# MAKING CODE DOCUMENTATION WORK FOR YOU – THE ELECTRONIC WAY Judy Boehm, RN, MSN

### Introduction

As the cardiac clinical nurse specialist at a major tertiary medical care center, I was responsible for managing the CPR data. But I felt that the data manipulated me, and much of my time was spent tracking down codes, analyzing the minimal data provided by the documenter, and determining best ways to display the statistical data for review by the CPR committee.

Beth Mehring, RN, at the University of Virginia states: "The majority of the paper CPR records were sparsely completed in a cryptic language that was very hard to determine what was intended. It was clear that the documentation depended on the experience level of the care provider. The system of code documentation was reactive. If a problem was identified, somebody looked at it, but there was no systematic review of codes."<sup>1</sup>



After working with ZOLL Medical Corporation in the development of an electronic system to manage the resuscitation data, and then using CodeNet for over one year, I believe now is the time to let technology work for you. Hospitals need an integrated system that supports data entry during codes, produces individual records of resuscitations, and provides meaningful aggregate reports of resuscitation data. Through analysis of this data, the work of the CPR committee evolves into:

- Setting standards of resuscitation care
- Providing a structure for team response to resuscitations
- Implementing systems for purchase, set up, and maintenance of resuscitation equipment, supplies, and support
- Assuring staff competency in resuscitation care and equipment
- Continuous evaluation and improvement of resuscitation systems



Process of care time intervals and outcomes must be measured so that the hospital understands if it is ready to respond to medical emergencies in a timely, effective manner. A hospital does not know if it is providing care according to the American Heart Association Guidelines and if their patient survival rate is similar to like institutions unless CPR data is collected and analyzed. *Resuscitation care and patient outcomes cannot be wisely improved until they are measured*!

### **Problems Inherent in the Paper System of Documentation**

Most institutions use a paper CPR record for collection of data at the time of a resuscitation. Problems that I have found in use of a paper record include:

- It is not always available at the beginning of a code.
- The form is often so open ended that all necessary data elements are not documented.
- It is easy to write anything on the record, which is considered as "acceptable".
- The writing is often illegible.
- The ECG paper record is on paper size that is not compatible with the paper medical record; the ink fades over time.
- It takes at least one day for transmission of the paper record to the CPR committee for review.
- CPR data from the paper record must be entered by hand into a data management software program.
- Knowledgeable resources are needed to manipulate and display the data for review by hospital groups.
- Space is needed for archiving the paper records.



# Value of Electronic Documentation

#### Electronic Documentation Improves the Quality of Documentation at Codes

With electronic documentation the individual CPR record is more complete and legible, and the resuscitation "story" is better understood. Many paper CPR records are open ended with few prompts. Other CPR records have so many boxes that it is difficult for the less experienced documenter to quickly determine where to write the interventions. I have found that no matter how little is written on a paper CPR record, it is usually considered "sufficient" for review by the CPR committee.

Peberdy et al<sup>2</sup> reported at the Resuscitation Science Symposium in 2003 on the accuracy and completeness of documentation during 7 ventricular fibrillation mock codes at a university hospital. Real-time, accurate, time synchronized documentation was performed by the study physician and compared to the paper record documentation. Their findings include:

- First responder BLS or AED efforts were documented in 0/7 event records.
- Performance of any chest compression effort was documented in 3/7 and correctly reflected performance in 1/7.
- The correct initial rhythm was documented in 5/7 and subsequent rhythms were correctly documented in only 3/7.
- The correct number of shocks delivered was documented in 1/7.
- Pre and post shock rhythms were completely documented in only 2/7.
- Documentation of all delivered drugs occurred in 4/7, and the correct dose in 3/7.
- Response time intervals to first shock, invasive airway, and drug administrations were all incorrect.

She concludes, "Is the resuscitation record merely an illusion?"



