The ART of Debriefing

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Introduction

What is the value of debriefing after a code event? That's the question this edition of *Code Communications* will address. My institution, the University of California San Diego Medical Center (UCSD), has developed a thorough debriefing paradigm as part of its Advanced Resuscitation Training (ART) program. Initiated in 2007, ART takes a new approach to resuscitation that is significantly impacting patient outcomes. This article will explore the foundation of debriefing as well as some of the advanced technology that can help aid other health care providers in post-event analyses.

Origins of Debriefing

The concept of debriefing originated in the military, with individuals providing first-person accounts of a mission upon return. This information was analyzed and used when strategizing for other missions or exercises.[i] Further benefit obtained from debriefing was "defusing" to aid in the processing of traumatic events. The goal was, and continues to be, reducing the psychological damage for returning front-line combatants as quickly as possible. Participants are brought together in groups to debrief, describe what happened, to account for the actions that took place, and to develop new strategies.

Another form of debriefing, specifically critical incident debriefing was pioneered by Mitchell and is used to mitigate stress among emergency first responders.[ii] He formulated a set of procedures known as Critical Incident Stress Debriefing (CISD). CISD is a facilitator-led approach that enables participants to review facts, thoughts, impressions, and reactions after a critical incident. Its main aim is to reduce stress and accelerate normal recovery after a traumatic event by stimulating group cohesion and empathy.[ii]

Debriefing also takes place in experimental psychology and describes the means by which participants who may have been deceived in some manner as part of a psychological study are informed about the true nature of the experiment.[iii] The purpose of this ethically required debriefing is to allow "dehoaxing" to occur, and to reverse any effects the experiment may have had.[iv]

Code debriefing in the hospital draws from these examples. The principles of debriefing include: the dissecting of the event, breaking down what worked and what needs improvement, creating strategies to move forward, as well as discussing the emotional and psychological components of the event.

Support for Debriefing

The American Heart Association (AHA) continues to emphasize the role and importance of debriefing, specifically after in-hospital cardiac arrest. The 2010 AHA Guidelines state that "Maximizing survival from cardiac arrest requires improvement in resuscitation education and the implementation of systems that support the delivery of high-quality resuscitation and post-arrest care, including mechanisms to systematically evaluate resuscitation performance. . . . In addition continuous quality improvement processes should close the feedback loop and narrow the gap between ideal and actual performance. Community- and hospital-based resuscitation programs should systematically monitor cardiac arrests, the level of resuscitation care provided, and outcomes. The cycle of measurement, benchmarking, feedback, and change provides fundamental information necessary to optimize resuscitation care and maximize survival."[v]

This is further emphasized in the 2013 AHA CPR Quality Consensus Statement: "It is important to put in place a process for post event debriefing that best fits the culture of the institution, the resources, and the timing of data capture, and analysis. It is important to define who will lead the debriefing (preferably people trained as facilitators) and when it will occur. Debriefing is used to identify best practices unique to the institution, to optimize performance, and to address emotional responses related to the specific event."[vi]

The AHA is not the only society emphasizing the value of debriefing. In its 2010 Guidelines, the European Resuscitation Council's key educational recommendations state, "Team debriefings to plan for resuscitation attempts, and debriefings based on performance during simulated or actual resuscitation attempts should be used to help improve resuscitation team and individual performance."[vii]

While there is strong support for debriefing from the leading professional societies, there is still the need for more data to determine the best strategies for data collection and dissemination after a code. The 2013 AHA consensus statement states, "Further study is needed to evaluate routine debriefing with respect to capacity to build and retain teams, who should conduct debriefing, when the debriefing should occur, and to define the cost-effectiveness of this intervention."[vi] Basically, clinical evidence is needed to help formulate more specifics regarding the role of debriefing. The following discussion will take a look at some of the clinical evidence surrounding debriefing, as well as best practices being implemented at institutions to date.

Why Debrief after Codes?

Why is there strong support for debriefing specifically after cardiac arrest? The primary reasons are that it is: complex, time critical, and emotionally stressful. These facts are demonstrated in the current rates of survival from in-hospital cardiac arrest, currently at about 15% in the United States.[viii,ix,x] Recently, institutions have been introducing comprehensive resuscitation programs, such as ART at UCSD. By combining the use of technology, data, feedback, comprehensive training, and institution support the program is achieving huge advances in survival rates from sudden cardiac arrest as well as improving patient outcomes.

