

## CORRESPONDENCE

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*In Reply:*—Dr. Edsall's concern regarding the "smoothing issue" does not apply to our study. The computer scanning process, which identified records with defined intraoperative incidents, scanned the originally recorded data strings at 15-s intervals, not averaged data. In addition, our procedure for screening each record for artifacts included visual inspection of both the printed record (which does represent averaged data) and the originally recorded data strings at 15-s intervals. The CompuRecord<sup>®</sup> system we used in the study included a software module which facilitated rapid access to the originally recorded data.

Nevertheless, Dr. Edsall is correct to remind readers that retrospective review of any form of anesthesia record is unlikely to identify all artifacts with 100% certainty. We were very concerned about this problem and did our best to correctly identify artifacts when we visually examined each record selected by the computer system. But we agree with Dr. Edsall that identification of artifact remains a major challenge for anesthesia information management systems (AIMS). Concerning nomenclature, it seems that CPR (computer-based patient record) would be an unfortunate choice as an abbreviation for anything in the medical field other than cardiopulmonary resuscitation. Isn't that asking too much of context?

Among the anesthesiologists we studied, there was a very low compliance with voluntary reporting of intraoperative incidents iden-

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tified by the computer.<sup>1</sup> Dr. Edsall provides two more interesting and credible explanations for this low compliance. First, there is a delay of minutes or hours between the occurrence of the incident in the operating room and the opportunity to report the incident on the quality assurance computer in the PACU. Second, as we stated in our methods, the default answer to all quality assurance questions on the computer screen was "no." Dr. Edsall makes a convincing argument that these two conditions may have led to an unknown number of false negative entries.

Finally, we would echo Dr. Edsall's statement that Dr. Cooper's calculated cost of \$6 per case for AIMS<sup>2</sup> will easily be recovered by the savings which information management is likely to affect. Savings could be expected in expenditures for several categories, including pharmacy, billing, operating room efficiency, and medical record retrieval.

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## Self-reporting Can Be a Reliable Means of Tracking Adverse Perioperative Events

*To the Editor:*—Sanborn *et al.*<sup>1</sup> suggests that automated anesthesia records can identify, track, and report deviations from specific limits for physiologic variables, and that this might be preferable to self-reporting of adverse events. Copper<sup>2</sup> concluded in his accompanying editorial that "anesthesiologists . . . do not report most events meeting criteria that they themselves had defined as relevant to QA." We

strongly disagree and published evidence to the contrary (Lagasse *et al.*<sup>3</sup>). In fact, we demonstrated that with a non-threatening QA system with 100% concurrent medical record review, anesthesiologists reported approximately 90% of adverse clinical outcomes. Our present QA system relies on self-reporting of adverse outcomes associated with 35,000 anesthetics performed annually. The resultant database



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contains over 1,200 reports since January 1995 and again approximately 90% of these were self-reported by the anesthesiologists.

We agree with Cooper that at least two steps are necessary for effective self-reporting: (1) demonstrate the value of reporting, and (2) change the culture that attributes error to negligence.<sup>2</sup> W. Edwards Deming, an industrial quality manager, published these ideas over a decade ago.<sup>4</sup> At our institution, adverse outcomes are analyzed by a structured peer review process and statistical process control is applied to the adverse outcomes as a measure of the quality of our perioperative care. The outcomes data is also used by members of the department for clinical investigations which are considered part of our quality management program and have resulted in improved care. This leads us to further disagree with Cooper who writes that "the benefit to patient care of anesthesia QA systems has not been established rigorously. . . ." In fact, several authors have demonstrated the benefit of quality management programs to perioperative patient care.<sup>5-7</sup>

The difference between our experience and that of Sanborn may lie in the nature of the quality management programs. Our peer review process looks at errors in the system as critically as we look at human errors. Thus, peer review is less threatening thereby encouraging anesthesiologists to share the responsibility with management for delivering quality health care. This does not appear to be one of the objectives of the quality management program described by Sanborn which excluded incidents detected by his automated record if they were part of the system's limitations (e.g., the patient's clinical condition or other factors necessitating acceptance of deviations in physiologic variables).<sup>1</sup> In our experience, system errors account for the vast majority of all adverse outcomes. Because human error contributes only a small portion to adverse outcomes (5-15%), programs which focus QA measures on human error to the exclusion of system error may misdirect resources.

In summary, we have published evidence that demonstrates reliable self-reporting of adverse outcomes originating from active partic-

ipation in a nonthreatening quality management program. Our results show that such a system functions best when dependent upon self-reporting by anesthesiologists.

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**In Reply:**—Dr. Lagasse's correspondence begins by stating that Sanborn *et al.*<sup>1</sup> "suggests that automated anesthesia records can identify, track and report deviations from specific limits for physiologic variables and that this might be preferable to self-reporting of adverse events." He disagrees, and supports his disagreement by reference to his own data, based on review of hand-kept records, which have been demonstrated to be notoriously unreliable.<sup>2,3</sup>

In fact, we demonstrated that automated anesthesia records can identify, track and report deviations from specific limits for physiologic variables but we never stated that this might be preferable to self-reporting of adverse events. We do not dispute that voluntary self-reporting of intraoperative incidents is the centerpiece of QI programs in anesthesia. Indeed, in order to

emphasize that electronic detection of intraoperative incidents is only useful for a limited set of patient variables, we stated that

"While events such as cardiac arrhythmias, repeated attempts at intubation, mechanical failures, nerve injury, intraoperative awareness, failed regional block, bronchospasm, vomiting and many others may all be important to patient outcome, they are not readily detectable by electronic scanning of an AAR (automated anesthesia record) database." (page 984)

Our scientific goals were clearly stated in the introduction. The purpose of our report was not to evaluate our QI program, or to compare it to Dr. Lagasse's QI program. Misunderstanding this, Dr. Lagasse presents readers with a comparison of his QI program, based on outcome measures and dependent upon hand-kept records, versus our study of selected process measures, us-