EVALUATING QUALITY OF CARE AT CODES

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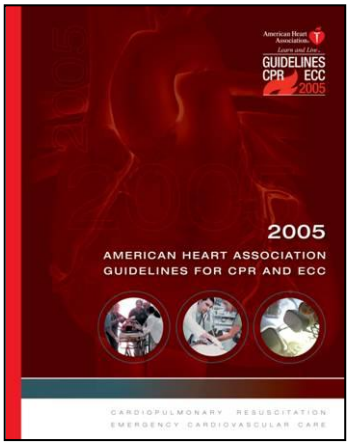
Introduction

Cardiac resuscitation is a high risk process of care that occurs infrequently, requiring a sudden outpouring of resources and a great investment of emotional energy. All hospitals have established resuscitation services in order to deal effectively, efficiently and cost effectively with these events. The Joint Commission on Accreditation of Healthcare Organizations defines the elements of performance for resuscitations: [1]

1. Policies, procedures, processes, or protocols govern the provision of resuscitation services.
2. Equipment is appropriate to the patient population (for example, adult, pediatric).
3. Appropriate equipment is placed strategically throughout the hospital.
4. Appropriate staff is trained and competent to recognize the need for and use of designated equipment in resuscitation efforts.

Resuscitation efforts should be delivered in accordance with the latest scientific evidence as delineated in the *2005 American Heart Association (AHA) Guidelines for Cardiopulmonary Resuscitation (CPR) and Emergency Cardiovascular Care (ECC)*[2], and in accordance with the policies and protocols of care established by an individual organization. In order to know if care for an individual patient is provided according to these standards, the resuscitation process is evaluated.



Organizational strategies should be in place both to praise providers when care is given according to best practice standards and to track variances of concern. This is especially important today as we are seeking to ensure a safe environment for patients and prevent adverse events. According to Sir Cyril Chantler: [3]

Medicine used to be simple, ineffective, and relatively safe.
Now it is complex, effective, and potentially dangerous.

Care providers at codes inherently want to do it right. But we can't know if it is "right" until care is actually evaluated. The "gut" method of assessment is no longer acceptable. We can't apply concepts of continuous improvement to prevent errors until care is measured, both for individual resuscitation events and then in the aggregate. The evaluation of resuscitation care must look at the *processes* of care, and move away from blaming individuals. Practitioners must feel safe to discuss the happenings at codes in a protected environment. The review process must be one that is supportive and educational, not punitive.

This issue of the *CodeCommunications* newsletter will speak to methods that may be used to review the process of resuscitation care at the time of the event. In addition, ways of providing feedback retrospectively will be discussed. But first, if we are going to evaluate the quality of care at codes, best practice must be defined. To obtain buy-in from members of the code response team, best practice should be defined locally.

What are Features of Best Practice at a Code?

In my work on microsystems at Dartmouth-Hitchcock Medical Center, I interviewed members of the adult CPR team asking what each thought were qualities of a "good" code and what were system issues that detracted from them performing their expected roles well. Based on these discussions and incorporating research findings, I suggest that these features be used to evaluate best practice at a code.

- If there are signs/symptoms of patient deterioration prior to the arrest, these are noted by the staff and appropriate help is sought.
- Cardiopulmonary arrest is recognized quickly, using assessment of consciousness, pulse, and respirations.
- Local and advanced support are sought immediately, using standard institutional systems for notification.
- The patient is placed into a position appropriate for providing CPR.
- Good quality CPR is immediately initiated by first responders and continued throughout the resuscitation.
- Good quality ventilation is initiated by first responders and provided throughout; an invasive airway is inserted when needed and its correct position assured.
- A monitor/defibrillator is quickly applied to the patient, the rhythm is analyzed and shocks are delivered as needed.
- The advanced life support team arrives in a timely manner.
- The advanced life support team is given a brief and pertinent patient history.
- Necessary equipment for monitoring/treating the patient is available and operational.
- Frequent patient assessments are made and communicated in order to guide treatment.
- Vascular access is achieved early and maintained throughout the resuscitation.
- Local staff responding to the arrest and members of the advanced life support team know their roles and perform competently.
- A leader of the advanced life support team is identifiable and provides effective guidance throughout the resuscitation.
- The advanced life support team works collaboratively, communicating clearly.
- The patient is treated according to the AHA Advanced Cardiac Life Support (ACLS)/Pediatric Advanced Life Support (PALS)/Neonatal Resuscitation Program (NRP) algorithms and institutional standards of care.
- Resuscitation care is provided in an age-appropriate manner.
- Up-to-date scientific knowledge/skills/technology are applied to the resuscitation.
- The safety of all those in the environment is assured during the resuscitation.
- The number of persons present at the resuscitation is sufficient to provide care, yet not so great as to cause confusion.
- The family is informed of the arrest, invited to be present at the bedside when available, and supported.
- The decision to terminate resuscitation efforts is reached using all information available to the advanced life support team.
- If the patient survives, his care is handed off to a primary team providing the necessary support and exchange of information.
- Complete, accurate, legible documentation is performed in real time throughout the resuscitation; quality concerns are noted. One clock is used for timing of events.