Complex

Treatment for sudden cardiac arrest is complex. During a code, several things have to happen quickly and simultaneously. At UCSD the first step is ensuring the right team is responding to the code. The code training is provided by UCSD-trained instructors in a simulation center at the affiliated medical school, allowing the staff to do actual mock simulations with other members of the team. Training is an annual requirement, and the team also meets quarterly to discuss and implement changes/initiatives. Making certain the team is properly trained is the first step in addressing the complexity of cardiac arrest.

Beyond having the right team, it is important that all involved know their roles once they arrive at the patient's bedside. Unlike advanced cardiac life support (ACLS) training, the philosophy of ART is that everyone has a specific job at each and every code, and they are the "masters" of that job. For example, a pharmacist is present so nurses don't have to worry about the correct dose of medication. Similarly, at UCSD, a nurse would not be asked to be an expert in airway management that is the sole focus of the respiratory therapist (RT). The RT will assist in those functions for which they are trained: airway management, ventilation, and end-tidal CO_2 monitoring. Assigning everyone a job and making certain that each person is the expert of that job helps to eliminate some of the hesitation and uncertainty surrounding these intense situations.

Another complex component of cardiac arrest is CPR. Published literature continues to emphasize the important role CPR plays in cardiac arrest. CPR quality will be discussed in more depth throughout the remainder of this article; however, it is important to have mechanisms in place to ensure the person providing compressions is achieving the proper depth, rate, and release. Having this feedback in real time helps clinicians make important decisions and provide instant feedback to the team on when they are compressing properly or need to make changes to their rate, depth, or release, as well as when they need to switch providers.

Time Critical

Besides being a complex medical situation, cardiac arrest is time critical. When a patient goes into cardiac arrest, the heart is no longer able to provide blood and thus oxygen to the brain. The longer a patient goes without oxygen, the greater chance of brain damage if they do survive. Ultimately, clinicians need to start CPR as soon as possible in order to get blood moving, and chest compressions should only be stopped to deliver a shock. Minimizing CPR pause times is paramount in improving patient outcomes. Data suggest that pauses in compressions should be kept to less than 10 seconds in order to maintain maximum perfusion.[xi]

Also, the only way to convert a patient from ventricular fibrillation (V-fib) or ventricular tachycardia (V-tach) is through defibrillation. Data suggest that the earlier the time to first shock, the greater chance of converting back to a non-life threatening rhythm.[xii] Not only is sudden cardiac arrest complex, it's stressful for responders. There are a lot of moving parts during a code, and everything needs to happen quickly. Debriefing after an event will help responders reinforce current actions identify areas of improvement.

What to Debrief

Early Recognition

The first item to identify when debriefing is how quickly was the deterioration identified. The best way to improve patient outcomes is to prevent cardiac arrest from occurring. Cardiac arrest is often preceded by deterioration that is evident in symptoms and changes in vital signs that could be identified and treated before a cardiac arrest occurs.[xiii] Hospital staff should be trained to recognize these signs and be familiar with the resources at their disposal, such as a rapid response team.

Bystander Response

With the exception of a few departments, often the first responder at the time of cardiac arrest has only basic lifesaving (BLS) skills. All hospital staff should be empowered to act when involved in a Code Blue situation, even if that means nothing more than calling for help and immediately starting high-quality CPR. At a minimum, the second responder should bring the crash cart to the room, deploy the defibrillator electrodes, and turn on the defibrillator in anticipation of the arrival of the code team. Some professional defibrillators have an AED mode but can also switch to manual mode once the code team arrives. If this is the case, staff should be trained to use the defibrillator in AED mode. When the staff is debriefing, it is important to identify areas where additional education is required. For example, when the code team arrived, were the electrodes placed correctly? Were high-quality chest compressions underway? How quickly did the first responder call a Code Blue?

Early Defibrillation when Indicated

Rapid recognition of a shockable rhythm and immediate shock delivery is critical when the presenting rhythm is coarse ventricular fibrillation or ventricular tachycardia because delays in shock delivery reduce shock efficacy. In the hospital, the arrhythmic arrest that requires an immediate diagnosis and shock is generally confined to the cardiac care unit, surgical intensive care unit, emergency department, or telemetry. The vast majority of codes outside of these units result from respiratory failure. During a post-event debrief, leaders should analyze time to first shock, as well as the type of rhythm to ensure staff is defibrillating or not defibrillating the patient appropriately.

