Is computer aided detection (CAD) cost effective in screening mammography? A model based on the CADET II study
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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.

CRD summary
This study examined the cost-effectiveness of a cancer screening mammography, with one person reading the mammogram plus computer-aided detection, compared with two people reading it. The authors concluded that a single reader plus computer-aided detection was unlikely to be cost-effective, unless there was very little increase in the recall rate after initial screening. The methods were satisfactory, and they and the study results were clearly reported. The authors' conclusion appears to be appropriate.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The aim was to estimate the cost-effectiveness of cancer screening mammography, with one person reading the mammogram plus computer-aided detection, compared with two people reading it, using data from the Computer Aided Detection Evaluation Trial (CADET) II.

Interventions
The alternatives were single reading with computer-aided detection or double reading. As the equipment costs varied according to the processing volume of the screening unit (the number of women screened annually), separate analyses were performed for low, average, and high volume units.

Location/setting
UK/out-patient care.

Methods
Analytical approach:
The economic evaluation was undertaken alongside a clinical trial. The trial was conducted in three screening units, one with high, one average, and one low volume of patients screened. High volume was 30,000 and 40,000 women annually, average volume was between 20,000 and 30,000 women annually, and low volume was between 5,000 and 20,000 women annually. The time horizon was seven years, which was assumed to be the lifespan of the computer-aided detection equipment. The authors reported that the perspective was that of UK health and social services.

Effectiveness data:
The effectiveness data came from the CADET II, which was a large prospective randomised controlled trial conducted in the UK (Gilbert, et al. 2008, see ‘Other Publications of Related Interest’ below for bibliographic details). It compared the diagnostic performance of single reading plus computer-aided detection against double reading, in a cohort of 31,057 women undergoing routine NHS breast screening in England. The main clinical effectiveness estimate was the cancer detection rate. The rate of recall for further assessment was also considered.

Monetary benefit and utility valuations:
Not relevant.

Measure of benefit:
No summary benefit was used. The alternatives were assumed to be clinically equivalent and a cost-minimisation
analysis was performed.

Cost data:
The analysis considered the costs of reading time, the computer detection system (including equipment, training, and maintenance), and further assessment arising from recall. The resource use was from the CADET II and other published studies. The cost of reading was based on the average cost of a radiologist and breast clinician or advanced practitioner in the UK. The cost of the radiologists was based on the salary of a medical consultant. The unit costs were from commonly used UK databases of health and social care. The cost of purchasing the detection equipment was from its manufacturer. The annual cost of the equipment was calculated assuming a seven-year lifespan and discounting at an annual rate of 3.5%, with no scrap value. All costs were reported in 2007 to 2008 UK pounds sterling (£).

Analysis of uncertainty:
The uncertainty surrounding the number of cancers detected, the reading time, the equipment and assessment costs, the recall rate, and the reader’s professional qualification for computer-aided detection or double reading (radiologist or advanced practitioner) was assessed in deterministic and probabilistic sensitivity analyses, for each size of screening unit.

Results
Compared with double reading, single reading plus computer-aided detection was associated with an additional cost per 1,000 women screened of £227 in high, £253 in average, and £590 in low volume units. The difference in cancer detection rate was very small and was assumed to be zero. Computer-aided detection was only cost-effective if it saved costs.

One-way sensitivity analysis showed that the assessment costs, the reading time, the reader's professional qualification, and the difference in recall rates had the greatest effect on the cost-effectiveness results.

Probabilistic sensitivity analysis confirmed that the findings were robust. When all parameters were varied, single reader plus computer-aided detection was cost-effective (the cost per additional case of cancer detected or per life-year saved) in 8% of simulations for high volume units, 7% of simulations for average volume units, and 4% of simulations for low volume units.

Authors' conclusions
The authors concluded that single reading with computer-aided detection was unlikely to be cost-effective, compared with double reading, unless there was very little increase in the recall rate after initial screening. The results were highly sensitive to variations in several parameters.

CRD commentary
Interventions:
The interventions were clearly described and included the usual practice.

Effectiveness/benefits:
The effectiveness data were from a large prospective randomised controlled trial and sufficient details were reported to suggest that this trial was of high quality. The measures of clinical effectiveness were clearly reported. These measures were typical of diagnostic studies and were appropriate for the objective of the analysis.

Costs:
The cost items for social services were not explicitly reported. So it is unclear if all those costs relevant to the stated perspective of health and social services were included. The resources and unit costs were reported. The cost data were from several UK sources. Other details of the cost analysis, such as the price year, were transparently and clearly presented.

Analysis and results:
A synthesis of costs and effects was not carried out, as a cost-minimisation analysis was conducted. The authors justified this on the grounds that the two interventions were equally effective. The cost analysis was well reported,
allowing an understanding of the analytic steps taken. The sensitivity analysis was adequate, with both a deterministic and probabilistic analysis; the results were fully reported. The authors discussed some limitations of their study including the assumption that the effectiveness of computer-aided detection, using a digital mammography system, was the same as that observed in the CADET II where film screen mammography was used.

Concluding remarks:
The methods were satisfactory and they and the study results were clearly reported. The authors’ conclusion seems to be appropriate.

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