## Despite Higher Upfront Costs, Cemented Hemiarthroplasty Results in Substantial Cost Savings Over the Long Term Compared to Uncemented Hemiarthroplasty for the Treatment of Femoral Neck Fractures: A Markov Analysis

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INTRODUCTION: Despite a significant and growing body of evidence suggesting better outcomes with cemented vs. uncemented hip hemiarthroplasty (HHA), adoption of cemented HHA for femoral neck fractures (FNFs) has been slower than one may expect, with the 2023 American Joint Replacement Registry Annual Report demonstrating that cemented HHA was utilized in 50.62% of all FNFs in 2012 and 50.57% of FNFs in 2022. The exact cause for this is unknown and may range from lack of surgeon comfort with cementing technique to lack of awareness of the latest literature supporting its use. While there is growing scientific evidence supporting superior outcomes following cemented versus uncemented HHA in elderly FNFs, the relative cost-effectiveness of this in the United States is unknown. Thus, the purpose of this study was to compare the cost-effectiveness of cemented vs. uncemented HHA for the treatment of FNFs in patients > 60 years old.

## METHODS:

A Markov model utilizing Monte Carlo microsimulation was developed to evaluate the outcomes and costs of patients undergoing cemented vs. uncemented HHA for the treatment of FNFs based on an 80-year-old patient (Figure 1). Health utility values, transition probabilities, and upfront costs were derived from the published literature (Table 1). Outcome measures included average total costs associated with each treatment (including those from patients who sustained a periprosthetic fracture), quality-adjusted life-years (QALYs), and the incremental cost-effectiveness ratio (ICER). Sensitivity analyses were performed to assess model stability.

RESULTS: Mean total costs resulting from cemented and uncemented HHA were \$19,462±3,581 and \$21,997±3,574, respectively (Table 2). Average QALYs resulting from cemented and uncemented HHA were 4.04±0.74 and 3.10±0.59 (Table 2). Cemented HHA was found to be the most cost-effective treatment strategy in 89% of the patients in the Monte Carlo microsimulation model (Figure 2). Results of the deterministic sensitivity analysis demonstrated the model was highly stable (Figure 3).

## DISCUSSION AND CONCLUSION:

Despite higher upfront costs, cemented HHA was found to result in average cost savings totaling at least \$2,534 when compared to uncemented HHA. In addition, cemented HHA resulted in an additional 0.94 QALYs relative to uncemented HHA. These findings further underscore the financial and quality of life benefits for adopting cemented HHA for the treatment of FNFs in the elderly. Our results suggest it may be in payers' interest to incentivize the accelerated uptake of cemented HHA, which would be cost-effective up to approximately \$2,500 per cemented HHA. It has been well-documented that incentives can drive behavior in healthcare, both across all of medicine and within orthopedics (e.g., bundled payments resulting in over a \$5,000 reduction in total joint arthroplasty cost, primarily due to surgeon's changing implant choice and discharge disposition), and this may be an opportunity where appropriate incentives would yield better outcomes for all stake-holders (i.e., patients, physicians, and payers).

