

Technique Articles

Perfusion Electronic Record Documentation Using Epic Systems Software

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Abstract: This paper describes the design and use of Epic Systems software for documentation of perfusion activities as part of the patient electronic medical record. The University of Wisconsin Hospital and Clinics adapted the Anesthesia software module and developed an integrated perfusion/anesthesia record for the documentation of cardiac and non-cardiac surgical procedures. This

project involved multiple committees, approvals, and training to successfully implement. This article will describe our documentation options, concepts, design, challenges, training, and implementation during our initial experience. **Keywords:** electronic medical record, EMR, Epic software, perfusion electronic record, integrated perfusion anesthesia patient record. *JECT. 2015;47:237–241*

Electronic medical records (EMR) are quickly replacing paper charts as the source of patients' medical information (1). Electronic record keeping has been around for some time, but as technology and user interfaces have evolved, there is greater demand for this capability (2–4). As part of Title XIII of the American Recovery and Reinvestment Act of 2009, medical institutions must convert to EMR for patient care documentation (5). To date, there are several software companies providing EMR products for recording patient care data (6). At the University of Wisconsin Hospital and Clinics (UWHC), the medical record software company of choice is Epic Systems software (Epic, Verona, WI). In October 2009, the UWHC operating rooms initiated the use of Epic's OpTime and Anesthesia modules for both perioperative nursing and anesthesia documentation, respectively. During this initial implementation, perfusion documentation continued as a paper record for the next year. As many of the institution's

departments converted to Epic, perfusion investigated their options for EMR documentation using the Epic platform. During this investigation, it became apparent that there was no specific perfusion-based module available from Epic Systems. Documentation options for perfusion included using the nurse OpTime platform, doc flow sheets, or the Anesthesia module. We concluded that using the Anesthesia module appeared to be the most viable option for perfusion documentation. As it was never used or intended for perfusion documentation, there were issues that would need to be addressed and resolved for a successful implementation. This article will describe our document options, concepts, design, challenges, training, and implementation experiences using the Epic Anesthesia module as a platform for perfusion documentation.

DESCRIPTION

Perfusion medical record documentation has traditionally occurred as an institutional paper document. As medical facilities convert to electronic patient records, perfusion must adapt and provide an accurate and representative document in electronic form. Many institutions are assessing third party software companies to provide

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other entity whose products or services are discussed in this paper.

them with institutional electronic record software that is compatible and accessible across all departments.

DOCUMENTATION OPTIONS

Perfusion documentation options include paper, perfusion manufacturer record/database systems, or third party institutional software systems. Documenting on paper does not provide an accurate assessment of the patient real-time condition as it was often recorded every 5–30 minutes. Paper documents are subjective and can only live as a physical or scanned document without the capability of electronic interaction. A perfusion manufacturer-based record and database platform, while providing an automated bypass record, may only produce a paper printout or uploaded electronic file format to the patient record. Compatibility with peripheral equipment outputs and required software drivers can be difficult given the array of devices used in the operating theater. A review of the patient record may require opening and interacting with files of differing formats in different programs. Moreover, software compatibility of the manufacturer and institutional systems, as well as physical hardware requirements and their interaction, was a concern for our Information Technology department. On the basis of these issues, and the desire to have full communication with the institutional EMR system, perfusion decided to incorporate within the institutional Epic System software. From this, we had the potential to choose from three Epic platform options: Nursing OpTime, doc flow sheets, and the Anesthesia module.

It became quickly obvious the option of using the nursing OpTime record was unfeasible. This was because of the structure and lack of real-time data collection capability from the operating room monitors and devices. The second doc flow sheet option (essentially a spreadsheet) allowed for some automated data capture, but required significant manual interaction by the perfusionist during the time on bypass. Lastly, when examining the Anesthesia module, we realized that many of the parameters already being collected and recorded by anesthesia (e.g., hemodynamics, medications, intake/outtake, and temperatures) were of interest to perfusion as well. On the basis of the available options, we moved forward with the integration of the Anesthesia module for perfusion documentation.