#### Scientific Statement

In-Hospital Resuscitation Recommended Guidelines for Reviewing, Reporting, and Conducting Research on In-Hospital Resuscitation: the In-Hospital 'Utstein Style' Electronic documentation systems have been designed to support the standard resuscitation data elements defined in the in-hospital 'Utstein template', published by the American Heart Association (AHA) in 1997 <sup>3</sup> and updated in 2004.<sup>4</sup>

Cues are provided in an electronic documentation program, often in dropdown menus, for the documenter to enter assessment data and interventions. By the tap of a stylus, data can be entered to fully describe an intervention. For

example, when intubation is performed entries are requested for the time, size of tube, mm at the gum line for alignment, methods of confirming the location of the tube, and name of the provider performing the insertion. Not only does this match with the Utstein template elements, but the documentation provides that which most institutions require for their patient medical record related to intubation.

The electronic record is more complete because the documenter is forced to complete select fields. For example, the names of the leader and documenter must be entered prior to closing the record. Quality concerns must be described briefly or noted to be absent. With paper records quality concerns are learned about through hallway conversations or several days later when it is difficult to follow up.

Since the CPR record is the physician order sheet for the event, the required elements for all orders must be entered. For example, with electronic entries the generic name, dose, route and time of administration must be entered for all medications.

The times written on a paper CPR record are often questionable. At the 2003 Resuscitation Science Symposium it was stated that there is nothing with more variability at a code than time of entries. Problems with time documentation include:

- Times may not be documented at all.
- The perception of time is inaccurate.
- Multiple timepieces are used.
- Atomic clocks are unable to synchronize via radiofrequency signal in hospitals.
- Times are entered into the record retrospectively.

Kaye reports<sup>5</sup> that when nurses at an urban academic medical center were asked what timepiece they used for documenting times during codes, 31.3% reported using only patient room clocks, 44.8% reported using only their watches, and 23.9% reported using one of several sources including patient room clocks, their watches, defibrillator clocks and emergency timers in patient rooms. Additionally, the precision of the timepieces used was inaccurate. The watches used by the nurses varied from atomic time by a mean of 2.4 minutes, the defibrillator clocks by 4.58 minutes, and the patient room clocks by 3.11 minutes.



Electronic documentation systems can provide the means to synchronize clocks so that reports of time are accurate. Electronic documentation systems automatically open with the date and time, and time stamps are automatically submitted concurrent with the stream of events as they are entered. CodeNet is the only system that synchronizes times across all the elements. At my medical center we set our system up so that all times related to resuscitations were synchronized to our institution's computer network time, which was synchronized to U.S. Naval Time. That means that when the ECG data was transferred to the pocket PC, all defibrillator times were shifted to that on the pocket PC. Then all times on the pocket PC were

shifted to the time on the network, once the pocket PC was docked and data submitted centrally. The computers used by the telephone operators were manually set once per week to network time so that we would know the time of CPR team notification, and thus the time of the start of the event. In this way all times are reported for analysis using *one* clock.

#### Electronic Documentation Provides Support for Decision Making

Technology should be used to support a culture of safety for the patient. Resuscitations are often chaotic and stressful with decisions needing to be made quickly. High stress can overwhelm our ability to process information, results in tunnel vision, and causes an increase in error rates. Cues to support care help create decisions that align with the American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care.<sup>6</sup>





AHA Pulseless Arrest Algorithm Circulation. 2005;112:IV-58 – IV-66 View larger version (52K): [in this window] [in a new window]

Any reminders at codes are helpful since cardiac arrests don't occur frequently and the responders rotate so they get little actual experience. Electronic programs can make reference information available at one's fingertips on a handheld instrument. For example, it is helpful to have the Advanced Cardiac Life Support algorithms available for reference.

Key pieces of information can be provided, such as usual drug doses for adults in resuscitations. The ability to calculate drug doses that are weight-based, such as for children and for dopamine infusions, is especially helpful. Alerts when maximal doses are reached can help prevent dosage errors.