How Can the Responders at a Code Evaluate their Process of Care?

Most institutions have a specified means for the CPR team to provide written feedback on the process of care at a code. It may be as simple as an open-ended question attached to the paper CPR record asking for input on any concerns. All feedback should be set up so that it is not placed in the medical record, but rather is written on a form that gets returned in a secure manner to the designated review group, and is thus protected from legal discovery according to state quality assurance statutes.

A quality review form may be designed with process of care category headings and check boxes to help the CPR team identify potential problems. For example, categories may include:

- Notification/paging
- Arrival of team
- Airway management
- Chest compressions
- Defibrillation
- Vascular access
- Medications
- Protocols: ACLS/PALS/NRP, institutional
- Equipment
- Team function
- Safety/precautions
- Documentation

An example of how potential problems can be specified under one of these categories is shown.

Defibrillation

- Delay in arrival/use
- Missing supplies
- Equipment malfunction
- Problem with pad or paddle placement
- Lack of competency in use
- Wrong energy level
- Interface with compressions not timely
- Indicated, not given
- Given, not indicated

Other/Comments: _____

It is important that a short list of the most frequent problems be listed without being exhaustive, which would tend to be ignored by the documenter. The purpose is to identify usual problems and to save time in documentation. The name(s) of those providing quality concerns should be written so that the reviewer can clarify and obtain further feedback when needed.

Collecting quality data on an institutional form can assist in tracking issues of specific interest to that entity. For example, if calcium is being used without due cause this problem could be listed under the Medication category, or if crowds are a problem this could be specified under the Team Function category. If family presence is being encouraged, issues that might be tracked are:

Family Presence

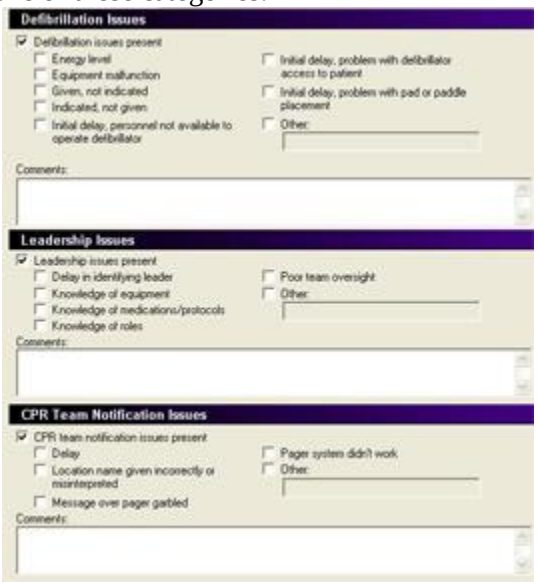
- Family chose not to be present
- Family present at beside & supported
- Family presence denied by staff
- Family presence disruptive to resuscitation

Other/Comments:

_____

For institutions that subscribe to the **National Registry of Cardiopulmonary Resuscitation**, a helpful template is provided, *Resuscitation Review – Quality Management*, to use when creating one's own institutional form. It can be downloaded from their web site: http://www.nrcpr.org/nrcpr_codesheets.html.

ZOLL Medical Corporation produces an electronic resuscitation management program. *CodeNet Writer* is their PDA-based application that is used for documentation during a code. One of the preprogrammed screens is available for documenting quality issues. With the tap of a stylus, the documenter can enter data under any one of these categories.