High-quality, Minimally Interrupted CPR

Studies continue to show the value of high-quality CPR in improving patient outcomes from cardiac arrest.[xiv,xv,xvi] The 2013 AHA Consensus Statement on CPR Quality summarizes all of these data.[xvii] The consensus statement is focused on the critical parameters of CPR that can be enhanced to help trained providers optimize performance during cardiac arrest in an adult or a child. The expert panel recommends that CPR providers optimize the individual components of chest compression delivery in the following order:

- Compression fraction (chest compression fraction of at least 80%)
- Compression rate (100 to 120 compressions per minute)
- Compression depth (greater than 2 inches of depth for adults, and at least one-third the anterior-posterior dimension of the chest in infants and children)
- Avoidance of leaning (full chest recoil)

Controlled Ventilation

The AHA 2013 consensus statement provides specific direction regarding ventilation during cardiac arrest: "Excessive ventilation rates are often observed during CPR for both out- and in-hospital cardiac arrest.[xviii] Fast ventilation rates in the laboratory setting are associated with increased intrathoracic pressures, lower coronary perfusion pressures, and decreased survival rates (20 to 30 times a minute).[xviii,xix] Devices that prompt or time ventilation through timing lights or audio cue during CPR may be useful to prevent excessive ventilation. In addition to improving quality of chest compressions, code team debriefing with audiovisual feedback has been associated with a decrease in mean ventilation rates from 18/min to 13/min."[xx,vi]

Data published in 2010 demonstrated that the use of end-tidal CO_2 ($EtCO_2$) was the most accurate means to track respirations during a code.[xx] This was further reinforced in the 2010 AHA Guidelines, which made the use of $EtCO_2$ a Class I recommendation for intubation verification and a Class IIa recommendation for tracking resuscitation progress.[v] According to current guidelines ventilation should be performed at a rate of two ventilations for every 30 compressions before intubation, and 8 to 10 times a minute after intubation.

Appropriate use of Drugs and Auxiliary Equipment

The 2010 AHA Guidelines suggest the use of 1 mg of epinephrine every 3 to 5 minutes, with a suggestion that the first or second dose of epinephrine can be replaced with a 40-unit dose of vasopressin.[v] Institution policy should determine appropriate drug administration. Amiodarone may be considered for recurrent arrhythmia in a first-dose bolus of 300 mg and a second dose of 150 mg. Further, the Guidelines suggest that use of intraosseous cannulation may speed vascular access, and use of laryngeal airways may aid in rapid intubation. Transcutaneous pacing is currently only recommended to treat bradycardia, not asystole.

H's and T's—Consider the Reversible Causes of Arrest

The most common causes on in-hospital cardiac arrest include cardiac arrhythmia, acute respiratory insufficiency, and hypotension. During cardiac arrest, staff should be attempting to identify whether the patient may have a reversible cause of arrest, such as the H's and T's (figure 1). While this is discussed during the arrest, it is also important to collect data and review during the team debrief post event. These data help to identify areas where additional education may be needed, processes that may need to be implemented, and general staff awareness of how to prevent arrests from occurring.

