The economic impact of failures in total hip replacement surgery: 28,997 cases from the Norwegian Arthroplasty Register, 1987-1993

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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 replacement (THR) surgery using a variety of implant combinations.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
Patients undergoing THR surgery whose data were collected in the Norwegian Arthroplasty Register.

Setting
Hospital. The study was carried out in Norway.

Dates to which data relate
Effectiveness, and resource use data were collected from September 1987 until January 1994. Cost data were derived from 1990-1995 sources. The price year was 1994.

Source of effectiveness data
Single study.

Link between effectiveness and cost data
The costing was undertaken on the same patient sample as that used in the effectiveness analysis. The costing was carried out prospectively alongside the effectiveness study.

Study sample
The following groups of primary THR were compared: the Charnley prosthesis (n=4,970), uncemented Ti-Fit/Bio-Fit combination (n=173), uncemented Coxa/Femora combination (n=153), THR with low-viscosity cement (n=1,807), and THR with Boneloc cement (n=1,250). No power calculations or exclusion criteria were reported.

Study design
This was a retrospective cohort study carried out at 64 hospitals (all relevant hospitals in Norway). Patients were followed up for 3-5 years.
Analysis of effectiveness
The basis for the analysis of the clinical study (intention to treat or completers only) was not clearly stated. The primary health outcomes studied included survival rate and revision rate. Groups were not compared in terms of demographic characteristics.

Effectiveness results
During the years 1987-1993, 199 combinations of cemented and uncemented prostheses were used. Uncemented arthroplasties were most commonly used in younger patients and the pre-operative diagnosis was less often primary coxarthrosis. The probability of revision at 5 years was 4.4% in the group of all other primary THR, compared to 2.2% in the reference group. The revision rates were as follows:

at 5 years for the Ti-Fit/Bio-Fit combination, 26%,
at 4 years for the Coxa/Femora combination, 17%,
at 5 years for THR with low-viscosity cement, 7%, and
at 3 years for the Boneloc combination, 8%.

Clinical conclusions
The revision rate was lowest in the reference group.

Modelling
No modelling was undertaken.

Measure of benefits used in the economic analysis
The number of revisions was used as the primary measure of benefits.

Direct costs
Direct costs were discounted at an annual rate of 3%. Quantities and costs were reported separately. Direct costs included the cost of the intervention and the treatment of post-operative complications. The quantity/cost boundary adopted was that of the hospital. The estimation of quantities and costs was based on actual data. Data were collected from the Norwegian Arthroplasty Register. The price year was 1994.

Statistical analysis of costs
Not reported.

Indirect Costs
Not included.

Currency
Norwegian kroner (NOK) with US$1 = 6.5 NOK.

Sensitivity analysis
Not reported.
Estimated benefits used in the economic analysis
An incremental analysis in relation to the reference group was conducted. The number of additional revisions at 5 years was 533 in the group of all other primary THR. For the Ti-Fit/Bio-Fit combination the figure was 39, 21 for the Coxa/Femora (4 years of follow-up) combination, 83 for THR with low-viscosity cement and 82 for the Boneloc combination (3 years of follow-up). The analysis also included estimated revisions per 1000 primary THRs adjusted for age, gender and diagnosis compared to the reference group. The differences, however, were almost identical.

Cost results
Compared to the reference arthroplasty, the group of all other primary THR gave an extra revision cost of $1.7 million per year. The extra revision costs for the first post-operative years for 1,000 Bio-Fit femoral prostheses amount to $0.7 million per year. Corresponding figures in the Coxa/Femora group were $0.08 million, $0.3 million in the low-viscosity cement group and $0.4 million in the Boneloc group.

Synthesis of costs and benefits
Cost and benefit measures were not combined into a cost-effectiveness ratio.

Authors' conclusions
The number of implants and implant combinations should be reduced and the clinical superiority in randomised trials should be a requirement before the marketing of new implants. The reference implant results in better outcomes at a lower cost and therefore dominates the alternatives.

CRD COMMENTARY - Selection of comparators
A justification was given for the comparator used; namely it was the most commonly used prosthesis in Norway. You, as a user of this database, should decide if this is a widely used health technology in your own setting.

Validity of estimate of measure of benefit
The analysis was based on a retrospective cohort study, which was appropriate for the study question. The study sample was representative of the study population. Patient groups, however, were not compared at analysis, but appropriate statistical techniques were undertaken to take account of potential biases and confounding factors. The authors did not derive a summary measure of health benefit, hence the analysis of cost-consequences design.

Validity of estimate of costs
All categories of costs relevant to the perspective adopted were included in the analysis. For each category of costs, all relevant costs were included. Costs and quantities were reported separately. No sensitivity analysis was conducted on quantities or costs. Survival curves were constructed by the Kaplan-Meier method. Adjustment for differences in age, sex, and diagnosis was carried out by stratification. The authors performed appropriate currency conversions and discounted costs. Charges were used to proxy prices, which introduces a limitation in terms of the generalisability of the results.

Other issues
The authors did make appropriate comparisons of their results with those from other studies; however, the issue of generalisability to other settings was not discussed. The authors did not present their results selectively. The study enrolled patients undergoing THR surgery and this was reflected in the authors' discussion.

Implications of the study
The number of implants and implant combinations should be reduced and clinical superiority in randomised trials
should be a requirement before the marketing of new implants.

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None stated.

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