Electronic functions can be built to help support decision making during codes. For example, the documenter can be alerted when three minutes has elapsed since the last dose of epinephrine. The code log

can be easily accessed so that past interventions can be readily viewed. The running time since the code started can help with the decision to stop resuscitative efforts. A timer could be started once defibrillation is performed that alerts the documenter to two minutes, when compressions should be momentarily stopped and the pulse checked. If documenters change in the middle of a resuscitation, the handheld instrument can be passed on to another person skilled in its use, who can then pick right up without losing data. Handoffs are a time when data frequently gets lost, and are one of the most common factors contributing to the occurrence of adverse events.<sup>7</sup>

Built-in forcing functions in the software program can help ensure all aspects of an intervention are considered and available for review later. For example, when the documenter enters that transcutaneous pacing has been initiated, a screen can pop up requesting the pacing rate and mA setting.

With electronic documentation the code record along with the ECG is available immediately for review when providing care to those who survive. A real example: A patient in the OR was hooked up to a defibrillator when a transient "funny arrhythmia" was seen on the monitor screen. Another episode occurred at the time of transfer to the PACU. I downloaded the ECG quickly from the data card and made it available for review by the Cardiology consultant. The consultant noted several short runs of torsades de pointe. The rate of the patient's internal pacemaker was increased, electrolytes were adjusted - and the amiodarone, ready to be hung by the anesthesiologist, was avoided.

# Electronic Documentation Assists in Evaluating the Quality of Care at a Resuscitation

The CPR committee usually designates one or more reviewers of the code data. Since electronic data from a resuscitation is complete, accurate, and available quickly, the reviewer can immediately and systematically examine the record. The paper CPR record would have to find its way to the reviewer via interoffice mail, usually taking one or more days. The electronic record can be reviewed to determine if the ACLS/PALS/NRP algorithms were followed. The entire ECG can be reviewed to decide if the interventions were appropriate to the rhythms. It can be easily seen on the ECG if synchronization did not occur for cardioversions or if defibrillation was performed for asystole; see figure 1.



Figure 1 – Example of a shock given for asystole

The American Heart Association gives us gold standard process of care time intervals that work together to optimize patient survival:

- CPR should be initiated within one minute of arrest recognition.
- Epinephrine should be delivered within 5 minutes of the time pulselessness was recognized.
  - Defibrillation should be performed within 3 minutes of ventricular fibrillation.

If time is synchronized with electronic documentation, the first responders and CPR team can be given feedback about how effective they were in meeting these standards.

With electronic documentation, the reviewer is quickly notified of quality issues related to a resuscitation. Follow up of quality issues can then be started on the same shift. When there is a delay in the arrival of the defibrillator, it is much easier to talk with those directly involved while the

memory is fresh and the participants are on duty. When it's stated that it took a long time for the CPR team to reach the patient at a distant location, the electronic record can help verify the actual interval from time of call to first documentation upon arrival. When it's learned that the ICU RN did not show up as a member of the CPR team, it can be immediately determined if the pager was accidentally turned off or went home with the night nurse. At my institution providers had found it difficult to perform pericardiocentesis because the needle was not sharp enough to cut the skin. After discussion with the physicians involved in the incident, the problem was solved by adding a scalpel to the code carts. When staff are said not to fulfill their designated roles at a code, the record provides a non biased place to begin discussion. I have found when following up quality issues that it's important to choose my words carefully. It's easy for participants to become defensive, and then they hold back the complete information that is sought. As written in the *Quality Review Board*: "It is wise to be gentle with those who have done their very best in one of medicine's most stressful circumstances."<sup>8</sup>

Retrospective reviews of the resuscitation process of care are much more meaningful to those involved if provided in a timely manner. Through a written report card, the providers will realize that their efforts are acknowledged by the CPR committee, who care that appropriate standards have been utilized by the team. It can be shown that quality issues they have reported are being rigorously investigated so appropriate system changes can be put into place to support future resuscitation efforts.

### Electronic Documentation Provides Meaningful Aggregate Reports to Drive Decisions

Resuscitation care at an institution cannot be evaluated until it is measured. Entering CPR data by hand into a spreadsheet or data analysis program is labor intensive and prone to error. Determining the type of reports needed to review resuscitation quality of care and how the data can best be displayed takes a knowledge base composed of understanding computer programs, analysis of data, and resuscitation science itself. When quality resources are strained at an institution, there are delays in resuscitation data management and reporting.