Figure 1. The reversible causes of cardiac arrest

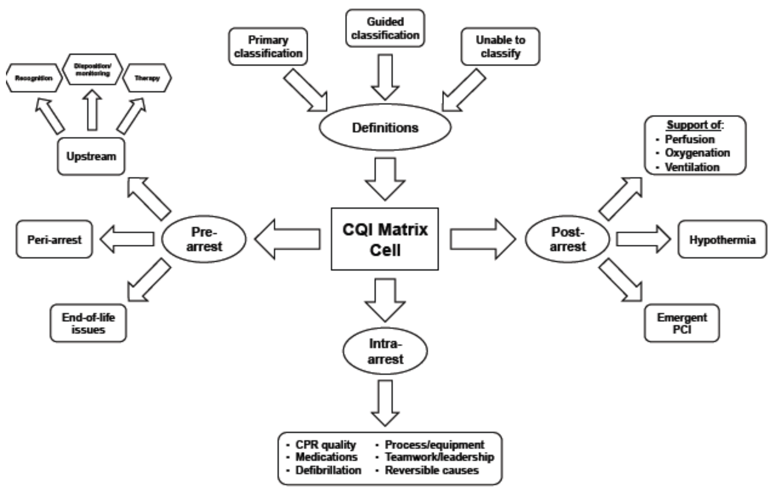
PROBLEM	DEFINITION	LIKELY CAUSES	WARNING SIGNS	TREATMENT
Hypovolemia	▪ Lack of circulating fluid/blood volume	▪ Bleeding ▪ Hemorrhage ▪ Dehydration	▪ Low blood pressure ▪ Low temperature ▪ Rapid pulse/breathing	▪ IV fluid ▪ Blood transfusion ▪ Stop bleeding ▪ Surgery
Hypoxia	▪ Lack of oxygen	▪ Airway obstruction ▪ Improperly placed or dislodged endotracheal tube ▪ Anemia ▪ Heart failure ▪ Pneumonia ▪ Tumor ▪ Pulmonary emboli	▪ Cyanosis ▪ Changes in consciousness ▪ Restlessness ▪ Rapid, shallow breathing	▪ Airway ▪ O_2 ▪ Proper ventilation ▪ CPR
Hydrogen ions (acidosis)	▪ Abnormal pH ▪ Acidosis	▪ Prolonged hypoxia ▪ Diabetic ketoacidosis ▪ Uremia/kidney failure ▪ Overdose: aspirin, methanol ▪ Extreme diarrhea	▪ Chest pain ▪ Headache ▪ Respiration shifting from shallow and rapid to deep and labored ▪ Mental confusion ▪ Nausea and vomiting	▪ Proper ventilation ▪ CPR ▪ Buffers ▪ Emergent dialysis ▪ Treat underlying disease
Hyperkalemia	▪ Excess potassium	▪ End-stage renal failure ▪ Poorly controlled diabetes	▪ ECG: Peaked T waves, small P waves ▪ Muscle contractions ▪ Joint locking: fingers and toes	▪ Calcium, salbutamol, and insulin ▪ Sodium bicarbonate
Hypokalemia	▪ Inadequate potassium	▪ Prolonged diarrhea; vomiting ▪ Malnutrition ▪ Excess diuresis ▪ Digitalis ▪ Alcohol abuse ▪ Eating disorders ▪ Bariatric surgery	▪ Flattened or inverted T waves ▪ U wave, ST depression, and a wide PR interval	▪ Aggressive IV fluid replacement
Hypothermia	▪ Temperature < 35°C	▪ Exposure ▪ Near drowning in colder waters	▪ Rapid heart rate; progressing to slower rate; shivering; cold to touch ▪ Diminished mental function with stroke-like symptoms	▪ Rewarm while performing CPR to maintain circulation
Hypoglycemia	▪ Low blood glucose	▪ Insulin overdose	▪ Palpitations ▪ Anxiety	▪ IV dextrose or glucagon
Hyperglycemia	▪ High blood glucose	▪ Lack of insulin (diabetic ketoacidosis)	▪ Increased thirst, urination	▪ Insulin, fluid, and electrolyte replacement
PROBLEM	**DEFINITION**	**LIKELY CAUSES**	**WARNING SIGNS**	**TREATMENT**
Tablets or Toxins	▪ That lead to overdose	▪ Tricyclic antidepressants ▪ Phenothiazines ▪ Beta-blockers ▪ Calcium-channel blockers ▪ Cocaine ▪ Digoxin ▪ Aspirin ▪ Acetaminophen ▪ Narcotic overdose	▪ Obtain detailed history if possible to identify possible toxin	▪ Identify toxin ingested and administer specific antidote ▪ Fluids for volume expansion ▪ Vasopressors ▪ Respiratory and cardiac support as needed: Ventilator, external pacing
Tamponade, Cardiac	▪ Compression of the heart due to critically increased volume of fluid in the pericardium	▪ Trauma ▪ Post-cardiac surgery	▪ Increased heart rate ▪ Increased respirations ▪ Narrow pulse pressure ▪ Muffled heart sounds ▪ Distended neck veins ▪ ST segment changes and low-voltage QRS on ECG	▪ Pericardiocentesis ▪ Thoracotomy
Tension Pneumothorax	▪ Buildup of air in the pleural cavity impedes blood flow to the heart, generally due to compression of the vena cava	▪ Physical trauma ▪ Surgical complications ▪ Spontaneous event after sneeze and cough in healthy person	▪ Severe air hunger ▪ Hypoxia ▪ Jugular venous distention ▪ Hyperresonance to percussion on affected side ▪ Tracheal shift on x-ray	▪ Needle thoracotomy at the 2nd intercostal space at the mid-clavicular line or 4th/5th intercostal at mid-axillary ▪ Temporary chest tube placement
Thromboembolism	▪ Blood clot in a branch of the pulmonary artery	▪ Prolonged immobilization ▪ Hyper-coagulability ▪ Damage to vessel wall ▪ Clot in lower extremities that breaks off (path is legs to lung)	▪ Chest pain ▪ Shortness of breath ▪ Decreased O_2 saturation ▪ Cardiogenic shock ▪ Sinus tachycardia > 100 ▪ Right heart strain on ECG	▪ Thrombolytic therapy ▪ Thrombectomy ▪ Surgical treatment for underlying cause
Thrombosis	▪ Myocardial infarction caused by a clot in the coronary arteries	▪ Coronary artery disease	▪ ST elevation on ECG ▪ Chest pain or jaw pain, which may radiate to left arm	▪ Percutaneous coronary intervention ▪ Thrombolytic therapy