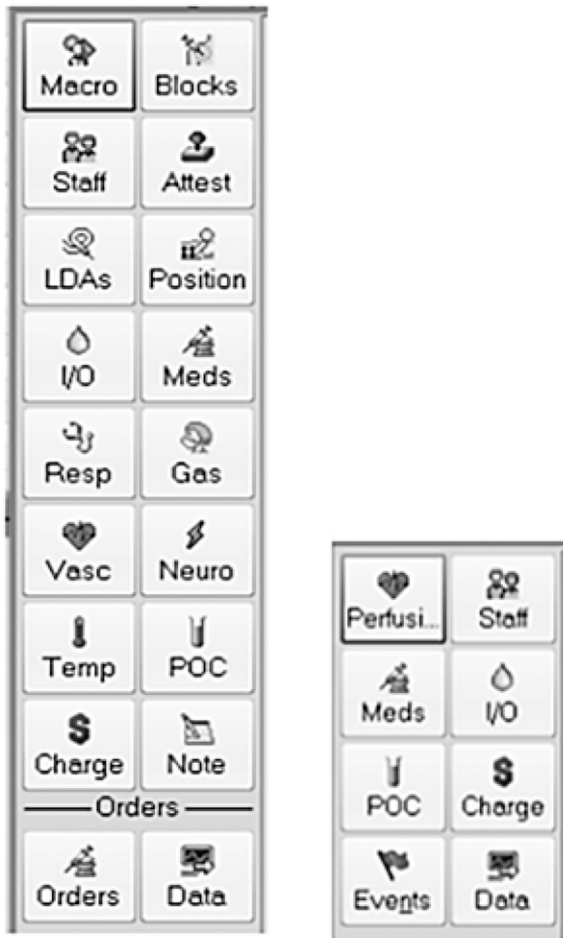
CONCEPTS AND DESIGN

The Epic Anesthesia module provided us the ability to create a stand-alone perfusion document or the capability to integrate perfusion data within the anesthesia data already being recorded. The second option provided the

opportunity to move from a “silo” system of documentation to an integrated information sharing one. On a conceptual level, we postulated that a combined record could provide advantages of a more accurate record, reducing duplicate data, providing greater information sharing, and improved safety for the overall care of the patient. By combining the record, both perfusion and anesthesia would be able to see all recorded parameters in real time, thus providing a greater understanding of the patient’s current condition. Several meetings were held with anesthesia to provide input and thoughts on the concept. One significant concern raised by several anesthesia staff members was that “Perfusion would be documenting in their record,” that they “owned” the anesthesia document. After much discussion and in consultation with the UWHC legal department, it was determined that neither anesthesia nor perfusion “owned” the record, but that, in fact, the patient was the owner of the record. As health-care providers, we are given permission by the patient to record the events of the procedure. Whether that occurred on separate documents or the same was irrelevant. The decision was made to proceed with a combined and integrated anesthesia/perfusion medical record.

Creating the perfusion workspace required that we address several software and hardware issues. In Epic software, a perfusion-specific log-in department was created, which allowed for the customization of the perfusion workspace. This workspace was similar in appearance to anesthesia’s intraoperative workspace but was streamlined and configured specifically to support the documentation needs of the perfusion team. A comparison of the two different sets of available Epic tools is shown in Figure 1.

Eleven cardiopulmonary bypass (CPB) variables were mapped and automatically filed into the record from the Terumo System 1 heart-lung machine (HLM) and CDI 500 blood gas monitor (Terumo Cardiovascular, Ann Arbor, MI). The parameters were taken from the paper record and included pump flow, revolutions per minute (RPM), line pressure, sweep flow, fraction of inspired oxygen (FiO_2), venous oxygen saturation (SvO_2), arterial oxygen saturation (SaO_2), arterial and venous temperatures, cardiac index, and cardioplegia volume. Other parameters such as cardioplegia details (antegrade, retrograde, type), Isoflurane and heater/cooler temperature were unable to be auto integrated and a place was created for them to be entered manually into the record. Serial data were connected from the HLM data port through a standard data cable to the DataCaptor (Capsule Technologies, Andover, MA) terminal server. This server also accepted data inputs from the patient hemodynamics (Phillips Medical Systems, Germany) and NIRS monitors (Somonetics, Troy, MI) as well as from the anesthesia machine (Datex-Ohmeda, Madison, WI). The perfusionist’s interaction with the



