

First Responder



October '11 Newsletter

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Man survives 96 minutes of CPR - neurologically intact

For Howard Snitzer, a 54-year-old chef from Goodhue, Minn., a capnograph kept his rescuers from giving up.

An article from the Chicago Daily Herald reports - A little-known device is shaking conventional wisdom for reviving people who suffer sudden cardiac arrest: People may be able to go much longer without a pulse than the 20 minutes previously believed.

The capnograph, which measures carbon dioxide being expelled from the mouth of the patient, can tell rescuers when further efforts at cardiopulmonary resuscitation, or CPR, are futile or whether they should be continued. It is the latest effort that cardiology experts and emergency teams are devising that aim to improve a patient's odds.

For Howard Snitzer, a 54-year-old chef from Goodhue, Minn., a capnograph kept his rescuers from giving up. When Mr. Snitzer collapsed from cardiac arrest outside a grocery store, two men at a gas station across the street sprinted to his aid.

His rescuers, who rotated every couple of minutes to avoid fatigue, kept pumping his chest. Thirty-four minutes after he went down, a medical team from the Mayo Clinic swooped in via helicopter. During the ordeal, 11 shocks with a defibrillator failed to restore his heartbeat.

What kept them going? Readings displayed on the capnograph brought by the Mayo team indicated the air coming out of Mr. Snitzer's lungs had healthy levels of carbon dioxide — strong evidence that CPR was effectively moving oxygenated blood to his brain and other organs. A person who is down for 10 to 12 minutes without any assistance is almost impossible to revive.

Other organs such as the kidneys and the lungs "can tolerate longer periods" without oxygen, but the brain is the organ that succumbs most likely early on, says Roger White, a Mayo Clinic anesthesiologist involved in Mr. Snitzer's case and an expert in management of sudden cardiac arrest. Mr. Snitzer "experienced a complete neurological recovery" and White described the episode as the "longest duration of pulselessness in an out-of-hospital cardiac arrest with a good outcome."

Seattle, Washington has highest cardiac arrest survival rate

Cardiac arrest survival statistics just keep getting better. For the second straight year, it was announced this May, Seattle's (USA) survival rate for witnessed ventricular fibrillation arrests has topped 50%. Nationally, the rate is between 2% and 25%. The city has long been a leader in the survival metric; its rate was firmly established in the 40% range even before its recent increase. The Medic One Foundation credits the even loftier numbers to improvements in CPR and a focus on quality improvement. For four decades now, the foundation notes, Medic One cofounder and longtime medical director Leonard Cobb, MD, "has overseen painstaking, scientific efforts to track what methods work best to improve survival rates from out-of-hospital cardiac arrest."

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"It was reassuring to see such a high survival rate," Cobb said of the new numbers, "but annual statistics don't necessarily make for a long-term trend. interruptions to patient chest compressions, knowing that's linked to higher resuscitation rates. What's more important is that over the course of years, we've seen steady improvement in survival rates. That we're anywhere near a 50-50 rate is remarkable."

Over the past three years Medic One has worked to minimize interruptions to patient chest compressions, knowing that's linked to higher resuscitation rates. It has limited interruptions to no more than 10 seconds-an ambitious goal its crews rose to meet. "It appears likely that minimizing CPR interruptions has contributed to the improved outcomes," says Cobb, now associate medical director for Medic One.

Compression only CPR associated with improved outcomes from out-of-hospital cardiac arrest

A study carried out in Arizona, USA showed remarkable outcomes in comparing standard Advanced Cardiac Life Support (ACLS) to Compression only CPR.

At the time of the study, 62 emergency medical service (EMS) agencies representing approximately 80% of Arizona's population submitted data to an out-of-hospital cardiac arrest registry. Thirty-two of those agencies followed standard basic life support (BLS) and advanced cardiovascular life support (ACLS) as advocated by the American Heart Association (AHA). Thirty-two of those agencies followed standard basic life support (BLS) and advanced cardiovascular life support (ACLS) as advocated by the American Heart Association (AHA).

The other 30 EMS agencies followed a different approach to the management of cardiac arrest known as cardiocerebral resuscitation (CCR). Responders using this approach immediately delivered 200 non-interrupted chest compressions at a rate of 100 compressions per minute without delivering bag-mask assisted ventilation when they arrived at the scene of a patient in cardiac arrest. At the end of the 200 compressions, rescuers analyzed the rhythm and delivered a single countershock, if indicated. Following the countershock, the rescuers immediately delivered 200 additional uninterrupted chest compressions without checking for a pulse or rhythm conversion. At the end of the compression period, rescuers delivered a second countershock if necessary and immediately began a third period of 200 uninterrupted chest compressions. Following the third compression cycle and the third countershock, medics performed endotracheal intubation and began ventilating the patient.

As soon as they could obtain IV or IO access, medics administered 1 mg of epinephrine and delivered additional doses during each of the three remaining compression cycles. If the patient did not achieve ROSC by then, medics followed standard ACLS guidelines.