How to Debrief

Data Collection

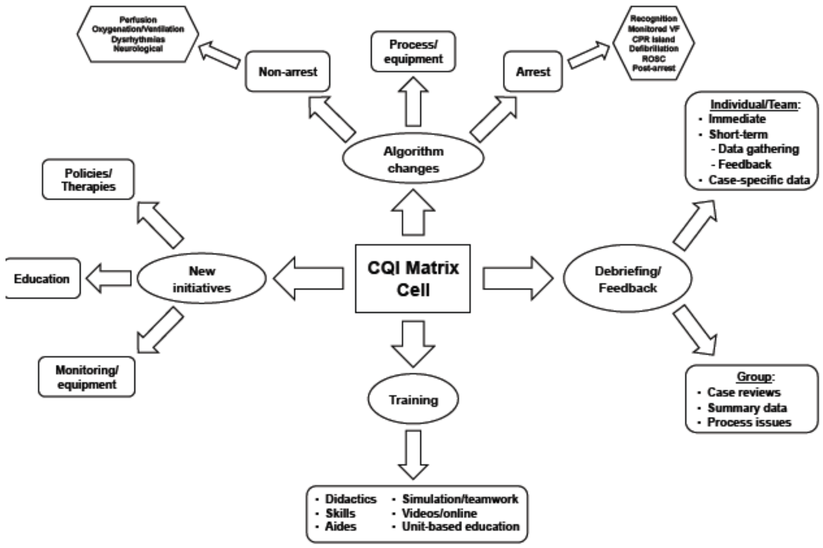
One of the keys to a successful resuscitation program is data collection. UCSD's ART program embraces the motto, "You can't improve what you can't measure." Data collection becomes paramount. All of UCSD's code and rapid response team (RRT) data is stored in the continuous quality improvement (CQI) matrix. Collected for each RRT and code response, afferent data include patient demographics, antecedent events, intra-arrest observations, post-arrest observations, process issues, and clinical interpretation. Figure 2 shows the afferent pathway used at UCSD.

Figure 2. Afferent pathway



Information is collected from several different sources including: electronic medical records (EMR), medical equipment, staff observations, and other means and tools available during the time of cardiac arrest. UCSD describes the processing of these data as the efferents or "data out." In other words, this is how the data is viewed and analyzed for debriefing, to make process/algorithm changes, launch training activities, and identify new initiatives. All of the incoming, or afferent, data that live in the CQI matrix can be analyzed and viewed to confirm that what UCSD is doing is working or if there is an area that needs more focus. These results help ensure that ART is adapting to meet the evolving needs of the UCSD staff. Figure 3 is an example of the efferent pathways used as part of the ART program. At the center is the CQI Matrix Cell. The data output is used to make decisions within the four large categories and smaller subsets regarding individual components, such as CPR quality during a cardiac arrest.

Figure 3. Efferent pathway



Advanced technology plays a large role in debriefing. For example, UCSD uses ZOLL defibrillators. These devices have the ability to provide real-time feedback on CPR quality during a code. In addition, after an event, these data can be downloaded from the defibrillator to a network computer. Figure 4 and Figure 5 are examples of the type of CPR data the institution has access to and can use for debriefing. Figure 4 provides a summary of the quality of CPR performed during the event. In this example, the time to first compression (when the defibrillator was turned on compared to when CPR started) was 12 seconds. This is very good. CPR should begin as soon as possible, the goal being to minimize the time off the chest to under 10 seconds. Mean compression depth was 2.22 inches and mean compression rate was 98 compressions per minute. This is very close to the AHA 2010 guidelines for CPR quality. Figure 5 provides a compression-by-compression breakdown of the event including rate and depth. The goal is to see a lot of green in the compression quality area. This information can provide those leading the debriefing with tools to host informed discussions and ask important questions like: How was compression quality? Were we at the right rate? How about depth? Did we switch providers when we saw compression quality was decreasing? What was our pause time, pre- and post-shock?

