

Economic Benefits of Continuous Pressure Monitoring as an Aid for the Diagnosis of Acute Compartment Syndrome

Yasser Bouklouch, PharmD, MPH; Milan K. Sen, MD, FIOTA

Purpose: Acute compartment syndrome (ACS) is a serious complication following a traumatic injury. The current standard of care relies on clinical assessment, which has a low sensitivity and specificity. Recent clinical trials have shown that microelectromechanical systems (MEMS) used for continuous pressure monitoring have near-perfect sensitivity and specificity when used for the diagnosis of ACS in extremity fractures. We have analyzed their economic impact.

Methods: The model makes use of a decision-tree structure to estimate the cost of tibial shaft and plateau fractures at 60 days and 1 year after admission and in the patient's lifetime. The model follows the UK's NICE guideline methodology.

Results: The inflation-adjusted cost of uncomplicated tibial fractures is on average \$57,144. The performance of an unnecessary fasciotomy (Gr1) increased that cost by \$27,789. This increase was largely driven by the increased risk of deep surgical site infection followed by the increased risk of nonunion. The maximum 60-day cost was attributed to ACS cases leading to an amputation (Gr5) with a total cost of \$276,661. The improved specificity of the continuous pressure monitoring reduced the number of unnecessary fasciotomies by 94%. The small differences in sensitivity had limited impact on the ability to detect ACS. Over a 60-day time horizon, the model showed a decrease in length of stay estimated at 2.73 days on average per patient. The gain in quality-adjusted life-year (QALY) was limited to 0.004 per patient with a net health benefit of 0.04 QALY with the willingness-to-pay threshold at \$50,000 per QALY. The net monetary benefit was a positive \$1,541 in favor of the continuous pressure monitoring strategy. This gain improved substantially with the increased time horizon reaching a peak of \$4,573 over the lifetime of the patient. Most importantly, the continuous pressure monitoring showed dominance over the standard of care with the incremental cost-effectiveness ratio (ICER) set at \$50,000.

Conclusion: The sensor cost incursion is offset by the reduction in unnecessary fasciotomies and the costs associated with their complications such as infection, nonunion, and amputation.