

# **New Jersey Student Athlete Cardiac Screening Task Force**

## **Final Report**

**June 15, 2011**

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## THE NEW JERSEY STUDENT ATHLETE CARDIAC SCREENING TASK FORCE

May 2010 – June 2011

In response to growing concern throughout the State of New Jersey regarding the incidence of young athletes who die suddenly while participating in sports, often due to an undetected heart problem, the New Jersey Senate and General Assembly enacted P.L. 2009, Chapter 260.<sup>1</sup>

This law required the establishment of the New Jersey Student Athlete Cardiac Screening Task Force (Task Force) in the Department of Health and Senior Services (DHSS). The purpose of the Task Force was to study, evaluate, and develop recommendations relating to specific actionable measures to enhance screening of student athletes for *hypertrophic cardiomyopathy* (HCM, a disease of the heart which can cause serious heart rhythm problems and blockages to blood flow) and other life-threatening cardiac conditions, thus helping identify those student athletes who are at risk for *sudden cardiac death*. See Glossary in Appendix C for definitions of italicized words.

As per legislative mandate, the task force consisted of the following organizations and members:

Organization	Representative
American Academy of Pediatrics (AAP)/New Jersey Chapter (AAP-NJ)	Stephen G. Rice, MD, PhD, MPH, FAAP, FACSM (Chair)
American Heart Association, New Jersey Chapter (AHA-NJ)	Perry J. Weinstock, MD, FACC (Vice-Chair)
American College of Cardiology, New Jersey Chapter (ACC-NJ)	Louis E. Teichholz, MD, FACP, FACC
New Jersey Academy of Family Physicians (NJAFP)	Jeffrey S. Rosenberg, MD, FAFP
New Jersey State School Nurses Association (NJSSNA)	Linda Morse, RN, MA, CHES
New Jersey State Interscholastic Athletic Association (NJSIAA)	Anthony R. Maselli
New Jersey Department of Education (NJDOE)	Christene DeWitt-Parker, RN, MSN Susan B. Martz, ED.M
New Jersey Department of Health and Senior Services (DHSS)	Lakota Kruse, MD, MPH Elaine Suehnholz, RN, BSN, MPA

See Appendix A for further information on Task Force representatives.

See Appendix L for a list of Task Force Meeting Invitees.

The Task Force convened monthly meetings from May 2010 through June 2011. During this time, comprehensive discussions occurred regarding preparticipation cardiovascular screening strategies for student athletes. In addition, the Task Force discussed public and professional education on sudden cardiac death (SCD) as well as emergency preparedness for SCD occurring during the school day or at school-sponsored activities. The committee also discussed pending legislation requiring *Automated External Defibrillators* (AEDs) in schools. See Appendix B for full text of abbreviations.

## INTRODUCTION

In order to fully address the problem of sudden death in young athletes, the Task Force has developed a three pronged approach to the problem: **Prevention, Response, and Reporting.**

The principal **prevention** method is by appropriate screening of the student population with a high quality history and physical examination as the foundation. In addition, there needs to be more education of parents and students about the nature of the problem to ensure complete and accurate reporting of the athlete's history and the family history.

Although the major approach to prevention of sudden death in young athletes is the initial screening process of the history and physical examination, with referral to a pediatric cardiologist for a more complete evaluation when indicated, the Task Force notes this is an incomplete solution unless we also address the immediate **response** to a potentially fatal sudden life-threatening arrhythmia. The ability to rapidly reverse this potentially fatal event can be accomplished by the ready availability of an automatic external defibrillator (AED) as part of an adequate cardiac emergency plan (CEP) which also entails training of athletic and other personnel.

Thirdly, in order to better examine the success of any proposed interventions and to allow us to have data for further recommendations in the future, we must develop a robust **reporting** and data collection process.

The following unanimous report addresses these issues in detail and outlines specific recommendations based on the best available scientific evidence and the current recommendations of the appropriate professional societies, taking into account cost-effectiveness and other economic considerations.

The Task Force prepared the following recommendations for the Governor and Legislature pursuant to Section 2 of P.L.1991, c.164 (C.52:14-19.1).

## SUMMARY OF RECOMMENDATIONS

1. The Task Force recommends that the current preparticipation history and physical examination form be replaced. The Task Force recommends the development of a new form based on the content of the Preparticipation History and Physical Form from the 2010 AAP published monograph PPE Preparticipation Physical Evaluation (4<sup>th</sup> Edition); this new form will become the primary method of screening for public and non-public school student athletes. The Task Force does not recommend electrocardiograms (ECGs) and echocardiograms in the primary screening for public and non-public school student athletes.
2. The Task Force recommends that all healthcare professionals responsible for conducting the preparticipation history and physical examination of student athletes be appropriately licensed as a medical physician (M.D.), doctor of osteopathy (D.O.), advanced practice nurse (A.P.N.), or physician's assistant (P.A.).

3. The Task Force recommends that all healthcare professionals performing (or reviewing) preparticipation histories and physical examinations be required to complete specific continuing education on cardiac assessment in adolescents; records of completion of this continuing education requirement, such as a statement of assurance, shall be included in the board-approved contract of any school physician.
4. The Task Force believes that there should be a separate insurance code for a sports preparticipation physical examination, allowing physicians and other healthcare providers to focus more specifically on cardiac screening and the musculoskeletal examination. Further, the Task Force recommends that this second annual physical examination (for the purpose of preparticipation clearance for athletic or camp activities) should be a covered benefit under health insurance plans.
5. The Task Force supports the requirement, established by P.L. 2007, c.125 (C.18A:40-41) that all students athletes and their parents/guardians certify in writing that they have reviewed the pamphlet "Sudden Cardiac Death in Young Athletes," developed by AAP-NJ and AHA-NJ and promulgated in 2011, as a prerequisite for the preparticipation history and physical examination. The Task Force recommends that the pamphlet be included as part of the preparticipation history, physical examination and athletic permission forms for each year of a student's participation in sports.
6. The Task Force recommends that all grade 7-12 public and non-public school students be educated on sudden cardiac death, Basic Life Support/Cardiopulmonary Resuscitation and the use of AEDs as part of the health curriculum as currently required by the New Jersey Core Curriculum Content Standards and adopted by the State Board of Education in 2009.
7. The Task Force recommends that: (a) every public and non-public school in New Jersey have one or more AEDs in all school buildings and on the school grounds (based on the size and layout of the facility)[See Recommendation #8]; (b) all coaches, licensed athletic trainers, athletic directors, building administrators and school nurses be trained in CPR and the use of an AED; and (c) each district board of education or governing body of the school must develop a structured policy, called a cardiac emergency plan (CEP), to address cardiac emergencies. This recommendation is intended to ensure that an adult, trained in CPR and AED use, will be present at all intramural and interscholastic athletic practices and competitions. Further, a specific individual within the school will be assigned the responsibility for ensuring that all AEDs are functional.
8. The Task Force fully supports the AHA guideline for lay-rescuer AED programs which recommends that AEDs be placed within a brisk 1 – 1.5 minute walk from any site in the school.<sup>29</sup> When the school campus is large and consists of several buildings, or athletic teams practice at remote sites, it may be necessary to purchase and place several AEDs on the school property.
9. The Task Force recommends that New Jersey establish a state system for analyzing data related to the incidence of deaths and near deaths among youth due to *hypertrophic cardiomyopathy (HCM)*, sudden cardiac arrest and other life-threatening cardiac conditions.

## IMPACT OF SUDDEN CARDIAC DEATH AMONG YOUNG ATHLETES

Sudden cardiac death (SCD) is the leading cause of death in young athletes.<sup>2</sup> SCD is defined as an unexpected death due to cardiac causes within one hour after the onset of symptoms.<sup>2-4</sup> *Hypertrophic cardiomyopathy* is the single most common cause of death among U.S. athletes, occurring most commonly in those playing football and basketball. Male athletes are much more likely to die suddenly than female athletes (male: female ratio for SCD in youth is up to 10:1). Identification of athletes at high risk for SCD is critical in order to prevent adverse events.<sup>4,5</sup>

SCD in a young athlete is a devastating event with tremendous impact on the family, local community, and school. The death of a student athlete frequently attracts media attention and stimulates debate on the adequacy of preparticipation screening and emergency planning at athletic events. Fortunately, sudden death in young athletes is a rare event. The incidence of SCD among young athletes is estimated to be one per 200, 000 athletes per year, and may be underestimated.<sup>2,4,6-9</sup> Estimates vary greatly depending on the age of the athlete, the source of the sampling population, the sports activity and the definition of sudden death.

Specific causes of SCD in young athletes are more likely to have genetic determinants than similar conditions in older persons. These include inherited cardiac arrhythmias, hypertrophic cardiomyopathy, abnormalities of the coronary arteries, undetected congenital heart defects and early coronary artery disease/atherosclerotic disease. Over the last decade there has been significant progress in identifying inherited disorders of the heart rhythm that increase the chance of SCD.<sup>9,10</sup> It is critical for healthcare providers and the public to be aware of risk factors for SCD in young athletes.

