

New Worlds to Conquer

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This article has been selected for the ANESTHESIOLOGY CME Program. Learning objectives and disclosure and ordering information can be found in the CME section at the front of this issue.

IN this issue of ANESTHESIOLOGY, Sun *et al.*¹ report on a retrospective observational study of anesthetic outcomes based on the model of care delivery. The authors report no difference in inpatient mortality, hospital length of stay, or cost of care based on whether care was delivered by an anesthesiologist working with a certified registered nurse anesthetist or an anesthesiologist assistant. Although these results will no doubt be used in some quarters to further the ongoing war of words among anesthesia providers about who does what, where, and when, it would be a shame if the larger message was lost in the noise: the American model of team-based anesthesia care delivery produces exceptional perioperative outcomes for a large volume of patients undergoing surgical and other procedures.

The methodology of this study is both simple and elegant. The simple parts are the patient population of 443,098 otherwise unselected Medicare beneficiaries aged 65 to 89 yr undergoing a surgical procedure; the independent variable of care provided by an anesthesiologist and a certified registered nurse anesthetist *versus* care provided by an anesthesiologist and an anesthesiologist assistant; and the outcomes of inpatient mortality, primary admission length of stay, and total cost of the episode of care. The elegant part is the instrumental variable risk-adjustment model. Without going into great detail, this sophisticated model provides confidence in the validity of the primary result: no difference in mortality, length of stay, or total cost associated with either care-team model.

More remarkable than this lack of difference is the mortality itself: 1.7%. This number can be viewed as either surprisingly high or surprisingly low—high because the odds of dying in the operating room or postanesthesia care unit, in the presence of an anesthesia provider, are so incredibly low: 0.1% in the National Anesthesia Clinical Outcomes Registry 2016 summary data and about 0.2% in a previous study from the same source.² That 17 times more patients die after



“...team-based anesthesia care delivery produces exceptional perioperative outcomes for a large volume of patients...”

leaving our care but before leaving the hospital would surprise most anesthesiologists.

On the other hand, a mortality of only 1.7% in a population of high-risk older patients undergoing inpatient surgery is a notably good result. Previous large studies in similar populations date back to at least the 1940s. Beecher and Todd³ studied patients of all ages and health status admitted for surgical procedures between 1948 and 1952 to one of 10 large academic hospitals. Overall mortality of this group was 1.33%, although it should be noted that this study predated open neuro or cardiac surgery, transplantation, and total joint replacement, among many other surgical procedures. More recently, Pearse *et al.*⁴ collected a 1-week sample of patients admitted

for surgery across 498 European hospitals in 2011 and found an unadjusted mortality of 4%, a number they thought to be surprisingly high. In the United States, inpatient mortality for an average 70-yr-old woman having a partial colectomy is estimated as 1.4% by the online risk calculator of the American College of Surgeons, using contemporary data from the National Surgical Quality Improvement Project.⁵

The reason these numbers are approximately similar may be the same as the reason that Sun *et al.*¹ found no difference in risk based on care team model. In practice, anesthesiologists and surgeons work every day to manage risk, often in ways that are not measurable in large data. Which patients are selected as surgical candidates, what facility is chosen for the procedure, what time of day it is scheduled for and which providers are assigned to the case (or available to assist) are all the result of decisions made by highly experienced experts with a vested interest in generating a constant level of safety. In the same way that the subjective American Society of Anesthesiologists physical status is a better predictor of outcome than any single objective variable,⁶ the similar mortality demonstrated in the cohorts identified by Sun *et al.*¹ is likely the result of multiple, unmeasurable

Image: J. P. Rathmell.

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Accepted for publication May 17, 2018. From the College of Medicine, Texas A&M University, Bryan, Texas; and US Anesthesia Partners, Dallas, Texas.

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decisions made by the providers over the course of care. Mortality after surgery may, in fact, be an unconscious societal construct of how much risk we will collectively tolerate. This would explain why surgical mortality is roughly constant in the developed world and constant over decades of advances in medical science. Improved outcomes are reinvested in sicker patients and more complex procedures to preserve a constant, tolerable level of safety.

Rather than debating differences in outcome based on the composition of the care team—which we are unlikely to ever find—perhaps a better investment would be figuring out how to make our current 0.1% intraoperative mortality apply to the duration of the hospital admission. We have made the operating room safe—and even efficient—using the care team. Now we should extend our efforts to the hospital as a whole in our expanded role as perioperative physicians. We should own not just intraoperative safety and survival but also the quality of care throughout the surgical episode. This is the thinking behind the perioperative surgical home and the enthusiasm for enhanced recovery protocols. Working with others—as we do in the care team—we can apply our skills at patient assessment, meticulous attention to detail, data-driven practice improvement, and hands-on rescue to a wider envelope of care. If we wish to prosper, it is time to think beyond the operating room. Anesthesiologists have many new worlds to conquer!

Competing Interests

The author is not supported by, nor maintains any financial interest in, any commercial activity that may be associated with the topic of this article.

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