



Five Things Physicians and Patients Should Question

1

Do not order troponins for the routine evaluation of pediatric chest pain in the absence of a concerning history or electrocardiogram (ECG) abnormalities.

Troponin-I levels are a valuable tool for the assessment of adult patients who present with chest pain. However, these levels are not as useful in the pediatric population. Troponin levels in the great majority of pediatric patients presenting with chest pain are normal. Furthermore, troponin levels have not been shown to reliably correlate with disease severity or prognosis in many cardiac diseases known to cause chest pain in pediatric patients. However, in a few circumstances, such as a family history of very early cardiovascular disease or a history suggestive of myocarditis/pericarditis, consideration of troponin levels is reasonable. Therefore, do not order troponin levels for the routine evaluation of pediatric chest pain in the absence of a concerning history or ECG abnormalities.

2

Do not routinely order a screening ECG as part of a sports preparticipation examination in asymptomatic, otherwise healthy patients with no personal or family history of cardiac disease.

Routine screening ECGs for preparticipation sports clearance are not currently recommended by the American Heart Association (AHA). Instead, it is recommended that the AHA's 14-point screening guidelines, or the American Academy of Pediatrics' "Preparticipation Physical Evaluation" be used in conjunction with a targeted personal history, family history, and thorough physical examination. The goal is to identify warning signs or signs that raise suspicion of cardiovascular diseases that place certain athletes at risk of sudden cardiac death. These individuals should be referred for further evaluation by a pediatric cardiologist who may order an ECG or an echocardiogram as part of the work-up.

Routine ECG screening of healthy pediatric patients with no personal or family history of cardiac disease has demonstrated a high false-positive rate and has not been found to reduce mortality from sudden cardiac death. In addition, it can also lead to unnecessary secondary evaluations. ECG screening should be performed in those patients with a strong family history of conditions likely to cause sudden cardiac arrest or death.

3

Do not order an echocardiogram for the routine evaluation of pediatric chest pain in the absence of a concerning history or ECG abnormalities.

Chest pain is a common presenting symptom in pediatrics but is rarely life-threatening, and the vast majority of cases are not cardiac in origin. Therefore, the addition of an echocardiogram only adds diagnostic value in very limited circumstances and increases the cost of care. If the patient has a concerning personal (exertional chest pain with an abnormal ECG) or family history of sudden or unexplained death or cardiomyopathy or ECG abnormalities, consultation with a pediatric cardiologist is generally recommended prior to obtaining an echocardiogram. Therefore, it is important to obtain a complete personal and family history,* physical examination, and screening ECG, if the treating physician feels that the chest pain is cardiac in nature, prior to proceeding with cardiac consultation and echocardiography.

4

Do not order an echocardiogram for the routine evaluation of pediatric syncope in the absence of a concerning history or ECG abnormalities.

Syncope is a common complaint in pediatrics and is rarely caused by a cardiac issue in patients with a normal physical examination. If the episode is caused by the heart, it generally is an issue with the heart rhythm. Therefore, an echocardiogram rarely adds diagnostic value and it increases cost of care. In situations in which an echocardiogram may be warranted, (syncope that occurs in the circumstance of an abnormal ECG, exertional syncope, unexplained postexertional syncope, or syncope in the setting of a concerning family history,* consultation with a pediatric cardiologist is recommended prior to obtaining the echocardiogram. Therefore, it is important to obtain a thorough personal and family history,* physical examination, and ECG when indicated prior to proceeding with echocardiography in the initial assessment of pediatric syncope.

5

Do not order a screening ECG prior to initiation of attention-deficit/hyperactivity disorder (ADHD) therapy in asymptomatic, otherwise healthy pediatric patients with no personal or family history of cardiac disease.

Many pediatricians obtain ECGs in healthy patients with no personal or family history* of cardiac disease prior to initiating stimulant therapy for ADHD out of fear of triggering an adverse cardiovascular event or worsening a previously undiagnosed cardiovascular disease. However, the probability that such screening will lead to the diagnosis of cardiac disease is low. Furthermore, when ECG abnormalities are identified, they rarely warrant a change in planned ADHD therapy. As a result, obtaining the ECG increases health care costs and can increase stress for both the patient and family.

If there is concern based on the history and physical examination, then a pediatric cardiology referral is a reasonable consideration.

*Family history should assess specifically for the following types of cardiovascular diseases:

- Connective tissue disorders
- Cardiomyopathies
- Arrhythmias, including need for pacemaker or defibrillator implantation
- Storage diseases
- Sudden unexplained death
- Premature cardiovascular disease prior to the age of 50 years

How This List Was Created

This list was developed initially by faculty in Pediatric Cardiology at University Hospitals in Cleveland OH. It was then revised and approved by the AAP Section on Cardiology and Cardiac Surgery. After review by other AAP sections, the AAP Executive Committee granted final approval of the list.

AAP's disclosure and conflict of interest policy can be found at www.aap.org.