An important opportunity for primary prevention of SCD is to identify high-risk athletes during preparticipation screening. However, guidelines for screening athletes differ widely on the state, national, and international level.<sup>5,11-17</sup>

Although some countries routinely incorporate the use of electrocardiograms (ECGs) for early detection of cardiovascular abnormalities in athletes, there has been considerable debate in the U.S. about the appropriate strategies, effectiveness and logistics of various preparticipation screening methods.<sup>11-24</sup> Evidence-based guidelines for preparticipation screening of non-professional athletes currently do not exist, and therefore, in the U.S., there are presently no universally accepted or mandated standards for screening athletes of any age, nor are there approved certification guidelines for the healthcare professionals who perform such examinations. The Task Force acknowledges that new criteria are currently evolving in regard to improving the accuracy of evaluating ECGs for cardiac abnormalities; however, these have not achieved the level necessary to be recognized as evidence-based guidelines.

A 2007 scientific statement published by the American Heart Association (AHA) and endorsed by the American College of Cardiology (ACC) discusses ethical-medical legal complexities and provides a thorough overview of the benefits and limitations of cardiovascular screening for competitive athletes, including those playing organized and sanctioned interscholastic sports at the middle school and high school levels.<sup>17</sup> While very little information on cost-effectiveness is available, the authors conclude that

the absolute cost of a large scale national screening program with routine ECG testing for 10 million middle and high school athletes would be enormous—in the range of \$2 billion annually. Independent of the cost, there are also concerns about the practicality of implementing widespread mass screening that include logistics, a shortage of qualified physician examiners, and the problem of borderline or false positive results.

The AHA and the ACC, while agreeing with the need for a screening program, currently believe that universal ECGs are not cost-effective and are also likely to result in unacceptably high rates of false-positive results. A false positive result is when a screening test indicates an abnormal test result, but the individual does not actually have the condition or disease for which the screening test was conducted.

It is recommended that athletes instead be screened through a health questionnaire and physical examination, with an ECG used only as a secondary investigation. In regard to the use of *echocardiography* as a screening process, there are less data; further, current recommendations do not include the use of echocardiography for screening purposes, with echocardiography also used only as a secondary investigation.<sup>20</sup>

Survival after exercise-related sudden cardiac arrest in young persons once was poor, but is improving steadily. The survival rate measured during the seven year period from 2000 to 2006 in the U.S. was only 11 percent.<sup>25</sup> Data from 2007 indicate that the survival rate among high school students in the U.S. was 64 percent where an AED was utilized.<sup>26</sup> A recent one-year large prospective study from the 2009-2010 school year indicated that if an AED was utilizing properly there was a survival rate of 85 percent among high school students who experienced sudden cardiac arrest.<sup>27</sup> Thus, more and more schools and athletic programs are reevaluating their emergency response planning for sudden cardiac arrest and have implemented onsite school AED policies.

## RECOMMENDATIONS

The following are actionable recommendations to enhance screening of student athletes for hypertrophic cardiomyopathy and other cardiac conditions by identifying students who are at risk for sudden cardiac death and other cardiac conditions.

1. The Task Force recommends that the current preparticipation history and physical examination form be replaced. The Task Force recommends the development of a new form based on the content of the Preparticipation History and Physical Form from the 2010 AAP published monograph PPE Preparticipation Physical Evaluation (4<sup>th</sup> Edition); this new form will become the primary method of screening for public and non-public school student athletes. The Task Force does not recommend electrocardiograms (ECGs) and echocardiograms in the primary screening for public and non-public student athletes.

The New Jersey Student Athlete Cardiac Screening Task Force (Task Force) recommends the use of a complete, current, and accurate preparticipation history and physical examination as the most beneficial screening method. For adolescent athletes, the most common cause of death during sports activities is congenital cardiovascular disease. In view of these rare but tragic deaths, the AHA committee recommended that cardiovascular screening be included in the preparticipation physical examination.<sup>17</sup> The Task Force agrees with the 2007 AHA recommendation which identifies personal and family history and physical examination as the most effective strategy to raise the suspicion of cardiovascular disease in both large scale and small scale settings when screening populations of high school and middle school students. See Appendix D for Guidelines for a preparticipation physical examination.

The current preparticipation history and physical forms, as required by N.J.A.C. 6A:16-2.2, should be in accordance with the 12- Element AHA Recommendations for Preparticipation Cardiovascular Screening of Competitive Athletes.<sup>17</sup> See Appendix E for details of N.J.A.C. 6A:16-2.2. It is the consensus of the Task Force that the current New Jersey Department of Education Annual Athletic Preparticipation Physical Examination Form Part A: Health History and Part B: Physical Examination Forms authorized by N.J.A.C. 6A:16-2.2 and found at <http://www.nj.gov/education/students/safety/health/records/>) are in accordance with the AHA guidelines.<sup>17</sup> Several history questions focus on heart-related conditions. The appended "notes to the examiner" are inclusive of physiologic maneuvers of heart sounds and a brief explanation of stigmata of *Marfan Syndrome*; an expanded "notes and resources for medical providers" section was written but not promulgated to healthcare providers. See Appendix F for the expanded version.

However, a more comprehensive preparticipation physical examination form presently exists in the Fourth Edition of the monograph PPE Preparticipation Physical Evaluation, published by the American

Academy of Pediatrics.<sup>28</sup> See Appendix G. The Task Force recommends that the New Jersey Department of Education adopt this history and physical evaluation format for all New Jersey public and private schools with athletic programs in grades 6-12. It was developed by six medical societies, including the American Academy of Family Physicians, American Academy of Pediatrics, American College of Sports Medicine, American Medical Society for Sports Medicine, American Orthopedic Society for Sports Medicine, and the American Osteopathic Academy of Sports Medicine. The Preparticipation Physical Evaluation forms (including History and Physical Examination Forms) are screening tools to help identify diseases or processes that may affect an athlete's participation in physical activity. The questions are designed to assess the athlete's general medical history and address potential issues related to cardiovascular problems, the central nervous system, pulmonary system, gastrointestinal, genitourinary system, dermatologic conditions, musculoskeletal and issues specific to the female athlete.<sup>28,29</sup>

While we recognize that the recommendations to utilize that PPE monograph is not mandated in non-public schools, the Task Force recommends that all students who participate in New Jersey State Interscholastic Athletic Association (NJSIAA) athletic events should participate in the same preparticipation screening measures as public school student athletes.

According to New Jersey Administrative Code, the preparticipation physical examination is valid for 365 days. The Task Force also recommends that an updated health history form be submitted to and reviewed by the school nurse if the preparticipation physical examination occurred 90 days prior to the first day of official practice in an athletic season (this represents a recommendation to increase the time period from 60 to 90 days). This update form focuses on health changes, injuries, and incidents that occurred since the last preparticipation history and physical examination. A newly revised and designed form, the Interim Sport Health History Questionnaire, is contained in Appendix H.

### ***Rationale for Support of History and Physical Examination:***

The American Medical Association Board of Trustees prepared a report reviewing the current health state of adolescent athletes and the efficacy of trying to identify those students at risk for injury or sudden death. This report stated that the most productive portion of the Preparticipation Athletic Examination is the medical history. Approximately 70 percent of all orthopedic and medical problems causing disqualification are identified by the medical history alone and are not newly diagnosed by the physical examination.<sup>28</sup>

Screening large scale populations for hypertrophic cardiomyopathy with genetic testing remains highly impractical given the cost, substantial mutational heterogeneity, and anticipated frequency of false-negative results.<sup>18</sup>

The 2007 AHA recommendations are based on a careful analysis of the relevant medical and economic factors by medical experts. The AHA does not recommend electrocardiography (ECG) or echocardiography as a routine part of preparticipation physical examination. ECGs are not required in the AHA practice guidelines due to the number of athletes to test in the United States, the cost

associated with screening an athlete, lack of standardized interpretation of ECG in an athlete, low disease incidence, limited qualified practitioners to interpret the ECG, and the risk and frequency of false positive readings.<sup>7,13,17,18,20</sup>

The Task Force does not support large scale electrocardiogram (ECG) screening at this time. The problem of borderline or false-positives test results commonly from ECG interpretation is particularly relevant in evaluating the feasibility for an athletic screening program. In prior screening efforts of varying design, the percentage of false positive examinations ranged from 10 percent to 25 percent depending on the threshold criteria used to define an abnormal ECG or a pathological heart murmur.<sup>20,29</sup> False positive screening diagnoses would generate unnecessary life implications, with emotional, financial, and medical burdens for the athlete, family, team and school including unnecessary additional tests and procedures, anxiety, uncertainty, and possibility of disqualification without merit.

A responsibility exists on the part of a student athlete's personal physician(s) and healthcare providers (medical home) to initiate prudent efforts for the identification of life-threatening diseases.

Preparticipation physical examinations are not meant to replace a regular annual health maintenance visit. Nevertheless, the preparticipation physical examination is often the only yearly health examination that some children and youth ever receive.<sup>30</sup>

There are no universally accepted or mandated standards for the screening of high school athletes, nor are there approved certification guidelines for those health care professionals who perform screening examinations.

