AIMS Insights: 3-Part Series

Editor’s Introduction:
This is a series of CSA Online First articles about anesthesia information management systems (AIMS), written by Drs. Johnathan Pregler and James Moore from the Department of Anesthesiology at UCLA. UCLA is in the process of adopting such a system, and these blog articles provide insight into the experience from their perspectives. The editorial comments throughout the article are based upon the editor, Dr Linda Hertzberg’s perspective, as a consequence of having gone through this process first hand in her own hospital, several years ago.

AIMS Insights, Part 1:

Choosing an AIMS
Many factors will determine which information system is best for any particular practice. Integration with a facility's non-anesthesia clinical systems is a primary determinant. The ability to transfer data easily from other physicians’ records and offices, nursing notes, and test results to the anesthesia perioperative record is a tremendous advantage. This alone will significantly reduce the amount of time and effort that anesthesiologists spend on documentation. AIMS cost estimates should include subsequent maintenance expenses, for software, hardware, and information technology infrastructure. Cost is certainly important, yet for an AIMS purchased as part of an Electronic Health Record (EHR) system for an entire enterprise, both the cost as well as the selection may be limited for the institution’s anesthesia department. However, the best information system for a hospital at large, does not always come with the ideal anesthesia information system. If the anesthesia module of an integrated system does not meet the needs of the anesthesia providers, a careful assessment of the pros and cons of installing an anesthesia system from another vendor should be undertaken.

Editor’s note: We were encouraged at our hospital to install a certain system that was supported by the vendor for the surgical peri-operative documentation piece. The reality was that the supposedly compatible systems never really communicated properly with one another. Now the hospital is obligated by its corporate parent to switch to an entirely different EHR within the next year. Needless to say, it remains to be seen if the current AIMS will be able to integrate with the new EHR, since the hospital cannot afford to install the supposedly compatible AIMS currently. Based on our experience, even if a “compatible” system is installed, there is no guarantee that it will integrate properly with existing systems. Be aware of these potential issues as you go forward.

If complete freedom exists in choosing an AIMS vendor, prospective systems should be considered for the value that they provide both in and out of the operating room. A principle consideration is that the system functions well in the operating room environment. Data collection should be automated across all of the different anesthesia machine and monitoring options at the facility.

Editor’s note: Consider all the places anesthesia is administered, labor and delivery (epidurals), cath lab, GI, radiology, ICU other out of OR areas. If you truly want to go completely electronic you will need to have the system installed and readily available in all your current offsite areas with the capacity and funds to expand to new sites as needed. We have multiple out of OR areas where we don’t have the AIMS and use paper records.
The system should have provisions for data collection in the case of a temporary interruption of the network or servers.

*Editor’s note:* We revert to paper records when this happens. Hopefully other institutions have a better backup plan.

Documentation of the written component of the record should be by template that can be modified easily during clinical care. In general, the AIMS should make documentation of anesthesia care easier than the use of paper.

*Editor’s note:* There is a learning curve and it will take time to reach this point once the system is installed, however, with a good system, one should be able to document quickly and accurately. I can do a record just as quickly (and very much more legibly than my own handwriting) with our AIMS.

In addition, users at other institutions that currently employ the prospective AIMS can provide critical insights into that system’s attributes.

If the chosen automated anesthesia record (AAR) does not include a comprehensive perioperative database, one may need to be purchased, implemented, and maintained independently.

*Editor’s note:* The importance of this cannot be over emphasized. If all you have is an anesthesia record, without other clinical data, you will not be reaping the benefit of risk stratification, quality improvement, and outcomes data that may be gleaned from a good AIMS. It has taken us a long time to be able to use our AIMS for this purpose.

The necessary resources for a separate database project may appropriately derive from the parent institution if the lack of database is a system-wide issue. Preferably, a modern AIMS will include such a database.

**AIMS Insights, Part 2:**

**Introduction**

With the Medicare and Medicaid Electronic Health Record (EHR) Incentive Programs providing financial incentives for "meaningful use" of EHR technology, hospital administrators and clinicians have new motivation for implementing electronic medical record systems.

Automated anesthesia record (AAR) systems have existed for decades. When an AAR system combines with a perioperative database to form a comprehensive anesthesia information management system (AIMS), the potential uses can be substantial: clinical research, quality improvement, risk management, billing, and compliance efforts all can benefit. However, these benefits should be weighed against concerns over cost, disruption of clinical workflow during implementation and sharing data with outside agencies, which may be perceived as either beneficial or detrimental.

**Hardware**

The anesthesia workstation consists of the anesthesia machine, monitors, computer, display screen (preferably a touch screen) and any associated hardware interface linking the system to the AIMS server via a network connection. Most AIMS vendors include a hardware interface solution as part of the package, providing the critical communication between anesthesia devices—machines and monitors—and the AIMS. If the vendor does not include such an interface solution, solving this problem may be one of the most critical steps to AIMS implementation. Even with a hardware interface included, particular attention must be paid to integrating all necessary biomedical devices for data capture. Hardware and networking needs must be carefully assessed well in advance, so that necessary equipment and configurations will be in place, as well as to accurately assess the cost involved. A network devoted exclusively to the AIMS and a second/redundant network (in case one network fails) is desirable but not always practical. On the other hand, the intensive and rapidly changing nature of anesthesia care...
demands that data acquisition and documentation be supported by a robust, stable infrastructure, even more so than in any other patient care environment.

