Introducing the Anesthesia Incident Reporting System (AIRS)

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On October 1, 2011, the Anesthesia Quality Institute (AQI) will activate the first nationwide system for collecting individual adverse events from anesthesia, pain management and perioperative care. We're calling it AIRS: the Anesthesia Incident Reporting System. Here's how it happened, and how it works:

Background and Rationale: Anesthesiology is characterized by a very low rate of serious complications. This scarcity makes it difficult to recognize recurrent problems and to achieve the statistical power necessary to understand risk factors and test potential solutions. Paradoxically, the very safety of anesthesia has reduced our ability to improve. Consider the example of postoperative visual loss (POVL). By the late 1990s, most experienced providers had seen or heard of at least one case, but very few providers knew of more than one. It was not until enough cases had accumulated in the ASA Closed Claims Project Registry that we realized this was a recurrent safety issue, more common in certain kinds of cases, and potentially influenced by our anesthetic practice.

The problem with relying on closed claims for our safety "signal" is that not all serious events result in lawsuits, not all malpractice insurers make their records available, and only those events that result in a patient injury are ever captured. It can take many years for a malpractice case to run its course and for the records to be abstracted. Hence the need for a more timely system.

Anesthesia registries, such as the National Anesthesia Clinical Outcomes Registry (NACOR) function at the opposite end of the spectrum. By capturing every case, every day, they will inevitably include some with serious adverse outcomes. Over time, a picture will emerge of the relative rate of serious occurrences, and the kinds of cases in which they occur. But registries are lacking in a different way: granularity of reporting. Standardized data entering the registry does little to identify the nuances of patient disease, evolving clinical circumstances and anesthesiologist judgment that contribute to an unusual occurrence – and these are the things that we would most like to know. Nor do registries capture near-misses, when no adverse event occurs.

This is why critical incident reporting, based on either actual adverse events or "near misses" is a common concept in anesthesia department quality management (QM) at the local level. Most hospitals and most anesthesia departments mandate the reporting of critical or "sentinel" events, and most academic departments have regular "Morbidity and Mortality" conferences to discuss unusual cases. Such systems work best when there exists a "safety culture" among practitioners, with free and open discussion about negative events. The desire for improvement must outweigh fear of the consequences of reporting. Yet even when such systems flourish at the local level, there is still an unfilled national need. Many serious anesthesia events occur at such a low frequency that a given group of providers might never see more than one occurrence. And the closed mouth nature of the legal system makes it difficult for one group to learn from the experience of another.

The AQI believes the time is ripe for a national system for reporting critical events in our specialty. The U.S. aviation system has had such a system in place since 1976. Called the Aviation Safety Reporting System, it is funded by the Federal Aviation Administration and administered by NASA. Blinded data gathered from reported incidents are available on the FAA website, in the Aviation Safety Information Analysis and Sharing system, and is available for public research.

History: Similar efforts have occurred elsewhere around the world. The Australian Incident Monitoring System (AIMS) was created almost 20 years ago to capture serious events and near-misses in the operating room. Reporting was via paper forms, sent to a central office. This registry spawned numerous academic papers up until 2005, when it became a victim of its own success. The system was expanded to include any in-hospital adverse events (losing its focus on anesthesia) and was then expanded internationally (losing its focus on local practice). With these changes, anesthesia providers stopped contributing to it, and AIMS ceased to be a useful tool for anesthesiologists. However, the need for such a system did

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Learning from Others:

A Case Report from the Anesthesia Incident Reporting System

Anesthesia Quality Institute
ANESTHESIA INCIDENT REPORTING SYSTEM (AIRS)

Detailed review of unusual cases is a cornerstone of anesthesiology education. Each month, the AQI-AIRS Steering Committee will abstract a case and provide a detailed discussion based on a submission to the national Anesthesia Incident Reporting System. Feedback regarding this item can be sent by email to ***r.dutton@asahq.org****.*

Case 2011-1 – Hypotension After Spine Surgery

A 35 year-old woman receives general anesthesia for lumbar laminectomy in the prone position. The case is uneventful until surgical closure, when the blood pressure drops to 70/42 mmHg, the heart rate increases to 110/min, end-tidal CO_2 declines from 33 to 28 cmH_20, and bispectral index decreases from 50 to 28. The events occur shortly after completion of vancomycin infusion. Vital signs normalize with a fluid bolus, Trendelenberg positioning, and a single 40 mcg dose of phenylephrine. The surgery is completed and the patient is awakened and extubated uneventfully.

In the PACU, the patient complains of pain at the surgical site and inability to move her left foot. Normal pulses are present in the right lower extremity, but absent in the left foot and groin. Sensation is intact in both extremities. Blood pressure falls to 95/66 mmHg, with increase in HR to 110/min.

Discussion

The differential diagnosis of the original intraoperative hypotension includes both serious conditions and transient events:

- Relative anesthetic overdose (decreasing surgical stimulation)
- Parasympathetic overload (a "vagal" episode)
- Hypovolemia: dehydration or hemorrhage
- Tension pneumothorax
- Venous air embolus
- Drug reaction (vancomycin).

Further observation is required because diagnosis may be obscured by supportive care; fluid and vasopressor therapy will improve hypotension but may not correct its underlying cause. In this case, the team maintains an appropriate level of clinical suspicion and the patient is closely observed in the PACU. The differential diagnosis evolves as more symptoms develop, eventually leading to a single unifying explanation.

