

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

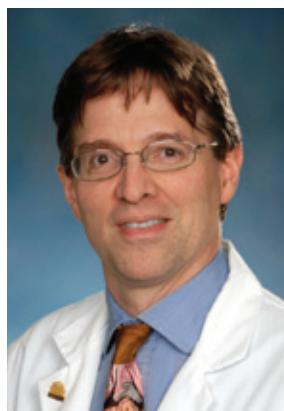
occurrences, and the kinds of cases in which they occur. But registries are lacking in a different way: granularity of reporting. Standardized data entering the registry does little to identify the nuances of patient disease, evolving clinical circumstances and anesthesiologist judgment that contribute 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:

Anesthesia
Quality Institute
ANESTHESIA INCIDENT
REPORTING SYSTEM (AIRS)

A Case Report from the Anesthesia Incident Reporting System

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 CO₂ declines from 33 to 28 cmH₂O, 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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not go away. The Australian and New Zealand Tripartite Anaesthetic Data Committee was formed in 2006 to reintroduce national anesthesia event reporting using the tools of the Information Age. This system, now active throughout Australia and New Zealand, uses anonymous web-based reporting to gather events.

The Critical Incident Reporting System (CIRS) was created in Switzerland in the 1990s to fill a similar role, and is still in use by Swiss anesthesiologists today. With the recent publication of the “Helsinki Declaration” proposing universal professional standards for anesthesia QM, there is thought of expanding this system across all of Europe. Similar systems are in place in Great Britain, Scandinavia and locally at several U.S. medical centers. And after decades of disinterest, the U.S. government has recently provided some support: The U.S. Patient Safety and Quality Improvement Act of 2005 authorized the creation and accreditation of Patient Safety Organizations (PSOs) as a means of aggregating health care quality data across multiple institutions. These regulations were completed in 2009 and have spawned a number of national quality registries based in hospital corporations, state governments and professional associations.

Development of AIRS: In January 2010, even as the AQI was launching NACOR, the AQI Board requested a plan for an incident reporting system. Since that time, we have researched incident reporting systems in other countries, conversed with dozens of experts in the U.S. and abroad, and conducted a detailed analysis of the legal issues such a system would raise. The AQI was designated as a Patient Safety Organization in September 2010. We formed the AQI-AIRS Steering Committee and recruited a select group of experts to advise us on the best approach to building the system. Aably led by James Caldwell, M.D., of the University of California, San Francisco, and Patrick Guffey M.D. of the University of Colorado, this volunteer committee of subject matter experts defined the scope of incidents we would seek, the data we would solicit and the uses we would make of the results. Members of the Steering Committee are shown in Table 1.

A prototype of the online reporting tool was developed this spring and evaluated by the committee. After several rounds of revision, a beta-test version of AIRS was launched in May, for use by the committee members themselves and by practices already participating in NACOR. We’ve captured dozens of incident in the past few months (one of which is presented as a teaching case on page 31 in this *NEWSLETTER*) and we’ve ironed out the kinks in the system. Now it’s time to make AIRS a truly national resource.

Table 1: The AQI-Anesthesia Incident Reporting System Steering Committee

Chair	James Caldwell, M.D.
Vice-Chairman	Patrick Guffey, M.D.
Members	Keith Ruskin, M.D. <i>(representing the AQI Board)</i>
	David Gaba, M.D.
	Alan Merry, M.D.
	Avery Tung, M.D.
	Joyce Wahr, M.D.
	David Martin, M.D., Ph.D.
	David Polaner, M.D.
	Steve Pratt, M.D.

- **Who can report:** Any anesthesia provider.
- **What to report:** Any unintended event related to anesthesia or pain management with the significant potential for patient harm.
- **How to report:** Go to www.aqiairs.org and fill out the form.

We are especially seeking events such as anaphylactic reactions, device malfunctions, medication side effects, unusual vascular or neurologic injuries and complications of electronic health care records. But there is no limit to the number of cases we will accept and analyze – we’ll take anything you would consider suitable for your own morbidity and mortality conference.

The report itself consists of three short pages. Structured data is gathered by radio-buttons and is augmented by a single field for a free-text narrative description of the event. Reports can be made either anonymously or confidentially. An anonymous report leaves no record of the sender anywhere in AIRS. In a confidential report, AIRS will maintain contact information from the sender as part of the record. This allows the reporter to modify an initial report with follow-up information on the patient or event; it also allows AQI personnel to contact the reporter to elucidate important or ambiguous details. All AIRS reports are made over a secure, encrypted Internet connection and are maintained in strict confidence (and firewall isolation) on the AQI server.

Legal protection is conferred by our standing as a PSO. Federal law protects any “patient safety work product” generated by an accredited PSO from legal discovery and in fact imposes strict guidelines on the way in which the PSO must preserve the confidentiality of its work. Per these regulations, the AQI may never reveal the identity of any patient, provider, facility or practice gathered through either AIRS or NACOR.

AIRS Reporting: The AQI will use data from AIRS in two ways. First, we will abstract interesting cases as educational nuggets, the same way that a local morbidity and mortality conference would do. Deidentified case presentations, and discussions of the topics raised, will be published in various ASA forums on an ongoing basis and archived on the AQI website.

Second, we will periodically examine the entirety of AIRS for emerging trends in anesthesia patient safety. These might be related to new medications, new techniques, evolution of patient risk factors or even the impact of electronic records. As with the Closed Claims Project, we will periodically publish our findings to alert practicing anesthesiologists to common and recurrent problems. By combining data between NACOR and AIRS, we will have both a quantitative and a qualitative picture of anesthesia safety in the United States. AIRS will enable us to find and fix the next new problem in our specialty, whether it's postoperative visual loss, bronchospasm from rapacuronium, or rare electrical interference in a new monitor. We urge you to visit the website the next time you see an unusual event, and keep our web address handy in your O.R. With your assistance, AIRS will be our specialty's latest weapon in the long quest to improve patient care.

More information about AIRS can be found on the AQI website at www.aqihq.org, or by email to askaqi@asahq.org.

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