In Milwaukee John Whitcomb, Emergency Department physician with many years as chair of the CPR committee, believes that the CPR team themselves are the best ones to evaluate their performance at a code. Improvement happens better at the front line – the work interface. If the CPR team members have been involved in determining the characteristics of best practice at a code, then they will recognize when it all comes together. He believes that better and more positive results are obtained "when *success* is recognized and rewarded, rather than when a reviewer comments on what did not go well since much is not under control of the CPR team. The paradigm should shift away from the concept of giving traffic tickets to the bright sunlight of success." He reports that the CPR team at Aurora Sinai Medical Center will often give a "high 5" or sign a "thumbs up" at the end of a code when they recognize all has gone well.[4]

Evaluation of Care during a Code by Another

When working as a cardiac clinical nurse specialist at Dartmouth-Hitchcock Medical Center, I carried a CPR team pager and responded to resuscitations as able. It is helpful to have the wider perspective of one not directly involved in performing the resuscitation procedures. I was able to give real time advice when questions were asked about processes of care, such as, "What is the quickest way to obtain ABG results?" or "Where do we get a blood glucose monitor?" When quality issues arose, I was able to see factors in play that lead to the problem, and ask the providers what could be done to prevent this from happening in the future.

At Johns Hopkins Hospital Betsy Hunt, an emergency physician, carries a CPR team pager and responds to codes several times per month where she evaluates the process of care using a quality tool she has developed. At the end of the code she talks with the individuals involved (including first responders), getting their perceptions on the resuscitation. She believes that it is important to ask probing questions, and then let the responders open up to express their thoughts and feelings. By not interrupting them, she encourages open communication so they

do not become defensive. Nelda Martin, clinical nurse specialist at Barnes-Jewish Hospital in St. Louis, reports that a team composed of a physician, nurse and respiratory therapist randomly attend codes for the purposes of observation and evaluation. Afterwards they use this "teachable moment" to debrief with the team. Other institutions use the nursing supervisor or the clinical coordinator attending the code to provide feedback on performance.

Abella, in his published study *Quality of Cardiopulmonary Resuscitation During In-Hospital Cardiac Arrest*[5], used a commercially available monitor/defibrillator with additional features for capturing and recording the rate and depth of chest compressions, the rate and volume of ventilations, the presence or absence of a pulse, as well as standard electrocardiogram and defibrillator shock event data. Through analysis of 30 second segments during the first 5 minutes of 67 patients undergoing resuscitation he found:

- Chest compression rates were slow - less than 90/minute in 28.1% of the segments, less than 80/minute in 12.8%
- Compression depth was too shallow - <38 mm for 37.4%
- Ventilation rates were too high - with 60.9% of the segments containing a rate of more than 20/minute
- The mean no-flow fraction (time of cardiac arrest without compressions being performed divided by cardiac arrest time) was 0.24 (Note: A 10-second pause each minute of arrest would yield a no-flow fraction of 0.17.)

He concluded that the quality of multiple parameters of CPR was inconsistent and often did not meet published guideline recommendations, even when performed by well-trained hospital staff.

The *2005 AHA Guidelines for CPR and ECC* emphasize good quality compressions as evidenced by:

- Rate at 100/minute
- Correct depth based on age
- Full recoil on compressions
- Limited interruptions
- Person performing compressions changes every 2 minutes

See the article *It's All About Compressions – and Defibrillation* in a previous issue of CodeCommunications for more information about the rationale for these guidelines and how improved hemodynamics and survival are closely linked to quality of compressions.

Aufderheide performed an observational study of ventilations by paramedics during out-of-hospital arrests in Milwaukee County[6]. The average maximum ventilation rate was 37 $\pm$ 4 breaths/minute. The rescuers were retrained to provide ventilations at 12/minute, yet in the field it was observed that they still ventilated at an average of 22 $\pm$3/minute. Survival was then studied in the porcine model, showing improvement at rates of 12 versus 30 breaths/minute.

Most CPR teams do not monitor the quality of CPR delivered during the actual event. This is a critical issue given that there may be a potential direct relationship between quality of CPR delivered and victim survival. Aufderheide believes that "the lack of accountability for quality of CPR delivered by professional rescuers represents a potentially significant national healthcare issue."[7] It can be the responsibility of the leader of the CPR team to monitor CPR performance, since maintaining standards of performance and coaching are within his expected role. Leaders though will need training in this coaching function since Cooper from his video recording of 20 resuscitations reports that CPR leaders rarely corrected performance or encouraged a high standard of performance.[8] It is important that the designated leader participate in a "hands-off" manner during the resuscitation so that he can monitor the larger scene and guide the team. End tidal CO_2 data can be used to evaluate the quality of CPR since it correlates with cardiac output, coronary perfusion pressure and successful resuscitation.

