Costs and cost-effectiveness in hip and knee replacements: a prospective 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.

**Health technology**
Total hip (THA) and knee (TKA) replacements in patients with primary arthrosis, primary operation, and total joint replacement.

**Type of intervention**
Treatment.

**Economic study type**
Cost-utility analysis.

**Study population**
Patients with primary arthrosis, primary operation, and total joint replacement.

**Setting**
Hospital. The economic study was carried out in Finland.

**Dates to which data relate**
The data for the effectiveness analysis and resources used were gathered between March 1991 and June 1992. 1992 prices were used.

**Source of effectiveness data**
The evidence for final outcomes was derived from a single study.

**Link between effectiveness and cost data**
The costing was undertaken prospectively on the same patient sample as that used in the effectiveness study (details of costs borne by patients were gathered from a subsample of the patients).

**Study sample**
Power calculations were not used to determine the sample size. There were 345 patients in the THA group and 223 in the TKA group. Each group was subclassified into three age groups (<=60 years of age; 61-70 years; and >70 years).

**Study design**
The study was a case-control study carried out in seven hospitals. The duration of follow-up was 2 years. The loss to follow up was 20% in the THA group and 21.1% in the TKA group.
Analysis of effectiveness
The analysis of the clinical study was based on intention to treat. The primary health outcome measures were changes in health-related quality of life (HRQoL) assessed by a 15-dimensional measure from which was derived a HRQoL index (the 15D score); quality of life dimensions (pain, mobility, and sleep), which changed postoperatively and which were measured by the Nottingham Health Profile (NHP); and changes in a sum score of activities of daily living (ADL) which were used as a measure of functional ability. The alternative groups were not shown comparable in preoperative characteristics.

Effectiveness results
The range of change in average 15D score was from 0.0314 (0.008=SD) in patients <70 years of age in the TKA group to 0.0888 (0.008) in patients <=60 years of age in the THA group. The range of change in 15D score, adjusted for its preoperative level, was from 0.204 in patients <70 in the TKA group to 0.0927 in patients <= 60 years of age in the TKA group. The range of change in NHP dimensions for pain (standard errors in parentheses) was from -47.75 (3.25) in patients <=60 years of age in the THA group to -28.6 (2.98) in patients <70 years of age in the TKA group. The range of change in mobility was from -39.19 (2.8) in patients aged 61-70 in the THA group to -22.02 (4.05) in patients <=60 years of age in the TKA group. The range of change in sleep was from -36.30 (7.75) for patients <=60 years of age in the TKA group to -12.54 (3.62) in patients aged 61-70 in the TKA group. The range of change in ADL was from -7.45 (0.74) in patients <70 years of age in the THA group to -4.26 (0.80) in patients <70 in the TKA group. The patients in the THA group showed constant improvement in their health-related quality of life reaching their maximum 15D score six months after the operation. The corresponding outcome in the TKA group revealed a slight decrease after reaching the maximum level in the six-month follow-up period (p>.05).

Clinical conclusions
The study revealed that patients in the THA group had a greater improvement in quality of life after operation than patients in the TKA group, even after adjustment for age and preoperative status.

Measure of benefits used in the economic analysis
The analysis of the clinical study was based on intention to treat. The primary health outcome measures consisted of changes in health-related quality of life (HRQoL) assessed by a 15-dimensional measure from which was derived a HRQoL index (the 15D score); quality of life dimensions (pain, mobility, and sleep), which changed postoperatively and which were measured by the Nottingham Health Profile (NHP); and changes in a sum score of activities of daily living (ADL) which were used as a measure of functional ability. The alternative groups were not shown to be comparable in preoperative characteristics. Patients’ values were used to assess the health-related quality of life.

