



Medicine for Managers

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Sudden Death

An unexpected sudden death is a tragedy at any age but is particularly so in childhood, adolescence or young adulthood. In general the causes of such events are understood and can often be managed but, in many individuals, the risk, though apparent, has not been identified. It is often due to undiscovered heart defects and the death often occurs during physical activity and more often occurs in males than females.

The incidence of sudden cardiac death is estimated to be between 2 and 3 per 100,000 a year in young athletes. In most cases death in young people is caused by a cardiac abnormality.

The heart rhythm may function out of control in such people for a variety of reasons. The heart dysfunction is known as ventricular fibrillation.

In the tracing, the upper recording shows the electrical activity of a heart in normal rhythm. The inverted V-shape is the stimulus for the ventricles to contract and the process occurs regularly, giving the ventricles time to empty and then to refill before receiving the next electrical impulse.

The lower tracing shows the tracing of a heart in ventricular fibrillation. The rhythm is completely disorganised and the stimuli

are coming too quickly for the heart's ventricles to empty and then to refill. The result is that the circulation stops with catastrophic consequences if defibrillation is not available.

Some people inherit a heart rhythm disorder called a **Long Q-T syndrome** which can cause fast, chaotic heartbeats which may lead to fainting. Such people have an increased risk of sudden death.

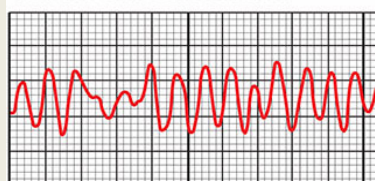
Coronary artery abnormalities may also compromise heart function if they are connected in an abnormal manner. During exercise, the arteries may become compressed, resulting in the heart muscle being starved of blood and therefore oxygen and nutrients.

Another condition is **hypertrophic cardiomyopathy**. This condition is usually inherited and it results in thickening of the heart muscle, which can disrupt the heart's electrical system,

Normal Sinus Rhythm



Ventricular Fibrillation



resulting in irregular or rapid heartbeats (arrhythmias) which may be fatal.

Some children are born with structural heart abnormalities (congenital) of various sorts which may go unnoticed during routine examinations and the heart may fail under strain.

Occasionally, an acute viral or other illness causing inflammation of the heart muscle may have catastrophic consequences during exercise.

Another rare cause of sudden cardiac death is **commotio cordis** (Latin - turmoil of the heart).

This can occur following a severe blow to the chest, such as may occur by being struck by a cricket ball or hockey puck or a blunt instrument. It may trigger ventricular fibrillation if it coincides with the wrong stage of the electrical cycle.

Other non-cardiac causes of sudden death do sometimes occur and the most common are acute epileptic seizure or overwhelming infection.

Clearly sudden cardiac arrests are catastrophic and tragic when the outcome is a fatality.

Various broadcast news stories have highlighted marvellous, immediate care, that has saved the life of sporting people who collapsed and arrested whilst engaged in sport, and other tragedies where the facilities were not available and young lives were lost.

What can be done to warn of impending arrest?

Many of these deaths occur with no prior warning.

However, in some cases there are warning signs:

- Unexplained syncope (fainting). If it occurs whilst the individual is engaged in

sport it might be a sign of a heart problem

- Shortness of breath or chest pain could indicate a potentially serious underlying problem, although of course there may be other causes for breathlessness including asthma.
- A family history of sudden cardiac death or other explained fatality before the age of fifty.

These symptoms or family history should prompt the individual to consult with the GP about arranging screening tests.

Can sudden death be prevented?

In a proportion of potential cases, it is now possible to take steps to avoid the disastrous consequences of an underlying condition.

Those steps include:

1. Recognition of warning signs and appropriate medical investigation
2. Diagnosis of particular cardiac or other disorders and necessary medical or surgical treatments to manage the condition and minimise risk of sudden death.
3. Avoidance of precipitating events such as vigorous physical exercise, if indicated.
4. In some cases, such as with some cardiomyopathies, an implantable cardioverter-defibrillator (ICD) device may literally be a life-saver.



They are all about the size of a pager and come in a range of different shapes and sizes. The device is implanted in the

upper chest and continuously monitors the heartbeat. If an arrhythmia develops, which could lead to an arrest, the device identifies the abnormality and delivers electric shocks to restore a normal heart rhythm.

Does screening of the young protect against sudden death?

Opinions vary about the value of screening. Routine electro-cardiograms (ECG) *may* identify some features of concern but there will be false positives and negatives which may limit the value of doing so.

It is questionable whether, for example, the extensive physical examinations undergone by football players before they join professional clubs, are effective in eliminating the risk of a player suddenly collapsing on the pitch.

In patients with a family history of sudden death, a negative routine screening does not exclude the risk and over time the heart screening should be repeated and re-evaluated.

Sudden collapse on the sports field

This remains a tragic occurrence on a sports field. Because pre-identification of catastrophic cardiac events has limits, pre-arranged medical services should be available at all vigorous sports activities to immediately respond to any collapsed player. Sports coaches and supervisors should be fully

trained in immediate recognition and response to collapse with cardiopulmonary resuscitation and early defibrillation.

Any player who collapses without contact with another player or obstacle should be regarded as a sudden cardiac arrest until proved otherwise.

It is essential that an AED (automated external defibrillator) or, failing that, a manual defibrillator, should be immediately accessible on the sports arena during activities.

Loss of young lives as a result of undiagnosed events causing catastrophic collapse in this way is to be avoided if at all possible.

For those recognised as at risk, it is important to obtain medical advice to formulate a strategy to minimise the risk.

This may involve avoiding the most vigorous sports.

For those with an identified cardiomyopathy, the solution may be an implanted ICD. In such situations, exercise will be permitted but impact sports such as rugby should be avoided.

In this day and age, there should be a defibrillator available at every sporting venue, which is accessible and easily usable, and the importance of resuscitation cannot be over-emphasised.

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