Figure 4. CPR summary data

Summary

Key indicators

	Manual		AutoPulse
Time to first compression:	00:00:12		—
Average time to shock after compressions stopped:	00:00:00		—
Average time to compressions after shock delivered:	00:00:00		—
Mean compression depth:	2.22 in		
Mean compression rate:	98.79 cpm		

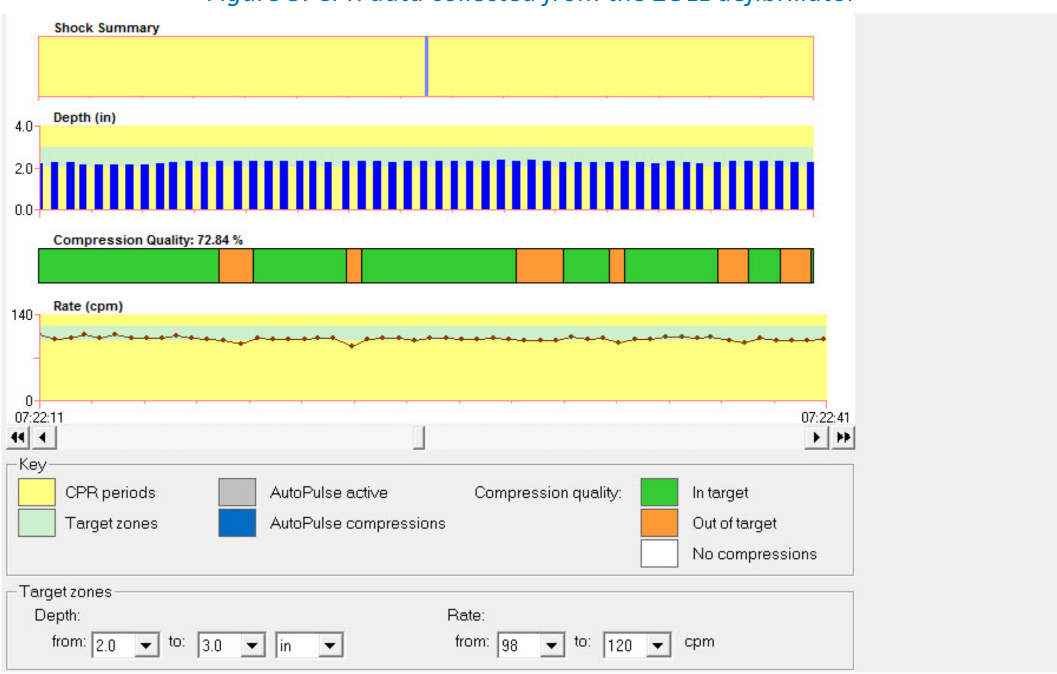
Entire case

Case duration:	00:01:02	
Time in CPR:	00:00:51	(82.26 %)
Time not in CPR:	00:00:11	(17.74 %)

CPR periods

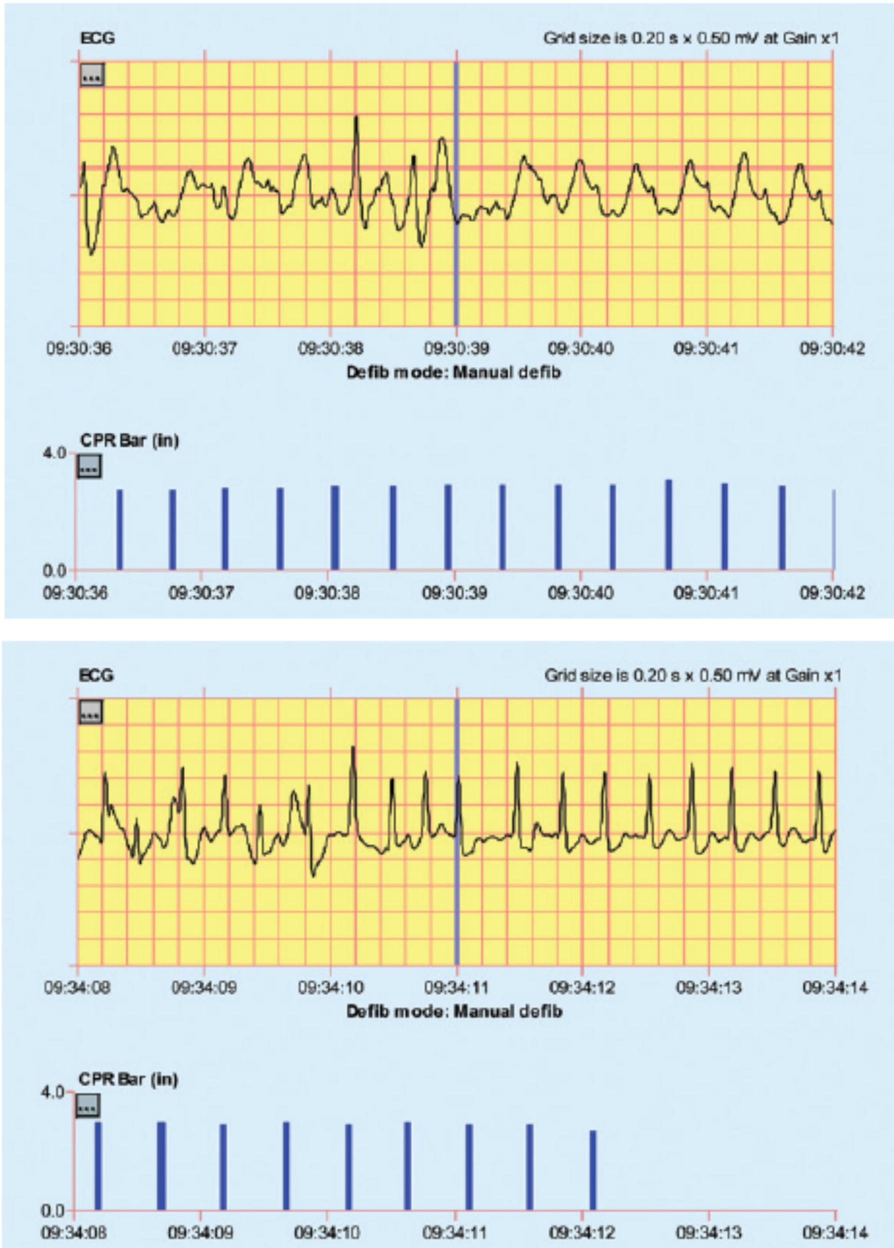
	Manual		AutoPulse
Time in compressions:	00:00:49	(96.08 %)	—
Time not in compressions:	00:00:02	(3.92 %)	—
Compressions in target:	72.84 %		
Depth:			
Standard deviation:	0.10 in		
Above target zone:	0	(0.00 %)	
In target zone:	79	(97.53 %)	
Below target zone:	2	(2.47 %)	
Rate:			
Standard deviation:	11.15 cpm		
Above target zone:	0	(0.00 %)	
In target zone:	60	(74.07 %)	
Below target zone:	21	(25.93 %)	

