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Surgeon volume and patient outcomes in shoulder replacement surgery

Higher volumes are associated with lower risks for patients

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The association between the volume of procedures performed by surgeons and patient outcomes has been well documented, notably in the context of hip and knee joint replacement surgery, with several studies showing that patients treated by surgeons with higher volumes experienced better outcomes, including lower complication rates, than patients treated by surgeons with lower volumes.^{1,2} This association has been extensively investigated using data from national hip and knee joint replacement registries. Evidence for other types of joint replacement surgery is more limited.

In the linked population based study, Valsamis and colleagues (doi:10.1136/bmj-2022-075355) used the UK's National Joint Registry and Hospital Episode Statistics for England to look at the association between surgeon volume and a range of outcomes following shoulder replacement surgery.³ Revision rates were investigated for a maximum follow-up period of 7.75 years. Other outcomes included reoperation (investigated for 12 months after surgery), length of hospital stay, and major adverse events.

Shoulder arthroplasty procedures are becoming increasingly common globally, particularly in high income countries such as the United States, Australia, and those in Europe.⁴ Even though this growth is allowing some surgeons to achieve a higher volume, a 2020 Australian joint registry study covering a period of 13 years found that most surgeons (78%) performed fewer than 10 shoulder arthroplasty procedures annually.⁵

Valsamis and colleagues analysed data from a total of 39 281 shoulder replacement operations and found that patients treated by surgeons who performed at least 10.4 arthroplasty procedures annually showed a lower risk of revision surgery than those treated by surgeons who performed fewer than this threshold (relative risk reduction 44.8%; hazard ratio decreased from 1.94 (95% confidence interval 1.27 to 2.97) to 1.07 (1.00 to 1.14)). Patients treated by higher volume surgeons also showed a lower risk of reoperation (relative risk reduction 53.1%; odds ratio decreased from 1.29 (95% confidence interval 1.06 to 1.57) to 0.60 (0.41 to 0.90)) and serious adverse events and shorter inpatient stays (relative risk reduction 61.9%; odds ratio decreased from 1.38 (1.24 to 1.54) to 0.53 (0.43 to 0.65)), although no minimum case volume threshold was identified for these outcomes.³ The authors also noted that surgeons' average annual volume of procedures over the course of their career was more important for better patient outcomes than variation in annual procedure volumes.

The association between surgeon volume and outcomes has been a crucial part of the GIRFT (Getting It Right First Time) programme, which was launched in 2012 with the aim of improving the delivery of orthopaedic services across the UK. Provision of "lower volume" procedures such as elbow replacement surgery was one of the factors this programme addressed, resulting in the publication in 2018 of the British Elbow and Shoulder Society guidelines advocating the centralisation of elbow replacement surgery to select hospitals.⁶ No such guidelines currently exist for shoulder arthroplasty, and evidence from studies such as that by Valsamis and colleagues should help guide policy decisions in this area. Investigating the association between surgeon volume and hospital case volume could also aid in the decision making around centralisation of care and establishing a "hub-and-spoke" network for shoulder arthroplasty.

Importantly, the association between surgeons and patient outcomes is a complex one that can be difficult to evaluate scientifically. National databases and registries provide researchers with substantial high quality data. The numbers, however, do not necessarily reflect what actually happens in the clinical setting.

Patient characteristics and complexity vary considerably, particularly in shoulder arthroplasty, which is generally considered a technically more difficult procedure and arguably has greater potential for technical errors and complications than hip or knee replacement surgery.⁷

Registry data do not reliably capture patient reported outcomes (quality of life, functional and wellbeing measures) and often report only revision rates or major adverse outcomes. Patients can experience pain and functional limitations related to their prosthesis but choose not to undergo a reoperation. The Danish Shoulder Arthroplasty Registry contains scores for patient outcomes and there seems to be a degree of disconnect between the number of patients having revision procedures and the number of those reporting low satisfaction on functional scores.⁸

Valsamis and colleagues' study is a useful addition to current knowledge of the association between surgeon volume and patient outcomes, especially considering the limitations of data in the UK National Joint Registry and Hospital Episode Statistics. Registry data need to be interpreted carefully at surgeon, hospital, and national level, as currently available outcome measures may not tell the whole story.

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