Some volunteer and community-based cardiac screening initiatives have emerged, including programs in which electrocardiograms (ECGs) and portable echocardiograms (in addition to a limited personal and family history) are used to assess high school athletes, largely for HCM detection. These non-profit and/or lower cost efforts are organized under unique circumstances in which echocardiographic equipment is donated and professional services are largely volunteered. Despite the benevolent intentions and potential benefit of such initiatives, these screening approaches have not been scientifically validated and may not fall within the scope of the traditional patient-physician relationship (the medical home), and thus they create uncertain areas of liability. Also, such volunteer public service projects cannot easily be sustained financially.<sup>17</sup>

**2. The Task Force recommends that all healthcare professionals responsible for conducting the preparticipation history and physical examination of student athletes be appropriately licensed as a medical physician (M.D.), doctor of osteopathy (D.O.), advanced practice nurse (A.P.N.), or physician's assistant (P.A.).**

The preparticipation history and physical examination should be performed by a health care provider with requisite training, medical skills, and background to reliably obtain cardiovascular history, perform a physical examination and recognize heart disease.<sup>32,33</sup> Presently, New Jersey regulations require only licensed physicians (with MD and/or DO degrees), advanced practice nurses and physicians assistants to complete all athletic screening. The Task Force strongly endorses this regulation.

In addition, N.J.S.A. 18A:40-1 requires that each district board of education appoint at least one school physician. The school physician must be licensed by the New Jersey Board of Medical Examiners in medicine or osteopathy with training in child and adolescent health and development. The school physician may also serve as a "team doctor" but statute and regulation do not describe the qualifications of a "team doctor" nor require that districts employ a team doctor. Consequently, if a district appoints several physicians to provide services, one physician is appointed as the lead, serves as health services director and is responsible for the duties outlined in N.J.A.C. 6A:16-2.3. See Appendix I.

**3. The Task Force recommends that all healthcare professionals performing (or reviewing) preparticipation histories and physical examinations be required to complete specific continuing education on cardiac assessment in adolescents; records of completion of this continuing education requirement, such as a statement of assurance, shall be included in the board-approved contract of any school physician.**

The Task Force recommends that all licensed practitioners (physicians [MD and DO], advanced practices nurses [APN] and physician assistants [PA]) who perform student athlete preparticipation screenings and school physicals must be required to complete a continuing education module one time only and sign NJDOE forms verifying the module was completed. The Task Force recommends that the educational module include:

- 1) How to complete and review a detailed history with emphasis on cardiovascular family history and personal reports of symptoms.
- 2) Identifying "Red Flag" symptoms for SCD. These symptoms generate concern and should result in a recommendation for specialized follow up care with a cardiologist. They include exercise related syncope or near syncope, chest pain with exercise, excessive shortness of breath upon exertion, excessive fatigue, a family history of premature death occurring before 50 years of age, or palpitations that are not associated with increase caffeine intake, medications, tobacco, or alcohol use.<sup>26</sup>
- 3) Recognizing normal structural changes of the athletic heart.
- 4) Recognizing *prodromal symptoms*. Prodromal symptoms are warning symptoms (noted above) that precede sudden cardiac death and which are documented to occur in approximately 36% of sudden cardiac deaths.<sup>34</sup>
- 5) Performing the cardiovascular physical examination – measurement of blood pressure and pulses; inspection for stigmata of Marfan syndrome; visual inspection of the precordium; cardiac auscultation for rate, rhythm, quality of heart sounds and presence of murmurs.

- 6) Reviewing the major etiologies of sudden unexplained cardiac death with emphasis on structural abnormalities such as hypertrophic cardiomyopathy, congenital abnormalities of the coronary arteries, Marfan syndrome, primary electrical abnormalities such as long QT syndrome and acquired conditions such as myocarditis, *commotio cordis* as well as the normal musculoskeletal assessment of an adolescent.
- 7) When to refer to a cardiologist for further assessment.
- 8) (Optional) Learning current criteria for evaluating ECGs in competitive adolescent athletes.<sup>35</sup>

The Task Force recommends that the American Academy of Pediatrics/New Jersey Chapter, the New Jersey Academy of Family Physicians, the American Heart Association and the American College of Cardiology, New Jersey Chapter, in collaboration, create or adopt an appropriate education module to increase the assessment skills of those professionals who perform student athlete assessments and screenings.

This professional development educational opportunity should be available on various professional websites. The professional healthcare organizations should also include the pamphlet on sudden cardiac death in young athletes on their websites to enable their membership ready access to this information. See Appendix J.

The Task Force requests that wording be added to the licensure renewal process requesting the Board of Medical Examiners and the Board of Nursing to ask any healthcare providers who perform pre-participation physical examinations to attest that they completed the Student Athlete Cardiac Screening professional development module and have read the Sudden Cardiac Death in Young Athletes pamphlet.

The Task Force believes that all physicians who serve as school district physicians should have the requisite knowledge base in screening for sudden cardiac death, enabling them to review the physical examinations submitted by other health care providers for potential risk factors for sudden cardiac death. To ensure that these physicians receive the necessary education, the NJDOE should require school district contracts with physicians to verify completion of this education.

School nurses, who often also review physical examinations forms from outside health care providers, should be thoroughly familiar with the key signs and symptoms of cardiac disease in order that the nurse may flag the chart for further physician review.

### ***Rationale for Requiring Continuing Education on Cardiac Screening for Health Professionals conducting and reviewing Preparticipation Physical Examinations:***

The preparticipation history and physical examination is the primary mechanism for initial screening of student athletes for medical conditions that can cause sudden cardiac death. For these examinations to reach their true effectiveness, however, they need to be performed by appropriate health care professionals who possess the most current information and knowledge. Therefore, there needs to be a mechanism to assure the competence of such individuals to understand the elements of the history and possess the skill set necessary for the performance of the physical examination. Currently, there are no guidelines available in the United States.

A study reported in 2003 showed that although 50-70 percent of pediatricians reported providing school health services, only 20 percent of pediatricians reported having training in school health.<sup>36</sup> Italy requires extensive post-graduate education of individuals doing such exams; however, this is not practical here in the United States.

The Task Force believes that there needs to be some minimal competence attained by those performing these exams. Further, because of the increased focus placed on the issue of reducing sudden cardiac death in young athletes in New Jersey, as demonstrated by legislation requiring development and publication of a pamphlet and the creation of this Task Force, an educational refresher course for those health care professionals who perform these examinations is appropriate.

Since New Jersey requires a number of hours of Continuing Medical Education (CME) or Continuing Nursing Education (CNE) in order to renew licenses and has required all physicians to take CME in cultural competency, the Task Force believes that CME/CNE training on cardiac assessments in adolescents is indicated for all individuals performing or reviewing preparticipation histories and physicals.

4. The Task Force believes that there should be a separate insurance code for a sports preparticipation physical examination, allowing physicians and other healthcare providers to focus more specifically on cardiac screening and the musculoskeletal examination. Further, the Task Force recommends that this second annual physical examination (for the purpose of preparticipation clearance for athletic or camp activities) should be a covered benefit under health insurance plans.

In the past few years, the New Jersey State Legislature has passed legislation requiring the development and distribution of a pamphlet on sudden cardiac death in young athletes and additional legislation creating this task force on student athlete cardiac screening. The Task Force believes that the preparticipation physical examination process is of sufficient importance to the health of the student athletes of New Jersey to justify re-evaluation of how it is conducted and financed.

The Task Force believes that there should be a separate insurance code for a sports preparticipation physical examination, allowing physicians and other healthcare providers more time to focus on cardiac screening and the musculoskeletal examination. Since the Task Force is recommending that all health care providers who conduct these examinations obtain additional professional development education to improve their skills in athletic cardiac screening, there should be adequate time and compensation to enable these healthcare providers to perform a high quality examination.

Preparticipation physical examinations are not meant to replace a regular annual health maintenance visit. Nevertheless, the preparticipation physical examination is often the only yearly health examination that some children and youth ever receive.<sup>31</sup> The current system of medical insurance covers only a

single annual physical examination for active adolescents, which may force the healthcare provider to choose between focusing on the general medical, social and behavioral issues critical to adolescent development or on issues directly related to safe athletic participation. Both areas are of high importance to the active adolescent; therefore the Task Force recommends that a second annual physical examination (for the purpose of preparticipation clearance for athletic or camp activities) should be a covered benefit under health insurance plans.

**5. The Task Force supports the requirement, established by P.L. 2007 (NJSA 18A:-40-41) that all students athletes and their parents/guardians certify in writing that they have reviewed the pamphlet “Sudden Cardiac Death in Young Athletes,” developed by AAP-NJ and AHA-NJ and promulgated in 2011, as a prerequisite for the preparticipation history and physical examination. The Task Force recommends that the pamphlet be included as part of the preparticipation history, physical and athletic permission forms for each year of a student’s participation in sports.**

The Task Force supports the distribution of the pamphlet “Sudden Cardiac Death in Young Athletes: The Basic Facts on Sudden Cardiac Death in Young Athletes” to all New Jersey public schools. See Appendix J. The pamphlet addresses the following topics:

- What is sudden cardiac death in the young athlete?
- How common is sudden death in young athletes?
- What are the most common causes?
- Are there warning signs to watch for?
- What are the current recommendations for screening young athletes?
- When should a student athlete see a heart specialist?
- Can sudden cardiac death be prevented just through proper screening?
- Why have an AED on site during sporting events?

The purpose of the pamphlet is to educate students and parents on the common causes and warning signs of SCD, and to emphasize the importance of honest and accurate reporting of the family’s health history and of any student-athlete complaints of dizziness, fainting, palpitations or shortness of breath.<sup>17</sup>

The Task Force encourages local Boards of Education to adopt a policy requiring coaches, licensed athletic trainers or school nurses to review the SCD pamphlet with student athletes, emphasizing the importance of correctly reporting their cardiac health history each season.