Researchers compared outcomes stratified by age group for patients receiving standard ACLS resuscitation interventions to those receiving CCR interventions. The primary outcome measures were survival to hospital discharge and neurological function of the survivors. The research team measured neurological outcome using the cerebral performance category (CPC), which assigns a score between 1 and 4 based on neurological function. A CPC score of 1 represents a conscious and alert patient who is able to return to work with only mild neurologic or psychological deficit. A CPC of 4 on the other hand, represents patients in a coma or persistently vegetative state. Researchers in this study considered a CPC score of 1 or 2 to represent good neurologic outcome.

For the total study sample, the odds of survival increased for all patient age groups if the rescuers performed CCR instead of traditional ACLS procedures (Table 1). The greatest benefit appeared in the group of cardiac arrest patients under the age of 40 years with the odds of survival in the CCR group being almost 6 times higher than survival in the Standard ACLS group.

The researchers performed a regression analysis in the CCR group to identify any independent factors that affect survival. This analysis resulted in five interesting observations:

- * If a bystander witnessed the arrest, patients were three times more likely to survival than if the arrest was unwitnessed.
- * Patients with a presenting rhythm of VF/pVT were seven times more likely to survive than those who presented in asystole or pulseless electrical activity.
- * Patients presenting with agonal respirations were over four and a half times more likely to survive than patients without agonal respirations.
- * The odds of survival decreased for every minute of EMS delay before arriving on the scene.
- * For every 10-year increase in patient age, the odds of survival decreased.

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The researchers also examined neurologic outcome for all the patients that survived long enough for physicians to discharge them from the hospital. Of the 204 survivors in both groups, the researchers were able to collect outcome data for only 147 of them. More patients had favorable neurologic outcome (CPC of 1 or 2) if they received CCR compared to standard ACLS (96.6% vs. 85%). After adjusting for witnessed arrest and the presence of VF/pVT as the initial rhythm, the odds were six times greater that patients who received CCR would have a favorable neurologic outcome.

Rescue breaths are not as important as chest compressions during the early stages of cardiac arrest because oxygen levels remain high for some time after the heart stops beating. When the arrest occurs, the arterial side of the patient's circulatory system is filled with oxygenated blood that suddenly stops moving. Rescuers who perform no intervention other than chest compressions will move oxygenated blood through the capillary beds of the patient's organs thus facilitating gas exchange at the tissue level. In the absence of airway obstruction, compression of the chest forces air out of the lungs allowing carbon dioxide elimination while chest recoil draws fresh oxygen into the airway. Additionally, the agonal breaths that are often present early in the cardiac arrest produces some air movement through the respiratory tract thus permitting some degree of gas exchange. CPR produces only about one-third of normal cardiac output, thereby resulting in diminished blood flow to the lungs. Reduced perfusion of the pulmonary capillary beds requires lowered ventilation volumes in order to achieve the same degree of oxygen saturation and carbon dioxide elimination. One animal model seems to suggest that the volume produced by this type of passive ventilation may be sufficient for several minutes after the onset of cardiac arrest. However, at some point, ventilation becomes necessary in order to replenish depleted blood oxygen levels. Researchers have still not identified the precise interval that a patient can go without assisted ventilation. This study seems to suggest, but does not prove that the time interval may be at least six minutes.

By the publication deadline for the Guidelines 2010, the consensus opinion of the writing group for the Advanced Cardiovascular Life Support Guidelines was that insufficient evidence existed to recommend removal of ventilation from standard resuscitation guidelines for advanced providers.

Editor's Note: *It will be interesting to see what 2015 guidelines brings.*

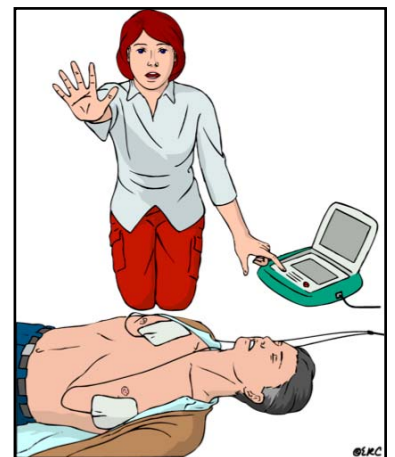
Pauses between CPR and defibrillation are deadly

A shorter pause in CPR just before a defibrillator delivered an electric shock to a cardiac arrest victims heart significantly increased survival according to a study in *Circulation: Journal of the American Heart Association*.

Researchers found the odds of surviving until hospital discharge were significantly lower for patients whose rescuers paused CPR for 20 seconds or more before delivering a shock (the pre-shock pause), and for patients whose rescuers paused CPR before and after defibrillation (the peri-shock pause) for 40 seconds or more, compared to patients with a pre-shock pause of less than 10 seconds and a peri-shock pause of less than 20 seconds. "We found that if the interval between ending CPR and delivering a shock was over 20 seconds, the chance of a patient surviving was 53 percent less than if that interval was less than 10 seconds," said Sheldon Cheskes, M.D., principal investigator of the study and assistant professor of emergency medicine at the University of Toronto. "Interestingly there was no significant association between the time from delivering a shock to restarting CPR, known as the post-shock pause, and survival to discharge. This led us to believe that a primary driver for survival was related to the pre-shock pause interval."