**Sharing Data**

Sharing clinical data with the ASA’s Anesthesia Quality Institute (AQI) or other outcomes and clinical databases such as the University of Michigan’s Multicenter Perioperative Outcomes Group (MPOG) can provide practice benchmarking and aid clinical research. However, AIMS use and AQI participation also facilitate sharing data with outside agencies, such as the Centers for Medicare and Medicaid Services (CMS). CMS will use submitted data for “pay-for-performance” efforts and to guide its “value-based purchasing” of healthcare for Medicare patients. Individual practices will decide whether to participate in programs such as CMS’s Physician Quality Reporting Initiative, which will exact financial penalties from physicians who do not measure up accordingly. Ideally, data used for quality measures and benchmarking should be clinical data of reasonably high quality. However, CMS uses Patient Safety Indicators from the Agency for Healthcare Research and Quality for hospital profiling and pay-for-performance purposes, and these indicators, based largely on simple administrative data including billing codes, demonstrate major shortcomings compared to measures based on clinical data.

Ultimately, individual practices must decide for themselves whether to participate in public data sharing and federal benchmarking, but anesthesiologists should realize that doing so may result in public reports and financial penalties based on administrative data without appropriate risk adjustment.

**Editor’s notes:**

If a hardware interface solution is not part of the package, beware. Integrating components may not be easily accomplished with overstretched local hospital IT resources. Think about every single monitor you use and how it might be integrated (BIS, ICP etc.), not just the standard hemodynamic monitoring. Hardware implementation comes with a unique set of issues and pitfalls. It is important to have excellent vendor and local IT support to solve problems as they occur—and they will occur. It is imperative that your institution factor in the costs of adding sites and new technology as the need dictates. Otherwise, you will have multiple sites using paper records, as is the result where I practice.

A clear advantage of using an AIMS system is that electronic data sharing and reporting with outside agencies and entities is possible; however, each individual group and facility must carefully consider the costs and benefits of doing so. We have yet to be able to have our AIMS download quality data to our local quality database, and are obtaining the data by other means. If participation in a quality and outcomes database is important to you and your facility, try to get this in place initially, rather than as an add-on, later.

For more information on meaningful use see the [ASA Update on Electronic Health Records and Meaningful Use](#).

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[iii] Romano PS. Health Serv Res 2009 Feb;44(1):182-204

**AIMS Insights, Part 3:**

**AIMS Implementation: Personnel**

An AIMS implementation team consists of several vital roles that should be defined and assigned in advance. A project manager with expertise in information technology leads the AIMS implementation and interfaces with clinical team members to ensure that the system build and workflows are appropriate. The project’s clinical leader should be an anesthesiologist who understands all the department’s clinical
workflows in detail and will guide the implementation team on configuring the user interfaces, determining appropriate documentation, establishing workflows and defining the necessary output formats, reporting and data analysis. Underestimating the clinical leader's time commitment could prove hazardous. This role may become a full-time job, especially as live implementation approaches. The clinical leader’s duties may need to be shared with other clinicians, particularly if the implementation is for a large enterprise or one with multiple physical facilities.

Many anesthesia information systems require extensive software customization to suit the needs of a particular practice, and appropriate personnel need to be assigned to this task. An AIMS vendor may offer basic customization, but other onsite programmers are often necessary, employed by the anesthesia group or the parent institution. These programmers need to learn how to make changes to the system software to adapt it to the end users’ needs. After initial implementation, a system administrator remains responsible for system troubleshooting, maintenance and adaptation. This may be the original project manager or another team member, and the role may be shared with the clinical leader. Many others will play important roles in AIMS implementation, including an “executive sponsor,” who may be the department chair or other key administrator, who can interface with the institution’s administration and advocate on behalf of the AIMS project. In an enterprise-wide EHR implementation, or when an AIMS is added to an existing large clinical information system, a large number of departments and services throughout the enterprise will impact the AIMS rollout, and the implementation team needs to interact with them. Biomedical support staff and information technology personnel and resources need to be identified and influenced to work together to accomplish successful hardware integration and system support. Failing to provide sufficiently for either of these services could have grave results.

Editor’s notes:
For any new AIMS adoption it is important that there be an “executive sponsor” or “clinical champion” in the department who understands the departmental dynamics and culture as well as having a good working knowledge of the AIMS. In addition, there should be several other anesthesiologists who can serve as “super user” resources to their colleagues as the system is implemented. These individuals can anticipate obstacles to the clinical adoption of the AIMS by their colleagues and make suggestions to the information technology department and hospital administration as to how to overcome resistance to the use of the new AIMS. Without several strong colleagues who can provide support to the anesthesiologists as a new system is rolled out, AIMS implementation will be unsuccessful.

