RAMR with valve surgery than the low-volume centers, but such was not the case with CABG procedures.

These findings reflect some features of cardiac surgery in New York State. However, the quality of cardiac surgery is hard to measure. RAMR is just one aspect. Other important indices include rates of major complications, readmission, and long-term survival, for which not enough is publicly reported. For practicing cardiac surgeons, still other details are of interest. These include use of internal thoracic arteries in CABG, rates of off-pump approach in CABG, rates of conversion to on-pump, and rates in degenerative mitral valve repair.³ These seem important for quality improvement in cardiac surgical procedures, but there seem to be no publicly reported data and no impact on marketing and current reimbursement healthcare policy.

Relevant realistic questions include the following. Will these volume-outcome relation data trigger any improvement in the quality of cardiac surgery, and if so, how?

Will some surgeons and hospitals simply defer the high-risk patients? Will healthcare policymakers limit numbers of cardiac surgery centers? Most important, what will be the benefits for patients undergoing cardiac surgery? One may expect opinions and arguments on these issues to abound. But I sincerely thank Shang and colleagues¹ for drawing the attention of our readers to the cardiac surgery status in New York State and reality of the volume-outcome relationship for all those involved.

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Commentary: Does only the practice make the master?

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In this issue of the *Journal*, Shang and colleagues¹ analyze the impact of procedural volume and market share (ie, volume concentration) on 30-day mortality after cardiac surgery. Publicly available data related to the outcomes after coronary artery bypass grafting (CABG) and/or valve surgery performed between 2005 and 2016 in hospitals in

CENTRAL MESSAGE

The influence of patient volume on surgical outcomes has been evidenced in this paper. This precedent should be considered for future policy changes regarding patient safety and outcome improvement.

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New York State are reported and analyzed. The main finding of this study is that valve surgery volume keeps increasing in high-volume centers, thereby continuously widening the outcome gap between high-volume and low-volume cardiac surgery centers.

The authors' findings are well in line with the current guidelines for the management of valve disease.² Although

the volume-dependence of the learning curve for technically challenging valve operations has been described previously,³ this article provides important updated scientific support for the conception that higher patient volumes lead to better outcomes. Moreover, it is important to ensure that volume concentration does not worsen volume-based outcome disparities, leading to unacceptable results in low-volume centers. Hence, this remarkable study will help guide future policy changes aimed at ensuring patient safety according to minimal standards of quality and quantity.

The authors also provide excellent insight into the developments in modern cardiac surgery during the last decade, reflecting not only the increasing diagnosis of valve diseases and the trend toward treating valve disease in “centers of excellence”, but also the significant increase in percutaneous catheter interventions for treating coronary artery disease, which leads to a reduction in CABG operations.

The concept of “high-volume centers” should not be mistaken with the concept of “high-volume surgeons,” because high-volume centers might have more surgeons on staff, leading to fewer cases per surgeon. Moreover, results depend not only on the technical abilities of the surgeons, but also on the performance of the whole team. The benefits of a multidisciplinary high-quality, well-trained surgical team have been widely observed in the treatment

of endocarditis, perhaps the most complex valve disease.⁴ Additionally, the authors corroborate with their results that the intra- and postoperative management of patients undergoing valve surgery is usually more complex than for patients undergoing CABG, thus explaining the author’s observed lower mortality after valve surgery in high-volume centers.

Therefore, we personally believe that high-volume centers can effectively improve results, not only because “practice makes the master,” but also because high-volume centers favor the conditions for gathering multiple technological and human resources in a single place, leading to resource optimization and improvements in the treatment of complications that may be beyond our cardiac surgical expertise.

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