

# Sports Medicine Monthly

Editor: Darren H. Lunow, M.Ed, ATC, LAT • Certified Athletic Trainer

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## FOCUS ISSUE:

### Sudden Cardiac Arrest in Athletics

Sudden cardiac arrest (SCA) is considered to be the leading cause of death in the high school and college-aged athletic population. Although the term 'leading cause' leaves the impression that SCA in athletics is a frequent occurrence, the exact opposite is actually true, and the prevalence of SCA is actually very rare. Thankfully, this also means that fatalities in high school athletics are also very rare. In fact, the prevalence of SCA is estimated to occur somewhere in-between 1:100,000 and 1:200,000 high school-aged athletes per year. When SCA does occur however, it leaves many wondering what could have been done differently.



In recent months, a handful of high school aged athletes across the country have, without any previous warning, collapsed suddenly during activity due to a cardiac related health condition. Sadly, this lack of warning, or any presence of previous evidence of cardiac concern, is all too common in this particular population. It is reported that in approximately 55% to 80% of all cases of Sudden Cardiac Death (SCD) in athletics, the athlete is asymptomatic until the episode of cardiac arrest actually occurs. Thus leaving many of us, coaches, parents, and medical professionals alike, wondering what could have caused an otherwise healthy adolescent to die so suddenly, so young, and without any perceived notice or warning.



Although SCA can occur due to a wide range of cardiac conditions and abnormalities, the most common causes are conditions known as Hypertrophic Cardiomyopathy, and Commotio Cordis, which account for 25% and 20% respectively.

### Commotio Cordis

A commotion or disruption (i.e. commotio) of the heart (i.e. cordis), or what is sometimes known as cardiac concussion, occurs when a blunt, non-penetrating blow to the chest occurs exactly over the heart at the exact millisecond when the heart is in-between beats. This force, which has been documented to come from something as unexpected as a friendly punch to that of a 40mph baseball, disrupts the electrical workings of the heart. Instead of now pumping normally, this electrical disruption sends the heart into a quivering-like state of uncoordinated contractions known as fibrillation. With that in mind it is now quite easy to see why the best possible treatment for such a condition is the immediate usage of an Automated External Defibrillator (AED). The very design of the AED is to immediately stop fibrillation so that the regular workings of the electrical system of the heart can subsequently resume their normal function and rhythm, thereby returning blood flow levels throughout the heart and throughout the body to normal, life-sustaining, levels.



Even though it is considered to be the leading cause of death in baseball, commotio cordis is still an exceptionally rare occurring condition. From information gathered from the United States Commotio Cordis Registry from 1985-2001, this condition only occurred an average rate of five times per year. However rare, the importance of rapid defibrillation and rapid CPR cannot be overstated. From little league baseball games to karate practice, the necessity of rapid access to an AED and the presence of individuals properly trained in CPR and AED usage is vital towards the saving of a life that is something far to precious to lose.



R. Clio Robertson, MD  
 Don L. Hawkins, MD  
 David R. Hicks, MD  
 Michael W. Tanner, MD  
 Brian C. Howard, MD  
 James D. Cash, MD

David E. Nonweiler, MD  
 Randall L. Hendricks, MD  
 David K. Wong, MD  
 Bryan J. Hawkins, MD  
 Perry D. Inhofe, MD  
 Thomas G. Craven, MD

Jeffrey R. Morris, DO  
 Ronald S. LaButti, DO  
 Jeff A. Fox, MD  
 Kathleen M. Sisler, MD  
 Troy A. Glaser, DO

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### Hypertrophic Cardiomyopathy (HCM)

Considered to be the second most common form of heart (i.e. cardio) muscle (i.e. myo) disease, Hypertrophic Cardiomyopathy refers to a genetically transmitted disease which causes abnormally excessive (i.e. hypertrophy) growth of the muscle fibers within the heart, most frequently seen in the muscle fibers of the left ventricle. As the thickness of the walls of the left ventricle increase, the void space where blood is pumped through subsequently decreases, thereby exponentially reducing the quantity of blood flow through this chamber, and thereby the heart as a whole.



During times of exercise-induced intensity, this lack of blood flow throughout the heart can quickly lead to an arrhythmia, or abnormal heart beat. This arrhythmia is characterized by the heart beating either to fast (i.e. ventricular tachycardia) or to slow (i.e. ventricular bradycardia). Either way, the amount of oxygenated blood that is being pumped out of the heart is substantially below optimal levels and subsequent chest pain, dizziness, and fainting can occur with death as a very possible end result.

In determining the presence or absence of HCM, the most important question to ask is family health history. This is one of the reasons why heart related questions, about the athlete, and about the athlete's immediate family, are present on a Pre-Participation Physical Examination Form. The combination of honesty and diligence in completing the Health History Questionnaire on the behalf of the student and the parents together, along with the completion of the physical by a prudent and well-trained Medical Doctor who examines heart health on a daily basis is one of the most effective ways to properly prepare student-athletes for successful competition while also preventing the possibility of such a tragedy.



### CPR and the AED

The reoccurring theme regarding proper management of sudden cardiac arrest in athletics is the rapid accessibility and proper usage of an AED along with the immediate initiation of CPR. Without CPR, survival rates decline 7%-10% with every minute. With CPR, survival rates only decline 3%-4% with every minute. Likewise, the single greatest factor affecting survival rates is the time interval from SCA onset to defibrillation. When bystander CPR and AED usage is initiated within 3-5 minutes of collapse, survival rates range from 41% to 74%. Keep in mind though that these statistics were not just regarding the athletes. In fact, according to one study, 77% of all SCA cases at collegiate sporting venues occurred in spectators, coaches, and officials and not in the athletes. Furthermore, the placement an usage of the AED at such locations led to a 54% survival rate for the aforementioned individuals.



For those involved with athletics at any level, CPR and AED training should be a mandate. Additionally, the greater the prevalence of AED's at all athletic venues, the greater the overall survival rates of those who sustain an SCA. By making the commitment to educate, train, and equip, the news stories that we have all heard about so recently could, in the future, change from the sad and disheartening story of an adolescent athlete dying on the field to that of the good news of how a coach and a parent saved a young athlete's life.

### A Note to the Reader.....

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