The Medicolegal Importance of Enhancing Timeliness of Documentation When Using an Anesthesia Information System and the Response to Automated Feedback in an Academic Practice

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Documentation should ideally occur in real time immediately after completion of a service. Although electronic records often do not print the time that documentation notes were entered on the medical record, automated anesthesia record keeping systems store an audit trail that time stamps events entered by all anesthesia providers. As more lawyers become aware of this fact and requisition audit trails, prospective charting of necessary documentation may undermine the integrity of an anesthesia care team accused of malpractice, with potentially significant medicolegal consequences. We changed existing documentation practices of a large academic practice via a three-step process. Educational sessions increased the percentage of cases with correct timing of emergence documentation from 25% to 60% over a 2-mo period. Automated email performance feedback further increased correct note timing to 70%. When combined with personal contact by a member of the billing office and email copy notification of the chair, the percentage increased to >99.5%. The behavioral change was seen in all individuals, as 95% of attendings had ≤2 records/mo with untimely documentation at the end of the study period. Once the habits were ingrained, further input was rarely necessary over the next 9 mo. This suggests physician behavioral change related to work process flow, unlike that related to patient care, is easily sustained.

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Documentation should ideally occur in real time immediately after completion of a service. When an anesthesiologist supervises more than one room, this may not always be possible. When using paper records, it is possible (and, according to private communications, not uncommon in many practices) to prospectively attest to work that a physician intends to perform. Eventually, electronic medical record (EMR) systems may incorporate voice recognition software, biometrics, or radio frequency identification to ease this task. Until this occurs, anesthesiologists may find it expedient to complete all documentation needed for billing purposes during a quiet moment in the case. Some may consider that such documentation, if done prospectively, lends itself to fraud.

Guidelines issued by the Centers for Medicaid and Medicare Services (CMS) require that anesthesiologists document the completion of the following 7 elements of anesthesia care; perform a preanesthesia examination and evaluation; prescribe the anesthesia plan; personally participate in the most demanding procedures in the anesthesia plan, including induction and emergence; ensure that any procedures in the anesthesia plan that he or she does not perform are performed by a qualified individual; monitor the course of anesthesia administration at frequent intervals; remain physically present and available for immediate diagnosis and treatment of emergencies; and provide indicated postanesthesia care (1).

Automated anesthesia record-keeping (AARK) systems store an audit trail, which time stamps entries (and changes) made to the anesthesia record. As more lawyers become aware of this fact (and requisition audit trails), prospective charting of necessary documentation may undermine the integrity of an anesthesia care team accused of malpractice and may have medicolegal consequences. After recently facing such a challenge during a high-stakes case in which the audit trail of event documentation was subpoenaed (2), we sought to eliminate the practice of pre-attested documentation.

Both authors were working at other institutions when the current AARK system was implemented. The education of the faculty focused on the completeness of documentation for billing purposes rather than the specifics of the timing of these entries. This is not surprising, given that our institution was one of the earliest adopters of an EMR in the operating room (OR). In the authors' combined 17 yr of experience with EMRs, specific consideration of entry timing did not arise. As it turns out, this was an unrecognized pitfall in transitioning from paper-based records to an EMR.

Of the documentation elements required by the CMS, we were most concerned about the timing of documentation pertaining to presence at emergence. Based on our findings, we implemented a process improvement to limit the number of cases where "present for emergence" was documented in a prospective manner. We hypothesized that we could significantly change an ingrained pattern of documentation using simple automated email feedback of documentation performance.

METHODS

Since 1997, we have used an AARK system (Picis version 6.3 until 2003, followed by version 7.1, Wakefield, MA) in all ORs at one institution where the department's faculty members provide anesthetic care. In addition to recording vital sign data and allowing entry of multiple time points of care (e.g., anesthesia start, surgery end), the system allows the anesthesiologist to complete documentation needed to satisfy the CMS requirements.

We initially reviewed all electronically recorded cases in our anesthesia information management (AIMS) system from January 2003 through December 2003 in which the anesthesiologist documented "present at emergence."