Anesthesia Tools

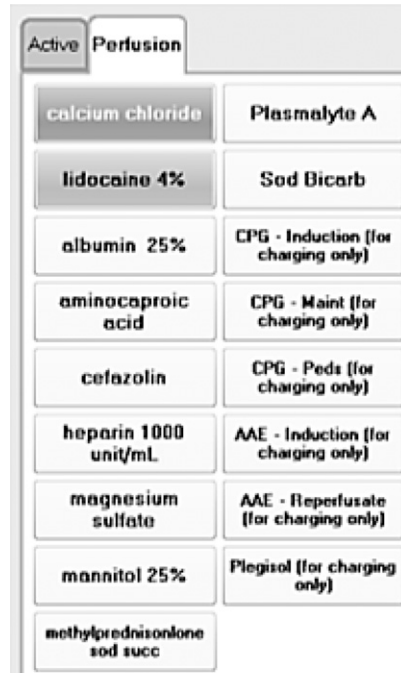
Perfusion Tools

© 2015 Epic Systems Corporation. Used with Permission. Figure 1. Anesthesia vs. perfusion workspaces.

record was provided by a wireless touch screen monitor (Tangent, Burlingame, CA) mounted on the HLM but could also be accessed with a portable PC or iOS device. The basic Anesthesia module screen was adapted to show perfusion data, patient hemodynamics, input/outputs, and medications (Figures 2–4). Sub screens including staffing, charges, event notes, and data connectivity were also created for the ease of documentation. Attestation of the prebypass checklist, circuit equipment, and disposable use was also included.

CHALLENGES

Incorporating the two documents was not without its challenges. Primary was the belief that each group “owned” their document. As mentioned, we concluded that it was the patient who was the ultimate owner of the record and that if any member of the health-care team wanted to



© 2015 Epic Systems Corporation. Used with Permission. Figure 2. Perfusion medication screen.

access the record, they must have approval from the patient. We were, in fact, “leasing” the record during the time the patient was in our care. Any concern about authorship of specific entries was addressed by the individual log-in requirement at the beginning of record access. Anything documented by perfusion or anesthesia has the appropriate log-in credential labeled with the entry. Individual accountability and patient safety were significant arguments for the integration.

Displaying real-time data that both practitioners interacted with created a greater understanding of the patient’s condition. Duplicate entries were virtually eliminated by agreeing on a division of labor. Primary from this discussion was who had the most vested interests in properly recording an event. From this, a workflow document was created for perfusion and anesthesia to follow as a guide. For example, events such as on/off bypass as well as cross-clamp application and removal were documented by the perfusionist. Anesthesia recorded baseline and post protamine activated clotting time (ACT), while perfusion recorded post heparin and CPB ACT.

The documentation of medications recorded both who administered the drug and at what time. This clear distinction of who administered the medications was a huge step in reassuring anesthesiologists regarding the validity of a single combined record. A medication list of drugs that perfusion routinely administered was created from existing perfusion protocols and approved by the pharmacy, surgery, and anesthesia committees. A macro was created

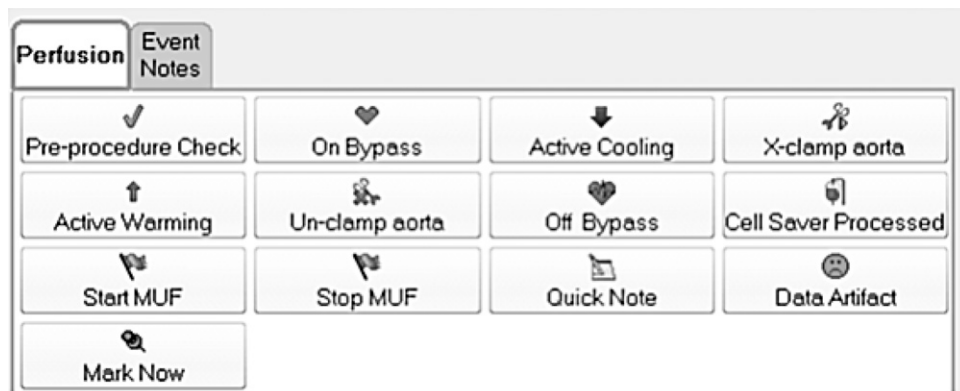


Figure 3. Perfusion events.

