

Cost Comparison Between Open Reduction and Internal Fixation and Non-operative Management for Ulnar Diaphyseal Fractures

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Disclosures: Herman Johal (2-Johnson & Johnson, Stryker; 9- Orthopaedic Research Society), Kim Rondeau (N), Ahmed Negm (N), Jessica Duong (N), Andrew Dodd (2- Arthrex Inc, Bioventus), Paul Duffy (4-Tactile Orthopaedics), Robert Korley (2-AO Asia Pacific, Johnson & Johnson), Prism Schneider (2-Stryker, Johnson & Johnson; 3B-Stryker; 5-Johnson & Johnson, Smith & Nephew; 8-Canadian Journal of Surgery; 9-Orthopaedic Trauma Association)

INTRODUCTION: Providing value-based care has become increasingly important; therefore, there is a need for cost-benefit assessments to inform surgical decision-making. Prior studies have reported on earlier functional recovery and reduced complication rates for patients with ulnar diaphyseal fractures treated with open reduction and internal fixation (ORIF) compared to non-operative treatment. This study aimed to complete a cost analysis comparing the differences in direct and in-directs costs between ORIF and non-operative treatment relative to the improvement in functional outcome scores for patients with isolated ulnar diaphyseal fractures.

METHODS: This is an *a priori* planned secondary analysis from a large randomized controlled trial comparing ORIF (plate and screws) with non-operative treatment (below elbow casting) for ulnar diaphyseal fractures. A cost-analysis was completed using data on costs and outcomes from the trial, including both direct costs of care (implant costs, hospital stay, readmissions, complications) as well as indirect costs (time off of work). Change in the Disabilities of the Arm, Shoulder, and Hand (DASH) functional outcome scores were used to quantify effectiveness, with an MCID of 10 used as a threshold for clinically significant improvement. Costs and outcomes were captured over a 1-year period. A Monte Carlo model was utilized to generate incremental cost-effectiveness ratios, using a probabilistic sampling strategy.

RESULTS: A total of 99 participants were included across 11 participating sites (mean age of 41.0 years; 73% male). The overall average direct and indirect costs for the ORIF group was \$21,332.95, while the overall average costs for the non-operative group was \$23,470.19. The overall change in DASH score for the ORIF group was 13.8, while the overall change for the non-operative group was 6.9 points. When combined, this resulted in an incremental cost-effectiveness ratio of \$325.05 per point improvement in DASH, or \$3,250.51 less costly to obtain a clinically important improvement in DASH functional outcome score with ORIF. Operative fixation is likely cost-saving when indirect costs are included (Figure 1). Using a cost effectiveness acceptability curve demonstrates >70% probability of cost effectiveness at a \$1,000/DASH point willingness-to-pay threshold (Figure 2).

DISCUSSION: Cost savings are becoming increasingly important for reducing overall healthcare costs. Cost comparisons allow for consideration of both direct and indirect costs. Using traditional thresholds, ORIF of isolated ulnar diaphyseal fractures would be considered a cost-effective treatment option. This study supports a shared decision-making approach that includes consideration for early functional benefit and cost savings with ORIF. This study supports that for the correctly selected patient, surgical management can provide early functional improvement and overall cost savings. Strengths include the use of prospective data from a large, multicentre randomized controlled trial, which increase generalizability of the results. Limitations include the single payer system analysis, which may limit cost comparison in other healthcare systems.

SIGNIFICANCE/CLINICAL RELEVANCE: Operative fixation for isolated ulnar shaft fractures was both less costly and associated with better DASH scores at one year. This study highlights the economic and functional value of operative treatment, especially when accounting for earlier return to work and reduced complication rates.

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IMAGES AND TABLES:

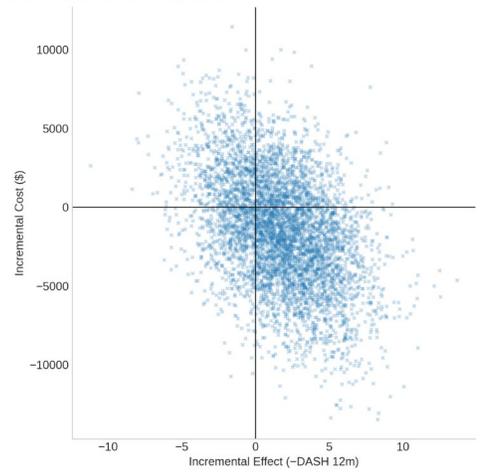


Figure 1: Cost effectiveness analysis plane scatterplot.

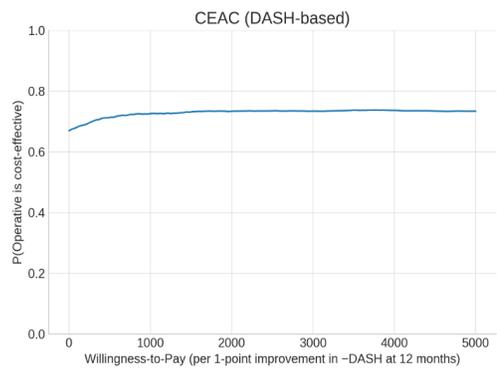


Figure 2: Cost effectiveness acceptability curve.