Sources

- 1 Brown JL, Hirsh DA, Mahle WT. Use of troponin as a screen for chest pain in the pediatric emergency department. *Pediatr Cardiol.* 2012;33(2):337-342
Liesemer K, Casper TC, Korgenski K, Shaji SC. Use and misuse of serum troponin assays in pediatric practice. *Am J Cardiol.* 2012;110(2): 284-289
- 2 Maron BJ, Levine BD, Washington RL, Baggish AL, Kovacs RJ, Maron MS; American Heart Association, Electrocardiography and Arrhythmias Committee of Council on Clinical Cardiology, Council on Cardiovascular Disease in Young, Council on Cardiovascular and Stroke Nursing, Council on Functional Genomics and Translational Biology; and American College of Cardiology. Eligibility and disqualification recommendations for competitive athletes with cardiovascular abnormalities: Task Force 2: preparticipation screening for cardiovascular disease in competitive athletes. *Circulation.* 2015;132(22):e267-e272
Maron BJ, Friedman RA, Kligfield P, et al; American Heart Association, Council on Clinical Cardiology, Advocacy Coordinating Committee, Council on Cardiovascular Disease in the Young, Council on Cardiovascular Surgery and Anesthesia, Council on Epidemiology and Prevention, Council on Functional Genomics and Translational Biology; and American College of Cardiology. Assessment of the 12-lead electrocardiogram as a screening test for detection of cardiovascular disease in healthy general populations of young people (12-25 years of age). *J Am Coll Cardiol.* 2014; 64(14):1479-1514
Schmeihl C, Malhotra D, Patel DR. Cardiac screening to prevent sudden death in young athletes. *Transl Pediatr.* 2017;6(3):199-206
American Academy of Pediatrics. Preparticipation Physical Evaluation. 5th Edition. Bernhardt DT, Roberts WO, eds. Itasca, IL: American Academy of Pediatrics; 2019
- 3 Campbell RM, Douglas PS, Eidem BW, Lai WW, Lopez L, Sachdeva R. ACC/AAP/AHA/ASE/HRS/SCAI/SCCT/SCMR/SOPE 2014 Appropriate use criteria for initial transthoracic echocardiography in outpatient pediatric cardiology: a report of the American College of Cardiology Appropriate Use Criteria Task Force, American Academy of Pediatrics, American Heart Association, American Society of Echocardiography, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and Society of Pediatric Echocardiography. *J Am Coll Cardiol.* 2014;64(19):2039-2060
Friedman KG, Kane DA, Rathod RH, et al. Management of pediatric chest pain using a standardized assessment and management plan. *Pediatrics.* 2011;128(2):239-245
Chamberlain RC, Pelletier JH, Blanchard S, Hornik CP, Hill KD, Campbell MJ. Evaluating appropriate use of pediatric echocardiograms for chest pain in outpatient clinics. *J Am Soc Echocardiogr.* 2017;30(7):708-713
Nguyen T, Fundora MP, Welch E, et al. Application of the pediatric appropriate use criteria for chest pain. *J Pediatr.* 2017;185:124-128
- 4 Campbell RM, Douglas PS, Eidem BW, Lai WW, Lopez L, Sachdeva R. ACC/AAP/AHA/ASE/HRS/SCAI/SCCT/SCMR/SOPE 2014 Appropriate use criteria for initial transthoracic echocardiography in outpatient pediatric cardiology: a report of the American College of Cardiology Appropriate Use Criteria Task Force, American Academy of Pediatrics, American Heart Association, American Society of Echocardiography, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and Society of Pediatric Echocardiography. *J Am Coll Cardiol.* 2014;64(19):2039-2060
Phelps HM, Kelleman MS, McCracken CE, et al. Application of pediatric appropriate use criteria for initial outpatient evaluation of syncope. *Echocardiography.* 2017;34(3):441-445
Pelletier JH, Blanchard S, Chamberlain RC, Hornik CP, Campbell MJ, Hill KD. The use of echocardiography for pediatric patients presenting with syncope. *J Pediatr.* 2017;190:43-48
- 5 Cooper WO, Habel LA, Sox CM, et al. ADHD drugs and serious cardiovascular events in children and young adults. *N Engl J Med.* 2011;365(20):1896-1904
Mahle WT, Hebson C, Strieper MJ. Electrocardiographic screening in children with attention-deficit hyperactivity disorder. *Am J Cardiol.* 2009;104(9):1296-1299
Perrin JM, Friedman RA, Knilans TK; American Academy of Pediatrics, Black Box Working Group, Section on Cardiology and Cardiac Surgery. Cardiovascular monitoring and stimulant drugs for attention-deficit/hyperactivity disorder. *Pediatrics.* 2008;122(2):451-453
Shahani SA, Evans WN, Mayman GA, Thomas VC. Attention deficit hyperactivity disorder screening electrocardiograms: a community-based perspective. *Pediatr Cardiol.* 2014;35(3):485-489
American Academy of Pediatrics, Subcommittee on Attention-Deficit/Hyperactivity Disorder, Steering Committee on Quality Improvement and Management. ADHD: Clinical practice guideline for the diagnosis, evaluation, and treatment of attention-deficit/hyperactivity disorder in children and adolescents. *Pediatrics.* 2011;128(5):1007-1022

About the ABIM Foundation

The mission of the ABIM Foundation is to advance medical professionalism to improve the health care system. We achieve this by collaborating with physicians and physician leaders, medical trainees, health care delivery systems, payers, policymakers, consumer organizations and patients to foster a shared understanding of professionalism and how they can adopt the tenets of professionalism in practice.

To learn more about the ABIM Foundation, visit www.abimfoundation.org.



About the American Academy of Pediatrics

The American Academy of Pediatrics is an organization of 67,000 primary care pediatricians, pediatric medical subspecialists and pediatric surgical specialists dedicated to the health, safety and well-being of infants, children, adolescents and young adults

American Academy
of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™



About the American Academy of Pediatrics Section on Cardiology and Cardiac Surgery

The AAP Section on Cardiology and Cardiac Surgery includes over 800 pediatric cardiologists and their mission is to advance the treatment and education of pediatric cardiology diseases through advocacy, education and collaboration.

For more information, visit www.aap.org.

For more information or to see other lists of Things Clinicians and Patients Should Question, visit www.choosingwisely.org.