**6. The Task Force recommends that all grade 7-12 public and non-public school students be educated on sudden cardiac death, Basic Life Support/Cardiopulmonary Resuscitation and the use of AEDs as part of the health curriculum as currently required by the New Jersey Core Curriculum Content Standards and adopted by the State Board of Education in 2009.**

The Task Force recommends that the American Heart Association (AHA) and Hypertrophic Cardiomyopathy Association (HCMA), in collaboration with the NJDOE and DHSS, create educational materials on SCD that identify the risk factors and warning signs of cardiac arrest with the goal to instruct the general public on life-threatening cardiac conditions such as hypertrophic cardiomyopathy (HCM). This tool should be available for use in the classroom as well.

It is recommended that the AHA and HCMA partner with the following organizations to promote distribution of educational materials to parents and teachers: New Jersey Parent Teacher Association (PTA), New Jersey Association of School Administrators (NJASA), New Jersey Principals and Supervisors Association, New Jersey School Boards Association, New Jersey State Interscholastic Athletic Association (NJSIAA), and Athletic Trainers Society of New Jersey, Inc., New Jersey Education Association (NJEA) and the New Jersey State School Nurses Association.

Educational materials should address:

- Indications for expanded screening of an athlete
- Educational DVD with a simulation of SCA
- Identify warning signs and symptoms associated with sudden cardiac arrest in young children and young athletes
- How to respond quickly and effectively to an emergency situation, and
- How to develop a cardiac emergency response plan

The Task Force supports the teaching of Cardiopulmonary Resuscitation (CPR) in high schools and middle schools, instruction on the use of an AED, and emergency response planning.

**Current Practice:** The New Jersey Core Curriculum Content Standards for Comprehensive Health and Physical Education (2009) require that students demonstrate knowledge of Basic Life Support by the end of grade eight and demonstrate competence in Basic Life Support and automatic external defibrillation by the end of grade 12. The standards do not require “certification” in CPR or the use of an AED.

See the attached hyperlink for complete text of the standards:

[https://www13.state.nj.us/NJCCCS/ContentAreaView\\_Health.aspx](https://www13.state.nj.us/NJCCCS/ContentAreaView_Health.aspx).

***Rationale to support teaching CPR and AED use in the health curriculum:***

- Laws or curriculum content standards in 36 states (as of 2009 - 2010 school year) now encourage the inclusion of CPR training programs in school curricula
- In 2003, the International Liaison Committee on Resuscitation strongly recommended that CPR training be incorporated in the standard school curriculum<sup>37</sup>
- That recommendation was based in part on the concept that over the long-term, children trained in CPR later contribute significantly to the number of adults trained in CPR within the community
- Although the risk of an out-of-hospital cardiac arrest event occurring to a student in a school is relatively low, the emotional costs associated with the sudden death of a child are enormous. The risk of a cardiac arrest in an adult, however, is higher; being surrounded by many individuals who are CPR trained increases the chances for survival
- People who are not health care professionals can provide lifesaving shocks with AEDs
- AEDs are designed for use by the general public so that defibrillation can be administered before Emergency Medical Services personnel arrive at the scene
- CPR is important both before and after defibrillation; it provides a small but critical amount of blood flow to the heart and brain and increases the likelihood that defibrillation will restore normal rhythm in time to prevent neurologic damage

7. The Task Force recommends that: (a) every public school or institution in New Jersey have one or more AEDs in all school buildings and on the school grounds (based on the size and layout of the facility)[see recommendation #8]; (b) all coaches, licensed athletic trainers, athletic administrative directors and school nurses be trained in CPR and the use of an AED; and (c) each district board of education develop a structured policy, called a cardiac emergency plan (CEP), to address cardiac emergencies. This recommendation is intended to ensure that an adult, trained in CPR and AED use, will be present at all intramural and interscholastic athletic practices and competitions. Further, a specific individual within the school will be assigned the responsibility for ensuring that all AEDs are functional.
8. The Task Force fully supports the AHA guideline for lay-rescuer AED programs which recommends that AEDs be placed within a brisk 1 – 1.5 minute walk from any site in the school.<sup>38</sup> When the school campus is large and consists of several buildings, or athletic teams practice at remote sites, it may be necessary to purchase and place several AEDs on the school property.

The Task Force strongly supports New Jersey legislation requiring an AED be available in every school building.<sup>39</sup> Assembly Resolution 84 (2010) urges all school boards of education in the state to take precautionary measures to protect its students and staff from sudden cardiac death through the following actions:

1. Install an AED at each of its schools.
2. Provide training to staff on the appropriate use of the device, in combination with training on CPR.
3. Develop a cardiac emergency action response plan for each school, and address the use of school staff in responding to cardiac emergencies that occur on school grounds.
4. Implement CPR training for all staff and students.

The Task Force firmly believes that the most cost effective way to save lives from sudden cardiac death is to have a comprehensive, fully operational cardiac emergency response plan in place in every school. This combination of CPR and AED trained staff and students, availability of a functional AED in close proximity with an operational cardiac emergency response plan will do more to save lives than any other intervention. Dollars invested in purchasing AEDs and training students and staff will be dollars well spent.

In acknowledgement of the present fiscal climate on school budgets, the Task Force also supports Assembly Resolution 99 (2010) which encourages local parent teacher associations and organizations to raise funds to acquire AEDs for use in schools.<sup>39</sup>

The Task Force recommends that schools be permitted to accept donations, gifts, grants, including in-kind designated for the purchase of an AED and the costs incurred to inspect and maintain the device and train staff to use the device. A local and regional board of education may accept a donation of an AED that meets the standards established by United States Food and Drug Administration and is in compliance with the device manufacturer's maintenance schedule.

The Task Force requests that legislators appropriate grant funding for the provision of AEDs over a 3-5 year period for public and private schools unable to raise funds for purchase and maintenance of AEDs.

The Task Force recommends the development of a state system to report all use of an AED in children 12-19 years old. A central state agency, such as the Emergency Response Services (EMS), New Jersey State Department of Health and Senior Services would collect all reports from police, schools and local EMS throughout the state. This data would be reviewed through the Child Fatality and Near Fatality Review Board. See Task Force Recommendation #9.

It would be beneficial to survey all New Jersey public schools to note the present location of all AEDs and indicate the responsible staff assigned for maintenance of each AED.

The Task Force supports legislation requiring public playing fields to have access to AEDs (S393; 2010).<sup>39</sup>

The Task Force also recommends that the Office of Emergency Medical Services (EMS), and NJDHSS collaborate with the American Heart Association to identify resources and guidance materials for schools for the establishment of Cardiac Emergency Plans (CEP).

While the AED itself is a vital tool for saving lives, it is only part of an overall Cardiac Emergency Plan (CEP).<sup>38</sup> Schools must appreciate the importance of developing a complete CEP, and conducting periodic practices in collaboration with local Emergency Medical Response Teams to ensure that the plan is functionally operative before faced with a life-threatening cardiac emergency.<sup>40,41</sup> For elements of a CEP, see also Appendix K.

### ***Rationale for CPR and AED training:***

- Automated external defibrillators (AEDs) are computerized devices that analyze cardiac rhythm, determine if a shock is needed, and deliver that charge in an appropriate shock dose, using audio and visual instructions to guide the rescuer. In one study, AEDs were safely and successfully operated by untrained sixth graders almost as quickly as trained paramedics in a simulated resuscitation, with only 23 second difference in mean time to defibrillation<sup>42</sup>
- Although sudden cardiac arrest (SCA) is rare but catastrophic event in young athletes, it is more common in an older population, with an estimated annual frequency of 1 in 1,000 persons aged 35 years or older in the United States<sup>38</sup>
- The presence of AEDs in schools and institutions provides a means of early defibrillation, not only for young athletes, but also for other individuals on campus who may experience an unexpected cardiac arrest<sup>29</sup>
- In athletes with hypertrophic cardiomyopathy even a brief delay in defibrillation may cause a steep decline in survival<sup>6,24,25,43</sup>
- AHA guideline for lay-rescuer AED programs recommend that AEDs be placed within a brisk 1 – 1.5 minute walk from any site in the school.<sup>38</sup> When the school campus is large and consists of several buildings, or athletic teams practice at remote sites, it may be necessary to purchase and place several AEDs on the school property
- The importance of involving Emergency Medical Services (EMS) both at the state and local level cannot be overemphasized. In the planning stage, their input will be helpful to optimize the location and implementation of the AED or AEDs within individual schools. This information, with the help of local EMS can then be transmitted to dispatch centers. This information enables the dispatcher to remind a 911 caller where the AED is located on the premises and if the user is untrained, he or she can be “talked through” the process by the dispatcher
- Widespread use of AEDs will enable more data collection about the frequency of *ventricular fibrillation* as a terminal rhythm in children in the out-of-hospital setting. It will also enable the collection of outcome data

9. The Task Force recommends that New Jersey establish a state system for analyzing data related to the incidence of deaths and near deaths among youth due to hypertrophic cardiomyopathy (HCM), sudden cardiac arrest and other life-threatening cardiac conditions.

