Cost-effectiveness of endorectal magnetic resonance imaging for the staging of prostate cancer

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
Magnetic resonance imaging using either an endorectal surface coil, a high-specificity endorectal surface coil or a pelvic multicoil array.

Type of intervention
Diagnosis.

Economic study type
Cost-utility analysis.

Study population
A hypothetical cohort of otherwise healthy men with biopsy-proven prostate cancer in whom conventional clinical staging identified disease limited to the prostate.

Setting
Hospital. The economic study was carried out in the United States.

Dates to which data relate
The effectiveness data were obtained from studies published in 1994 and 1995. The resource use data corresponded to 1992-1994. The price year was not clearly stated.

Source of effectiveness data
Effectiveness data was based on a synthesis of previously completed studies.

Modelling
A model was used to estimate benefits and costs. The model was used to perform two separate analyses: (a) to determine the incremental sensitivity and specificity of the endorectal coil, and (b) to study the effects of potential incremental changes in diagnostic accuracy.

Outcomes assessed in the review
Sensitivity and specificity values.

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.

Methods of combining primary studies
Not combined.

Investigation of differences between primary studies
Not stated except that one of the studies included stricter criteria for the diagnosis of extra-capsular disease than the other, which was based on conventional criteria.

Results of the review
The sensitivity and specificity of endorectal magnetic resonance imaging were taken to be 84% and 80% respectively. The sensitivity and specificity of pelvic coil magnetic resonance imaging were taken to be 74 and 67% respectively. The revised sensitivity and specificity of the high-specificity endorectal coil were 30% and 97% respectively (using stricter criteria for diagnosis).

Measure of benefits used in the economic analysis
Quality-adjusted life years (QALYs) gained were used as the outcome measure in the economic analysis. Utilities were obtained from a study that used physicians’ consensus estimates of patient utility.

Direct costs
Some quantities of resource use were not clearly stated. The cost of magnetic resonance imaging was computed from the 1994 Medicare resource-based relative scale (RBRVS) fee schedule. The incremental cost of prostatectomy was calculated by subtracting the average cost of radiotherapy as obtained from studies published in 1992-1993. The list price of the endorectal coil was used as proxy for its cost. The price year was not clearly stated. Total costs were calculated using a model.

Indirect Costs
Not included.

Currency
US dollars ($).

Sensitivity analysis
Simple, one-way and threshold sensitivity analyses were conducted to determine the effect of diagnostic accuracy and unit costs on the model results.
Estimated benefits used in the economic analysis
The quality-adjusted life expectancy in years with the pelvic multicoil array was 12.52, with the endorectal coil it was 12.71 and with the high-specificity endorectal coil it was 12.87. Results from the initial model show that the endorectal coil provided an additional 0.19 years (2.3 months) of quality-adjusted life expectancy over the conventional pelvic coil MRI. Using the high-specificity data, the improvement in diagnostic accuracy provided an additional 0.16 years (1.9 months) of quality-adjusted life expectancy over the same strategy using conventional criteria.

Cost results
The endorectal coil cost an additional $220 per patient compared to the pelvic multicoil array. The cost of the high-specificity endorectal coil was an additional $1,684 compared to the former coil.

Synthesis of costs and benefits
The incremental cost per quality adjusted life year for the endorectal coil was $1,158 relative to the pelvic multi coil array, and for the high-specificity coil was $10,525, compared to the endorectal coil. The two main model results (endorectal magnetic resonance imaging is more cost-effective than conventional magnetic resonance imaging and the use of strict criteria for extraprostatic disease is more cost-effective than the use endorectal magnetic resonance imaging) were unchanged throughout the “reasonable” ranges for each parameter. Endorectal magnetic resonance imaging was more cost-effective than conventional magnetic resonance imaging if it provided a 1.5% increase in sensitivity or a 0.2% increase in specificity. According to the authors, the use of strict criteria for extraprostatic disease was cost-effective as long as the incremental cost of prostatectomy remained less than $18,700 and the therapeutic benefits of prostatectomy were at least 1.2 years.

Authors’ conclusions
The results show that endorectal magnetic resonance imaging techniques are more cost-effective than conventional magnetic resonance imaging for the staging of prostate cancer and that strict criteria should be used for the diagnosis of extracapsular disease. The authors indicated that, whilst they have shown the relative superiority of one magnetic resonance imaging method over another, they have not shown that either magnetic resonance imaging technique is a cost-effective supplement to conventional clinical staging.

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

Validity of estimate of measure of benefit
It is unclear whether the estimate of the measure of benefit used in the economic analysis is internally valid due to the lack of information about the methodology used in the literature reviews of effectiveness studies. Also, it should be noted that the utility values were derived from physicians’ estimates rather than patients’ preferences.

Validity of estimate of costs
Inadequate details of the methods of quantity/cost estimation were given (price year, quantities of resource use and duration of costs).

Other issues
The issue of generalisability was not addressed. The uncertainty in the data was accounted for only partially in the sensitivity analyses.

Source of funding

Supported partly by a grant from the National Cancer Institute (CA-50985-03) and by a GE-AUR Radiology Research Academic Fellowship.

Bibliographic details

PubMedID
8796502

Indexing Status
Subject indexing assigned by NLM

MeSH
Cost-Benefit Analysis; Humans; Magnetic Resonance Imaging /economics; Male; Models, Economic; Neoplasm Staging /economics; Prostate /pathology; Prostatic Neoplasms /economics /mortality /pathology; Quality-Adjusted Life Years; Sensitivity and Specificity; Survival Rate

AccessionNumber
21996000490

Date bibliographic record published
31/10/1998

Date abstract record published
31/10/1998