Figure 5. CPR data collected from the ZOLL defibrillator



The graphs in Figure 6 are typical examples of the second-by-second data available for discussion during a post-code review. In the post-code debriefing, the team would discuss the fact that the patient was in V-fib and that the CPR was good, with a depth of more than two inches and rate of approximately 130 compressions per minute. As CPR continued, there was a change in the patient's rhythm. This is followed by a long period where CPR was halted. The code team would want to understand why CPR was stopped. This patient was pregnant and compressions were stopped in order to perform a C-section.

Figure 6. Second-by-second data for post-code debriefing



Using this type of information, the code team can go back and make informed decisions regarding training and process improvement. For each code, they can answer the following questions: When did we deliver a shock? How long did it take us to get back on the chest after the shock? How was our CPR quality? Were we compressing too fast? Not pushing deep enough? What could we have done better? Ultimately, it is very hard to provide the tools and training to improve patient outcomes from sudden cardiac arrest without being able to go back and review what has happened in detail. Having advanced technology in place can help improve the value of debriefing by increasing the quality and quantity of data at the clinicians' disposal.

Documentation

Documentation during a code is not always accurate. Often the person documenting is the last to arrive and may have missed some of the early actions taken. If a piece of paper isn't handy, the code data may be hastily written on a scrap piece of paper. In the heat of the moment, documentation is not the most important component of a code, but that information is vital to the debrief after the event. Having a formal mechanism in place to document can help ensure the debriefing afterward is beneficial. Tools such as the CodeNet® Resuscitation Data Management System provide a hand-held system to document events as they occur. This helps to ensure that events from the code are captured in a legible and accurate manner, complete with chronological time stamps. The most important aspect is that a mechanism is in place so that documentation is simplified during this hectic event.

Code Blue Committee

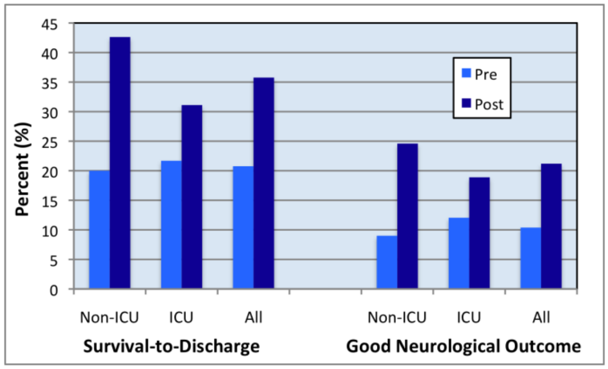
At UCSD, the Code Blue Committee meets monthly to discuss every Code Blue and Rapid Response event. Attendees include the chair of the code committee from each UCSD institution, the code and rapid response teams, clinical nurse specialists from the floors, medical directors, the chief medical officer, and members of the quality improvement team, just to name a few.

