New prediction model could help inform patients of their risks of having shoulder replacement surgery

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A new model to predict the risk of serious complications after shoulder

replacement surgery has been developed in a collaboration between researchers from the University of Oxford, University of Bristol, and University of Copenhagen. The model could be an important tool to help both patients and doctors make more informed decisions about this common procedure.

Shoulder replacements are becoming increasingly common, with some countries seeing a 17-fold increase in surgeries over the past decade. However, serious adverse events including medical complications requiring admission to hospital can occur in over 5% of patients.

The new study, published in *The Lancet Rheumatology* provides patients with personalized estimates of their risk.

"Despite seeing a year-on-year rise of serious adverse events after shoulder replacement surgery, there is as yet no prediction model in widespread use to provide patients with personalized estimates of their expected risk," explained Epaminondas Markos Valsamis, lead author of the new paper.

"Patients, caregivers and clinicians have previously identified the importance of being able to make accurate predictions of patients' outcomes to make well-informed decisions."

In collaboration with researchers from the University of Copenhagen and the University of Bristol, the Oxford team used data from the National Joint Registry and NHS Hospital Episode Statistics in England to develop their risk prediction model. They analyzed information from over 40,000 shoulder replacement patients, looking at factors such as age and medical conditions.

The research team then externally validated the model on patient data from 6,600 shoulder replacements in Denmark, demonstrating that it

performs consistently well and can be applied broadly, beyond just the original English population.

"We found it was accurate and performed well both in England and Denmark and demonstrated that it has 'clinical utility,' meaning it is beneficial to use in clinical practice," said Markos.

The resulting model was able to take inputs such as age, sex, and whether a patient has certain medical conditions, and accurately predict their risk of experiencing a serious adverse event, such as chest infections, heart attacks, and strokes, requiring hospitalization within 90 days of their surgery.

"Patients need to have realistic expectations about their surgery, and this model helps bridge gaps in their understanding," said Gillian Coward, National Joint Registry Patient Representative. "Armed with their personalized risk information, patients can work closely with their surgeon to decide on the best course of action for their individual circumstances."

"As complications from shoulder replacement can significantly impact a patient's quality of life and recovery, as well as being a major cost driver for health care systems globally, patients, clinicians and health care systems all stand to benefit from this type of predictive tool," said Jeppe Vejlgaard Rasmussen, shoulder and elbow surgeon, University of Copenhagen.

More information: Epaminondas Markos Valsamis et al, Risk of serious adverse events after primary shoulder replacement: development and external validation of a prediction model using linked national data from England and Denmark, *The Lancet Rheumatology* (2024). DOI: 10.1016/S2665-9913(24)00149-8

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