The Task Force recommends establishing a SCD sub-committee within the Child Fatality and Near Fatality Review Board. This SCD sub-committee would study and review SCD and near-SCD in all children ages 12 through 19 years of age. These findings shall be required to be reported to the National Sudden Cardiac Death Registry.<sup>44</sup>

Accordingly, the Task Force also recommends the development of a state system to report all use of an AED in children 12-19. See Recommendations #7 and #8. A central state agency, such as the Emergency Response Services (EMS), New Jersey State Department of Health and Senior Services would collect all reports from police, schools and local EMS throughout the state.

The SCD sub-committee should request and review incident reports of sudden cardiac death and near deaths from the NJDOE. Schools should document the frequency and outcome of life-threatening cardiac emergencies. The SCD subcommittee should review state death certificates, autopsy reports and reports generated from local and state EMS relating to the SCD of youth. The SCD subcommittee should note age, gender and race of the individual while also noting the location of the sudden cardiac arrest. Input from the State Birth Defects Registry may also be beneficial by noting the percentage of registered cardiac conditions.

### ***Rationale:***

- The National Center for Catastrophic Sport Injury Research (NCCSIR) tracks voluntary reports of serious injuries and deaths that occur during training or competition in male and female high school and college sports. Over a 27 year period from July 1983 to June 2009, the NCCSIR reported 465 non-traumatic sports deaths in high school athletes and 108 deaths in college athletes, or an average of 21 reported deaths per year nationwide.<sup>44</sup> Most of the deaths were caused by cardiovascular conditions, especially hypertrophic cardiomyopathy and congenital anomalous coronary arteries. Estimated death rates in male athletes were 5-fold higher than those in female athletes. The NCCSIR database includes only voluntary reports of deaths or injuries at athletic activities sanctioned or sponsored by high schools and colleges. It does not include deaths or injuries that occur during routine class hours, physical education classes, or pick up sporting activities. There is little information about SCA among high school students who do not compete in athletics. Although SCA has been reported in non-athletic adolescents during sedentary activities, the risk appears to be lower in high school students who do not play competitive sports.
- "A great deal of information is needed to enable schools and communities to improve the survival of sudden cardiac death in children and adults. It is only through the collections of data

and the documentation of outcomes that our society can determine the most effective allocation of personnel, training, equipment, and resources to save the greatest number of lives."<sup>45</sup>

## Conclusion

This report addressed important issues in detail regarding cardiac screening and outlined specific recommendations based on the best available scientific evidence and the current recommendations of the appropriate professional societies, taking into account cost-effectiveness and other economic considerations.

"The primary care practitioner is encouraged to perform a focused cardiovascular history and physical exam .....as part of the standard of care for a sports preparticipation visit. This is an important step in the evaluation of a patient who may then go on to further testing and specialist referral as needed. Although community-based screenings with ECGs of young athletes in the U.S. may become routine at some point in the future, currently they are not performed widely because of concerns regarding false positive, false negatives, and screening costs. In the meantime, refinement of the cardiovascular focused history and physical in athletes may help identify risk factors for sudden cardiac death and lead to appropriate referral for detailed cardiac evaluation."<sup>23</sup> This paragraph is the conclusion of an April 2011 article on "Cardiac Screening for Healthy Pediatric Athletes" which appeared in the American College of Sports Medicine journal *Current Sports Medicine Reports*.

The National Heart, Lung and Blood Institute of the National Institutes of Health (NIH) convened a working group on "Screening for Sudden Cardiac Death in the Young" in 2010. Their report was published in the May 2011 issue of the American Heart Association journal *Circulation*. "The debate over cardiovascular screening to prevent Sudden Cardiac Death in the Young has fervent and well-intentioned supporters on both sides. However, this debate will continue unresolved until additional, compelling evidence is provided that either supports or refutes the utility of screening for Sudden Cardiac Death in the Young."<sup>24</sup> "Moving the field forward will require the rigorous application of research to fill in the knowledge gap identified by the Working Group. ....The ultimate goal....is to transform the debate over screening for Sudden Cardiac Death in the Young into a conversation about the evidence needed to help answer important questions (and) .....put us on a path to developing a sound evidence base for the prevention of Sudden Cardiac Death in the Young."<sup>24</sup>

In summary, based on review of the current medical evidence and the unanimous consensus of its members, the Task Force has developed a three pronged approach to the problem: **Prevention, Response, and Reporting.**

The principal **prevention** method is by appropriate screening of the student population with a high quality history and physical examination as the foundation. In addition, there needs to be more education of parents and students about the nature of the problem to ensure complete and accurate reporting of the athlete's history and the family history.

Although the major approach to prevention of sudden death in young athletes is the initial screening process of the history and physical examination, with referral to a pediatric cardiologist for a more complete evaluation when indicated, the Task Force notes this is an incomplete solution unless we also address the immediate **response** to a potentially fatal sudden life-threatening arrhythmia. The ability to rapidly reverse this potentially fatal event can be accomplished by the ready availability of an automatic external defibrillator (AED) as part of an adequate cardiac emergency plan (CEP) which also entails training of athletic and other personnel.

Thirdly, in order to better examine the success of any proposed interventions and to allow us to have data for further recommendations in the future, we must develop a **robust reporting** and data collection process.

The Task Force recognizes that future research and medical advances continue to arise. These changes may result in re-evaluation of the recommendations made in this report. The Task Force is prepared and willing to continue to meet on a periodic basis to address these on-going issues and to help implement the current recommendations.

The Task Force is prepared and willing to continue to exist and meet periodically to help implement these various recommendations.

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**APPENDIX A NEW JERSEY STUDENT ATHLETE CARDIAC SCREENING TASK FORCE MEMBERSHIP**

As per legislative mandate the task force consisted of the following members:

***Membership Profiles:***

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**APPENDIX B****ABBREVIATIONS**

AAC	American College of Cardiology
AAP	American Academy of Pediatrics
AED	Automated External Defibrillator
AHA	American Heart Association
APN	Advanced Practice Nurse
CEP	Cardiac Emergency Plan
CPR	Cardiopulmonary Resuscitation
DO	Doctor of Osteopathy
ECG	Electrocardiogram
EMS	Emergency Medical Services (Rapid Responders)
HCM	Hypertrophic Cardiomyopathy
HCMA	Hypertrophic Cardiomyopathy Association
MD	Doctor of Medicine
NCCSIR	National Center for Catastrophic Sport Injury Research
NIH	National Institutes of Health
NJAFP	New Jersey Academy of Family Physicians
NJDHSS	New Jersey Department of Health and Senior Services
NJDOE	New Jersey State Department of Education
NJSIAA	New Jersey Interscholastic Athletic Association
NJSSNA	New Jersey State School Nurses Association
NP	Nurse Practitioner
PA	Physician Assistant
PTA	Parent Teacher Association
SCA	Sudden Cardiac Arrest
SCD	Sudden Cardiac Death

## APPENDIX C

## GLOSSARY

*Sudden Cardiac Death* is the result of an unexplained failure of proper heart function, usually (about 60% of the time) during or immediately after exercise without trauma. Since the heart stops pumping adequately, the athlete quickly collapses, loses consciousness, and ultimately dies unless normal heart rhythm is restarted using an automated external defibrillator (AED).

*Hypertrophic Cardiomyopathy (HCM)* (hi-per-tro-fic cardee-oh-my-op-a-thee) is a disease of the heart with abnormal thickening of the heart muscle, which can cause serious heart rhythm problems and blockages to blood flow. This genetic disease runs in families and usually develops gradually over many years.

*Cardiovascular* means pertaining to heart and blood vessels.

*Electrocardiogram (ECG)* is a graph of the electrical activity of the heart.

*Echocardiogram* is an ultrasound test to allow for direct visualization of the heart structure.

*Ventricular Fibrillation (VF)* is a condition in which there is uncoordinated contraction of the cardiac muscle of the ventricles in the heart, making them quiver rather than contract properly. While there is activity, it is undetectable by palpation (feeling) at major pulse points of the carotid and femoral arteries especially by the lay person. Ventricular fibrillation is a medical emergency that requires prompt basic life support.

\*Ventricular Fibrillation is a cause of cardiac arrest and Sudden Cardiac Death.

*Automated External Defibrillator (AED)* is a computerized medical device that can check a person's heart rhythm. It can recognize a rhythm that requires a shock and can advise the rescuer when shock is needed. The AED uses voice prompts, lights and text messages to tell the rescuer steps to take to complete the emergency resuscitation process.

*Marfan Syndrome* is 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 member.

*Dilated Cardiomyopathy* is an enlargement of the heart for unknown reasons.

*Long QT syndrome* is an electrical abnormality of the heart rhythms that can also run in families. Syncope is the medical term for fainting. It is a sudden loss of consciousness.

*Dyspnea* is the medical term for labored or difficult breathing.

*Cardiac arrhythmias* are disturbances in the normal rate and rhythm of the heartbeat.

*Murmurs* are extra heart sounds that are produced as a result of turbulent blood flow that is sufficient to produce audible noise. Most murmurs can only be heard with the assistance of a stethoscope (“on auscultation”).