Direct costs
Costs were not discounted. The resource quantities and costs were reported separately. The average total cost was the main measure of the costs. The average costs consisted of three broad categories including the costs of inpatient and outpatient services, and patients' out-of-pocket costs. The inpatient costs included the patient-related prosthesis costs, and the costs of patients' stay in the ward including operating theatre costs, wages, fees, depreciation costs of equipment, and administration costs. The outpatient costs comprised the costs of visits to different health providers and the cost of home visits. Unit costs for outpatient services were estimated based on the data obtained from the health organisations. The source of inpatient cost data was the national organisation in charge of hospital services. The cost calculations were performed from the perspective of the health service since, in the end, the patients' out-of-pocket costs were excluded from the study. 1992 prices were used.

Indirect Costs
Not calculated.

Currency
Finnish Marks. A conversion was carried out based on an exchange rate of US$1 = FIM 4.30).

**Sensitivity analysis**
Not performed.

**Estimated benefits used in the economic analysis**
The range of change in average 15D score was from 0.0314 (0.008 = SD) in patients <70 years of age in the TKA group to 0.0888 (0.008) in patients <=60 years of age in the THA group. The range of change in 15D score, adjusted for its preoperative level, was from 0.204 in patients <70 in the TKA group to 0.0927 in patients <= 60 years of age in the TKA group. The range of change in mobility was from -39.19 (2.8) in patients aged 61-70 in the THA group to -22.02 (4.05) in patients <=60 years of age in the TKA group. The range of change in sleep was from -36.30 (7.75) for patients <=60 years of age in the TKA group to -12.54 (3.62) in patients aged 61-70 in the TKA group. The range of change in ADL was from -7.45 (0.74) in patients <=60 years of age in the THA group to -4.26 (0.80) in patients <70 in the TKA group. The patients in the THA group showed constant improvement in their health-related quality of life reaching their maximum 15D score six months after the operation. The corresponding outcome in the TKA group revealed a slight decrease after reaching the maximum level in the six-month follow-up period (p>.05). The duration of the benefits was assumed to be 2 years.

**Cost results**
The average costs in FIM (standard errors in parentheses) were:

- Patients aged <=60: THA 50,790 (3,520); TKA 43,630 (6,900)
- Patients aged 61-70: THA 44,710 (2,180); TKA 47,060 (1,840)
- Patients aged <70: THA 44,110 (2,010); TKA 51,000 (3,300)

The duration of the costs was 2 years.

**Synthesis of costs and benefits**
A cost-utility ratio was calculated to combine the costs and benefits of the alternative technologies. The costs per unit change in the 15D score, as a measure of cost-utility, was calculated for each subgroup. The calculated values for the cost-utility ratio for the patient groups were:

- Patients aged <=60: THA 5.720; TKA 6.020
- Patients aged 61-70: THA 5.460; TKA 8.980
- Patients aged <70: THA 7.280; TKA 16.240

**Authors’ conclusions**
The cost-utility ratio for younger (<=60 years of age) knee patients did not differ from those of hip patients in all age groups, whereas TKAs in those over 60 years had a worse cost-utility ratio compared with all other patient subgroups. It was concluded that allocation efficiency can be improved by considering, not only the intervention, but also patient characteristics such as age. Indeed, the cost-utility ratio varied more across age groups of knee patients than between average THA and TKA patients.

**CRD COMMENTARY - Selection of comparators**
No justification was given for the choice of the comparator. You should consider whether it is a widely used health technology in your own setting.

**Validity of estimate of measure of benefit**

Lack of randomisation may have had adverse effects on the power of the study to detect the true benefits of the alternative health technologies. As the authors noted, the duration of the benefits was assumed to be two years, while figures show that the benefits would last for at least for ten years. The authors justified their choice of duration by pointing out the rate of advance of new technologies in this field and the possible irrelevance of previous figures on survival rates and life expectancy. This issue prevented them from calculating QALYs.

**Validity of estimate of costs**

The resource quantities and cost items were reported separately. Adequate details of the methods of cost calculations were given. Costs were not discounted despite this being methodologically necessary. It would seem appropriate to have included in this study the indirect costs of patients, but the authors did not do so. The average total costs of patients for the THA, and TKA groups, in general, were not reported.

**Other issues**

Because of the absence of randomisation and sensitivity analysis, the results need to be treated with some caution. P-values were not reported consistently for the effectiveness and cost outcomes.

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