management. It is reassuring to see that case volumes will probably continue to increase, but training programs will have to adapt to train residents appropriately. Use of simulation labs and comprehensive didactic sessions will be paramount to yield proficient surgeons.

Recently, more attention is being given to milestone-based operative education as a marker of surgical competency.[8] Trainees learn different skills at varying speeds and comfort levels. While case logs do not accurately depict proficiency, they are a useful metric. As integrated cardiothoracic residencies become more commonplace, we will be training younger, less-developed residents. There will be a wider range of preparation and readiness among trainees. Programs will have to devote more time to maturation processes that previously had occurred during a general surgery residency. Case volume will be just one component in creating a competent cardiothoracic surgeon going forward.

The field of cardiothoracic surgery is changing. With these changes, programs will need to evolve how they train residents. Shah and colleagues have shown that case volume for each trainee is increasing. However, case volume will need to be complemented by many other elements to train proficient surgeons for the future.

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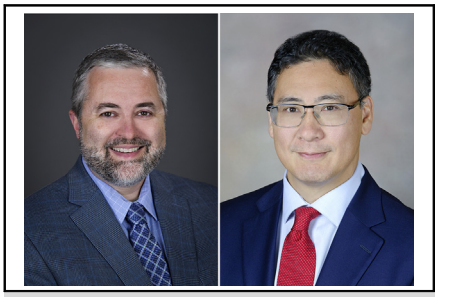
Commentary: The kids are alright

Gurion S. Lantz, MD, and Frederick A. Tibayan, MD

The growth of percutaneous coronary and valvular interventions, as well as improvements in medical management, are associated with decreases in the number of bread-and-butter cardiac surgeries, such as coronary artery bypass grafting (CABG) and surgical aortic valve replacement (SAVR).[1]



Gurion S. Lantz, MD (*left*), and Frederick A. Tibayan, MD (*right*)

CENTRAL MESSAGE

Despite the changing clinical landscape and decreasing numbers of cardiac surgery cases nationwide, the average resident cardiac surgical volume increased from 2016 to 2019.

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Has this changing landscape had an adverse effect on cardiothoracic surgery (CTS) trainees' surgical volume? In this issue of the *Journal*, Shah and colleagues[2] seek to answer this important question by analyzing Accreditation Council for Graduate Medical Education (ACGME) case log data to identify trends in reported resident case volume between 2016 and 2019.

Assessing the operative exposure of our CTS trainees is eminently sensible. With few exceptions, more operating makes for better operators. Reassuringly, despite the rapidly evolving landscape, much of which favors medical or percutaneous therapies, the authors found that average resident cardiac case volumes increased during the study period. Importantly, this analysis held true not just for total cases, but also for category-specific cases. And although cardiac track residents had greater increases, thoracic track residents also reported larger cardiac case volumes.

There is a clear imperative in CTS training to deliver robust clinical exposure, both in case volume and in direct operative experience. Although the latter is difficult to objectively assess across multiple programs, case numbers are a reasonable surrogate, because these data are captured by the ACGME as a prerequisite for graduation. The accurate recording of cases in these logs has been debated,[3] and once the minimum cases are captured, there may be little incentive to continue recording cases in a particular category. We encourage all residents to log all their cases beyond the minimums, not only because it helps track program performance, but also because this record of additional experience is "money in the bank" when applying for a job.

Although a perfect study would assess the amount of hands-on operative experience and proficiency of trainees, these data are difficult to capture on a large scale. Many interesting questions related to individual resident data and comparison of integrated, 2-year, and 3-year programs cannot be answered by this otherwise powerful ACGME dataset.

Concerns about surgical case volume are not new. The early days of percutaneous coronary intervention generated concerns about training and predictions of the death of cardiac surgery. But far from dying, the field has remained robust and embraced new technology, as clearly evidenced by the integral role of surgeons in structural heart teams. As we bring this new generation of trainees into the field, they will have to learn new percutaneous skills and achieve proficiency in open surgery. Surgical educators must be up to the challenge to ensure that "the kids are alright."[4]

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