A *functional murmur* or “*physiologic murmur*” is a heart murmur that is primarily due to physiologic conditions as opposed to structural defects in the heart itself. Functional murmurs are benign (“innocent murmurs”). For example, in the normal heart, during high level exertion, the flow of blood traversing through the heart increases and the slight turbulence created by this higher level of flow may produce an audible, low level, benign “functional flow murmur.”

Murmurs may also be the result of various problems, such as narrowing or leaking of valves, or the presence of abnormal passages through which blood flows in or near the heart. Such murmurs, known as pathologic murmurs, should be evaluated by an expert, such as a cardiologist.

*Atherosclerosis* is a condition characterized by degeneration and hardening of the walls of the arteries and sometimes the valves of the heart, related especially to thickening of the tunica intima (intimal layer).

*Coronary Heart Disease (CHD)* – Arteriosclerotic heart disease is a narrowing of the small blood vessels that supply blood and oxygen to the heart. CHD is also called coronary artery disease.

*Coronary Artery Disease (CAD)* is a condition in which plaque builds up inside the coronary arteries.

*Systemic Arterial Blood Pressure* is the force of blood pressure on the arterial walls just after ventricular contraction. The sound becomes too faint to be heard by stethoscope.

## APPENDIX D

## AMERICAN HEART ASSOCIATION GUIDELINES

The AHA guidelines are summarized below:

Medical History (Parental verification is required for high school and middle school athletes)

1. Personal History
  - a. Chest pain and/or discomfort (such as palpitations) at rest or with exercise and physical activity
  - b. Unexplained dizzy spells, fainting (syncope), seizures
  - c. Unexplained excessive shortness of breath (dyspnea) and fatigue with exercise
  - d. Prior recognition of a *heart murmur*
  - e. Elevated blood pressure
2. Family History
  - a. Sudden and unexplained death due to heart disease in a relative who was less than 50 years old
  - b. Disability from heart disease in a close relative less than 50 years old
  - c. Specific knowledge of certain cardiac conditions in family members:
    - (1) hypertrophic or dilated cardiomyopathy, a condition where the heart walls are thickened making it hard for the heart to pump blood
    - (2) *long-QT syndrome* or other *ion channelopathies*, a condition where the heart beats irregularly
    - (3) *Marfan syndrome*, an inherited syndrome characterized by changes in heart valves, walls of major arteries, eyes and the skeleton.
    - (4) clinically important *arrhythmias*.
3. Physical examination
  - a. Cardiac examination for rate, rhythm, quality of heart sounds and heart murmurs
  - b. Femoral pulses to exclude aortic coarctation (significant narrowing of the aorta)
  - c. Physical stigmata of Marfan syndrome
  - d. Brachial artery blood pressure (sitting position)

As of October 11, 2011, the proposed new language of the code will be assessed at NJDOE  
**Current Practice: New Jersey Administrative Code, Programs to Support Student  
Development Subchapter 2. N.J.A.C. 6A: 16-2.2(h)1 - Required Health Services:**  
See: [www.state.nj.us/education/code/current/title 6A/chap16.pdf](http://www.state.nj.us/education/code/current/title%206A/chap16.pdf)

1. Prior to participation on a school- sponsored interscholastic or intramural athletic team or squad for students enrolled in any of grades six to 12;
  - i. The examination, in accordance with (g) above shall be conducted within 365 days prior to the first practice session.
  - ii. The medical examination shall report pursuant to (g) above and shall include a health history questionnaire, complete and signed by the parent.
    - (1) The report of health findings of the medical examination for participation shall be documented on the Athletic Preparticipation Physical Examination Form approved by the Commissioner of Education to determine whether the student had or currently has any of the following conditions since their last physical:
      - (A) Injuries
      - (B) Chronic or ongoing illness
      - (C) Prescribed medications
      - (D) Allergies
      - (E) Head related conditions
      - (F) Heart related conditions
      - (G) Eye, ear, nose mouth or throat conditions
      - (H) Neuromuscular/orthopedic conditions
      - (I) General or exercise related conditions
    - (2) The Medical Report shall include a determination concerning the student's participation from the examining physician, advanced practice nurse or physician's assistant which includes, at a minimum the following normalities:
      - (A) Measurement of weight, height and blood pressure
      - (B) Examination of the skin to determine the presence of infection, scars from previous surgery or trauma, jaundice and purpura
      - (C) Examination of the eyes to determine visual acuity, use of eyeglasses or contact lenses, and examination of the sclera for the presence of jaundice
      - (D) Examination of the ears to determine the presence of acute or chronic infection, perforation of the eardrum and gross hearing loss
      - (E) Examination of the nose to assess the presence of deformity which may affect endurance

- (F) Assessment of the neck, back and spine to determine range of motion, the presence of pain associated with such motion and abnormal curvature of the spine
  - (G) Examination of chest contour
  - (H) Auscultation and percussion of the lungs
  - (I) Assessment of the heart with attention to the presence of murmurs, noting rhythm and rate
  - (J) Assessment of the abdomen for, splenomegaly or abnormal masses
  - (K) Examination of upper and lower extremities to determine abnormal mobility or immobility, deformity, instability, muscle weakness or atrophy, surgical scars and varicosities
  - (L) Examination of the testes to determine the presence and descent of testes, abnormal masses or configurations, or hernia
  - (M) Assessment of physiological maturation
  - (N) Neurological examination to assess balance and coordination
- (3) The medical report shall indicate whether a student is allowed or disallowed to participate in the required sports categories and be completed and signed by the original examining physician, advanced practice nurse or physician's assistant. A form that is incomplete will be returned to the student's medical home for completion.

iii Each student whose medical examination was completed more than 60 days prior to the first practice session shall provide health history update of medical problems experienced since the last medical examination. This shall be completed and signed by the parent. The health history update shall include the following information:

- (1) Hospitalizations/operations
- (2) Illnesses
- (3) Injuries
- (4) Care administered by a physician of medicine or osteopathy, advanced practice nurse or physician's assistant
- (5) Medications

iv Each school district shall provide written notification signed by the school Physician to the parent stating approval of the student's participation in Athletics based on medical report or the reasons for the school physicians' Disapproval of the student's participation

v A student that does not have a completed Athletic Preparticipation Physical Examination Form shall not be permitted to participate

**APPENDIX F**

**NOTES AND RESOURCES FOR MEDICAL PROVIDERS**

**A. Medical conditions requiring clearance before sports participation include, but are not limited to the following:**

**\*\*Adapted from Rice SG and Council on Sports Medicine and Fitness, *Medical Conditions Affecting Sports Participation Pediatrics* 2008; 121(4):841-849.**

Anaphylaxis; Atlanto-axial instability; Asthma; Obesity; Bleeding disorder; Hypertension (>95<sup>th</sup> %ile for age gender and height); Congenital and acquired heart disease; Dysrhythmia; Mitral valve prolapse; Heart murmur; Syncope; Cerebral palsy; Diabetes mellitus; Eating disorders; Heat illness history; Congenital or acquired single abdominal organ; Hepatomegaly, Splenomegaly; Malignancy; Seizure disorder; Marfan syndrome; History of repeated concussion; Organ transplant recipient; Cystic fibrosis; Sickle cell disease; and/or One-eyed athletes or athletes having best corrected visual acuity worse than 20/40 in the poorer-seeing eye; Suspicion of substance abuse.

<u>Contact or Collision</u>	<u>Limited Contact</u>	<u>Non-Contact</u>
Basketball	Baseball	Martial arts
Cheerleading	Fencing	Racquetball
Diving	Field events	Skating
Extreme sports	High jump	Ice
Field hockey	Pole vault	In-line
Football, tackle	Floor hockey	Roller
Gymnastics	Football	Softball
Ice hockey	Flag/touch	Volleyball
Lacrosse	Handball	Weight Lifting
Martial arts		
Soccer		
Wrestling		
		Badminton
		Body building
		Bowling
		Dance
		Field events
		Discus
		Javelin
		Shot put
		Golf
		Power lifting
		Rope jumping
		Running
		Swimming
		Table tennis
		Tennis
		Track

**B. HYPERTENSION**

New recommendations on sports participation for athletes with hypertension are available from the National High Blood Pressure Education Program working group (available in the first reference below). Their report defined prehypertension and stage 1 and stage 2 hypertension as well as produced the latest blood pressure tables which list the 50<sup>th</sup>, 90<sup>th</sup>, 95<sup>th</sup> and 99<sup>th</sup> percentiles based on age, gender and height percentile. Periodic monitoring of elevated resting (pre-exercise) blood pressure levels is preferred for readings above the >90<sup>th</sup> percentile. A more complete medical evaluation is utilized for sustained elevated blood pressure readings >95<sup>th</sup> percentile for age, gender and height percentile.

The blood pressure reading must be at least 5 mm Hg above the 99<sup>th</sup> percentile before any exclusion from sports is indicated. Those with **hypertension >5 mmHg above the 99th percentile for age, gender and height percentile** should avoid heavy weight and power lifting, bodybuilding, and other high-static component sports (see list below of high static component sports [ $>50\%$  MVC]). The increasing static component is related to the estimated percent of maximal voluntary contraction (MVC) reached and results in an increasing blood pressure load. The increasing dynamic component is calculated as the estimated percentage of maximal oxygen uptake thereby resulting in increased cardiac output.

