When should an athlete see a heart specialist?

If the primary health care provider, team physician or athletic trainers have concerns, a referral to a heart specialist (cardiologist) is recommended. This specialist will perform a more thorough evaluation, including an electrocardiogram (ECG), which is a graph of the electrical activity of the heart. An echocardiogram (ECHO), which is an ultrasound test to allow direct visualization of the heart structure, will likely also be done. Further tests could be required based on each patient's case.

Can sudden cardiac death be prevented by screening?

A proper evaluation can find many, but not all, conditions that could cause sudden death in the athlete. This is because some diseases are difficult to uncover and may only develop later in life. Others can develop following a normal screening evaluation, such as an infection of the heart muscle from a virus. This is why screening evaluations and a review of the family health history need to be performed on a yearly basis by the athlete's primary health care provider. With proper screening and evaluation, many cases can be identified and prevented, but, unfortunately, not all cases can be prevented.

Why have an AED on site during sporting events?

The only effective treatment for ventricular fibrillation is immediate use of an automated external defibrillator (AED). An AED can restore the heart back into a normal rhythm. The AHA/ACC encourages widespread placement of AEDs in public places as well as educational programs on resuscitation in all communities, schools and special groups. AEDs do not require training and increase survival rates dramatically. Some studies suggest survival rates increase up to three times when an AED is used.

Why get trained in cardiopulmonary resuscitation (CPR)?

New Hampshire and many other states do not require by law that an AED be present at all public places, schools or sporting events. CPR training can maintain circulation (blood flow in and out of the heart) until emergency personnel arrive with an AED. CPR training can be obtained through local hospitals.

CPR and AED training sites can be found by visiting the American Heart Association website. http://www.heart.org/HEARTORG/CPRAndECC/FindaCourse/Find-a-Course_UCM_303220_SubHomePage.jsp

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Sudden Cardiac Death
in Athletes

Dartmouth-Hitchcock
HEART & VASCULAR CENTER

Sudden cardiac death in athletes between the ages of 12 and 25 is very rare. We've created this brochure so that you are aware of the risks and warning signs for sudden cardiac death.

What is sudden cardiac death in the athlete?

Sudden cardiac death is the sudden failure of the heart's pumping function during or immediately after exercise occurring without associated trauma. Because the heart stops, the athlete rapidly loses consciousness and collapses. Without cardiopulmonary resuscitation (CPR) and successful use of an automated external defibrillator (AED), the athlete will die.

How common is sudden cardiac death in the athlete?

Sudden cardiac death in the athlete is very rare. Approximately 100 athletes die every year from sudden cardiac death. Research estimates that the incidence is about 1 in 150,000 athletes in the high school population and 1 in 43,000 athletes in the collegiate population.

Sudden cardiac death is more common in males than in females; in football and basketball than in other sports; and for African-Americans than for other ethnicities.

What are the most common causes?

Research suggests that the main cause of sudden cardiac death is an abnormal heart rhythm called **ventricular fibrillation**. This is an abnormally fast, uncoordinated heart rhythm that prevents the heart from pumping blood effectively. This problem is usually caused by one of several structural or electrical diseases of the heart that is often undiagnosed in healthy-appearing athletes.

The most common of these diseases in the United States is **hypertrophic cardiomyopathy** (HCM). HCM is a genetic disease of the heart muscle in which abnormal thickening develops over time and can lead to ventricular fibrillation and obstruction of blood flow. HCM runs in families and usually develops slowly over many years.

The second most likely underlying cause is congenital (i.e., present from birth) abnormalities of the coronary arteries (blood vessels that supply the heart muscle). In this case, the blood vessels are connected to the main blood vessel of the heart in an abnormal way. During exercise, the abnormally connected blood vessels can become 'squeezed,' causing a decrease in blood flow to the heart. This differs from blockages that may occur when people get older (commonly called " coronary artery disease," which may lead to a heart attack).

Other diseases of the heart that can lead to sudden death in young people include:

- Arrythmogenic Right Ventricular Cardiomyopathy (ARVC), an inherited disorder of the heart muscle. This condition causes part of the myocardium to break down over time, increasing the risk of an abnormal heartbeat (arrhythmia).
- Dilated cardiomyopathy, an enlargement of the heart for unknown reasons.
- Long QT syndrome and other electrical abnormalities of the heart that cause abnormally fast heart rhythms. These electrical abnormalities can also run in families.
- Myocarditis, an acute inflammation of the heart muscle (usually due to a virus).
- Marfan syndrome, an inherited disorder that affects heart valves, walls of major arteries, eyes and the skeleton. It is generally seen in unusually tall athletes, especially if being tall is not common in other family members.

What are the warning signs?

In more than a third of sudden cardiac deaths, there were warning signs that were not reported or taken seriously. Warning signs include:

- Fainting, a seizure or convulsions during physical activity
- Fainting or a seizure from emotional excitement, emotional distress or being startled
- Dizziness or lightheadedness, especially during exertion
- Chest pains at rest or during exertion
- Palpitations: an awareness of the heart beating unusually (skipping beats, irregular beats or extra beats) during vigorous activity or during cool down periods after athletic participation
- Fatigue or tiring more quickly than peers
- Being unable to keep up with friends due to shortness of breath (labored breathing)

What are the current screening recommendations for young athletes?

The American Heart Association and the American College of Cardiology recommend a 14-item screening checklist that includes questions about personal and family history, and physical examination to uncover aspects of an individual's health that could signal a cardiovascular problem. The screening usually starts with the athlete's primary care physician asking parents and student athletes questions about symptoms during exercise and about their family health history.

To help the primary care provider identify athletes who may be at risk for sudden cardiac death, the following questions should be answered during annual exams:

- Has any family member died suddenly during physical activity or during a seizure?
- Has anyone in the family under the age of 50 had an unexplained sudden death such as drowning or car accidents?

The required physical exam includes measurement of blood pressure and a careful examination of the heart. If there are no warning signs reported on the health history and no abnormalities discovered during the exam, no further evaluation or testing is recommended.

Are there other options available to screen for cardiac conditions?

Technology-based screening programs include a 12-lead electrocardiogram (ECG) and echocardiogram (ECHO). These are noninvasive and painless options that parents may consider in addition to the required PPE; however, these procedures may be expensive and are not currently advised by the American Heart Association and the American College of Cardiology unless the PPE reveals an indication that these tests are necessary. Research is ongoing to determine if other technology-based assessments can help identify athletes at risk and thereby reduce the rate of sudden cardiac death.