The Anesthesia Quality Institute

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The Anesthesia Quality Institute (AQI) was founded in 2009 by the American Society of Anesthesiologists to promote patient safety and operational efficiency in the profession. The AQI was created for the specific purpose of building and maintaining a national registry of anesthesia cases and outcomes, to enable the benchmarking of patient care in the perioperative period.

The AQI is a 501(c)3 "related organization" of the ASA, and derives most of its funding in the form of an annual grant from ASA. In return, the AQI offers discounted participation to ASA members. The AQI is governed by a 7 member Board of Directors (see Table 1) and managed day-to-day by an Executive Director, who serves at the pleasure of the Board. Although it was not the original intention, the full-time Executive Director is both an administrator with experience in healthcare quality management and a (part-time) practicing anesthesiologist. This combination has enabled the rapid and focused growth of the AQI.

The AQI currently maintains 4 registries: the National Anesthesia Clinical Outcomes Registry (NACOR), the Anesthesia Incident Reporting System (AIRS), the National Pain Registry, and the Maintenance of Certification in Anesthesia-Practice Performance Assessment and Improvement Registry (MOCA-PPAI). The first two registries are operational now; the latter two are under development.

The core mission of the AQI is development of NACOR. This registry consists of case-based anesthesia data submitted by participating practices. All data is captured electronically, in the form of regular reports from existing electronic healthcare record (EHR) systems. For some participants this is limited to data from billing software—which must always exist in order for the practice to get paid—but for other groups the data collected can include hospital records (diagnostic codes, laboratory values, length of stay), process information from an anesthesia information management system (AIMS), or clinical outcomes from stand-alone quality management software. Individual case data is combined with 'context' data collected annually from the practice. This includes information about group composition, the facilities they work at, teaching activities, and coverage ratios.

All data submitted to NACOR is anonymized. No direct patient identifiers are captured, and individual providers and healthcare facilities are assigned code numbers by the contributing practice. The AQI is a federally-accredited Patient Safety Organization, and is enjoined from public disclosure of any identifiable patient, provider, practice or facility information. NACOR data currently arises from 37 different software platforms, including 8 AIMS. A rough schema of how NACOR accumulates data is shown in Figure 1.

One hundred and twenty practices have completed participation agreements with the AQI, and more than 100 of these have submitted demographic data. Case records have been submitted by 70 groups, of which 50 are now engaged in routine, automated reporting. The earliest data in NACOR case records is January 1, 2010. After almost two years of collection the registry

consists of more than 2,000,000 case records, from 850 facilities and more than 3,000 anesthesiologists. This represents approximately 10% of national anesthesia practice. NACOR data mirrors other sources of information about US anesthesia in many respects: the average age and gender of providers, rural-urban and teaching-non-teaching distribution, inpatient-outpatient ratio, and the kinds and numbers of surgical facilities represented. NACOR is systematically skewed towards physician practice, as groups made up predominantly of nurse anesthetists are less likely to participate. There is also almost certainly a bias towards practices that are more engaged in quality management and continuous improvement.

Although data from NACOR will ultimately have many academic and practice management applications, routine reporting occurs in two ways. First, aggregated national data is used in presentations such as this one, to illustrate the scope and demographics of the specialty. Aggregated data is also available to ASA leaders, ASA staff, and subspecialty society officers as needed to further their efforts on behalf of the profession as a whole. Data from NACOR is also combined with information the AQI gathers from other sources to produce the annual *Anesthesia in the US* publication, which is intended as an almanac for anesthesiology and perioperative care.

Even more important, every participating practice in NACOR has continuous access to their own data on the AQI reporting server. Here the practice can see a 'dashboard' of their overall activities, along with dozens of prepared reports based on the case and context data submitted. Most reports include both the practice's data and appropriate national or peer-group benchmarks for the same measure. Within each report the practice can choose to apply filters to either their own data or the national aggregates, and can choose to drill down to detailed data at the level of an individual facility or provider. The purpose of this 'reporting cube' is to provide the practice the information it needs to evaluate its own performance on an ongoing basis, in the context of national norms.

One of the most important features of NACOR as a 'new model' registry is the fact that it does not collect the same quantity of data from every contributor. More process data is available for cases from practices with AIMS, and even more useful data is available from groups that have digitally-recorded anesthetic outcomes. The long-term goal is to link an element of anesthesia practice (e.g. use of a particular technique or agent) with an outcome of relevance to the patient (e.g. the risk for a perioperative myocardial infarction), after appropriate adjustment for differing risks (e.g. patient age; type of procedure). In the short term, the AQI is acquiring this data incrementally, with the intention of growing into the full data schema as the use of electronic records in anesthesia practice increases. For practical purposes, this means that any research in NACOR must begin with an inventory of how much of the necessary data is available, and from what breadth of practices. One of the current AQI information technology projects is to make this inventory an automated process, feeding a continually updated internal dashboard.

