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Commentary: The reality of The Society of Thoracic Surgeons risk calculators at high volume centers

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In a large single-center retrospective series, Johnston and colleagues¹ report outcomes of low-risk surgical aortic valve replacement (SAVR) in 3474 patients between 2005 and 2017. The authors used Society of Thoracic Surgeons (STS) risk models and found observed-to-expected ratios of <1 for mortality (0.27; 95% confidence interval [CI], 0.14-0.42), stroke (0.65; 95% CI, 0.41-0.89), and reoperation (0.50; 95% CI, 0.42-0.60).

Few will find it surprising that the Cleveland Clinic, one of the world's largest cardiac surgical centers, achieves SAVR outcomes superior to STS predictive models. Importantly, the authors also show that outcomes have improved over time for low-risk patients undergoing SAVR through a series of quality improvement efforts, including standardized pre-operative screening and imaging protocols, intraoperative pump and cardioplegia protocols, a pre-chest closure checklist to reduce bleeding, early extubation protocols, and a Cardiac Medical Emergency Team all oriented toward standardization and patient safety. These findings are a testament to the impact of continuous quality improvement, even at an already high-volume, high-performance center. Similar efforts have been undertaken through statewide initiatives in Michigan^{2,3} and Virginia⁴ and a nationwide collection of quality improvement collaboratives, thereby benefiting large patient populations.⁵ These studies have demonstrated that a significant amount of outcome variation is not explained through traditional STS risk models and instead may be related to patient selection, organizational structure, and

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CENTRAL MESSAGE

Outperforming national risk models for surgical aortic valve replacement is achievable. Continued optimization of cardiac risk models is necessary to provide useful data for clinicians and patients.

care processes.^{6,7} Notably, lower-volume centers may not have the ability to select patients for SAVR in the same way as large referral centers but may be able to implement similar quality improvement techniques.

The authors indicate these data could provide a benchmark for transcatheter aortic valve replacement (TAVR). Recently published data showed that TAVR was superior to SAVR in low-risk patients with regard to a composite endpoint of death, stroke, or rehospitalization at 2 years in the randomized PARTNER 3 trial, which included patients from Cleveland Clinic and other high-volume centers.⁸ Notably, these findings require verification with longer-term follow-up as has been performed for SAVR. We advocate for a lifetime management approach to the aortic valve and make treatment decisions in conjunction with the heart team and through shared decision making with each patient, which results in most of our low-risk patients undergoing SAVR.

Lastly, the authors suggest that the substantial improvements in performance relative to the expected outcomes from STS risk models support the development of a "more agile 'real-time' risk tool, such as that being developed by the American Association for Thoracic Surgery Quality Gateway."¹ In parallel, the STS also has initiated updates to the Adult Cardiac Surgery Database, including cloud-based technology and a similar plan to utilize real-time results.⁹ For more accurate modeling, it may be useful

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to add a procedure-specific operative volume variable to STS risk models to reflect the variable volume–outcome relationships exhibited across different cardiac surgical procedures. Further improvements to risk prediction also could involve machine learning and predictive modeling, as discussed by the authors, and may be best and most efficiently achieved in a collaborative fashion between the 2 major North American cardiothoracic societies.

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