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Unicompartmental And Total Knee Replacement For Osteoarthritis Of The Knee: A Cost-Utility Analysis Using Data From Three National Registries

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Introduction: Contemporary economic analyses of unicompartmental knee arthroplasty (UKA) versus total knee arthroplasty (TKA) are conflicting. Accurate probabilities, utilities and costs are essential. National registries are the largest data source and also include detailed breakdown information regarding revision subtypes. To date, no cost-effectiveness analyses have combined multiple registry data, national utilities, and revision costing figures.

Objectives: The aim was to conduct the most comprehensive cost-utility analysis for UKA v TKA yet published, combining a separate bottom-up, costing study with data from national registries and, uniquely, comprehensive revision surgery data.

Methods: A Markov simulation model was constructed for analysis, which included both first and second revisions for TKA and UKA. The event horizon was the expected age of death. 2013 costs were used. Costs and utilities were discounted by 3.5%.

Costs were calculated following a comprehensive micro-costing analysis using data from the UK National Joint Registry (UKNJR) (n=75000 cases), Australian Joint Registry (AOANJRR) and the Swedish Knee Arthroplasty Register (SKAR), which also categorize type of revision procedure (n=20000). 20-year revision rates were obtained from combined UKNJR, AOANJRR, and SKAR data. Second revision rates were obtained from the AOANJRR (n=10 618). Mortality rates were sourced from UK Life Tables. EQ-5D utilities were obtained from the UK PROMS database (n=24 000).

Probabilistic and univariate sensitivity analyses were performed to address uncertainty in the model and the variables.

Results: UKA dominates TKA: UKA is both cheaper and more effective. For the healthcare provider, at a baseline age of 67, the strategy of choosing UKA is at a cost of £7,300 for 10.2 QALYs, and the choice of TKA £8,000 for 9.6 QALYs. This results in an incremental cost-effectiveness ratio (ICER) of -£1400 per QALY. If the threshold is set at £20,000 per QALY, the probability that UKR is cost-effective is 80%.

The micro-costing exercise determined that total cost for UKA was £5,700, TKA £7,400, revision UKA £9,600, and revision TKA £9,500

Sensitivity analyses showed that UKA continued to dominate TKA from 40-90 years, for 5 and 11-year horizons, and throughout the 95% confidence intervals for revision rates. Threshold analysis determined that even when TKR implants are supplied free of charge, UKR remains the cost-effective strategy.

Conclusions: UKR is the cheaper primary procedure and is the cost-effective arthroplasty strategy for knee osteoarthritis, despite its higher revision rate. This conclusion remains robust to sensitivity analysis. If UKR were to be performed for all patients who are suitable, then in the UK alone, annual savings of over £50million would be realised.