

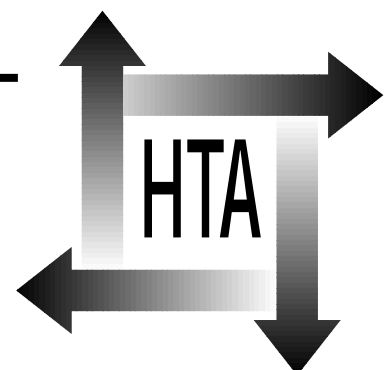
Executive summary

Effectiveness of hip prostheses in primary total hip replacement: a critical review of evidence and an economic model

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Executive summary

Objectives

- To review available evidence on the comparative effectiveness of different prostheses types in total hip replacement (THR) for adults suffering primarily from osteoarthritis.
- To develop an economic model, using cost data from two NHS orthopaedic centres, to model the cost-effectiveness of alternative prostheses under varying resource input assumptions.

Methods

The reviewers had the benefit of a large in-house database. Additional searches were conducted in Medline, 1980–95, using a modified Cochrane strategy for identifying randomised controlled trials (RCTs). Separate searches were conducted in Embase, 1990–96, to identify studies with comparison or control aspects. Further details are given in the full report.

For inclusion, studies had to provide clinical outcome data for specified prosthesis designs, comprising functional assessment, radiographic data or time to failure. There were very few RCTs. Priority was given to studies with an element of comparison. Checklists and simple rating scales were used.

NHS price data and data relevant to costs were obtained directly from two NHS Trusts and their associated orthopaedic centres. The total expected costs of THR included an element for revision of the primary operation.

Results

Appraisal of studies

Most of the studies came from specialist orthopaedic centres; this has a bearing on the generalisability of the results of individual studies. The methodological quality of the studies was generally poor, for example, lack of sample size calculations.

Comparison of prosthesis types

The following tentative conclusions can be drawn about the performance of different types

of prostheses. The various designs are described in the full report.

Cemented designs in general show good survival results at 10–15 years plus. Models with good, published, comparable results (at 10 years or more) include the Stanmore, Howse, Lubinus, Exeter and Charnley. The rate of acetabular revision in cemented implants remains problematic. Newer ('second-generation') cementation techniques usually give better results than more traditional techniques.

In comparing short- to medium-term longevity between **non-cemented porous-coated** and **cemented** prostheses designs, there is no clear advantage for either type. Thigh pain is a problem associated with non-cemented porous-coated implants to which cemented designs are not prone.

The small number of studies of **cementless hydroxyapatite (HA)-coated** models report mild to moderate thigh pain in between 0% and about 5% of patients at 2–5 years' follow-up, a good result compared with porous-coated implants.

Hybrid designs are comparable with the best cemented designs for early survival (6–7 years), superior both in terms of survival and thigh pain to porous-coated implants.

The **uncoated press-fit** and **resurfacing** types of hip prosthesis have survival results that are notably inferior to those of other types. Little evidence is available on **fully modular** prostheses.

Economic modelling

Using the economic model developed in this study, the general conclusions under our assumptions are summarised below.

Prosthesis cost, hospital costs and revision rate are the components of the model with the greatest impact in terms of changing total expected costs for THR procedures.

Very high and very low estimates of hospital costs change the total expected costs for individual prostheses but have little effect on their relative cost-effectiveness compared with each other.

Compared with survival data for the Charnley cemented prosthesis from 'centres of excellence', and assuming a prosthesis cost of £353 including cement, even a 'no revisions' prosthesis should not cost more than about £650 (at 1997 prices) to have equivalent total expected costs over 20 years. Only cemented prostheses are currently available at this price.

In 70-year-old men, for example, a low price prosthesis is generally more cost-effective than a high price prosthesis, even with a very low revision rate. In 40-year-old men, prostheses with high prices and low revision rates can be more cost-effective than low priced prostheses with higher failure rates.

Conclusions

Policy implications

- The major concern is the proliferation of novel designs of prostheses whose effectiveness is unknown. Mechanisms for improving use of appropriate prostheses could be examined. Aspects to consider are suggested in the full report.
- Healthcare commissioners could model costs of alternative prostheses, using their local input resource assumptions and outcome data, along the lines of the model described.
- Commissioners and providers could also:
 - ascertain the range and extent of use of routinely used prostheses known to have results poorer than the best cemented designs, distinguishing different design types and taking account of age-groups, and seek audit of outcomes, including revision rates
 - in the case of significantly new designs, satisfy themselves that appropriate monitoring and evaluation is carried out.

Research recommendations

Some of the key recommendations from the main report are as follows.

General

- Improvements are needed in the design and reporting of research studies in this area.
- Further inclusion of patient-derived quality-of-life measures in studies of hip prosthesis performance is essential, as clinical hip-scoring systems do not take the patient's views into account when assessing outcomes.
- Patients' values and choices regarding quality of life in relation to THR should be investigated.

Prosthesis types

- Reporting of longer follow-up studies, especially of hybrid and cementless HA-coated models, is required in order to assess further their early promising outcomes. Follow-up of the coated acetabular component of hybrid implants is required to ascertain the medium- and long-term performance of this prosthesis design.
- Results for thigh pain and longevity in HA-coated models require longer follow-up periods. The extent and significance to patients of thigh pain associated with porous and HA-coated implants should be assessed. Longer follow-up assessments are also required for porous-coated cementless and fully modular designs.
- Further exploration is required of the associations between radiographic signs of loosening/migration and later mechanical failure.
- More up-to-date information is needed on the use of new cementation techniques, so that their use can be encouraged.

Publication

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NHS R&D HTA Programme

The overall aim of the NHS R&D Health Technology Assessment (HTA) programme is to ensure that high-quality research information on the costs, effectiveness and broader impact of health technologies is produced in the most efficient way for those who use, manage and work in the NHS. Research is undertaken in those areas where the evidence will lead to the greatest benefits to patients, either through improved patient outcomes or the most efficient use of NHS resources.

The Standing Group on Health Technology advises on national priorities for health technology assessment. Six advisory panels assist the Standing Group in identifying and prioritising projects. These priorities are then considered by the HTA Commissioning Board supported by the National Coordinating Centre for HTA (NCCHTA).

This report is one of a series covering acute care, diagnostics and imaging, methodology, pharmaceuticals, population screening, and primary and community care. It was identified as a priority by the Acute Sector Panel.

The views expressed in this publication are those of the authors and not necessarily those of the Standing Group, the Commissioning Board, the Panel members or the Department of Health. The editors wish to emphasise that funding and publication of this research by the NHS should not be taken as implicit support for the recommendations for policy contained herein. In particular, policy options in the area of screening will, in England, be considered by the National Screening Committee. This Committee, chaired by the Chief Medical Officer, will take into account the views expressed here, further available evidence and other relevant considerations.

Reviews in *Health Technology Assessment* are termed 'systematic' when the account of the search, appraisal and synthesis methods (to minimise biases and random errors) would, in theory, permit the replication of the review by others.

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The editors have tried to ensure the accuracy of this report but cannot accept responsibility for any errors or omissions. They would like to thank the referees for their constructive comments on the draft document.

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