

Modular Dual Mobility (MDM®) clinical evidence

The Cost-Effectiveness of Dual Mobility Implants for Primary THA: A Computer-Based Cost-Utility Model

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Study objective:

The purpose of this study was to investigate the cost-effectiveness of dual mobility (DM) implants compared with conventional bearings for primary THA.

Methods and materials:

- Markov model analysis was conducted from the societal perspective with use of direct and indirect costs.
- Costs, expressed in 2013 U.S. dollars, were derived from the literature, the National Inpatient Sample, and the Centers for Medicare & Medicaid Services.
- Effectiveness was expressed in quality-adjusted life years (QALYs).
- The model was populated with health state utilities and state transition probabilities derived from previously published literature.
- The analysis was performed for a patient's lifetime, and costs and effectiveness were discounted at 3% annually.
- The principal outcome was the incremental cost-effectiveness ratio (ICER), with a willingness-to-pay threshold of \$100,000/QALY.
- Sensitivity analyses were performed to explore relevant uncertainty.

Background:

- Dislocation remains a clinically important occurrence following primary total hip arthroplasty, and it is a common reason for revision total hip arthroplasty.
- DM implants decrease the risk of dislocation but can be more expensive than conventional implants and have idiosyncratic failure mechanisms.

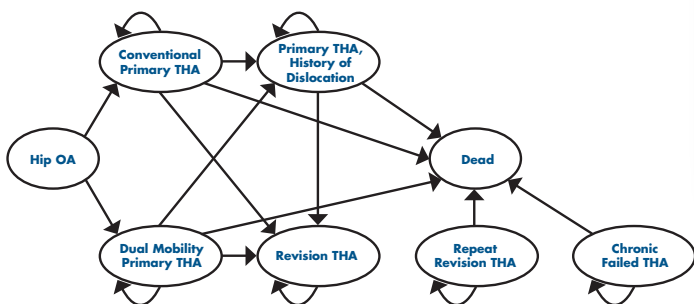


Figure 1: The structure of the Markov model for the treatment of hip osteoarthritis (OA) with either conventional total hip arthroplasty (THA) implants or dual mobility total hip arthroplasty implants is depicted. Each oval represents a chronic health state in the model. Straight arrows indicate possible transitions between health states, and curved arrows indicate remaining in the same health state. The death state is the absorbing state for the model.

Results:

- In the base case, the authors noted that DM total hip arthroplasty showed “absolute dominance” over conventional total hip arthroplasty, with lower accrued costs (\$39,008 versus \$40,031 U.S. dollars) and higher accrued utility (13.18 versus 13.13 QALYs) indicating cost-savings.
- DM total hip arthroplasty ceased being cost-saving when its implant costs exceeded those of conventional total hip arthroplasty by \$1,023, and the cost-effectiveness threshold for DM implants was \$5,287 greater than that for conventional implants.

Table 1

Two-way sensitivity analysis showing the cost-effectiveness thresholds for incremental DM costs versus age at the time of primary total hip arthroplasty*

Patient age at primary op. (yr)	Threshold cost for DM implants
50	\$7,554
60	\$6,135
70	\$4,554
80	\$3,926
90	\$2,993

*This table reports 2-way sensitivity analysis evaluating the incremental cost of DM implants over conventional total hip arthroplasty implants versus patient age at the time of the primary total hip arthroplasty. When the incremental cost of DM implants exceeds the reported value at the given patient age, conventional total hip arthroplasty is the preferred (dominant) implant option; DM total hip arthroplasty is preferred when the incremental cost is less than the value reported at a given patient age. The willingness-to-pay threshold was \$100,000 per QALY for this analysis.

- DM was not cost-effective when the annualized incremental probability of revision from any unforeseen failure mechanism or mechanisms exceeded 0.29%. The probability of intraprosthetic dislocation exerted the most influence on model results.

Discussion:

- This model determined that, compared with conventional bearings, if newer-generation DM implants meet specific economic and clinical benchmarks they may be cost-saving for routine primary THA from the societal perspective.
- Sensitivity analyses suggest that small differences in the clinical effectiveness of DM implants may influence their cost-effectiveness.
- For example, if the annualized probabilities of intraprosthetic dislocation, large articulation dislocation, or failure from unforeseen mechanisms exceed 0.49%, 0.29%, or 0.29%, respectively, then DM implants may not be cost-effective.
- While earlier series suggest that these probabilities are lower than these thresholds, newer-generation DM designs, which have known design differences compared with earlier implants, require further follow-up.
- The results underscore the cost and quality of life burdens that dislocations following total hip arthroplasty pose to the health-care system.

Conclusion:

- This analysis demonstrated that DM implants can be cost-effective for primary total hip arthroplasty compared with conventional total hip arthroplasty under specific conditions.

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