

Does It Matter Who the Anesthesiologist Is for My Heart Surgery?

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Patients choose surgeons carefully. Conversely, patients typically accept whatever anesthesiologist is assigned, and rarely know the name of their anesthesiologist until the day of surgery. Hospital administrators and operating room directors regularly move and reschedule anesthesiologists to cover any case and maximize efficiency. We are perceived as interchangeable cogs in the perioperative machine, at least within groups (e.g., those who routinely do cardiac cases). The assumption underlying this practice is that any similar anesthesiologist will do, and that substitution of Anesthesiologist A for Anesthesiologist B does not change patient outcome.

In this issue of *Anesthesia & Analgesia*, Glance et al.¹ demonstrate that these assumptions may be incorrect and indeed harmful to patients. The uncomfortable finding of Glance et al. is that the individual anesthesiologist has a substantial impact on outcome after coronary artery bypass graft surgery. The authors investigated a large database of cardiac surgical patients in New York State. They defined a composite end point of death, postoperative myocardial infarction, renal failure, or stroke. They adjusted the risk of this composite outcome for patient demographics, severity of cardiac disease, and patient comorbidities. In modeling this adjusted risk of the composite end point by anesthesiologist and hospital, they demonstrated significant variability in the rate of death or major morbidity after coronary artery bypass graft surgery by anesthesiologist. This risk was independent of hospital variability, patient comorbidities, or stratifying across low-risk and high-risk patients.

The magnitude of the anesthesiologist effect observed by Glance et al.¹ is significant. The risk-adjusted rate of the composite outcome occurred in 3.33% of patients whose anesthesiologists were in the worst quartile and occurred in 1.82% of patients whose anesthesiologists were in the best quartile. This translates to an absolute risk difference of 1.51% for the

composite outcome between best and worst quartile of anesthesiologists. The number needed to harm was 66. That is, for every 66 patients who are assigned to an anesthesiologist in the worst quartile, rather than an anesthesiologist in the best quartile, 1 will have a bad outcome because of the anesthesiologist assigned to them. If one compares the risk for worst 10% of anesthesiologists (4.57%) to that for the best 10% of anesthesiologists (1.31%), the absolute risk difference is 3.26%. The number needed to harm is just 31! To put this in perspective, the number needed to treat of aspirin in patients with unstable angina was 20.²

What should we make of Glance et al.'s¹ findings? First, we should consider that there are important limitations of the analysis. For example, the authors controlled for hospital effects, but not for the effect of variability in the individual surgeon. Their demonstration of low correlation between anesthesiologists and surgeons reduces the potential that anesthesiologist quality may be a proxy for surgeon quality. Otherwise, the results could be explained away by saying that high-quality surgeons simply choose to work with high-quality anesthesiologists. Their analysis does not support this alternative interpretation, but it does not entirely eliminate this possible explanation.

Glance et al.¹ used sophisticated statistical methods. Though there are multiple ways the data could be modeled, the methods used are sound and robust. The fixed-effects modeling they used treats each anesthesiologist as a constant variable. This cannot account for a bad day, or more importantly, for a learning curve. Because this technique cannot model providers without at least 1 success and 1 failure, it also required the authors to exclude 1571 cases (17%) and 22 anesthesiologists (19%). This methodological limitation also means that this report cannot offer a comparison of interanesthesiologist variability to that of surgeons. That's too bad! It would be interesting to ask whether the assignment of a particular anesthesiologist matters as much as (or more than) the choice of a particular heart surgeon.

Furthermore, the study sample size is not as large as some might like: with 23 hospitals and 91 anesthesiologists, it is a smallish study for such a bold claim. However, the authors demonstrated a dose-response relationship (the risk of the primary outcome increased steadily across all strata of anesthesiologist performance, i.e., signs of increased risk were not limited to, for instance, only the lowest-performing level) and the results were consistent across patient risk categories, features which increase confidence in the study's findings.

While we recognize these potential limitations, they do not significantly detract from the provocative question that

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arises from these findings: By what mechanism does the practice of a specific anesthesiologist influence outcomes that surely depend on the actions of multiple providers at multiple time points? There is “biologic plausibility” as many aspects an individual anesthesiologist’s judgment and interventions might influence patient outcome. An anesthesiologist’s decisions about transfusions, fluid management, and hemodynamic support may affect long-term outcome. Outcome may also reflect how quickly and effectively an anesthesiologist responds to treat intraoperative hemodynamic instability, how adroitly the anesthesiologist diagnoses and resuscitates intraoperative bleeding, and how well the anesthesiologist communicates and collaborates with the surgeon, perfusionist, and nursing team. These and other aspects of anesthetic care could translate into effects on stroke, myocardial injury, renal failure, and death.

Understanding the mechanism by which a “good” anesthesiologist (whatever that means) improves patient outcomes may identify systems factors that promote better performance. Knowledge of these factors could be incorporated into guidelines and best practices. For example, we know very little about whether outcome is influenced by anesthesiologists’ training (fellowship, echocardiography, etc.), maintenance of certification, staffing models (i.e., working alone versus covering 1 resident, covering 2 residents, or covering 2 or more Certified Registered Nurse Anesthetists), or call-coverage models for emergency cardiac cases (i.e., dedicated cardiac anesthesiologist coverage versus general call team).

