Cost-effectiveness analysis of unicompartmental knee arthroplasty as an alternative to total knee arthroplasty for unicompartmental osteoarthritis

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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
The objective was to examine the cost-effectiveness of unicompartmental knee arthroplasty in comparison with total knee arthroplasty for the treatment of isolated end-stage unicompartmental knee arthritis. Unicompartmental arthroplasty was cost effective when the durability and function of the implant were similar to those of a total knee implant. The quality of the study was satisfactory and, despite some limitations to the clinical data, a reasonably transparent analysis was presented. It is likely that the results reflected the available evidence.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to examine the cost-effectiveness of unicompartmental knee arthroplasty in comparison with total knee arthroplasty, for the treatment of isolated end-stage unicompartmental knee arthritis, in a hypothetical cohort of 65 year olds.

Interventions
The interventions were unicompartmental knee arthroplasty and total knee arthroplasty.

Location/setting
USA/secondary care.

Methods
Analytical approach:
A decision tree model, with a time horizon of 18 years, was used to combine the economic and clinical data. The authors stated that the perspective was societal.

Effectiveness data:
The effectiveness data were derived from published studies identified through a literature review. Using a series of keywords, 345 articles were initially identified. The exclusion criteria, for example, excluding studies published prior to 1994 and those with fewer than 50 patients, resulted in a total of nine studies being selected. The details of these were included in an on-line appendix.

Monetary benefit and utility valuations:
The utility weights associated with the various health states were derived from published studies. The instruments used to derive them were not reported.

Measure of benefit:
The measure of benefit was the quality-adjusted life-year (QALY) and these were discounted at a rate of 3% per annum.

Cost data:
The treatment costs associated with the two interventions were included. Gross costs were estimated from Medicare reimbursement data for the relevant Current Procedural Terminology and Diagnosis-Related Group. The price year was
1998 and all costs were presented in US dollars ($) and were discounted at an annual rate of 3%.

Analysis of uncertainty:
Sensitivity analysis was conducted on some of the key variables including the durability of unicompartmental knee replacement relative to total knee replacement. The results were presented as a range of incremental cost-effectiveness ratios.

Results
Unicompartmental knee arthroplasty resulted in 12.21 QALYs at a cost of $19,000 and total knee arthroplasty resulted in 12.19 QALYs at a cost of $18,995. The incremental cost-effectiveness ratio of unicompartmental knee arthroplasty over total knee arthroplasty was $277 per QALY gained.

The sensitivity analyses showed that these results were sensitive to the estimate of the durability of unicompartmental knee replacement relative to total knee replacement and the cost of unicompartmental knee arthroplasty. For example, the survival of unicompartmental implants (assumed to be 12 years) needed to be within three to four years of the survival of total knee implants (assumed to be 15 years) for them to remain a cost-effective alternative.

Authors' conclusions
The authors concluded that unicompartmental knee arthroplasty was a cost effective alternative to total knee arthroplasty for unicompartmental arthritis when the durability and function of a unicompartmental replacement were similar to those of a total knee replacement.

CRD commentary
Interventions:
The two interventions were reasonably well reported and relevant to the authors' setting.

Effectiveness/benefits:
While the sources searched to identify the effectiveness estimates were not reported, information on the search terms and exclusion criteria were provided. The details of the studies selected were not given, making it difficult to comment on their validity, but they were available in an on-line appendix.

Costs:
The authors reported that a societal perspective was adopted, but only the direct medical costs were included. The source for the cost data was reported, but these costs were presented as macro-categories, which reduces the possibility of replicating the analysis for other settings. Adjustments to the cost data, including the price year and discounting, were reported.

Analysis and results:
The model structure was presented graphically along with all the relevant details and modelling assumptions. The authors conducted an appropriate incremental analysis and the full results were presented. One-way and a multi-way sensitivity analyses were conducted on the modelling assumptions and parameters, enhancing the generalisability of the findings. The results were reported in detail and in their discussion the authors appropriately noted the limitations of their study.

Concluding remarks:
The quality of the study was satisfactory. Despite some limitations to the clinical data, the authors presented a reasonably transparent analysis and it is likely that the results reflected the available evidence.

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