We considered emergence to be a process that starts when anesthetic drugs are titrated to reduce the depth of anesthesia in anticipation of extubating the trachea and ends when the patient is fully awake. "Surgery end" time is recorded by the user by selecting a designated icon (Fig. 1). For each case that contained "present at emergence," we determined the time interval between the attending anesthesiologist's entry and "surgery end." As emergence is not a single point in time (and because our institution has a preponderance of very long cases), we arbitrarily defined pre-attested documentation to occur if the time interval between "present for emergence" and "surgery end" time exceeded 30 min. We did not require a specific notation about presence at extubation because we considered the emergence process—not simply the extubation—to be the critical event. Attending physicians did not document the duration of their presence during emergence.
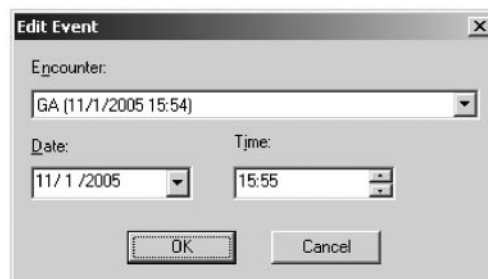

Figure 1. Icon bar displaying times. The user selects the icon corresponding to one of the following, listed in chronological order from left to right (Anesthesia Start, Preinduction Check, Patient in OR, Time out, Anesthesia Induction, Anesthesia Ready, Surgery Start, Incision Time, Surgery End, Emergence/Extubation, Patient leaves OR). When the user selects an icon, a dialog box appears with the current time. The user can adjust the time to reflect when the event occurred or simply press "OK" to enter the current time.

After reviewing our baseline data, we implemented a combined education/monitoring program to educate attending anesthesiologists about the financial and medicolegal impact of such documentation.

In January 2004, we educated the faculty about the possible misinterpretation of pre-attested documentation at a meeting attended by 98% of the faculty who were using the EMR at that time. In May 2004, we initiated daily monitoring of the timing of this documentation. Anesthesiologists who documented "present for emergence" >30 min before "surgery end" were automatically sent an email (Fig. 2) the next morning indicating the inappropriateness of pre-attested documentation. In September 2004, the department chair and a member of the billing office were copied on the emails sent to attending anesthesiologists. During the subsequent 3 mo, a member of the billing office personally contacted individual attending physicians as well. On two occasions, the chair spoke to individuals whose practices did not initially change after contact by the billing office. Since January
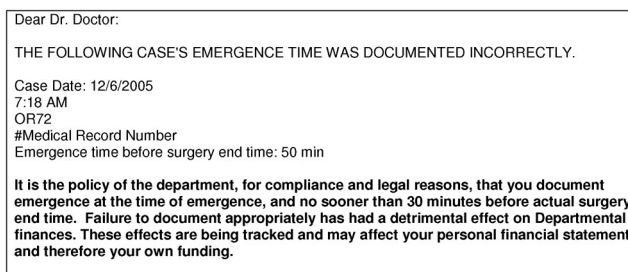

Figure 2. Email sent to attending physician. An automated application reviews all cases done in the previous 24 h. An email (containing specifics about the case) is sent to the attending anesthesiologist, if documentation of "present for emergence" occurred more than 30 min before the user-defined "surgery end" time.
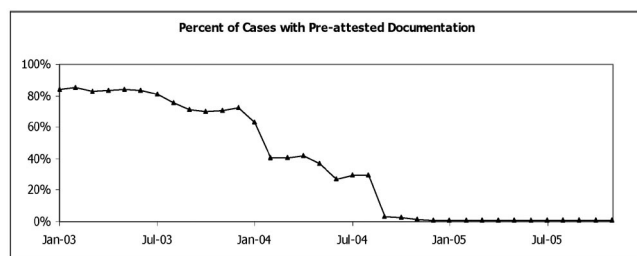
Figure 3. Documentation of emergence >30 min before surgery end. The initial reduction in January 2004 occurred after an announcement at a faculty meeting about the possible misinterpretation of existing documentation practices. The slight reduction starting in May 2004 followed the initiation of emails to individual physicians. The final reduction occurred in September 2004 after the billing office and the chair were copied on emails sent to anesthesiologists with untimely documentation. Between September 2004 and December 2004, a member of the billing office personally contacted individuals receiving this email. This practice was discontinued in 2005.

2005, we have continued to send emails but discontinued contact by the billing office.

We determined the number of cases per week (and the percent of cases) that had pre-attested documentation of emergence. We also determined the time interval between the documentation of emergence and "surgery end."

RESULTS

From January 2003 through November 2005, there were an average of 1254 cases/mo that had "present for emergence" documented in the anesthetic record (range, 1164–1395 cases/mo).

There was a steady decrease in the number of cases containing pre-attested documentation (Fig. 3). Although these were not randomly sampled independent events, we attempted to determine whether the changes resulted from changing behavior of the entire group or of only a few individuals. We reviewed the percentage of attending physicians that had two or fewer cases with pre-attested documentation. After the initial educational session, approximately 30% of attending anesthesiologists were documenting emergence within 30 min of "surgery end." Once the chair was copied on the emails (and a member of the billing office contacted the anesthesiologist), there was a dramatic increase in this percentage. Now, in any given month, almost 90% of attending anesthesiologists have 100% appropriate documentation of emergence. If we allow up to 2 cases/mo where the time interval exceeded 30 min (e.g., because of a resident/student closing), this figure increases to 97% (Fig. 4).