The expectation for monitoring the quality of Basic Life Support can be found in the *2005 Guidelines:*

> *"Systems that deliver professional CPR should implement processes of continuous quality improvement that include monitoring the quality of CPR delivered at the scene of cardiac arrest, other process-of-care measures (e.g. initial rhythm, bystander CPR, and response intervals), and patient outcome up to hospital discharge. This evidence should be used to maximize the quality of CPR delivered."*[9]

It is difficult to evaluate the quality of CPR without the use of feedback devices. There are now biomedical products that cue the rescuer to the proper timing of ventilations, e.g. ResQPOD™ inspiratory impedance valve, and Lyfetymer six second metronome. Defibrillator manufacturers are releasing smart products to provide feedback on compressions, e.g. ZOLL CPR-D padz™ for use with the AED Plus and AED Pro, and Laerdal Q-CPR defibrillator.

Abella reported that at the University of Chicago Hospitals, the Laerdal Q-CPR defibrillator is used during resuscitations. Debriefings are held with the physicians on the CPR teams each week, in which transcripts from codes are displayed including ECG and shock data, chest compression rates and depths, compression pauses, and ventilation rates and volumes. Teaching is specifically tailored to their recorded performance.[10]

Evaluation of First Responder Performance at a Code

Much of the credit for a successful resuscitation has historically gone to the advanced response team. But science shows us that the ability to resuscitate a patient clearly rests with:

- Prompt recognition of the arrest and calling for help
- Immediate CPR by first responders
- Early defibrillation

Einav debriefed with first responders within 24 hours following 244 codes on wards (but not in the emergency room, intensive care units or operating theatres) at Hadassah Hebrew University Medical Centre to obtain data about performance of procedures prior to the arrival of the advanced team[11]. He found that basic diagnostic measures and therapeutic interventions were often not provided according to guidelines by first responders.

Recommendation	Denominator	% of events in which specified recommendation was NOT followed
Basic diagnostic measures		
Assess pulse	All (n=244)	19.3%
Attach monitor/defibrillator when available	Patients not previously connected to defibrillator	34%
Assess rhythm	All	33.6%
	Patients connected to ECG by department team	50%
	Patients already monitored by ECG prior to event	7.9%
Therapeutic measures		
Provide positive pressure ventilation by bag/mask	Patients in full respiratory arrest	17.3%
If no pulse, start compressions	Patients diagnosed as pulseless	12.5%
Attempt defibrillation	Patients diagnosed with VF/ pulseless VT	44%

In another study of in-hospital arrests, Herlitz linked the interval between collapse and start of CPR to patient survival.[12] Among patients in whom CPR was started more than one minute after collapse, survival was less than half compared with patients in whom CPR started earlier (P = 0.0008). He did find that CPR was started within one minute in 80% of the patients studied. The premise of early defibrillation is based on the fact that for every minute defibrillation is not performed for a victim in VF/pulseless VT, survival is decreased by 7-10%, though survival declines by only 3-4% when bystander CPR is provided.[13]

I have found that first responders on general wards often welcome the chance to discuss the event afterwards, since they are distraught and may feel guilty. Find in *Appendix A* a questionnaire that could be used to guide this discussion with the first responders. While obtaining their answers, it is an excellent time to teach since they are ready to try and do a better job the next time.

More education, including scenario-based simulation, should focus on the first responder role, stressing good quality CPR and early defibrillation. The Resuscitation Council in the United Kingdom has developed a one-day course for health care providers called the *Immediate Life Support Provider Course*. Its emphasis is on managing patients until the arrival of the cardiac arrest team and on participating as members of that team. Information can be found at the following web site: http://www.resus.org.uk/pages/ilsinfo.htm.

