Effectiveness of hip or knee replacement surgery in terms of quality-adjusted life years and costs


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 undertake a cost-utility analysis of (primary or secondary) hip and primary knee replacement surgery. The authors concluded that both procedures were cost-effective strategies from the perspective of the health care payer in Finland. The study had some methodological limitations and was based on some strong assumptions on the long-term costs and effects. Some caution is required when interpreting the authors’ conclusions.

Type of economic evaluation
Cost-utility analysis

Study objective
The objective was to undertake a cost-utility analysis of (primary or secondary) hip and primary knee replacement surgery.

Interventions
The two interventions were total hip arthroplasty (THA) and total knee arthroplasty (TKA). Both primary and revision THA were considered. Each procedure was compared with no surgical intervention, which was represented by the pre-operative condition.

Location/setting
Finland/hospital.

Methods
Analytical approach:
This economic evaluation was based on a single study. The time horizon of the analysis appears to have been lifetime, although the costs and quality-adjusted life-years (QALYs) were estimated at one year. The authors stated that the perspective of the health care provider was taken.

Effectiveness data:
The clinical data came from a within-group comparison study, with a sample of 385 consecutive patients undergoing scheduled hospital treatment in orthopaedics, between March and August 2002 at the authors’ institution. Only 279 patients provided complete data and 56 of these did not undergo the study procedures (either THA or TKA), which left 223 patients: 96 primary THAs, 24 secondary hip operations, and 103 primary TKAs. The mean age was 63 years for primary THA and 69 years for revision THA and TKA. The last assessment of health-related quality of life (HRQoL), which was the primary clinical endpoint, was taken between six and 12 months after the operation and the maximum follow-up was one year after the operation.

Monetary benefit and utility valuations:
The health utilities were measured by the 15 dimension HRQoL questionnaire in the sample of patients enrolled in the clinical study. The utilities were estimated at baseline, six months and 12 months after the operation.

Measure of benefit:
QALYs were the summary benefit measure and were discounted at an annual rate of 5%.
Cost data:
The economic analysis included all the relevant specialty-related costs such as the operation, ward care, ambulatory visits, laboratory, radiology, and pathology. The analysis also considered pre- and post-operative out-patient visits to the hospital. The resource use data were derived from the sample of patients enrolled in the clinical study. The costs were derived from the Ecomed Clinical Patient Administration System, which routinely stores all the costs of hospital treatment for individual patients in Finland. These costs were in Euros (EUR) and no discounting was required as they were incurred over a short time period. The price year was not reported, but the resource use data were retrieved in 2002 and 2003.

Analysis of uncertainty:
A univariate sensitivity analysis was carried out on the discount rates, and using alternative median values of QALYs and costs, as well as the upper and lower values of the 95% confidence interval for the mean differences in effectiveness (change in HRQoL score) and costs.

Results
In all the groups the mean utility score had improved, relative to the baseline, at both the six- and 12-month follow-ups, but this improvement was not statistically significant in the revision THA group at 12 months.

In comparison with baseline, the discounted expected QALYs gained from the operation was 0.708 (standard deviation, SD: 1.334) for primary THA, 0.127 (SD: 0.543) for revision THA, and 0.359 (SD: 0.744) for primary TKA.

The mean 12-month hospital costs were EUR 8,737 (SD: 2,786) for primary THA, EUR 11,239 (SD: 2,996) for revision THA, and EUR 8,047 (SD: 2,051) for primary TKA. Thus, the incremental cost per QALY gained with operation over baseline was EUR 6,710 for primary THA, EUR 52,274 for revision THA, and EUR 13,995 for primary TKA.

In the sensitivity analysis, the incremental cost per QALY gained ranged from EUR 4,767 to EUR 12,340 for primary THA and from EUR 9,874 to EUR 24,021 for primary TKA, depending on the assumptions made. Revision THA was dominated, which means it was more expensive and less effective, when using the lower value of treatment efficacy, and produced its most favourable estimate of EUR 19,857 per QALY gained, when using the upper value of treatment efficacy.

Authors’ conclusions
The authors concluded that primary THA and TKA were both cost-effective strategies from the perspective of the health care payer in Finland.

CRD commentary
Interventions:
The rationale for the selection of the comparators was clear and appropriate in that the post-operative period was compared against the pre-operative period.

Effectiveness/benefits:
The use of a before-and-after study has the advantage of not requiring an external control group because each patient acts as their own control. The main limitation of this design is time-related bias, as factors other than the intervention may affect the change in quality of life. In this case, the size of the sample was not confirmed by statistical calculations and the clinical evidence came from a single academic institution, which may not be representative of other health care centres. In general, these issues should be considered when assessing the internal validity of the study. The instrument used to elicit the patient preferences was validated and they were elicited from a sample of Finnish patients, which was a strength of the analysis. QALYs are also an appropriate benefit measure and allow cross-disease comparisons to be made.

Costs:
The categories of costs were consistent with the perspective. A breakdown of cost items was not provided and details on the unit costs, resource quantities, and the price year were not given, which reduces the transparency of the economic
analysis and the possibility of replicating it in other settings. The sources of costs were reported, but no detail of the specific accounting system (charges or true costs) was given.

**Analysis and results:**
The use of an incremental analysis to combine the costs and benefits was appropriate, and the expected costs and benefits were clearly reported. The issue of uncertainty was dealt with using a deterministic approach, which considered the confidence intervals for both costs and benefits. The QALY results appear to have been strongly influenced by the assumption of constant utility values over the lifetime after the operation, which may be unrealistic. Also, the long-term costs arising from the need for future operations were not considered. The use of a model would have allowed the long-term costs and effects to be more appropriately assessed. The authors compared their results with those from other publications and demonstrated that they had produced similar findings.

**Concluding remarks:**
The study has some methodological limitations and was based on some strong assumptions on the long-term costs and effects. Some caution is required when interpreting the authors’ conclusions.

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