We reviewed the distribution of cases within 5 time intervals (31–45, 46–60, 61–120, 121–240, >240 min) to determine the minutes between documentation of emergence and "surgery end" (Fig. 5). After the January 2004 meeting, there was a general decrease in the number of cases with pre-attested documentation for
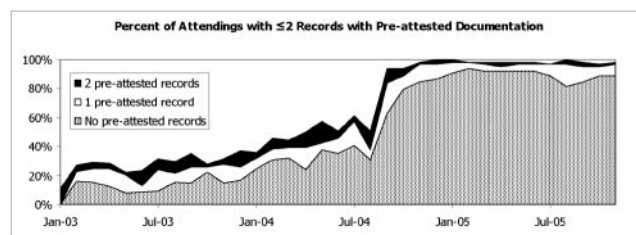

Figure 4. Percentage of attendings with ≤2 records with pre-attested documentation. The increase in the percent of attending anesthesiologists who had ≤2 pre-attested records mirrors the decrease in the percent of cases with pre-attested documentation seen in Figure 3. Starting in September 2004, almost 80% of attendings had no records with pre-attested documentation. The cumulative percent when one allows for 2 pre-attested records/month reaches 95% in September 2004. Once reached, this level of performance is sustained.

each of the 5 time intervals. After the initiation of copying the chair and personal contact by a member of the billing office, there was another significant decrease in the number of cases in each of these intervals. On average, 0.5% of cases contained pre-attested documentation, according to our definition.

DISCUSSION

A claim against one of our anesthesiologists alleged that inappropriate timing of documentation entries (all done at the beginning of a case) raised questions about their supervision of a 7-hour anesthetic. We reviewed our department's documentation practices and were surprised to find that a large percentage of entries documenting presence at emergence occurred well in advance of the end of surgery.

As departmental policy requires attending physicians to be present for tracheal extubation, we were initially concerned about both the level of care and billing issues. This turned out to be unfounded, as
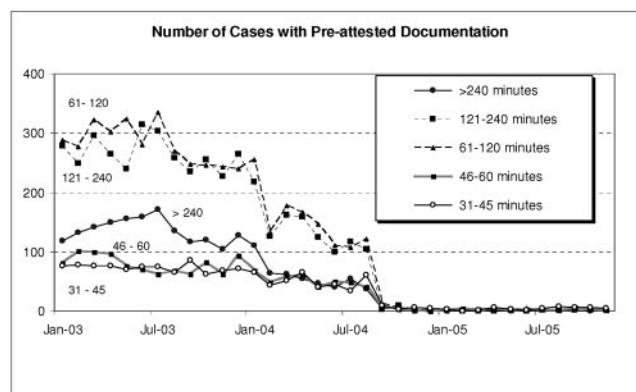
Figure 5. Number of cases with pre-attested documentation, classified by timing of the documentation. All cases with pre-attested documentation were classified by the time interval between documentation of "present for emergence" and "surgery end." As the percentage of cases with untimely documentation decreased (as in Figs. 3 and 4), the most dramatic decrease occurred in cases where documentation occurred more than 1 h before "surgery end." In September 2004, there is a striking decrease in the number of cases in all 5 subcategories.

several investigations revealed virtually 100% compliance with physical presence at tracheal extubation and 100% compliance with the need to be present during some portion of emergence. Therefore, we surmised that this pattern most likely reflected perceived time pressures on the anesthesiologist at the end of the case and the fact that, once closed, the record could not be altered without contacting the Information Technology (IT) department. When queried as to why data were entered early, there was concern that the emergence documentation entry might be forgotten in the press of tracheal extubation, assessment of ventilation, control of pain, and patient transport to the stretcher. Like many busy professionals, when they found a convenient time to document what they had done, or were planning to do, our faculty anesthesiologists entered the required events into the record. The entries are untimed on the front sheet of the printed anesthetic record, which was the primary source of data for our billing office, so it was not apparent to either the attending anesthesiologist or the billing office that there could be a problem. Our attending physicians did not consider this a problem because they were performing the actions that they had documented. However, an anesthesiologist familiar with automated records, serving as a plaintiff's expert, suggested the plaintiff's lawyer subpoena the specific case's audit trail and in a deposition stated that the documentation of care constituted fraud. The plaintiff's attorney then used these data to impugn the care given to a patient with a bad outcome, and undermine the integrity of the anesthesiologist's other testimony about what he did or did not do during the case.

