Cost-effectiveness of coronary MDCT in the triage of patients with acute 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.

CRD summary
The aim was to assess the cost-effectiveness of triage based on computerised tomography coronary angiography (CTCA), compared with usual care, for patients presenting to the emergency department with acute chest pain. CTCA-based triage for patients with low-risk chest pain was a cost-effective alternative to usual care in men, and a dominant strategy in women. The analysis appears to have been carried out satisfactorily although the sources used were not clearly described. The authors’ conclusions appear to be robust and valid.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to assess the cost-effectiveness of triage based on computerised tomography coronary angiography (CTCA) in comparison with usual care, for patients presenting to the emergency department (ED) complaining of acute chest pain. Male and female patients at low risk of acute coronary syndrome (ACS) were analysed separately.

Interventions
The intervention was 64-MDCT coronary angiography for the diagnosis of suspected ACS. Patients were imaged using CTCA and either discharged, evaluated with a stress test, or sent directly to invasive coronary angiography, depending on the severity of their atherosclerosis. This diagnostic strategy was compared with standard care, which consisted of management based on biomarkers and stress tests alone.

Location/setting
USA/hospital.

Methods
Analytical approach:
A Monte Carlo microsimulation model (a Markov model based on individual simulations) was developed to compare the costs and benefits associated with usual care and CTCA. The time horizon of the analysis appears to have been lifetime. The authors stated that a societal perspective was adopted.

Effectiveness data:
The clinical data used to estimate transition probabilities and populate the decision model were derived from a selection of known, relevant studies. Except for the sample size and the patients’ characteristics of some of these studies, their details were not given. The diagnostic accuracy of supplementary tests was derived from a meta-analysis of published studies, while the accuracy of CTCA was taken from a single study the details of which were not provided.

Monetary benefit and utility valuations:
The utility valuations were derived from a Canadian study that enrolled 878 patients and used the standard gamble method.

Measure of benefit:
Quality-adjusted life-years (QALYs) were used as the summary benefit measure, and were estimated using the decision model. QALYs were discounted at an annual rate of 3%. Life-years gained were also calculated but were not combined with costs.
Cost data:
The two main cost categories were ED (which included all the diagnostic procedures), and inpatient costs. Both of these were derived from a randomised controlled trial supplemented with Medicare reimbursement data. The costs of medications were also considered and were estimated using common treatment patterns. All costs were in US dollars ($) and the price year was 2005. Costs incurred after the first year were discounted at an annual rate of 3%.

Analysis of uncertainty:
Key model inputs were varied in a deterministic sensitivity analysis using published ranges of values. Several alternative scenarios were also considered.

Results
In men, the expected costs and QALYs were $9,990 and 15.27 with usual care, and $10,190 and 15.31 with CTCA. The incremental cost per QALY gained with CTCA over usual care was $6,400.

In women, the expected costs and QALYs were $7,010 and 16.98 with usual care, and $6,630 and 16.99 with CTCA. As CTCA was simultaneously more effective and less expensive, it was a dominant strategy.

The sensitivity analysis did not alter the key conclusion that CTCA was the preferred strategy, since the incremental cost always remained lower than $25,000 per QALY in men, and CTCA was almost always dominant in women.

Authors' conclusions
The authors concluded that CTCA-based triage for patients with low-risk chest pain was a cost-effective alternative to usual care in men and was a dominant strategy in women.

CRD commentary
Interventions:
The selection of the comparator was appropriate as it reflected the standard care in the authors' setting. A detailed description of the diagnostic pathways was given.

Effectiveness/benefits:
The approach used to derive the clinical data was not described. The studies selected may have been known to the authors who did not perform a literature review to identify relevant model inputs. The authors did not report the characteristics of the primary studies such as study design, length of follow-up, and the types of endpoints used. The diagnostic accuracy was taken from a meta-analysis, but the details of the synthesising method were not provided. This limits the possibility of assessing the validity of the clinical data. The source of quality of life values was reported and the derivation of QALYs was clear. QALYs are a validated benefit measure, and can also be used to compare the benefits of other health care interventions.

Costs:
The analysis of costs appears to have been restricted to the payer's perspective given the types of costs included and their sources, although the authors stated that a societal perspective was adopted. The costs were presented as macro-categories and a detailed breakdown of cost items was not given. This may reduce the transparency of the analysis, but it does reflect the typical third-party payer's accounting system. The price year and the use of discounting were reported. Statistical analyses of economic inputs were not performed and costs were treated deterministically.

Analysis and results:
The costs and benefits were appropriately synthesised using an incremental analysis, the findings of which were clearly presented. The issue of uncertainty was addressed in a deterministic sensitivity analysis, which was centred on some key model inputs. The impact of simultaneous variations of these inputs was not considered. Extensive information on the decision model and the clinical management of patients in the two diagnostic strategies was given.

Concluding remarks:
The analysis appears to have been carried out satisfactorily although the sources used for clinical and economic estimates were not fully described. The authors' conclusions appear to be robust and valid.
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