1:10,000 mg (0:1 mg/mL) PRUTECT FROM LIGHT Aggregate reports of the institution's gold process time intervals provide data for the CPR committee to review and determine if practice should be improved. For example, if time to intubation is prolonged, system considerations might include:

- Standardization/availability of airway management equipment
- Maintenance of intubation equipment so that it is always "ready to use"
- Faster way to get the airway equipment to the code
- Timely arrival of providers who perform intubation
- Clarification of roles for those who are authorized to perform intubation
- Need for an airway team or a medical response team (MET)

In the JCAHO chapter on "Management of Information", Standard PI.2.10 is: "Data are analyzed and compared internally over time and externally with other sources of information when available."<sup>9</sup> In order to compare, uniform definitions must be used for the data elements. Standardized definitions according to the AHA Utstein template can be guaranteed by a good electronic management system for resuscitations. If an institution submits its data to the National Registry of CPR (NRCPR), these standardized definitions must be used.



JCAHO further states, "Comparative data are used to determine if there is excessive variability or unacceptable levels of performance." Aggregate patient outcomes for hospital discharge of patients undergoing resuscitation can be compared among institutions. In NRCPR data through March 2004, the discharge rate for adults is 18%, while it is 27% for children.<sup>10</sup>

Yearly reports of resuscitations by department should be compiled so that feedback can be provided to the first responders at the local level. Aggregate yearly institutional reports are always reviewed with the CPR committee, the QA committee, the critical care committee, and responders on the CPR teams. This data is the very cornerstone for all aspects of the CPR program work at an institution.

Information in an electronic information management system can be used to drive supply/equipment allocation for emergency care, to educate practitioners in a realistic and pertinent manner, to track the effectiveness of evidence-based practice changes, and to answer resuscitation research questions. Questions that can be answered using the aggregate data include:

- What quantity of the various medications used at resuscitations should be placed on the code cart?
- What low use items could be removed from the arrest cart in order to make room for prepared infusions of emergency drugs?
- Where are codes occurring so that an institution can strategize about placement of defibrillators and code carts?
- What is the average cost of opening a code cart for a resuscitation?
- What are the most frequent variances in use of the ACLS algorithms that should be emphasized during class?

- Are changes in the AHA Guidelines being incorporated into practice, e.g. amiodarone as the first line antiarrhythmic, appropriate use of high dose epinephrine, inclusion of vasopressin?
- Has your education program to improve the quality of compressions (push hard and fast, allow full recoil, limit interruptions, switch compressors every 2 minutes) lead to an increase in return of spontaneous circulation and discharge rate?
- For a unit with an unexpectedly high number of arrests, what are factors in their resuscitations that could have made a difference?
- If AEDs were implemented one year ago, what is their usage and have there been any quality issues?
- With the implementation of a Medical Emergency Team (MET), has the number of resuscitations decreased and the survival rate improved?
- Is monitoring of end tidal CO<sub>2</sub> being employed to confirm the placement of the ET tube?
- Is it feasible to incorporate portable ultrasound into resuscitation of those with PEA? (Note: When Niendorff set up his research study,<sup>11</sup> the first question he asked me was how many PEA codes occurred the previous years.)
- What is the survival of inpatients experiencing two or more arrests? (Note: If you want to know the answer to this research question, read the reference by Niendorff.<sup>12</sup>)

# Summary

In order to assess the effectiveness of resuscitation care at your institution and then to improve performance, you must have accurate and complete CPR data. Now is the time to consider using technology to assist you in managing your CPR data. The ability to manage your data electronically is now available, so evaluate the available systems and determine which one will work best for you considering the key selection criteria given below.