We report both the initiating event and the solution, as it is clear that plaintiffs are likely to view such documentation practices very differently than the anesthesia community, especially when these occur in the context of a poor clinical outcome. We recently reported a case in which our medical liability increased because of a data drop in our automated anesthesia record (2); the software fix for dropped data discussed in that report was a direct outcome of that case. The improvement in documentation practices is another good outcome from a bad experience. We are hopeful that other departments with AARKs will learn from our "trials."

Changing physician behavior remains a challenging problem. Reviews of the literature stress that the most commonly used technique (formal didactic lectures) is the least effective method for enacting change (3,4). Other techniques (e.g., reminders, opinion leaders, multifaceted activities, and audit with feedback) that have been shown to be more effective (5) all entail a more individualized (and costly) approach.

However, audit and feedback using an AIMS with minimal labor costs can still be effective. One such effort decreased annual pharmaceutical costs 50% (over $1,000,000) when anesthesiologists changed their practice patterns (6). Continued feedback was necessary, though, to maintain these savings, which may reflect a greater degree of difficulty in changing a health care provider's medical practice than simply their work flow and documentation practices. Others have used this same type of feedback to change behavior related to prevention of postoperative nausea and vomiting and improvement in OR efficiency. Cohen et al. (7) used intensive education and individualized feedback to increase anesthesiologists' use of preventive measures to reduce postoperative nausea and vomiting. At the end of the educational phase, 4 individualized feedback forms (one every 3 months) were distributed confidentially to each anesthesiologist. There was a significant increase in the mean percentage of the anesthesiologists' female patients receiving a preventive measure. Using individualized outcome feedback, Overdyk et al. (8) produced a 48% reduction in monthly expenditures using a cost-effective, standardized antiemetic protocol. The results were sustained after the study. Both studies were conducted at institutions without AIMS.

Overdyk et al. (9) used educational interventions and monthly feedback as a means of instituting meaningful improvements in OR efficiency. St. Jacques et al. (10) used physician profiling, reporting, and an incentive program to increase several indicators of OR efficiency that related to the anesthesiologist's performance. Results were emailed to physicians on a monthly basis and top performers received a credit of up to $500/month in their personal continuing medical education/expense account. Comparing the first month to the sixth month, the percent of on-time first case starts increased from 19% to 61% while the percent of cases with an anesthesiology preparation time less than target increased from 57% to 73%. The mean number of cases per physician with a delay during anesthesiology-controlled time decreased from 15% to 3.3%. All of these previous studies are consistent with our results showing the limitations of education and the success of individualized feedback in the perioperative arena.

There have been no reported studies on changing physician documentation practices. A study of nursing documentation in intensive care units using computer-generated reminders demonstrated a decrease in documentation deficiencies, as measured at the end of a nursing shift (11). However, the reminders were effective only 29% of the time, as nurses either did not receive the reminder from the charge nurse or they considered the reminder inaccurate or not applicable to their patient.

Of the six methods typically used to change physician behavior (12) (education, feedback, participation by physicians in efforts to bring about change, administrative rules, financial incentives, and financial penalties), we primarily used audit and feedback. Our feedback mechanism was effective because it satisfied a number of conditions necessary to ensure success; physicians recognized that their existing practice

needed to change; the person receiving the feedback was able to act on it and the feedback was timely (13).

The timeliness and automation of our auditing/feedback process distinguishes this approach from most others directed at changing physician behavior. Its significance can be inferred from the conclusions of a recent Cochrane review (14), which stated that audit and feedback can be effective in changing practice but that available evidence says relatively little about how to use it most efficiently. The review failed to find definitive answers to many commonly asked questions: How should it be presented? How frequently should the feedback be presented, as the level of improvement might not justify the time required and costs of data collection? How should the data be delivered to the clinician? Should it be part of a scheduled meeting or should there be specially focused meetings to address gaps in lack of adherence to guidelines? Should the information be conveyed by the chairman or an office staff person?

Our study may help answer several of these questions as we found that daily auditing and feedback using an automated application that emails attending anesthesiologists did not incur an additional workload (once the application was written). Moreover, delivering the data directly to the physician obviated the need for special meetings. Concerns about cost/benefit/labor tradeoffs and logistics of providing frequent feedback are significant considerations. We suggest that automated emailing is an efficient, inexpensive, timely method to achieve certain behavioral changes in those departments with AIMS.

One of the unanticipated consequences of transitioning from paper to EMRs is the effect on documentation practices. The standard paper anesthesia record that offers a limited space for written documentation has not changed in more than 100 years. In the electronic world, payers and regulatory agencies may review specific date/time notations of each entry. The capabilities of the software regarding the timing of entries are a major consideration for those considering implementing an AARK.