<u>High Static/Low Dynamic</u>	<u>High Static/Moderate Dynamic</u>	<u>High Static/High Dynamic</u>
Bobsledding/luge	Body building	Boxing
Field events (throwing)	Downhill skiing	Canoeing/kayaking
Gymnastics	Skateboarding	Cycling
Martial arts	Snowboarding	Decathlon
Sailing	Wrestling	Rowing
Sport climbing		Speed-skating
Water skiing		Triathlon
Weight lifting		
Windsurfing		

National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents. The fourth report on the diagnosis, evaluation, and treatment of high blood pressure in children and adolescents. *Pediatrics*. 2004;114(2 Suppl):555-576

36th Bethesda Conference: Eligibility recommendations for competitive athletes with cardiovascular abnormalities. *J Am Coll Cardiol*. 2005;45:1313-1375

### C. CARDIAC MURMURS: Effects of physiologic maneuvers on heart sounds:

<u>Standing:</u>	Increases murmur of HCM Decreases murmur of AS, MR MVP click occurs earlier in systole	
<u>Squatting:</u>	Increases murmur of AS, MR, AI Decreases murmur of HCM MVP click delayed	HCM = Hypertrophic Cardiomyopathy AS = Aortic Stenosis MVP = Mitral Valve Prolapse MR = Mitral Regurgitation AI = Aortic Insufficiency
<u>Valsalva:</u>	Increases murmur of HCM Decreases murmur of AS, MR MVP click occurs earlier in systole	

36th Bethesda Conference: Eligibility recommendations for competitive athletes with cardiovascular abnormalities. *J Am Coll Cardiol.* 2005;45:1313-1375

### D. MARFAN SYNDROME: *Physical Signs suspicious of Marfan Syndrome:*

Kyphosis	High arched palate
*Reduced elbow extension <170°	Arachnodactyly
*Wrist and thumb sign	Typical facial features
*Pectus excavatum	*Arm span > height ratio (1.05:1 or greater)
*Pectus carinatum	Murmur consistent with mitral or aortic valve pathology
*Scoliosis >20° or spondylolisthesis	Myopia, flat cornea
Joint hypermobility	*Lenticular dislocation
	Stretch marks (striae)

#### \*Major criteria

*Marfan Syndrome is diagnosed based on findings of a major criteria in 2 organ systems and involvement of a third organ system. Note that family history or a FBN1 gene mutation is a major criteria of one system. "Involvement" of each organ system varies by organ system criterion and is defined as follows: Skeletal: 2 major OR 1 major with 2 minor criteria; CVS: 1 minor criteria; Pulmonary: 1 minor criteria; and Skin: 1 minor criteria.*

**Marfan syndrome:** Ammass, N, Sundt, T, and Connolly, H Marfan Syndrome – Diagnosis and Management. *Current Problems in Cardiology* 2008;33(1):7-39.

### E. OBESITY (overweight and under-active)

Children whose BMI is > 85%ile should be evaluated for co-morbidities associated with overweight and obesity. These may include, but are not limited to: impaired glucose tolerance, diabetes mellitus, hyperandrogenism, and abnormalities in growth and puberty, hypertension, dyslipidemia, nonalcoholic fatty liver disease, cholelithiasis, obstructive sleep apnea (OSA) and the obesity hypoventilation syndrome, slipped capital femoral epiphysis (SCFE) tibia vara (Blount disease), impaired mobility, and lower extremity malalignment (predisposing to injury), idiopathic intracranial hypertension (pseudotumor cerebri), intertrigo and furunculosis, and decreased health-related quality of life (physical, emotional, social, and school functioning)

**Activity:** Rice SG and Council on Sports Medicine and Fitness, Clinical Report: Medical Conditions Affecting Sports Participation *Pediatrics* 2008;121(4):841-848.

**Obesity:** Active Healthy Living: Prevention of Childhood Obesity Through Increased Physical Activity  
AAP Council on Sports Medicine and Fitness and AAP Council on School Health *Pediatrics* 2006;117(5):1834-1842

### F. ANABOLIC STEROID ABUSE

Users of anabolic or androgenic compounds are more likely to be male, involved in sports that demand high levels of strength, power, size, and speed or participate in sports that demand leanness, are likely to use other illegal substances such as tobacco and alcohol and/or obsessed with body image. Users of certain performance-enhancing substances might be identified by philosophy, outward signs such as virilization in females, testicular atrophy in males, and mood changes, jaundice, impotence, gynecomastia, amenorrhea, clitoromegaly, Breast atrophy, increased rates of strains and sprains, acne, striae, hirsutism, male pattern baldness, deepening of the voice, increased blood pressure and signs of withdrawal and dependency. Unfortunately, most young people who use performance-enhancing substances are not readily identified by outward signs. Therefore, it is imperative that all adolescents be asked about use of performance-enhancing substances.

### G. ADDITIONAL RESOURCES:

1. AAP Council on Sports Medicine and Fitness <http://www.aap.org/sections/sportsmedicine>
2. **Asthma:** Expert Panel Report 3 (EPR-3): Guidelines for the Diagnosis and Management of Asthma-Summary Report 2007. *The Journal of Allergy and Clinical Immunology.* 2007;120(5 Suppl):S94-138.

# PREPARTICIPATION PHYSICAL EVALUATION HISTORY FORM

(Note: This form is to be filled out by the patient and parent prior to seeing the physician. The physician should keep this form in the chart.)

Date of Exam \_\_\_\_\_

Name \_\_\_\_\_ Date of birth \_\_\_\_\_

Sex \_\_\_\_\_ Age \_\_\_\_\_ Grade \_\_\_\_\_ School \_\_\_\_\_ Sport(s) \_\_\_\_\_

**Medicines and Allergies:** Please list all of the prescription and over-the-counter medicines and supplements (herbal and nutritional) that you are currently taking

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Do you have any allergies?  Yes  No If yes, please identify specific allergy below.

Medicines  Pollens  Food  Stinging Insects

Explain "Yes" answers below. Circle questions you don't know the answers to.

GENERAL QUESTIONS	Yes	No	MEDICAL QUESTIONS	Yes	No
1. Has a doctor ever denied or restricted your participation in sports for any reason?			26. Do you cough, wheeze, or have difficulty breathing during or after exercise?		
2. Do you have any ongoing medical conditions? If so, please identify below: <input type="checkbox"/> Asthma <input type="checkbox"/> Anemia <input type="checkbox"/> Diabetes <input type="checkbox"/> Infections Other: _____			27. Have you ever used an inhaler or taken asthma medicine?		
3. Have you ever spent the night in the hospital?			28. Is there anyone in your family who has asthma?		
4. Have you ever had surgery?			29. Were you born without or are you missing a kidney, an eye, a testicle (males), your spleen, or any other organ?		
<b>HEART HEALTH QUESTIONS ABOUT YOU</b>	<b>Yes</b>	<b>No</b>	30. Do you have groin pain or a painful bulge or hernia in the groin area?		
5. Have you ever passed out or nearly passed out DURING or AFTER exercise?			31. Have you had infectious mononucleosis (mono) within the last month?		
6. Have you ever had discomfort, pain, tightness, or pressure in your chest during exercise?			32. Do you have any rashes, pressure sores, or other skin problems?		
7. Does your heart ever race or skip beats (irregular beats) during exercise?			33. Have you had a herpes or MRSA skin infection?		
8. Has a doctor ever told you that you have any heart problems? If so, check all that apply: <input type="checkbox"/> High blood pressure <input type="checkbox"/> A heart murmur <input type="checkbox"/> High cholesterol <input type="checkbox"/> A heart infection <input type="checkbox"/> Kawasaki disease Other: _____			34. Have you ever had a head injury or concussion?		
9. Has a doctor ever ordered a test for your heart? (For example, ECG/EKG, echocardiogram)			35. Have you ever had a hit or blow to the head that caused confusion, prolonged headache, or memory problems?		
10. Do you get lightheaded or feel more short of breath than expected during exercise?			36. Do you have a history of seizure disorder?		
11. Have you ever had an unexplained seizure?			37. Do you have headaches with exercise?		
12. Do you get more tired or short of breath more quickly than your friends during exercise?			38. Have you ever had numbness, tingling, or weakness in your arms or legs after being hit or falling?		
<b>HEART HEALTH QUESTIONS ABOUT YOUR FAMILY</b>	<b>Yes</b>	<b>No</b>	39. Have you ever been unable to move your arms or legs after being hit or falling?		
13. Has any family member or relative died of heart problems or had an unexpected or unexplained sudden death before age 50 (including drowning, unexplained car accident, or sudden infant death syndrome)?			40. Have you ever become ill while exercising in the heat?		
14. Does anyone in your family have hypertrophic cardiomyopathy, Marfan syndrome, arrhythmogenic right ventricular cardiomyopathy, long QT syndrome, short QT syndrome, Brugada syndrome, or catecholaminergic polymorphic ventricular tachycardia?			41. Do you get frequent muscle cramps when exercising?		
15. Does anyone in your family have a heart problem, pacemaker, or implanted defibrillator?			42. Do you or someone in your family have sickle cell trait or disease?		
16. Has anyone in your family had unexplained fainting, unexplained seizures, or near drowning?			43. Have you had any problems with your eyes or vision?		
<b>BONE AND JOINT QUESTIONS</b>	<b>Yes</b>	<b>No</b>	44. Have you had any eye injuries?		
17. Have you ever had an injury to a bone, muscle, ligament, or tendon that caused you to miss a practice or a game?			45. Do you wear glasses or contact lenses?		
18. Have you ever had any broken or fractured bones or dislocated joints?			46. Do you wear protective eyewear, such as goggles or a face shield?		
19. Have you ever had an injury that required x-rays, MRI, CT scan, injections, therapy, a brace, a cast, or crutches?			47. Do you worry about your weight?		
20. Have you ever had a stress fracture?			48. Are you trying to or has anyone recommended that you gain or lose weight?		
21. Have you ever been told that you have or have you had an x-ray for neck instability or atlantoaxial instability? (Down syndrome or dwarfism)			49. Are you on a special diet or do you avoid certain types of foods?		
22. Do you regularly use a brace, orthotics, or other assistive device?			50. Have you ever had an eating disorder?		
23. Do you have a bone, muscle, or joint injury that bothers you?			51. Do you have any concerns that you would like to discuss with a doctor?		
24. Do any of your joints become painful, swollen, feel warm, or look red?			<b>FEMALES ONLY</b>		
25. Do you have any history of juvenile arthritis or connective tissue disease?			52. Have you ever had a menstrual period?		
			53. How old were you when you had your first menstrual period?		
			54. How many periods have you had in the last 12 months?		

