It is ironic that the American Society of Anesthesiologists, whose members are critical observers of surgical procedures, evolved the best index of "operative risk." Perhaps the American Surgical Association, whose members are critical observers of anesthetic procedures, will provide us with a meaningful index of "anesthetic risk".

Arthur S. Keats, ANESTHESIOLOGY, October 1978

Our knowledge with respect to perioperative risk has come a long way since Arthur Keats’ 1978 editorial. Yet, even then with wittingly sharp prescience, Keats recognized that further long-term advancements with respect to perioperative risk would require the collaboration of our surgical colleagues. In this month’s issue, Goswami et al. present such a collaboration. Specifically, they present an analysis of prospectively collected perioperative data in 362,767 patients from the American College of Surgeons (ACS) National Surgical Quality Improvement Program (NSQIP) database in an effort to elucidate the incidence, risk factors, and survival outcomes for intraoperative cardiac arrest (ICA) in adults undergoing noncardiac surgery.

Initiated by the Department of Veterans Affairs in 1991, the NSQIP set out to collect high-fidelity, risk-adjusted perioperative data. Thirteen years after implementation of the NSQIP, their tracking efforts were validated in multiple subsequent outcome studies, most notably by a reduction in 30-day postoperative morbidity and mortality (43% and 47%, respectively). Spurred on by the success within the Veterans Affairs system, the then retitled "ACS NQIP" was expanded to the private sector, where it currently incorporates data from more than 400 U.S. hospitals, including 8 of the top 10 hospitals listed in the 2012–2013 U.S. News and World Report’s Best Hospitals.

The current study by Goswami et al. utilizing the ACS NQIP has many strengths compared with previous studies that have attempted to address the ICA incidence. Most notable are the large number of subjects (362,767), the homogeneity of the sample population, and the fact that the data were prospectively collected. Statistical analysis was bolstered by forcing relevant patient risk factors for ICA into a logistic regression model, and then stratifying for procedure risk. Moreover, the study population was a relatively focused sample, excluding patients receiving cardiac procedures, monitored anesthesia care, peripheral nerve blocks or local anesthesia, trauma, concurrent and transplant cases, adolescents less than 16 yr of age, and American Society of Anesthesiologists physical status VI patients.

Consistent with previously published studies, the authors found the overall ICA incidence to be 7.2 per 10,000
noncardiac surgeries, with a 30-day mortality rate of 63%. After multivariable analysis, the amount of intraoperative erythrocyte transfusion was found to be the most important predictor of ICA after noncardiac surgery in adults. Stratified analysis of the ICA risk revealed adjusted odds ratios of 2.5, 7.6, 11.4, and 29.7 for 1–3, 4–6, 7–9, and more than 10 units transfused, respectively. Indeed, Goswami et al. suggest that the number of erythrocytes transfused can be used as a surrogate marker of intraoperative blood loss. Other independent risk factors for ICA included increased age, American Society of Anesthesiologist physical status classification, impaired functional status, and preexistent comorbidities.

Although the authors were unable to demonstrate a temporal correlation between erythrocyte transfusion and ICA, transfusion-related acute lung injury, hemolytic transfusion reaction, and transfusion-associated sepsis are known to account for more than 70% of transfusion-related mortality per the U.S. Food and Drug Administration database. Similarly, beyond the reduction in death from traumatic bleeding found in the Clinical Randomisation of an Antifibrinolytic in Significant Haemorrhage trial, a recent meta-analysis of 129 tranexamic acid trials spanning 10 yr found an overall one-third reduction in the probability of receiving a transfusion and an overall reduction in mortality. Despite these data suggesting transfusion-associated perioperative mortality, it is unclear from the current study that the decision for intraoperative transfusion was based on a preexisting anemia as opposed to actual intraoperative bleeding. Forcing the preoperative hematocrit, which is recorded in the ACS NSQIP database, into the multivariate logistic regression model in future studies may help further clarify the issue, not only with respect to mortality, but also ICA.

Interestingly, we would like to suggest that the average practicing anesthesiologist in their daily practice might have intuited the primary findings of study by Goswami et al. (e.g., ICA in adults undergoing noncardiac surgery is associated with increased erythrocyte usage, age, American Society of Anesthesiologists physical status, and the presence of preexistent comorbidities). Although these and future data generated from the ACS NSQIP database will be extremely helpful in continuing to elucidate the underlying mechanisms of perioperative risk, they also affirm and pay homage to our heritage as perioperative observers, thinkers, and physicians. To quote Charles Vacanti from his 1970 landmark publication in this area (words that could have been transposed into the 2012 article by Goswami, et al.):

The foregoing figures give statistical support to the generally accepted belief that postoperative mortality increases as physical status decreases. While it is to be expected that mortality will be higher in emergency than in elective procedures… in the rush to get the emergency patient into the operating room, a hasty preoperative workup—or none at all—may contribute to the mortality statistics.

Undeniably, an anesthesiologist’s preoperative impression, their “circling one number on an anesthetic record before the event,” remains to this day, more than 70 yr after its inception, a statistically significant predictor of perioperative risk and ICA. Indeed, we came full circle in 2006 when Devenport et al. validated the predictive value of the American Society of Anesthesiologists physical status using data from the NSQIP.

In conclusion, we thank the surgeons who in 1991 had the foresight to initiate the NSQIP program in an ongoing effort to collect high-fidelity, risk-adjusted perioperative data, as well as Goswami et al., anesthesiologists who have added momentum to the push for improved patient outcomes. Thus, although the current study echoes and reaffirms findings previously noted in the literature, it is also worth noting, as Keats so eloquently put it in his editorial 34 yr ago, “Progress requires periodic repetition to renew what is forgotten by the sliding scale of memory.”

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anesthetics over 10 years from a US teaching hospital.

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