The team also found that patients with peri-shock pauses of more than 40 seconds had a 45 percent decrease in survival when compared to those who had peri-shock pauses of less than 20 seconds. Based on previous studies, American Heart Association resuscitation guidelines advise minimizing interruptions to chest compressions to 10 seconds or less. However, previous studies didn't measure how such pauses in CPR affected survival to hospital discharge.

According to this study, emergency medical services (EMS) in the United States treat nearly 300,000 cardiac arrest cases a year that occur outside the hospital. Less than 8 percent survive. Cheskes and colleagues used data gathered by the Resuscitation Outcomes Consortium (ROC), a group of 11 U. S. and Canadian Emergency Medical Services that carry out research studies related to cardiac arrest resuscitation and life-threatening traumatic injury.



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Between Dec. 1, 2005, and June 30, 2007, 815 patients suffered a cardiac arrest and were included in the study. They were treated by EMS paramedics in Toronto and Ottawa, Ontario; Vancouver, B.C.; Seattle/King County, Wash. and Pittsburgh, Pa. The patients were treated with either an automated external defibrillator (AED) or a manual defibrillator.

Other findings from the study:

- * The length of the post-shock pause showed no significant survival difference between the two groups.
- * AEDs were used to treat 40 percent of the cardiac arrests; 20 percent received shocks from a manual defibrillator.
- * Patients treated with AEDs had pre-shock pause times nearly double those treated in the manual mode, a median of 18 seconds versus 10 seconds. This likely resulted from the time required for an AED to analyze the patients rhythm as well as the time required to charge it prior to delivering a shock.

The study findings could prompt EMS providers and defibrillator manufacturers to adopt changes likely to increase the number of successful cardiac arrest resuscitations, researchers said.

- These include:
- * Paramedics should minimize all CPR interruptions; preferably defibrillate patients in manual mode to limit the pre-shock pause to an optimal time of five seconds.
 - * Manufacturers should modify defibrillator software to quicken the assessment of a patients heart rhythm, and allow devices to deliver more timely shocks while in AED mode.

"If these changes occur, I think you have at least the potential to see a greater number of patients surviving cardiac arrest," Cheskes said.

Although the study was not a randomized controlled trial, researchers said their findings confirm those of other smaller observational studies and that it would be very difficult to perform a randomized controlled trial given the evidence to date. Furthermore, higher rates of bystander witnessed cardiac arrest and bystander-provided CPR occurred in the study group which may have resulted in a selection bias. Although the study controlled for a large number of resuscitation variables, the potential for other components of CPR such as compression rate and depth may have also confounded the findings.

The Last Word

What should be taught in a First Aid class ? Well apparently not very much.

The Australian Emergency Care Providers (AECF) group has recently submitted recommendations to the Community Services and Health Industry Council (CSHIC) to attempt to improve the minimum content required in First Aid courses.

AECF (the peak industry body) has been concerned for many years now that First Aid certificates may not be worth the paper they are written on. The national competency of "apply first aid" is delivered by hundreds of companies or individuals throughout Australia, some being Registered Training Organisations (RTOs) and others running of the back of these RTOs. Throughout the country you will find that First Aid courses will be conducted from 2 days to just 3-4 hours. The sad state of affairs is partly due to the fact that the "shonks" have a minimal chance of being audited, so simply get away with it all the time.

How can this be so ? It all boils down to the interpretation of the competency within the training package and finally down to what are the demonstrable skills required. Well, in turns out that the only skill that has to be demonstrated is CPR. Some will take 3-4 hours to teach this, whilst others may take less than an hour.

At present, the way the syllabus is written there is no need to teach and assess the participants any skills relating to using a first aid kit, especially in relation to bleeding management or supporting a limb injury.

Most reputable training organisations usually conduct the programs over 1 full day with mandatory pre-course study which ensures the participant comes to class with the required underpinning knowledge. These organisations will deliver quality training in CPR, bleeding management and basic care for limb injuries along with detailed content on how to recognise and deal with acute illness such as heart attack, asthma attacks etc.

Its these reputable companies that AECF support and are requesting the Industry Council that is in charge of first aid training (CSHIC) to amend the syllabus so the "shonky" operators will be forced to comply and deliver quality training.

AECF, as the peak industry body representing the First Aid industry has now drafted its own set of minimum standards for its members in relation to deliver of content. It addresses , instructor to student ratios, minimum content (both theory and practical), delivery methodology, procedures to be demonstrated and practiced, instructor qualifications, assessment criteria and audit requirements.

Lets hope that the standard will improve, but it requires support from the training organisations in using bodies such as AECF to have a voice that can be heard.

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Charles Makray

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Beaton et al. The Sarin Gas Attack on the Tokyo Subway - 10 years later: lessons learned. Journal of Traumatology (June 2005)

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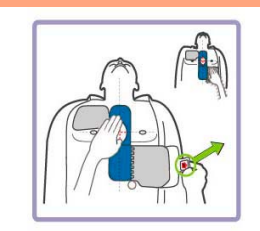
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