Retrospective Audit of a Code

An institution decides what group(s) will retrospectively review the CPR records and quality reports from codes. For meaningful review and continuous quality improvement, the following characteristics are needed by persons in this review capacity:

- Consistently review reports from resuscitations so can look for trends over time
- Are familiar with the standards of resuscitation care, both institutional and national
- Understand the expectations and demands on the code responders
- Possess the authority/ability to make change happen in the institution
- Have a connection with the code responders, e.g. Critical Care Committee when ICU fellows and nurses respond
- Are committed to timely review

In discussions with colleagues I have learned of a variety of persons and groups who review codes and follow up quality issues:

- CPR committee
- Resuscitation coordinator
- Critical care committee
- Nursing and medical director for the unit where the patient was located
- Clinical nurse specialist for the unit
- Respiratory care director
- Quality assurance (QA) staff
- Internal medicine house staff (if they are the primary physicians on the CPR team)
- Director of house staff who participate in codes

Resources at some institutions may be sufficient to briefly review *every* code. In *Appendix B* find the form we used at Dartmouth-Hitchcock Medical Center for review of all codes. Information about each resuscitation was obtained from the ZOLL CodeNet record transmitted to the CPR Committee chairperson over our computer network. The ECG record of the whole code was downloaded from the defibrillator to the pocket PC, which allowed me to evaluate if the shock was given appropriately and timely, whether correct energy levels were used, and if it was synchronized when a QRS was present. When evaluating whether ACLS/PALS algorithms were appropriately used, I would especially look for dose and timing of epinephrine, use of epinephrine vs. vasopressin, appropriate use of calcium and sodium bicarbonate,

preference given to amiodarone over lidocaine, and evidence of investigation for the etiology of PEA. Quality of documentation was based on data elements defined in the American Heart Association Scientific Statement *Recommended Guidelines for Reviewing, Reporting, and Conducting Research on In-hospital Resuscitation: The 'Utstein Style'*.[14] I sent the completed audit to the leader and documenter for the resuscitation, along with the medical director, nursing director and clinical nurse specialist of the unit, usually within 3 days after the code. It is important to close the loop of the QA process by providing the action plan for following up reported quality problems.

At the very least institutions should track and report back to the code responders how their times measure up to the gold standard process of care indicators suggested by the American Heart Association:

a. Time from collapse to initiation of compressions is $\leq$ 1 minute
b. Time from collapse to first shock when victim in VF/pulseless VT is $\leq$ 3 minutes
c. Time from collapse to first dose of epinephrine is $\leq$ 5 minutes[15]

We are all aware of the difficulties in achieving accurate recorded times at codes. Providers should be encouraged to use only one clock for documenting times at a resuscitation.

Institutions may only be able to review individual codes in which quality issues are reported – more of a reactive method of review. It is always important to perform the retrospective review of the resuscitation in a timely manner, when memories are fresh for the responders. I have found it best when there is peer to peer feedback, e.g. CPR Committee *physician* chair speaks to *physicians* related to quality concerns surrounding their actions. Feedback should be provided in a supportive manner, recognizing that providers are trying to do their best during resuscitation, while dealing with complex patients and situational barriers to efficiency. At the University of Virginia Health System, selected resuscitations for which there are quality concerns are presented at Morbidity and Mortality Rounds. If institutions participate in critical incident debriefing following codes, as recommended in the *2000 AHA Guidelines*, additional quality concerns will become known and dealt with as the group discusses what went well and what could go better.[16]

Appropriate incidents should be reported to Risk Management immediately for further investigation. For example:

- Patient falls at time of or prior to arrest
- Malfunctioning equipment
- Alarm did not function, either equipment or related to team notification
- Unanticipated death with major quality of care issues
- Concern voiced by family

Success should be recognized when best practice is in evidence. Many facilities have sought ways to encourage staff to correctly complete code records. Some examples include meal tickets, pizza parties and inexpensive awards like writing pens, lapel pins or note pads. When the AED was applied and a shock delivered prior to the arrival of the CPR team at Dartmouth-Hitchcock Medical Center, I have written a letter of commendation to those involved (with a copy to their supervisor) and given a gift certificate to a local restaurant. Success stories can be published in the institutional newsletter, so others are aware.