In addition, the study requires us to ask whether the outcomes for anesthesiologists should be reported, as those for surgeons and hospitals are. Such reporting would require careful effort to appropriately risk-adjust outcomes, to avoid encouraging physicians to game the system and preferentially “cherry-pick” low-risk patients. The risk for systematic error is significant. Even among busy anesthesiologists, random error in estimates of outcomes will be large. This type of reporting also could have important effects for patients, surgeons, and hospitals. Should patients be encouraged to pick their anesthesiologist? If so, what tools should we provide them to guide their decision-making? Would patients “shop” for an anesthesiologist separately instead of shopping for a surgeon? Or would high-performing surgeons and hospitals be motivated to pair with high-performing anesthesiologists to optimize patient outcomes?

More fundamentally, these results present a quandary about what we make of interprovider variability in outcomes. This might be described as the problem of Lake Wobegon (the fictional Minnesota town of Garrison Keillor’s creation where “all the women are strong, all the men are good looking, and all the children are above average”). Every stakeholder in the increasingly fraught game of measuring health care quality wants to be in the top quartile. Mathematics and logic force us to confront the uncomfortable truth (as Atul Gawande³ has pointed out in his essays) that in medicine, as in all human endeavors, there is a range of competency and outcomes. No more than one-quarter of us can be in the quartile of providers. Half of the readers of this editorial are less capable than average (sorry).

We could use performance metrics to eliminate those providers in the bottom half, but this would just move the goalposts. The result would be that the “average” provider was suddenly at the bottom of the barrel. Who wants the worst provider? We could continue eliminating the bottom half of providers until there was only 1 provider left. Sadly, by definition, the remaining individual would be merely average.

While we cannot escape the inevitability of variability, and the fact that as many of us will always be below average as above average, what Glance et al.¹ have provided is a demonstration of the magnitude of variability in performance. This variation appears to translate to preventable deaths and complications, which poses profound challenges for anesthesiologists to take ownership of this contribution to perioperative outcomes.

If anesthesiologist quality does matter (and it does), we should incorporate this into our goals as a specialty. Does improving quality mean reducing variability in outcomes, such that the average provider’s outcomes do not change but the spread between the lowest and highest quartiles is diminished? That is, making the bell curve narrower (Fig. 1)? Efforts to provide more protocol-driven perioperative decision-making may tend towards this strategy, focused on decreasing the variability between providers that results from individual decision-making. How much variation is acceptable? Or does quality improvement mean shifting the overall range of outcomes, such that a bell curve of similar shape persists but the curve is centered on an average outcome that is better than the current one? Should we accept interprovider variability based on the premise that “a rising tide lifts all boats” (Fig. 2)? Should we conclude that humans are not machines but individuals of varying skills, and focus on assigning our clinical superstars to the most demanding cases, while the rest of us handle the routine cases? These questions mirror fundamental questions debated in our society that values egalitarianism but provides differential rewards for differential performance.

Glance et al.¹ provide convincing evidence that your cardiac anesthesiologist matters. This is not a surprise to those aware of the cognitive and technical skills required for cardiac anesthesia. However, it provides firm evidence that even our most highly trained colleagues are not interchangeable cogs in a health services machine. The challenge

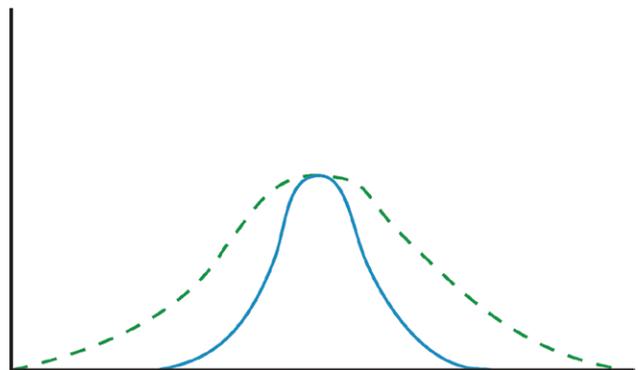


Figure 1. One model of quality improvement focuses on reducing variability in outcomes (change from the green dotted line to the solid blue line) without any change in the average outcome.

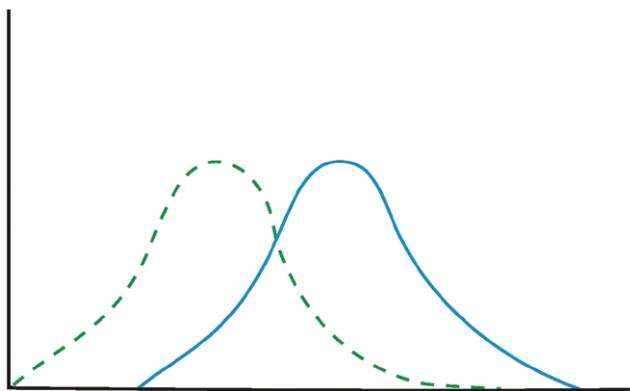


Figure 2. Another model of quality improvement focuses on improving the average outcome (change from the green dotted line to the solid blue line) without any change in variability in outcomes.

for our specialty is to leverage these findings to improve quality and optimize outcomes for all patients. ■■

RECUSE NOTE

Dr. Charles Hogue is the Associate Editor-in-Chief for Cardiovascular Anesthesiology for the journal. This manuscript was handled by Dr. Steven L. Shafer, Editor-in-Chief, and Dr. Hogue was not involved in any way with the editorial process or decision.

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