The goal of these meetings is to review the afferent and efferent data surrounding every event to identify areas of progress, processes that are either working well or need to be changed and to address any areas where more education is required. The tone of these meetings is very positive. The leadership staff is able to have a bird's eye view, and this becomes a learning environment for them to ask questions, provide feedback, and hear directly from the staff on what is and what isn't working. This goes a long way in empowering the staff. They know that they have the leadership of the institution supporting them. It also creates a positive, healthy environment for fruitful discussions amongst administration, code team, and staff.

Outcomes

As previously stated, "You can't improve what you can't measure." The value of data and debriefing is not the most interesting piece of resuscitation science, but its value should not be overlooked. The role debriefing plays at UCSD has been integral in the success of the ART program and, more importantly, improving survival rates and patient outcomes from sudden cardiac arrest. In fact, the bar charts in Figure 7 compare the survival-to-discharge and good neurological outcomes data pre-ART training versus post-ART training. The results are clear; there has been a significant increase in survivability and good neurological outcomes since the implementation of the program. To date, more than 250 lives have been saved through the implementation of the ART program at UCSD.

Figure 7. Comparison of outcomes pre- and post-ART outcomes



When compared with the mortality rates for all of the hospitals in San Diego, UCSD has the lowest rate in the area (Figure 8). When compared with all of the teaching hospitals in California, UCSD is at the very bottom for mortality (Figure 9). These results are not going unnoticed. The ART program has been designated as a Best Practices Model by the Joint Commission and recognized as a Best Patient Safety Initiative by both the National Association of Public Hospitals and the University of California Regents. Recently, the UCSD team received a Quality Leadership Award from the University Health System Consortium based on rapid improvements in overall mortality and patient safety and a top-five ranking in overall quality of care. The greatest achievement, however, is that observed mortality at UCSD is 38% below expected values, leading to the medical center's recognition as one of the safest hospitals in the country.

Figure 8. UCSD mortality rate compared with all San Diego Hospitals

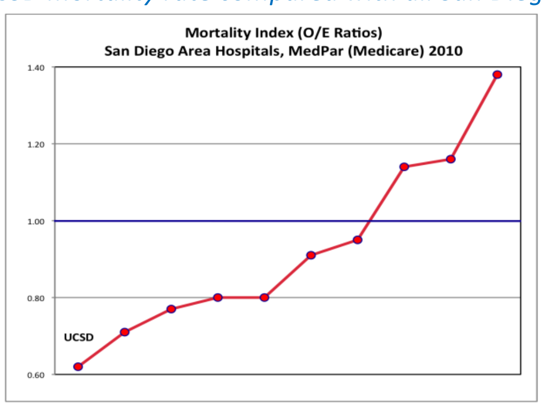
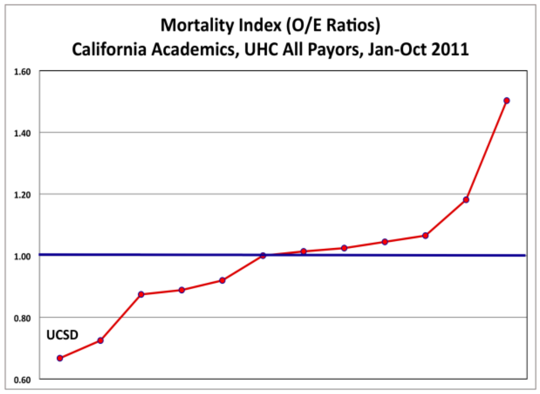


Figure 9. UCSD mortality rate compared with all California teaching hospitals



Now what?

Many hospitals do not have the same level of support services and advanced technology as UCSD, but that does not mean resuscitation programs cannot be successful. The key factor in starting debriefing is getting support within the institution. Use the technology and information available and begin the conversation. Use published guidelines from the American Heart Association and other professional societies to document best practices, then begin to identify areas that may need improvement, such as CPR quality. Maybe this simply means that the code team needs to be more cognizant of their compressions, or switch providers more frequently. Begin identifying data that may be helpful in these discussions and talking to those involved with quality improvement at your institution about implementing some of these metrics. There is a lot of value in ensuring codes are documented accurately.

In addition, the team at the UCSD Center for Resuscitation Science actively works with other institutions to help implement the ART program and replicate its results in both the hospital and pre-hospital settings. There are several ways to become involved or participate in an upcoming ART workshop. If interested, please visit: http://health.ucsd.edu/medinfo/training/crs/Pages/default.aspx.

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