At our institution, the faculty could document their presence at emergence any time the record was open. Our software application does not restrict the timing of any entry and to the best of our knowledge, such pre-attested documentation could have occurred with any existing system implemented in the United States. Some other systems alert users (by text pager) about missing documentation (personal communication, Warren Sandberg); others use a window to indicate that specific entries are missing (personal communication, Michael O'Reilly). However, no system prevents the user from prospectively documenting an entry. Our investigations revealed that before our awareness of this issue, most entries were entered without regard for timing considerations. Rarely did an attending physician make an entry and then go back to that entry later in the case and change the time
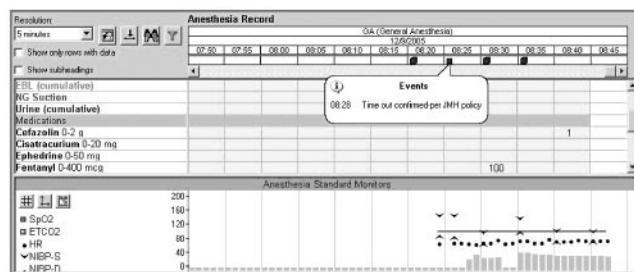

Figure 6. Clear temporal visualization aids in placement of entries in the proper chronological order. In this flowsheet representation of the data, holding the mouse over the symbol representing a documented event displays the associated documentation. Entries can be added by clicking on the bubble to add additional events at the same time or in the row underneath the listed time to add events at a new time. The resolution (5 min per column in this window) can be adjusted from 1 min to 1 h. Finer time cuts allow the user to place documentation entries in a more precise chronological order, and larger time cuts are useful for viewing trends.

of the entry. From personal communications it is clear that other practices with AIMS have similar documentation issues, although not all are as concerned as we are with the timing of entries.

Our software has an electronic signature associated with each entry whereas other institutions use one all-inclusive attestation to comply with billing requirements. When using an EMR, it is worthwhile not only to consider the design of the documentation necessary for billing purposes but also to consider the potential medicolegal consequences of each approach.

What are the implications of using an automated system for documentation in an academic department or one that works primarily within the anesthesia care team model?

We found a number of problems regarding the completeness, accuracy, and logical arrangement of documentation entries. Although these issues may occur with a paper-based record, having an EMR enabled thorough review and analysis of our documentation practices.

At our institution, new residents/nurse-anesthetists initially receive 2 2-hour training sessions. Most users report that they are up to speed within a week. If a user experiences a problem with the software during a case, an IT support can be paged (either via the phone or computer). Most problems are solved (using remote viewing/controlling software) without requiring physical presence of the IT support person, an important consideration with a 24-7 application.

Documentation entries typically consist of commonly used phrases that limit the amount of free text required by the user. Logical organization of these phrases helps the user to select the correct entry and to place entries chronologically, and clear visualization of documentation is useful for reviewing purposes (Fig. 6). Because users make mistakes, easy movement of entries (drag and drop) is a desirable feature. We have created event sets that aid the user but are

working on an application to verify the proper chronology of events. The lack of such system software makes illogical sequences routine (e.g., tracheal intubation occurs before mask ventilation is established).

Although our most recent version of the software restricts modification of events to the user who entered them, this requires users to log in/out appropriately (e.g., when giving a break). We have found that nurse-anesthetists are more attentive to this issue than are attending anesthesiologists or residents.

Despite the relative ease of documentation entry, we have found that records periodically lack needed information (e.g., allergy, location of IVs). We attempt to prevent this problem by using on-screen reminders to aid the user during the case. If an entry is missing after the case has been closed, the user is notified by the automated email mechanism. In the absence of mandatory data field entry, others have experienced the same problem (15). We recommend mandatory field entry that can be overridden only by affirmative action with automatic notification of the compliance office.

Our department and faculty remain remarkably positive about AARK systems, despite the problems associated with one medicolegal case. Rather than limiting the adoption of AARK systems, these unanticipated consequences of using EMRs should spur software designers to improve their product and ease the anesthesiologist's workload. Focusing on intelligent design features, such as user-friendly interfaces, forced function logical entry sequences, intuitive design that reflects the user's workflow habits and prompts that alert users to missing documentation entries (or inappropriate documentation entries) would go a long way to increasing more widespread adoption of AARK systems.

Until these issues are resolved, we recommend that institutions using AARK systems monitor how these systems are used. We have shown that it is possible (with minimal resources) to identify problems and design solutions which yield dramatic results in a very short time.

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