Trends in quality issues will be tracked by a hospital, analyzed and action plans made to implement small tests of change in their systems of care. Once these small changes are evaluated as an improvement, then they can be incorporated into the standard of care for the institution. Many institutions use the model found in Appendix C of

There should be a direct link between identified quality issues during resuscitations and education. Kimberly Temple from the University of Dayton found that code records were incomplete, inaccurate, illegible, or missing. An Interdisciplinary Code Blue Process Management Team was established to reengineer aspects of code management. Ten Advanced Cardiac Life Support certified nurses became "core code recorders." Each recorder received instruction about proper code documentation and data collection. Code records are now available for all called events, and records demonstrate 100% legibility and 100% compliance with their Cardiopulmonary Resuscitation Standards.[17]

Conclusion

The best quality resuscitation is one in which patient instability is noted by staff in advance and the patient is rescued before an arrest can occur. But if the patient deteriorates into cardiopulmonary arrest, the initial response should be started early and done well. When the advance team arrives, their processes of care should be efficient, effective, and based on latest science. But we won't know if quality care is delivered unless it is evaluated. There are a variety of means to audit resuscitation care. You just need to determine the method(s) that work best for your institution and commit to reviewing the processes of resuscitation care, praising providers when best practice standards are met, and following up reported quality issues. Use the lessons learned as a foundation for improving care and as the needs assessment when planning education.

Appendix A

First Responder Debriefing Following a Code

1. Were there any signs that the patient was deteriorating prior to the code, i.e. criteria used to call the Rapid Response Team? If so, what actions were taken?

2. What findings were present that lead to your determination that the patient was in cardiac arrest, i.e. consciousness, pulse, respirations?

3. At what time did the arrest occur?

4. Were there any problems in calling for help?

5. Were there any issues with quickly getting the patient into a position in which CPR could be performed?

6. How soon were ventilations started, and what method/device was used to provide these? Were there any issues with achieving good ventilations?

7. How soon were compressions started? When were you able to get the compression board under the patient? Were there any issues with achieving good compressions?

8. How soon were you able to attach the monitor/defibrillator? What was the initial patient ECG rhythm? If using an AED, was a shock advised and delivered?

9. Was the following equipment brought to the scene and set up for use?
   - Bag/valve/mask device with oxygen
   - Intubation equipment
   - Suction
   - Code cart
   - Pulse oximeter
   - End tidal CO_2 monitor
   - Automatic blood pressure device

10. Did the CPR team arrive in a timely manner?

11. Was the CPR team provided a brief history of the patient and your initial responses?

12. Were you able to assist the CPR team with universal precaution supplies?

13. Was the family at the hospital and given a chance to be at the bedside?

Appendix B

Dartmouth Hitchcock Medical Center

CPR COMMITTEE QUALITY REVIEW OF CARDIOPULMONARY RESUSCITATIONS

This report is protected pursuant to the provisions of New Hampshire's quality assurance statute, RSA 151:13-a. Distribution of this report to persons not authorized to receive the information it contains may result in the loss of this statutory protection.

Date/Time of Resuscitation: **Unit of Resuscitation:**
CPR Record #:

1. Were the ACLS/PALS/NRP algorithms followed for the process of care during the resuscitation?
   ☐ Yes ☐ No If no, were there good reasons to deviate?

2. Were the Gold Standard Process Variables established by the American Heart Association met?
   a. Compressions initiated within 1 minute of finding victim
      Time CPR Team called in Communications:
      Time of delivery of compressions written on CPR Record:
      ☐ Yes ☐ No ☐ Not applicable

   b. Epinephrine administered within 5 minutes of finding victim
      Time CPR Team called in Communications:
      Time of administration of epi written on CPR Record:
      ☐ Yes ☐ No ☐ Not in algorithm for this event

   c. Defibrillation delivered for pulseless VT/VF within 3 minutes of finding victim
      Time CPR Team called in Communications:
      Time of defibrillation on defibrillator data card:
      ☐ Yes ☐ No ☐ Not applicable

   d. Invasive airway placed within 5 minutes of finding the victim
      Time CPR Team called in Communications:
      Time of delivery of intubation written on CPR Record:
      ☐ Yes ☐ No ☐ Not needed

3. Was the documentation on the CPR Record sufficient for data entry into the National Registry of CPR or other CPR database?
   ☐ Yes ☐ No Missing information:

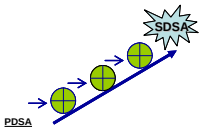
4. Is the CPR Team physician leader current in the required life support certifications, i.e. BLS, ACLS, PALS, NRP?
   ☐ Yes ☐ No ☐ Physician in "exempt category for ACLS

5. Were any quality management issues identified with this resuscitation?
   ☐ No ☐ Yes Follow-up:

Thanks for all your efforts during this resuscitation. If you have feedback for the CPR Committee, please get back to Judy Boehm, RN, CPR Committee Co-Chair via e-mail or pager 7334.

