.71). Technetium-99m-sestamibi was less expensive than 201TI in all scenarios with more than two cardiac patients per day and when 201TI was used three days post-calibration (range -$5.62 to -$126.12). When 201TI was allowed to decay for one and two days post-calibration, the cost-differential results became dependent upon the assumptions.

Synthesis of costs and benefits
Not applicable.

Authors’ conclusions
201TI, when used in a timely manner in the detection of coronary artery disease, was more cost-effective than 99mTc-sestamibi in the institution studied however, the generalisability of these results is strictly limited.

CRD COMMENTARY - Selection of comparators
The reason for the choice of comparator is clear.

Validity of estimate of measure of benefit
Insufficient detail of the literature review is given in the paper to allow assessment of whether the estimate of the measure of the benefit used in the economic analysis is valid.

Validity of estimate of costs
Adequate details of the methods of the differential cost estimation were given and no important cost items were omitted.

Other issues
No statistical analysis of costs was carried out. As the authors acknowledged the generalisability of the results are limited but given these reservations, and assuming the results of the effectiveness analysis are valid, their conclusions are justified.

Source of funding
None stated.
Bibliographic details

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Subject indexing assigned by CRD

MeSH
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