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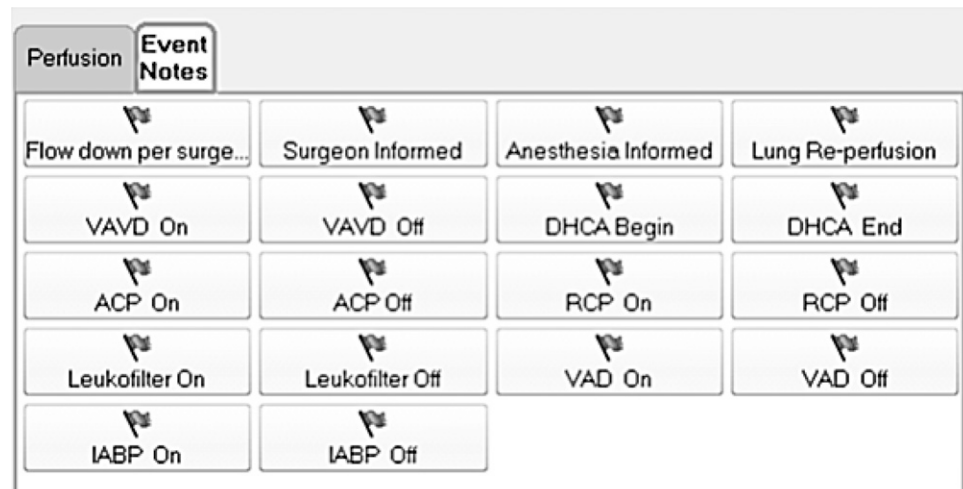


Figure 4. Perfusion event notes.

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to populate the medication screen with the list of routine anesthesia and perfusion medications so as to reduce duplicate medication line items.

TRAINING AND IMPLEMENTATION

Testing the documentation occurred by creating an electronic shadow record. For several weeks prior to the go live, a member of the institutional EMR team was paired up with a perfusionist not responsible for patient care, to electronically document the case in real time. This allowed one perfusionist to concentrate on the new documentation system, whereas another could safely care for the patient and complete the paper documentation. The electronic and paper copies were compared at the end of each case and it was confirmed that the electronic record showed greater accuracy, primarily with the time stamps associated with events and medication recording. Education of the perfusionists occurred during these shadow charting times as well as during a single 2-hour classroom session. The

PowerPoint tutorial that was created for the classroom session was loaded onto the PCs mounted to the HLM and saved as a desktop favorite. This provided an easily accessed reference in case questions arose during the initial roll out of the new process. Once the final version of the workspace was complete, go live was nearly seamless because of the time invested with the shadow charting.

DISCUSSION

Incorporating the Anesthesia module to accommodate perfusion parameters created a document that provided a seamless record of events during cardiac procedures. From the time the patient enters the room, is lined, intubated, cannulated, CPB initiated/terminated until exiting the operating room, all events, medications, and interactions are recorded in one single document. We have been able to adapt this document to capture events during perfusion standby and for non-cardiac procedures such as autologous blood processing and hyperthermic intraperitoneal

chemotherapy (HIPEC) and conform to the AmSECT 2013 Standards and Guidelines for perfusion records (7). Also included in the design was a charge screen, which on audit, confirmed several thousands of dollars in missed revenue that was not being captured under the paper documentation method. Over the past two years, variations such as duplicate recordings, interpretations, and time stamps have been virtually eliminated. Moreover, there is a complete knowledge of medication administrations, times, and total dosages by all team members. Greater communication and understanding of the real-time patient status has fostered a more collegial and safe environment for the cardiac surgical patient. Using an integrated document will also foster future quality initiatives with our anesthesia colleagues.

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