Appendix C

PDSA ↔ SDSA Worksheet



Name of Group: _____ **Start Date:**

TEAM MEMBERS:

1. Leader: _____ 5. _____

2. Facilitator: _____ 6. _____

3. _____ 7. _____

4. _____ 8. _____

Coach: _____ Meeting Day/Time: _____/_____

Data Support: _____ Place: _____

1. ***AIM*** ⟶ What are we trying to accomplish?

2. ***Measures*** ⟶ How will we know that a change is an improvement?

3. ***Current Process*** ⟶ What is the process for giving care to this type of patient?

Note: Questions 1, 2 and 3 are bigger picture ("30,000 feet" type questions.
Questions 4 - 8 are very specific, ground-level questions.
This worksheet can be used to plan and keep track of improvement efforts.

The "PDSA Worksheet" is based on the work of Tom Nolan, PhD, Paul Batalden, MD, and Eugene Nelson DSc. 8/93,
 Revised3/07/06

4. ***Plan*** ⟶ How shall we ***PLAN*** the pilot? Who does what and when?
With what tools or training?
Baseline data to be collected?
How will we know if a change is an improvement?

Tasks to be completed to run test of change	Who	When	Tools/Training needed	Measures

5. ***Do*** ⟶ What are we learning as we ***DO*** the pilot? What happened when we ran the test? Any problems encountered? Any surprises?

6. ***Study*** ⟶ As we ***STUDY*** what happened, what have we learned? What do the measures show?

7. ***Act*** ⟶ As we ***ACT*** to hold the gains or abandon our pilot efforts, what needs to be done? Will we modify the change? Make PLAN for the next cycle of change.

8. ***Standardize*** ⟶ Once you have determined this PDSA result to be the current "best practice" take action to Standardize-Do-Study-Act (SDSA). You will create the conditions to ensure this "best practice" in daily activities until a NEW change is identified and then the SDSA moves back to the PDSA cycle to test the idea to then standardize again.

9. ***Tradeoffs*** ⟶ What are you NOT going to do anymore to support this new habit?

What has helped you in the past to change behavior and help you do the "right thing?"

What type of environment has supported standardization?

How do you design the new "best practice" to be the default step in the process?

Consider professional behaviors, attitudes, values and assumptions when designing how to embed this new "best practice."

10. ***Measures*** ⟶ How will we know that this process continues to be an improvement?

What measures will inform us if "standardization" is in practice?

How will we know if "old behaviors" have appeared again?

How will we measure? How often? Who?

This worksheet can be used to plan-standardize and keep track of improvement efforts.

The "PDSA Worksheet" is based on the work of Tom Nolan, PhD, Paul Batalden, MD, and Eugene Nelson DSc. 8/93,

 Revised3/07/06

11. ***Possible Changes*** ⟶ Are there identified needs for change or new information or "tested" best practice to test? What is the change idea? Who will oversee the new PDSA? Go to PDSA worksheet.

12. ***Standardize*** ⟶ How shall we STANDARDIZE the process and embed it into daily practice? Who? Does what? When? With what tools? What needs to be "unlearned" to allow this new habit? What data will inform us if this is being standardized daily?

Tasks to be completed to "embed" standardization and monitor process to run test of change	Who	When	Tools/Training needed	Measures
*Playbook- Create standard process map to be inserted in your Playbook.				

13. ***Do*** ⟶ What are we learning as we ***DO*** the standardization? Any problems encounterd? Any surprises? Any new insights to lead to another PDSA cycle?

14. ***Study*** ⟶ As we ***STUDY*** the standardization, what have we learned? What do the measures show? Are there identified needs for change or new information or "tested" best practice to adapt?

15. ***Act*** ⟶ As we ***ACT*** to hold the gains or modify the standardization efforts, what needs to be done? Will we modify the standardization? What is the change idea? Who will oversee the new PDSA? Design new PDSA cycle. Make PLAN for the next cycle of change. Go to PDSA worksheet.

References

1 Joint Commission on Accreditation of Healthcare Organizations. Hospital Accreditation Standards 2006. Joint Commission Resources: Oakbrook Terrace, IL.

2 American Heart Association. 2005 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation* supplement 2005;112:IV-1-IV-211.

3 Chantler, C. The role and education of doctors in the delivery of health care. *Lancet* 1999;353:1178-1181.

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