AIMS Implementation: Strategies
The executive sponsor or clinical champion works with other anesthesiologists/anesthesia care team members for input on documentation needs, including perhaps one clinician with expertise in each key clinical area or case type. Different intraoperative documentation may be needed, for example, for pediatrics, cardiac surgery, ophthalmology, liver transplantation, neurosurgery, outpatient surgery and obstetrics. Customized preoperative documentation may be required for pediatrics, obstetrics, and others. If an anesthesia simulator is available, interfacing it to the AIMS for system development can facilitate developing the documentation across a wide variety of case scenarios.

In an integrated EHR, the team that develops the AIMS needs to consider how it interacts with the other system components. Implementation involves working together with the teams that manage operating room scheduling, outpatient clinics, inpatient admitting physicians and consultants, nursing care and the pharmacy, just to name a few. In an integrated EHR system, the anesthesia documentation will include data fields that are shared with other applications, such as a pharmacy’s drug list or nursing documentation of fluid intake and output. As a result, the implementation team may face decisions where customizing certain formatted information is desirable, but doing so may mean that it cannot be shared
with other applications or users. Whatever compromises must be made, no concession should be permitted to detract from patient safety, with regards to what documentation is preferable or necessary for anesthesia applications. For instance, if an AIMS requires a process for documenting transfused blood units which is so cumbersome that using it would distract clinicians from patient care during episodes of acute hemorrhage, it is imperative to find an alternate solution.

When faced with a great level of customization, the clinical leader needs to decide to what extent system users can customize individual user experiences. Provided that doing so does not adversely affect other users, the risk of allowing someone to create personal routines and templates within the AIMS interface may be simply that it could distract the user from learning to use the standard templates well. Creating sufficient standardized preoperative and intraoperative documentation templates to meet a large majority of needs should reduce the desire to create custom templates.

Not all EHR systems excel in every aspect of clinical documentation. Thus, outside information systems may remain in use for some aspects of patient care, even after adoption of a comprehensive EHR. The EHR must reliably incorporate access to key outside systems.

One of the most fundamental strategic decisions is whether to “go live” with the AIMS everywhere at once, or whether to roll out implementation in discrete phases. Implementing everywhere at once compresses the time during which initial system troubleshooting occurs. Also, in a staged rollout with different facilities coming online at different times, it is more likely that a clinician could get assigned to the live AIMS facility without having been trained yet, especially if the facility’s staff includes anesthesiologists who also work at other locations. On the other hand, a staged rollout at one location at a time allows a limited number of problems to occur for a limited number of users during the initial clinical use. This may reduce the chance of adversely affecting both patient care and the system’s adoption by skeptical users. For this reason, the staged introduction may be preferable in many cases. Larger groups and those covering multiple physical facilities, especially with different clinical populations at each facility, are more likely to benefit from a staged rollout. The first phase of adoption is where the most problems and troubleshooting should occur, so a substantial delay before the second stage of rollout may be followed by shorter periods between subsequent rollout stages. Initial training may be done with the AIMS connected to a live operating room environment but still with paper charting as the official medical record. This is easier in the anesthesia care team model, when two providers can be present: one training on the AIMS and one charting on paper. Even after the AIMS is live, it may be prudent to continue paper as the official record until the stability and performance of the AIMS is well established. Whatever the strategy, the implementation team should work to ensure that patient safety is not compromised, that the anesthesia documentation is adequate throughout and that billing is not adversely affected.

Although the AIMS and the perioperative database can aid clinicians well beyond providing clinical documentation, features such as clinical decision support, quality improvement, risk management, billing, compliance efforts, pay-for-performance reporting and clinical research may not be in place at the time the automated anesthesia record goes live. Having the AIMS facilitate such efforts is desirable but may take a back seat chronologically as the basic AAR is first brought online. Nevertheless, if the AAR does not come packaged with a robust perioperative database or good tools for decision support or performance measure reporting, foresight is required to see that such features will eventually be available.

Finally, no anesthesia practice should need to implement an AIMS without the benefit of conferring with current users of the system at other institutions. (Implied is this axiom: don’t be the first user of a new system.) The experience and advice of fellow clinicians who have successfully implemented the same
AIMS can prove invaluable. Perhaps as AIMS implementation becomes a more common necessity, resources for support from colleagues across institutions—including professional networking and web-based communities online—will as well.

*Editor’s notes:*

*During the rollout of the AIMS you will experience both “early adopters” and “resistors”. As the executive sponsor or clinical champion, it is important to listen to the concerns of the resistors and address appropriate clinical issues, while not getting sidetracked by emotions, personalities or potential manipulation of circumstances. In any event, it is critical that all members of the department are informed and understand up front that a “drop dead” date exists, beyond which the AIMS use is mandatory. Otherwise, an undesirable hybrid system will exist for an extended period of time. I recommend making the time for initial adoption at the primary site as short as is reasonable for your individual facility.*

*(Conclusion of the series)*