D.N.F. has received consulting/speaker's fees from Eli Lilly, Daiichi-Sankyo, Abbott Vascular, Pfizer, and Bristol-Myers Squibb. All other authors have nothing to disclose with regard to commercial support.

PERI- AND POSTOPERATIVE CARE AFTER CORONARY ARTERY BYPASS GRAFTING IN LOW VERSUS HIGH VOLUME CENTERS

Reply to the Editor:

We thank Dell'Aquila and colleagues for their editorial regarding our article. Indeed, the care of patients with coronary artery disease undergoing coronary artery bypass grafting is incredibly complex. Upon entering the hospital, the typical patient encounters a myriad of health care providers and staff: the surgical team, anesthesiology team, perfusionists, nursing staff, intensive care unit staff, physical and occupational therapists, nutritionists, and additional consulting teams. Hospital management staff strives to meaningfully and efficiently coordinate these providers to ensure operational success and superior patient outcomes.

Given its limited scope, the National Inpatient Sample database cannot account for the quality and interaction among the aforementioned factors, particularly at the level of preoperative and postoperative care. Higher-volume centers tend to have more resources devoted to the treatment of critically ill patients, whereas lower-volume centers may have insufficient allocation or availability of resources, inadequate intensive care, lack of specialty consultants, or poor hospital management. Poor outcomes may be less related to surgical case volume and more heavily influenced by other forces.

There have been numerous reports demonstrating an association between hospital volume and outcome, for instance in carotid endarterectomy,¹ septal myectomy,² and surgical aortic valve replacement.³ Given the familiarity of operators and staff with the performance of inherently complicated procedures and subsequent postoperative care, higher-volume centers may be a surrogate for quality insofar as they have the ability to coordinate the various resources necessary to produce better patient outcomes. Better organized health systems may mitigate the negative effects of lower-quality operators.

Our article seeks to inform the readers that complications, including perioperative mortality, are more frequent in hospitals that perform coronary artery bypass grafting less often (Figure 1). Causal relationships cannot be inferred because many variables, not accounted for in the

FIGURE 1. Adverse event rates after elective coronary artery bypass grafting by quartiles of hospital volume.

database, affect quality beyond patient level characteristics and hospital volume. Further elucidation of the relative contribution of each factor to clinical outcomes is beyond the scope of our article and represents an opportunity for additional investigation and research.

Luke K. Kim, MD
Patrick Looser, MD

Dmitriy N. Feldman, MD
Division of Cardiology
Weill Cornell Medical College
New York Presbyterian Hospital
New York, NY

References

- Kim LK, Yang DC, Swaminathan RV, Minutello RM, Okin PM, Lee MK, et al. Comparison of trends and outcomes of carotid artery stenting and endarterectomy in the United States, 2001 to 2010. *Circ Cardiovasc Interv.* 2014;7:692-700.
- Kim LK, Swaminathan RV, Looser P, Minutello RM, Wong SC, Bergman G, et al. Hospital volume outcomes after septal myectomy and alcohol septal ablation for treatment of obstructive hypertrophic cardiomyopathy: US Nationwide Inpatient Database, 2003-2011. *JAMA Cardiol.* 2016;1:324-32.
- Agarwal S, Garg A, Parashar A, Svensson LG, Tuzcu EM, Navia JL, et al. In-hospital mortality and stroke after surgical aortic valve replacement: a nationwide perspective. *J Thorac Cardiovasc Surg.* 2015;150:571-8.e8.

<http://dx.doi.org/10.1016/j.jtcvs.2016.06.042>

SECOND STAGE OF HYBRID PATHWAY: HAVE WE REACHED A CONCLUSION?

To the Editor:

There is no doubt that patients with hypoplastic left heart syndrome continue to present a challenge, none more so than those who have received initial hybrid palliation, a procedure reserved for high-risk patients in many institutions. The anatomic constraints imposed by the initial pulmonary artery (PA) banding and duct stenting further complicate