

Poster #32

Research Study

Title: “Accuracy of Machine Learning to Predict the Outcomes of Shoulder Arthroplasty: A Systematic Review”

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Category: Orthopedics; other

Keywords: Orthopedic Surgery; Shoulder Arthroplasty; Machine Learning

Introduction and Objective. Artificial intelligence simulates cognitive capacities with computer systems to accomplish goals like problem-solving and decision making. Machine learning, a branch of AI, makes algorithms to find connections between preset variables, which produce prediction models. Machine learning can aid surgeons determine which patients may be susceptible to complications or worse outcomes following total shoulder arthroplasty (TSA), as well as aligning patient expectations following TSA. This systematic review assessed: 1) Can machine learning accurately predict the outcomes and complications after TSA? 2) Can machine learning accurately predict healthcare utilization including discharge disposition after TSA?

Methods. A systematic literature review in accordance with PRISMA guidelines was performed identifying primary research articles evaluating machine learning’s ability to predict outcomes of TSA. After removing duplicates, the initial query yielded 327 articles, and after applying inclusion and exclusion criteria, 11 articles were included for qualitative synthesis which discuss the relationship between machine learning and TSA.

Results. With accuracy of 90%, machine learning can predict 30-day postoperative complications, including reoperation. Machine learning predicted range of motion at various postoperative time points with 90% accuracy for TSA and 85% accuracy for rTSA. Machine learning predicts Patient-reported outcome measures and clinical improvement above the Minimal clinically important differences with 93-99% accuracy. In varying degrees, machine learning can predict length of stay (LOS), operative time, discharge disposition, or hospitalization costs.

Conclusions-Implications. Machine learning's ability to predict outcomes can aid in surgical risk classification and help surgeons to reduce complications and improve outcomes. Additionally, predicting different healthcare utilization factors such as LOS and discharge disposition with high accuracy makes machine learning a valuable tool that could reduce healthcare costs and help surgeons expedite the discharge process, potentially lowering healthcare costs and mitigating adverse events.