



Space Coast Aquanauts

<http://www.movingthroughwater.com/Masters.html>



This article, though covering a dark topic, is truly essential for those of us who are AGING and ENGAGING in vigorous exercise. Coach Ed Nessel has coached 6 Olympians. He has been coaching over 46 years. He is a pharmacist, biochemist, and physiologist out of Rutgers University. Coach Nessel uses his scientific backgrounds to train his athletes in a scientific manner. "We don't count the yards, we make the yards count."

Treating Sudden Cardiac Arrest and the use of Automated External Defibrillators in the Community Setting

Edward H. Nessel, R.Ph, MS, MPH, PharmD

As a coach, masters swimming competitor, and general participant in vigorous exercise, I have eye-witnessed or was in close proximity, over a 30-year period, to several sudden deaths upon those partaking in competition, vigorous training, or informal intense athletic involvement. In all the cases but the last, there was no or very little warning something devastating was about to happen. This is a dark topic and one not comforting about which to write, but it needs to be brought forth and expounded upon so all who either partake in vigorous physical endeavors, administer same, or simply view them first hand will no longer be ignorant of the most important available life-saving procedures. We call these "the chain of survival." This refers to a series of critical interventions that can reduce the absolute mortality from sudden cardiac arrest. But if one of these actions is neglected or poorly executed, it is unlikely the victim will survive. Saving a life is as responsible and serious an act as one can perform. Most hope never to be put in such a traumatic situation, but we also never know what life has in store and places directly before us. Being prepared to correct sudden cardiac arrest is the greatest service one can provide our fellow man when circumstance presents.

What takes down a person almost immediately in these cases is "sudden cardiac arrest" (SCA). Most occur when the electrical impulses in the dysfunctional heart become rapid (tachycardia) or chaotic (fibrillation) through the more muscular segments (ventricles) assigned the task of blood circulation throughout the body. This irregular heart beat (arrhythmia) may cause the heart to suddenly stop beating, producing a precipitous drop to critically-low levels in arterial blood pressure. Death, if left to the natural cascade of events, usually ensues within 10 minutes due to the lack of oxygen supply to several vital organs. Less than five minutes of deprived oxygen at normal room temperature usually brings about some form of lingering brain damage.

Sudden cardiac arrest is a major health problem worldwide and is the leading cause of death in many developed countries. In the United States alone, there have been as many as a quarter million cardiac deaths in a single year; most arise from the high-risk segment of the population exhibiting several strong contributory factors of imprudent lifestyle which produce obesity, high blood pressure, coronary inflammation, excessive circulating fats in the blood, non-defusing of unremitting stress, and cardiac vessel

constriction from smoking. And there are the very unfortunate who have inherited the dangerous genes which can produce cardiac anomalies that can crossover into pediatrics and the athletic world.

Cardio-pulmonary resuscitation (CPR) was developed around 1960 with closed-chest cardiac massage as the key element. The "chain of survival" was fully described and delineated in the 1992 guideline for CPR and emergency cardiac care by the American Heart Association (AHA). Over the years the actual hands-on procedures have modulated into what is taught today where it is deemed more important to keep compressing the chest rather than interrupt this to give "rescue breaths."

The "chain of survival" has four interdependent links: 1) early access, 2) early basic CPR, 3) early defibrillation, and 4) early advanced cardiac life support (ACLS). Notice the one common word in each link: EARLY. The guidelines were again revised in 2005 to create a single international version of evidence-based, scientific resuscitation guidelines. There must be an unbroken continuation in the rescue process to ensure the greatest possibility of survival. But the obvious most critical point is the "immediate" recognition of the emergency and initiation of the "chain" by those surrounding the victim. If no one recognizes the signs of the emergency, and no action is taken quickly, the possibility of survival plummets to zero.

"Early Access" refers to the actions taken from the time the victim collapses until emergency medical service (EMS) personnel arrive. When someone suffers sudden cardiac arrest, the most important actions a bystander can take are to recognize the critical nature of the situation, have an emergency service number called, and to start procedures on the victim for resuscitation. Recognition of early warning signs, such as chest pain, shortness of breath, and patient activation of the emergency response system can significantly increase the rate of survival. This is the compelling reason the American Heart Association stresses education concerning the importance of recognizing the signs and symptoms of cardiac arrest, acute myocardial infarction and stroke, and initiating the action plan for survival.

"Early CPR" Statistics and logic confirm that the survival rate is much higher in victims who receive early CPR than in those who get delayed attention. The physical procedures involved in CPR (chest compressions pushing blood circulation through to the vital organs) help preserve cerebral and myocardial viability, but it can not stand alone as the sole important link to increased survival mainly because of the complexity of administration and the variability of the competence of the administrator. The main cause of failure to adequately resuscitate in this chain of survival is the delay in initiating defibrillation when needed.

"Early Defibrillation" The survival rate from sudden cardiac arrest, according to many studies, is poor if the victim does not receive electric-shock therapy within a few minutes to restore normal electrical cardiac activity. Studies have shown that the most critical factor for survival from ventricular fibrillation is the time difference between onset of fibrillation and administration of defibrillation. By the numbers, the probability of survival is reduced by about 50% for each three-minute delay in administration of defibrillation. Further, survival rates for sudden cardiac arrest can rise to as high as 90% when immediate electrical cardiac shock is administered. Because of this fact, the immediate correction of fibrillatory cardiac beating is recognized as the most critical component in the chain of survival. But, as stated

previously, early defibrillation is not the only important aspect of treatment; all the factors in the chain of survival must be interconnected, attended to, and applied.

“Early Advanced Cardiac Life Support (ACLS)” Defibrillation works best when CPR is provided right up until the electrical shock is applied, followed by rapid advanced care to prevent fall-back to the previous dangerous cardiac conditions. ACLS is enhancement of basic life support (BLS) and is provided by professional EMS personnel. It includes airway and breathing management, medications, and, in some cases, inducing dropping the body's temperature (hypothermia) to reduce onset of oxidative inflammation and destruction in cardiac and cerebral tissues. But since EMT personnel are almost never the first responders, it has been discussed with some persuasion that if the victim does not receive immediate adequately-provided CPR and fruitful defibrillation with an automated external defibrillator (AED), advanced life support will prove to be disappointing and of limited or no value.

Many studies show positive outcomes with early defibrillation in public places, as it saves precious minutes and improves survival rates for cardiac arrest victims. This positivity relies critically on the fact of having many trained lay rescuers with readily-available AEDs in public places that attract large crowds such as public transportation, shopping malls, hotels, venues that host sports competitions, high-rise buildings, and manufacturing plants. Of course, having a private-home unit is also a wise decision especially if there are cardiac patients residing.

As part of the public access defibrillation (PAD) program, a federal law was enacted in 2002 to provide AEDs to states and localities at places where circumstance might provide a need. Funds from this law also provide training for those wanting to learn to recognize symptoms of severe cardiac distress and the subsequent use, if need be, of AED's. The primary goal of a program of this type is simply to sustain the patient's previous quality of life by preserving normal neurologic functioning. The program seeks to enable rescuers to deliver early defibrillation to victims within three to five minutes of collapse, the first critical moments after sudden cardiac arrest. However, this program should not replace the care provided by EMS personnel, but rather provide a lifesaving bridge in the chain of survival during the several critical minutes it takes for advanced life support to arrive.