Explain "yes" answers here

\_\_\_\_\_

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\_\_\_\_\_

\_\_\_\_\_

I hereby state that, to the best of my knowledge, my answers to the above questions are complete and correct.

Signature of athlete \_\_\_\_\_ Signature of parent/guardian \_\_\_\_\_ Date \_\_\_\_\_

# PREPARTICIPATION PHYSICAL EVALUATION THE ATHLETE WITH SPECIAL NEEDS: SUPPLEMENTAL HISTORY FORM

Date of Exam \_\_\_\_\_

Name \_\_\_\_\_ Date of birth \_\_\_\_\_

Sex \_\_\_\_\_ Age \_\_\_\_\_ Grade \_\_\_\_\_ School \_\_\_\_\_ Sport(s) \_\_\_\_\_

1. Type of disability		
2. Date of disability		
3. Classification (if available)		
4. Cause of disability (birth, disease, accident/trauma, other)		
5. List the sports you are interested in playing		
6. Do you regularly use a brace, assistive device, or prosthetic?	<b>Yes</b>	<b>No</b>
7. Do you use any special brace or assistive device for sports?		
8. Do you have any rashes, pressure sores, or any other skin problems?		
9. Do you have a hearing loss? Do you use a hearing aid?		
10. Do you have a visual impairment?		
11. Do you use any special devices for bowel or bladder function?		
12. Do you have burning or discomfort when urinating?		
13. Have you had autonomic dysreflexia?		
14. Have you ever been diagnosed with a heat-related (hyperthermia) or cold-related (hypothermia) illness?		
15. Do you have muscle spasticity?		
16. Do you have frequent seizures that cannot be controlled by medication?		

Explain "yes" answers here

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Please indicate if you have ever had any of the following.

	<b>Yes</b>	<b>No</b>
Atlantoaxial instability		
X-ray evaluation for atlantoaxial instability		
Dislocated joints (more than one)		
Easy bleeding		
Enlarged spleen		
Hepatitis		
Osteopenia or osteoporosis		
Difficulty controlling bowel		
Difficulty controlling bladder		
Numbness or tingling in arms or hands		
Numbness or tingling in legs or feet		
Weakness in arms or hands		
Weakness in legs or feet		
Recent change in coordination		
Recent change in ability to walk		
Spina bifida		
Latex allergy		

Explain "yes" answers here

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I hereby state that, to the best of my knowledge, my answers to the above questions are complete and correct.

Signature of athlete \_\_\_\_\_ Signature of parent/guardian \_\_\_\_\_ Date \_\_\_\_\_

# PREPARTICIPATION PHYSICAL EVALUATION PHYSICAL EXAMINATION FORM

Name \_\_\_\_\_ Date of birth \_\_\_\_\_

## PHYSICIAN REMINDERS

- Consider additional questions on more sensitive issues
  - Do you feel stressed out or under a lot of pressure?
  - Do you ever feel sad, hopeless, depressed, or anxious?
  - Do you feel safe at your home or residence?
  - Have you ever tried cigarettes, chewing tobacco, snuff, or dip?
  - During the past 30 days, did you use chewing tobacco, snuff, or dip?
  - Do you drink alcohol or use any other drugs?
  - Have you ever taken anabolic steroids or used any other performance supplement?
  - Have you ever taken any supplements to help you gain or lose weight or improve your performance?
  - Do you wear a seat belt, use a helmet, and use condoms?
- Consider reviewing questions on cardiovascular symptoms (questions 5–14).

EXAMINATION		
Height	Weight	<input type="checkbox"/> Male <input type="checkbox"/> Female
BP / ( / )	Pulse	Vision R 20/ L 20/ Corrected <input type="checkbox"/> Y <input type="checkbox"/> N
MEDICAL	NORMAL	ABNORMAL FINDINGS
Appearance <ul style="list-style-type: none"> <li>Marfan stigmata (kyphoscoliosis, high-arched palate, pectus excavatum, arachnodactyly, arm span &gt; height, hyperlaxity, myopia, MVP, aortic insufficiency)</li> </ul>		
Eyes/ears/nose/throat <ul style="list-style-type: none"> <li>Pupils equal</li> <li>Hearing</li> </ul>		
Lymph nodes		
Heart* <ul style="list-style-type: none"> <li>Murmurs (auscultation standing, supine, +/- Valsalva)</li> <li>Location of point of maximal impulse (PMI)</li> </ul>		
Pulses <ul style="list-style-type: none"> <li>Simultaneous femoral and radial pulses</li> </ul>		
Lungs		
Abdomen		
Genitourinary (males only) <sup>b</sup>		
Skin <ul style="list-style-type: none"> <li>HSV, lesions suggestive of MRSA, tinea corporis</li> </ul>		
Neurologic <sup>c</sup>		
MUSCULOSKELETAL		
Neck		
Back		
Shoulder/arm		
Elbow/forearm		
Wrist/hand/fingers		
Hip/thigh		
Knee		
Leg/ankle		
Foot/toes		
Functional <ul style="list-style-type: none"> <li>Duck-walk, single leg hop</li> </ul>		

\*Consider ECG, echocardiogram, and referral to cardiology for abnormal cardiac history or exam.

<sup>b</sup>Consider GU exam if in private setting. Having third party present is recommended.

<sup>c</sup>Consider cognitive evaluation or baseline neuropsychiatric testing if a history of significant concussion.

- Cleared for all sports without restriction
- Cleared for all sports without restriction with recommendations for further evaluation or treatment for \_\_\_\_\_
- Not cleared
- Pending further evaluation
  - For any sports
  - For certain sports \_\_\_\_\_
- Reason \_\_\_\_\_

Recommendations \_\_\_\_\_

I have examined the above-named student and completed the preparticipation physical evaluation. The athlete does not present apparent clinical contraindications to practice and participate in the sport(s) as outlined above. A copy of the physical exam is on record in my office and can be made available to the school at the request of the parents. If conditions arise after the athlete has been cleared for participation, the physician may rescind the clearance until the problem is resolved and the potential consequences are completely explained to the athlete (and parents/guardians).

Name of physician (print/type) \_\_\_\_\_ Date \_\_\_\_\_

Address \_\_\_\_\_ Phone \_\_\_\_\_

Signature of physician \_\_\_\_\_, MD or DO

# PREPARTICIPATION PHYSICAL EVALUATION CLEARANCE FORM

Name \_\_\_\_\_ Sex  M  F Age \_\_\_\_\_ Date of birth \_\_\_\_\_

- Cleared for all sports without restriction
- Cleared for all sports without restriction with recommendations for further evaluation or treatment for \_\_\_\_\_

- Not cleared
  - Pending further evaluation
  - For any sports
  - For certain sports \_\_\_\_\_

Reason \_\_\_\_\_

Recommendations \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**I have examined the above-named student and completed the preparticipation physical evaluation. The athlete does not present apparent clinical contraindications to practice and participate in the sport(s) as outlined above. A copy of the physical exam is on record in my office and can be made available to the school at the request of the parents. If conditions arise after the athlete has been cleared for participation, the physician may rescind the clearance until the problem is resolved and the potential consequences are completely explained to the athlete (and parents/guardians).**

Name of physician (print/type) \_\_\_\_\_ Date \_\_\_\_\_

Address \_\_\_\_\_ Phone \_\_\_\_\_

Signature of physician \_\_\_\_\_, MD or DO

## EMERGENCY INFORMATION

Allergies \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Other information \_\_\_\_\_  
\_\_\_\_\_  
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\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**INTERIM SPORT HEALTH HISTORY QUESTIONNAIRE**

To be completed by the parent or guardian:

Student's Name \_\_\_\_\_ Age/ Grade \_\_\_\_\_

Sport \_\_\_\_\_ Date: \_\_\_\_\_

**Since the last pre-participation examination, has your son/daughter:**

1. Been medically advised not to participate in a sport? YES \_\_\_ NO \_\_\_  
If yes, describe in detail: Why? Is there a doctor's note to resume participation? YES \_\_\_ NO \_\_\_

2. