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Facts About

Sudden Cardiac Death in the Young

Your child or a young person you know may be at risk for sudden cardiac death due to an inherited condition. He/she will appear healthy and, in most cases, you will have absolutely no idea that something might be wrong. Once diagnosed, these conditions are treatable!

About sudden cardiac death in the young:

- Each year in the United States, more than 356,000 Americans die suddenly and unexpectedly due to cardiac arrhythmias. More than 7,000 of them are young people under age 18. (AHA Heart Disease and Stroke Statistics—2020 Update)
- Every hour, a young person under 18 dies from Sudden Cardiac Arrest
- Approximately 10% of sudden infant death syndrome can be attributable to genetic heart diseases. (AHA Heart Disease and Stroke Statistics—2020)
- Sudden cardiac death is one of the top five leading causes of death in young adults.
- These conditions include LQTS, Hypertrophic Cardiomyopathy (HCM), Brugada Syndrome, CPVT, and ARVC, among others.

Other facts:

- Most SCD in children is due to hereditary conditions and, therefore, more than one family member will be at risk. It is extremely important that **all** family members be tested once one family member is diagnosed.
- The symptoms of genetic arrhythmias (like LQTS) are frequently misdiagnosed as vasovagal syncope, asthma or epilepsy without any cardiac evaluation.
- Most cardiac arrhythmias and structural defects that may cause sudden death in the young are treatable. With treatment, people with these conditions often have normal life spans and lifestyles.

A child should be seen by a doctor if she/he has:

- ♥ Family history of unexpected, unexplained sudden death in a young person
- ♥ Fainting (syncope) or seizure during exercise, excitement or startle
- ♥ Consistent or unusual chest pain and/or shortness of breath during exercise

Remember...

- Most cardiac problems that may cause sudden death in the young can be diagnosed and treated.
- With treatment, people with these conditions can have normal, productive lives.
- All children should have the questionnaire completed—and be checked by a doctor if they answer “yes” to any question—before they participate in organized sports programs.

Causes of Sudden Death	Current screening - Questionnaires on symptoms, family history, and cardiac exam to determine the probability of heart disease and if further testing is needed.	ECG – look at electrical conduction	Echocardiogram – look at the structure
Long QT		Abnormal	Normal
WPW		Abnormal	Normal
Brugada		Abnormal	Normal
Hypertrophic Cardiomyopathy		Abnormal	Abnormal
Dilated cardiomyopathy		Possible	Abnormal
Arrhythmogenic right ventricular cardiomyopathy		Abnormal (subtle sign)	Abnormal
Cardiac contusion/commotio (sudden blow to chest)		Abnormal-arrhythmia	Abnormal
Anomalous coronary arteries		Can be normal	Abnormal
Outflow tract obstructions (valvulopathies)		It can be normal unless significant.	Abnormal
Aortic dilation (aortopathy)		Can be normal	Abnormal

Table 3. What ECG and Echo can add.

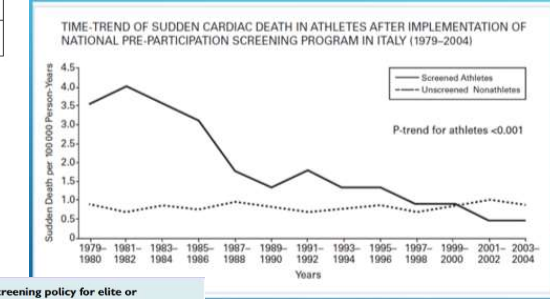
Other countries:

Italy has mandated ECG by law for its athletes. Since the mandate 25 years ago, the SCD in Italy has decreased by 90% (as seen by the solid line). In international leagues, ECG and echo (heart ultrasound) are mandated, as these tests save athletes' lives (highlighted in red). US is highlighted in blue.

US recommends history and physical (H&P) during the sports screen. H&P for screening alone is not as effective as H&P with ECG and echo. When ECG is added to the screening, it is 6 times more likely to pick up cardiac abnormalities. The chart shows what ECG can pick up and what echo can show.

Research:

- **Performance of the American Heart Association (AHA) 14-Point Evaluation Versus Electrocardiography for the Cardiovascular Screening of High School Athletes: A Prospective Study:* A study on 3,600 students in Seattle, WA. 16 students had abnormal heart conditions. If, based on the H&P alone, 7 students were flagged as abnormal. With EKG, 15 students were abnormal. Of these students, 1 had anomalous coronary and 1 had dilated aorta (only echo would pick up), 2 had HCM, 3 had LQTS, 9 had WPW. So, 9 (56%) of these students would have been missed without the additional testing.
- *Bronzetti, G. et al. Chronicle of a death foretold. It is time for echocardiographic screening in young athletes-* A mom's persistence for an echocardiogram to evaluate the coronaries showed her son with an anomalous coronary artery requiring surgery.
- *Skeete J. et al. Preventing sudden cardiac death in young athletes – A perspective from the United States-* EKG is 6 times more likely to pick up cardiac abnormalities.