At present, the greatest need in anesthesia quality management is the generation of patient-centered outcome data for every case. Some AIMS include a QM form as part of the PACU sign-out process, and some facilities – especially outpatient surgery centers – routinely survey patients 24 hours after discharge. These systems are mostly home-grown, however, and definitions and standards vary widely. One ongoing task of the AQI is the creation and promulgation of uniformity in anesthesia EHR and quality outcomes capture. The AQI website

(www.aqihq.org) includes open source information on the ideal definitions of process variables and outcomes, and templates for data capture. To date, these resources have been widely accessed by IT developers and vendors, giving us hope that NACOR will soon contain enough uniform outcome data, from enough sources, that reliable national benchmarks can be developed.

The Anesthesia Incident Reporting System (AIRS) was developed a year after NACOR to serve a different, but complimentary, function. NACOR is a 'census registry' intended to capture basic facts about every case, every day, in a structured, top-down fashion. AIRS, on the other hand, is a bottom-up registry to collect detailed information from a small sample of unusual or noteworthy cases. NACOR requires individual contracting with participating practices, but data submission to AIRS is open to any provider, anywhere, through its online submission portal (www.aqiairs.org). The AIRS case submission form collects structured data through the use of interactive menus and lists, and free text from a single narrative submission box. Any interesting case can potentially be submitted, but we are specifically seeking cases in which an adverse event occurred or was narrowly averted (a 'near miss'), or in which there was an unusual complication or system failure.

Submissions to AIRS can be completely anonymous if desired, but the default is a confidential submission that allows the provider to append new information at a later time, and allows for queries from the AQI in response to the initial submission. As with NACOR, the AQI is legally committed to preserving the absolute confidentiality of AIRS submissions.

Cases submitted to AIRS will be used to improve the quality of anesthesia care in two ways. First, trends in unusual complications will be followed as an early-warning system for emerging risks of anesthesia techniques, equipment or medications. The AQI will aggregate AIRS reports from multiple practices and then work with technical experts in the Anesthesia Patient Safety Foundation, ASA Committees, or subspecialty societies to analyze the events and propose solutions. Second, the AIRS Steering Committee will periodically select cases with educational value and 'fictionalize' them for presentation in the *ASA Newsletter*. Like the traditional Morbidity and Mortality Conference, this will give every member of the audience the chance to learn from someone else's unfortunate experience.

The MOCA-PPAI Registry is being developed specifically to collect data submitted by anesthesiologists using ASA's PPAI modules, with the long-term intention of providing real-time benchmarks for those participating. These modules are being developed by a joint committee of ASA and the American Board of Anesthesiology, and will become increasingly important over the next decade, as the number of Diplomates in the MOCA process continues to increase. By getting in on the ground floor of data collection, the AQI and its stakeholders will gain the maximum possible advantage of the aggregated information. This will enable feedback to both the education department on the value of their efforts, and the Board on the ability of the PPAI program to meet its stated goals.

In addition to its Registries the AQI serves ASA and anesthesiologists as an important liaison to national efforts to improve the safety and efficiency of healthcare. Most experts agree that in the not-too-distant future payment for anesthesia services will require demonstration of the value of what we do. This will require the development of outcome measures – none of which have

been validated today – that discriminate good care from bad. One of the key roles of the AQI is to gather the data that will inform these discussions. It is part of the Executive Director's job to represent the specialty on national committees that are debating these issues, in order to guide the process in a way that makes the most sense for our patients and our practices. There will also be numerous opportunities to work with other physician societies to develop multi-specialty registries, and to refine the data collection and reporting techniques that will be possible in the Information Age.

Other potential uses of AQI data include comparative effectiveness research, post-marketing surveillance for new drugs and devices, standardization and interoperability of EHR systems, and background information for research grants and proposals. Development of a reliable source of national anesthesia practice data will be important to the specialty in many ways, some of which cannot yet be predicted. Regardless of the specifics, however, it is likely that the AQI and the data it gathers will advance the practice of anesthesiology, and preserve our reputation as the leaders in patient safety.

Table 1. The AQI Board of Directors and Officers

Chairman:	Jeff Plagenhoef, M.D.
Vice-Chairman:	Keith Ruskin, M.D.
Secretary:	Donald Arnold, M.D.
Treasurer:	Roger Moore, M.D.
Member:	Alex Hannenberg, M.D.
Member:	Daniel Sessler, M.D.
Member:	Robert Stoelting, M.D.
President:	John Thorner, Esq. (appointed by ASA)
Executive Director:	Richard P. Dutton, M.D., M.B.A. (appointed by AQI Board)

Figure 1. Data flow into the National Anesthesia Clinical Outcomes Registry