



By Stephen Bachhuber, MD

# Reporting Anesthesia-Related Critical Incidents: The KP Northwest Region's Experience

Quality Assurance (QA) in anesthesia can be defined as a focus on patient safety: Patient safety is a fundamental objective of anesthesia care because anesthesia by itself has no therapeutic value. The mainstay of anesthesia-related quality assurance has been peer review of adverse outcomes, but peer review alone is inadequate to assure high-quality care or patient safety.

Peer review's limitations are multiple. First, the process is triggered only by adverse outcome; "near miss" events—events identical to adverse outcomes except that the patient is not harmed—are ignored by peer review. Peer review may examine only a narrow range of the department's activities, and examination depends on which charts are selected for review. Traditional peer review is directed only at detecting clinician error and fails to assess the competency of the system that supports the clinician. This peer review is unfair because it magnifies the errors of clinicians who assume the care of high-risk and problem-prone patients. The peer review process finds it necessary to assign blame and presumes that error is the fault of the clinician.

To enhance patient safety, QA processes must be based on new assumptions:

- Assume that the delivery of anesthesia care has inherent risks and that errors will occur at a statistically predictable rate.
- Discard the notion that every error is the fault of the clinician, and instead assume that nearly all errors are ul-

timately the result of system problems.

- Believe that any attempt to blame individuals is unnecessary.

## Creation of a Program for Effectively Reporting Critical Incidents

Given three premises—that the quality of care may be improved by reducing the occurrence of critical incidents; that the traditional peer review process has inherent limitations; and that patient safety must be continuously improved—the Kaiser Permanente (KP) Northwest Region established, in 1999, a program for reporting critical incidents. We saw several advantages to implementing such a program:

- opportunity to identify and address system problems overlooked by isolated case review;
- opportunity to analyze "near miss" events to reveal potential problems before harm occurs;
- opportunity to identify clinically significant trends or clusters of incidents in an individual clinician's practice or the department's practice. Such clusters may indicate system problems.

## Features of the KP Northwest Reporting Program

Aware that reporting anesthesia-related critical incidents has been used successfully in conjunction with continuous quality improvement<sup>1</sup> and with the clinical audit function,<sup>2</sup> we incorporated our own program into our QA program and thus protected the reporting

system from legal discovery (required by peer review statutes). The system of reporting critical incidents covers about 100 items ranging from the clinically trivial (eg, delay) to the clinically significant (eg, death) and provides an opportunity to manually add items not on the checklist. Our system functions as a universal reporting system—anyone may report any problem by submitting a form—and uses paper checklists available at every anesthesia location and at the postanesthesia care unit. The forms are completed by the clinician only when an incident occurs. They are collected regularly and are entered into a database by the department secretary. Incidents may be flagged for immediate peer review. Only the departmental QA representatives and clinical chief have full access to the database reports.

Because the quality of information yielded by the database is directly related to the quantity of incidents recorded, we make reporting easy; indeed, ease of use appears to be the greatest factor in increasing reporting, and critical incidents are reported more frequently at locations where paper forms are always within reach of the anesthetist. We are now testing the use of handheld computers to capture relative value units (RVUs) and billing data. In conjunction with this effort, we are exploring ways to make reporting critical incidents a part of the process of recording RVUs and thus eliminate paper from the operating suite.

The system relies on self-reporting. However, because there is abundant research that shows that self-reporting fails to detect a

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sizable number of incidents unless a strong incentive exists for individuals to report themselves,<sup>3,4</sup> our department uses three incentives to encourage self-reporting:

- **Exemption from quality determination, a rating of the provider's performance related to an incident.** When a critical incident is reported through the reporting program, the quality determination procedure will be used only if death or major injury has occurred.
- **Useful feedback to individual clinicians and to the department.** Analysis of departmental trends is regularly reported via e-mail to every department member. Individual feedback is not yet available, but the database is being revised to allow each clinician to compare his or her own standing with a departmental mean for the most frequently reported incidents. The knowledge that you are a statistical outlier can be powerful incentive to examine and change practice.
- **Follow-up identification of program nonparticipants.** Because critical incidents are inherent in the practice of anesthesia, all clinicians can be expected to encounter such incidents in their practices. Therefore, as the database is revised, we will use it to identify clinicians who have not submitted a minimal number of reports. Clinicians who have not filed reports will be identified as "nonparticipating" on evaluations.

### Program-Related Results and Observations

Our department has for the most part complied with a nonpunitive

system of self-reporting. Our growing database has made trends easier to identify, but obtaining useful information from the database involves more than punching keys to generate reports. The database will yield lists of patients, clinicians, dates, locations, and medical chart numbers for each incident or incident class. The QA representative or assistant will then review each chart according to a template of questions developed by the QA representative to more sharply focus the chart review and to shorten the time required by this process to as little as five minutes per chart. Use of this self-reporting technique has revealed two important trends in the past year:

- From January through December of 2000, 13 instances of prolonged neuromuscular blockade were reported. Charts for 10 of the 13 affected patients were available for review. Of these ten patients with prolonged neuromuscular blockade reported, three received only succinylcholine or mivacurium; prolonged blockade in these patients appeared to result from pseudocholinesterase deficiency. One patient received succinylcholine and rapacuronium, and six patients received rocuronium.

We identified a problem with our department's use of Zemuron® (rocuronium bromide; Organon, West Orange, NJ) and with potential misinterpretation of the drug package information. In some instances, the drug was inappropriately chosen. The drug is considered an intermediate- to long-acting relaxant and is thus inappropriate for use in brief surgical procedures. In other instances, the dose of rocuronium was not reduced to account for the effect of

succinylcholine or inhalational anesthetic, effects that potentiate activity of the relaxant.

Most important of all, department members, possibly misinterpreting drug package information, were unaware of the highly variable duration of action of rocuronium. This variability is a problem with potential misinterpretation of the drug package information. I reviewed the manufacturer's data on clinical duration and found that it clearly stated in tabular format that the median duration of effectiveness for a dose of .6 mg/kg (the most common dose given for intubation) is 31 minutes with a 25- to 75-percentile range of 15 to 85 minutes.<sup>5</sup> Not generally being noted by most of the anesthesia staff, however, was that this means for only 50% of patients receiving an intubating dose of rocuronium will the duration of action fall within 15 and 85 minutes. This supporting information was sent by e-mail to all department members for clarification; the decision to alter their practice remains theirs. I will repeat this review next year to determine whether use of rocuronium still accounts for 60% of prolonged neuromuscular blockade.

Because effective airway management is a main principle of anesthesia practice, we searched for trends in the incidence of laryngospasm, hypoxemia, and pulmonary edema. Of seven instances of pulmonary edema reported in 2000, five medical charts obtained for review showed that two instances resulted from multiorgan failure, and three instances resulted from postextubation laryngospasm and obstruction. We noted four instances of postobstructive pulmonary edema in 1999.

Results of chart review suggested that otolaryngologic procedures



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carry high risk and that post-obstructive pulmonary edema occurs most frequently in healthy young patients with airway irritation due to smoking or upper respiratory infection. I believe that postobstructive pulmonary edema can be avoided by using excellent technique and by properly timing extubation. We will continue to follow this trend with a goal of consistently preventing postobstructive pulmonary edema.

### Enhanced Use of Data and Other Systemic Refinements

Another use of the database proved productive, this time in an effort to reduce the incidence of severe pain among surgical patients and, by extension, to improve overall quality of pain relief. In coordination with the perioperative nursing staff, the anesthesia department reviewed charts to track monthly incidence of a single condition, severe pain, through most of 2000. We discovered that a mean of ten reports of severe pain was recorded each month from March 2000 through August 2000. We observed that the number of reports filed during this six-month period followed an upward trend even though the department was concurrently discussing use of narcotic loading, axial narcotic agents, regional anesthesia, nonnarcotic analgesic drug alternatives, and a "multimodal" approach to pain control and was forming an anesthesia plan that incorporates postoperative pain control.

In response to this observation, we asked patients how their pain treatment might be improved. Re-

sults of a detailed patient survey, conducted in July 2000, showed that patients want better preoperative education about how much pain to expect and how this pain can be treated. The survey results also suggested that local anesthesia administered by the surgeon may be insufficient, particularly among outpatients. After this information was sent to all our surgeons and their nursing staff in late August 2000, data review clearly showed a decline in incidence of severe pain: A mean of 4.5 incidents per month was reported from September 2000 through December 2000. Although incidence of severe pain declined, incidence rates for nausea and hypoventilation remained constant. We learned that excellent pain control requires attention to every detail as well as good clinical coordination among nurses, anesthesiologists, and surgeons.

### Conclusions

Patient safety has been improved by use of information obtained from our self-report database of anesthesia-related critical incidents. Our use of muscle relaxants, our techniques of airway management, and our treatment of pain have been altered by knowing our department's overall performance in these areas. The database is most useful in coordination with review of all the charts related to a single incident. Moreover, it also enables us to periodically gauge quality of care by tracking a frequently occurring medical situation or condition. The system works for several reasons: it con-

tains incentives to use it, it is nonpunitive, and it provides useful information. Automated data collection can be expected to expand the database and improve its utility, and improvements made to provide feedback to individual clinicians can be expected to greatly affect their practices. In addition, our program of reporting anesthesia-related critical incidents has enabled the process of peer review to more effectively advance patient safety. ♦

### References

1. Posner KL, Kendall-Gallagher D, Wright IH, Glostien B, Gild WM, Cheney FW Jr. Linking process and outcome of care in a continuous quality improvement program for anesthesia services. *Am J Med Qual* 1994 Fall;9(3):129-37.
2. Over DC, Pace NA, Shearer VE, White PF, Giesecke AH. Clinical audit of anesthesia practice and adverse perioperative events at Parkland Memorial Hospital, Dallas, Texas. *Eur J Anaesthesiol* 1994 May;11(3):231-5.
3. Sanborn KV, Castro J, Kuroda M, Thys DM. Detection of intraoperative incidents by electronic scanning of computerized anesthesia records. Comparison with voluntary reporting. *Anesthesiology* 1996 Nov;85(5):977-87.
4. Cooper JB. Is voluntary reporting of critical events effective for quality assurance? *Anesthesiology* 1996 Nov;85(5):961-4.
5. Zemuron (rocuronium bromide): distributed by Organon, West Orange, NJ [Web site]. Available on the World Wide Web (accessed May 23, 2001): <http://www.organoninc.com/products/medical/zemuron/zemuron.html>. (Click on "Prescribing information" link.)