# What Should your Electronic System be Able to Do?

# The electronic device used to enter data at codes must:

- Be small and lightweight
- Be available for data entry at the beginning of a resuscitation
- Enable data entry via several means, e.g. stylus, voice, scribble
- Have a logic in its presentation that works for resuscitation teams
- Have pre programmed menus containing resuscitation data elements from the AHA in-hospital 'Utstein template'
- Provide cues for resuscitation data needed by hospitals, e.g. names of providers, quality issues
- Be constructed in such a way to force required data elements
- Prompt the documenter when data is incomplete
- Perform needed calculations, e.g. weight-based med doses, defibrillation voltages
- Be useful for victims of all ages
- Support data collection for a variety of emergencies, i.e. cardiac, respiratory, medical emergency team (MET)
- Provide current, authoritative cues/references for decision support, e.g. AHA algorithms, med doses, stopwatch
- Alert documenter when data is out of line in order to prevent errors
- Provide prompts when select time intervals are reached, e.g. 3 minutes since last dose of epinephrine, 2 minutes performing compressions after shock
- Have sufficient memory to support several resuscitations
- Be visible in low light situations
- Have good battery life

### The centralized data management system must:

- Be organized in a logical manner to work with the data
- Produce individual CPR records in a timely manner
- Readily provide complete ECG data from the resuscitation
- Produce individual CPR records that meet specifications for hospital medical records
- Produce aggregate reports for a variety of grouped events, e.g. adults, pediatric, cardiac, respiratory, in-hospital, pre hospital, individual departments
- Produce accurate, meaningful displays of the aggregate data
- Have technical support to create special reports specific to institutional needs
- Maintain archived electronic records of all resuscitations/medical emergencies for an institution with easy retrieval at any time

### The entire electronic system must:

- Be easy to use with a minimal learning curve
- Be set up so that data is entered only once, yet will automatically populate other fields where this same data is needed
- Have an easy method to add free text data about the resuscitation
- Have adequate technical support online and via phone
- Require minimal time/expertise to "push out" software updates
- Ensure the confidentiality of patient information and be compliant with HIPPA
- Synchronize timing of data related to a resuscitation so that one clock is used
- Work smoothly with few hang-ups
- Work reliably with no loss of code data
- Not increase the total use of resources for managing CPR data at an institution, and hopefully decrease them
- Provide a smooth way to transmit data to the NRCPR so there is no replication

# Choose wisely!!

#### **References**

- 1 Mehring, B. Timing is everything Improving time and documentation accuracy. NRCPR User Group call on March 9, 2005.
- 2 Peberdy, M. A. et al. Accuracy and completeness of documentation during in-hospital resuscitation events: Is the resuscitation record merely an illusion? *Circulation* supplement 2003; 108:IV-1039.
- 3 American Heart Association. Recommended guidelines for reviewing, reporting, and conducting research on in-hospital resuscitation: The 'Utstein style'. *Circulation* 1997; 95:2213-2239.
- 4 Jacobs, I. et al. Cardiac arrest and cardiopulmonary resuscitation outcome reports. Update and simplification of the Utstein templates for resuscitation registries. *Circulation* 2004;110:3385-3397.
- 5 Kaye, W., Mancini, M. E., & Truitt, T. L. When minutes count the fallacy of accurate time documentation during in-hospital resuscitation. *Resuscitation* 2005; 65:285-290.
- 6 American Heart Association. 2005 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation* supplement 2005; 112:IV-1-IV-211.
- 7 Bates, D. W., & Gawande, A. A. Improving safety with information technology. *New England Journal of Medicine* 2003; 348:2526-2534.
- 8 Code teams and the review of cardiac arrests. *Quality Review Board* 1990; April:156-162.
- 9 Joint Commission on Accreditation of Healthcare Organizations. Hospital Accreditation Standards 2006. Joint Commission Resources: Oakbrook Terrace, IL.
- 10 Nadkarni, V. M. et al. First documented rhythm and clinical outcome from in-hospital cardiac arrest among children and adults. *JAMA* 2006;295:50-57.
- 11 Niendorff, D. F. et al. Rapid cardiac ultrasound of inpatients suffering PEA arrest performed by nonexpert sonographers. *Resuscitation* 2005; 67:81-87.
- 12 Niendorff, D, Koff, M. D., & Ball, P. In-Hospital Mortality Following Recurrent Cardiac Arrest. *Critical Care Medicine* Supplement 2004;31(12): 238.