The patient's complaint of pain makes relative anesthesia overdose and parasympathetic stimulation less likely, while the timing and pattern of complaints eliminates a vancomycin effect. Venous air embolus is unlikely once the surgical wound is closed. Pneumothorax remains possible, but does not explain the isolated lack of pulses. Recurrent hypotension is consistent with ongoing occult hemorrhage – a possibility during and after spine surgery – and an expanding hematoma could explain the loss of pulses.

Reaction to rapidly changing clinical circumstances is one of the most important skills of the anesthesiologist, but must be guided by imagination (What could possibly cause this?), experience (What has caused this in the past?) and paranoia (What's the worst thing that could be causing this?) In the case of ongoing postoperative hemorrhage, a rapid response may be needed to forestall an unfavorable outcome. Recommended actions at this point include:

- Immediate communication with the surgeon
- Notification of the O.R. for a potential urgent return
- STAT laboratory assessment (hemoglobin, clotting function)
- Ultrasound assessment of the abdomen (if available)
- Preparation for transfusion (increased venous access, ordering blood products).

Clinical Follow-up

The patient became progressively hypotensive and obtunded, with distention of the left side of the abdomen. Ongoing hemorrhage was diagnosed. The patient was reintubated and a central line was placed while the O.R. was being readied. Red blood cell (RBC) transfusion was initiated and the patient was returned to the O.R. for exploratory laparotomy. A laceration of the left common iliac artery was discovered and repaired. The patient received 6 units of RBC and 2 units of plasma. Subsequent recovery was uneventful.

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Organizational Support for Pediatric Anesthesia

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Matching Program this past June for the academic year 2012-13.

Coming full circle from advocacy and support groups to the development of rigorous training programs, many leaders in the field began advocating for subspecialty certification in pediatric anesthesia. In 2010, after listening to constituent groups both within and outside the specialty of anesthesiology, the ABA voted to support a certification process and made application to the American Board of Medical Specialties (ABMS) requesting approval to offer certification in the subspecialty of pediatric anesthesia. The ABMS approved that request in 2011, so the ABA is now working on a certifying examination and entrance requirements for individuals wishing to sit for the first examination, expected to be administered in 2013.

No doubt, the vast majority of children in the U.S. will continue to be cared for by competent physicians trained in pediatric anesthesia during core residency training, while the educational efforts of AAP, ASA and SPA continue to raise the level of expertise of practicing physicians at community and specialty hospitals. These educational efforts, coupled with vigorous quality improvement and outcomes projects, aligned with dedicated educators building robust training programs, suggest a bright future for the specialty of pediatric anesthesia and all of its dedicated physicians, joining together to benefit the safety and well-being of our most vulnerable patients.

References:

1. American Academy of Pediatrics Section on Anesthesiology. Guidelines for the pediatric perioperative anesthesia environment. *Pediatrics.* 1999;103(2):512-515.
2. Coté CJ, Wilson S; American Academy of Pediatrics; American Academy of Pediatric Dentistry; Work Group on Sedation. Guidelines for monitoring and management of pediatric patients during and after sedation for diagnostic and therapeutic procedures: an update. *Pediatrics.* 2006;118(6):2587-2602.
3. Cravero JP, Beach ML, Blike GT, Gallagher SM, Hertzog JH; Pediatric Sedation Research Consortium. The incidence and nature of adverse events during pediatric sedation/anesthesia with propofol outside the operating room: a report from the Pediatric Sedation Sesearch Consortium. *Anesth Analg.* 2009;108(3):795-804.
4. Couloures KG, Beach M, Cravero JP, Monroe KK, Hertzog JH. Impact of provider specialty on pediatric procedural sedation complication rates. *Pediatrics.* 2011;127(5):e1154-e1160.
5. Mallory MD, Baxter AL, Yanosky DJ, Craveo JP; Pediatric Sedation Research Consortium. Emergency physician-administered propofol sedation: a report on 25,433 sedations from the Pediatric Sedation Research Consortium. *Ann Emerg Med.* 2011;57(5):462-468.

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Discussion

Unintended injury to retroperitoneal or posterior peritoneal structures is a known risk of spinal procedures and can occur during initial dissection, fixation of hardware or even during closure and placement of surgical drains. Diagnosis may be delayed because the initial hemorrhage occurs into a body compartment that is not readily visible; surgeons and anesthesiologists must therefore maintain a high index of suspicion for this complication if hemodynamic instability develops. Immediate recognition of hemorrhage in this case was obscured by several other plausible causes of hypotension and by the patient's response to supportive therapy. During subsequent observation it became clear that the patient was continuing to bleed. A rapid return to the O.R., with prompt surgical and resuscitative therapy, enabled successful rescue of this patient. Exposure to blood products and a prolonged hospital length of stay were unfortunate, but far less serious complications than might have occurred with failure to rescue. This incident emphasizes the importance of "worst case" planning for major surgical procedures, including provision for 1) ongoing communication among team members, 2) emergency re-access to the O.R. and 3) protocols for massive transfusion. Every anesthesiologist should understand how a similar case would be handled in his or her own practice and should take steps to ensure that rescue would be equally effective.