Sporting Federation	Mandatory or recommended	Screening protocol	Primary screening methodology		
			Physical examination	Personal symptom and FH	12-lead ECG
International Olympic Committee	Recommend	IOC	✓	✓	✓
International Paralympic Committee	Recommend	IOC	✓	✓	✓
Fédération Internationale de Football Association	Mandate	Self-imposed	✓	✓	✓
Union of European Football Associations	Mandate	Self-imposed	✓	✓	✓
Union Cycliste Internationale	Mandate	Self-imposed	✓	✓	✓
Fédération Internationale de Motocyclisme	Mandate	Self-imposed	✓	✓	✓
Fédération Internationale de l'Automobile	Mandate	Self-imposed	✓	✓	✓
International Association of Athletic Federations	Recommend	IOC	✓	✓	✓
National Basketball Association (USA)	Recommend	AHA	✓	✓	✓
National Football League (USA)	Recommend	AHA	✓	✓	✓
Major League Baseball (USA)	Recommend	AHA	✓	✓	✓
National Hockey League (USA)	Recommend	AHA	✓	✓	✓
World Rugby	Recommend	Self-imposed	✓	✓	✓
Fédération Internationale de Natation	Recommend	Self-imposed	✓	✓	✓
World Boxing Federation	Recommend	Self-imposed	✓	✓	✓
International Handball Federation	Recommend	IOC	✓	✓	✓
International Triathlon Union	Recommend	IOC	✓	✓	✓
Fédération Internationale de Ski	Recommend	IOC	✓	✓	✓
Fédération Internationale des Sociétés d'Aviron	Mandate	IOC	✓	✓	✓

Does your child play sports?

Schedule an EKG and echocardiogram to ensure your child plays safely.

Frequently Asked Questions about Heart Screenings

What is Sudden Cardiac Arrest?

Sudden Cardiac Arrest (SCA) is a condition that occurs when the heart suddenly and unexpectedly stops beating effectively. If this happens, blood stops flowing to the brain and other vital organs. This is caused by an electrical disturbance and/or a structural abnormality. Death occurs within minutes if not treated with CPR and an AED (automated external defibrillator). SCA is not a heart attack. A heart attack involves rupture of an atherosclerotic plaque in a coronary artery and can lead to SCA.

Why is an electrocardiogram (EKG) important?

The standard of care for well-child and sports physical examinations miss about 90% of electrical and structural issues that can put young people at risk for SCA. Most of these conditions are not detectable with just a stethoscope. Research shows that electrocardiograms (EKGs or ECGs) are the most effective way to diagnose an undetected heart condition.

What is an electrocardiogram (EKG)?

An EKG is a completely painless, non-invasive test that evaluates the health of your heart. It measures your heart rate and rhythm through electrodes attached via small patches with a mild latex free adhesive to the chest, legs and arms. No physical activity is required.

What is an echocardiogram (ECHO)?

When indicated or preferred by family, a completed echocardiogram (ultrasound of the heart) will be done. This specifically focuses on

identifying heart structural abnormalities relevant to the age group being screened.

What does it mean if my screening finding indicates that further evaluation is needed?

An abnormal screen requires additional testing with a cardiologist to evaluate for the presence of a heart disorder. Dr. Hua will arrange further testing if indicated.

Will results be shared with the school?

No. A letter to the coach is written and shared with the school if you prefer.

Will a diagnosis be made on the results of the screening?

Yes. Based on the EKG, ECHO, and consultation, a diagnosis will be made. If further testing is needed to make a diagnosis, Dr. Hua will make the arrangement.

If my EKG is within normal limits, does it need to be repeated again in future years?

Yes. Dr. Hua recommends yearly EKG while active in sports through age 25 or if any new warning sign, symptom, or family history of a heart disorder are present.

What are the warning signs or symptoms that should always be shared with your PCP?

- Family history of SCA or sudden death
- Chest pain or pressure with exercise
- Fast heart beat that is unexplained
- Fainting during exercise
- Seizure
- Unexplained fatigue or shortness of breath with exercise

Pediatric Sudden Cardiac Death Risk Assessment Form

Parents, answer these questions (or have your child's doctor help complete them) every few years at these times: preschool, before/during middle school, before/during high school, and before participating in organized sports.

Patient History Questions	Yes	No
Has your child fainted or passed out DURING exercise, emotion or startle?		
Has your child fainted or passed out AFTER exercise?		
Has your child had extreme fatigue associated with exercise (different from other children)?		
Has your child ever had unusual or extreme shortness of breath during exercise?		
Has your child ever had discomfort, pain or pressure in his chest during exercise?		
Has a doctor ever ordered a test for your child's heart?		
Has your child ever been diagnosed with an unexplained seizure disorder?		
Family History Questions		
Are there any family members who had an unexpected, unexplained death before age 50? (include SIDS, car accident, drowning, others)		
Are there any family members who died of heart problems before age 50?		
Are there any family members who have had unexplained fainting or seizures?		
Are there any relatives with certain conditions such as:		
Hypertrophic cardiomyopathy (HCM)		
Dilated cardiomyopathy (DCM)		
Aortic rupture or Marfan syndrome		
Arrhythmogenic right ventricular cardiomyopathy		
Long QT syndrome (LQTS)		
Short QT syndrome		
Brugada syndrome		
Catecholaminergic ventricular tachycardia		
Primary pulmonary hypertension		
Pacemaker		
Congenital deafness		
Please explain more about any "yes" answers here:		

If you answer yes to any of these questions, your doctor should check your child's heart.

For more information: Peds Happy Hearts, PLLC. Tel: (406) 272-2376. Fax: (406) 645-7995.
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Here at Peds Happy Hearts, we package the screening to make it more affordable for families while maintaining high-quality care. Dr. Hua performs her own EKG and echocardiogram.

Our Pricing:

Sports Package: **Call for pricing**
Comprehensive: **Call for pricing**
Consult, EKG, Echocardiogram (ECHO), letter to coach, sports physical form

Standard Screen: **Call for pricing**
Consult, EKG, letter to coach, sports physical form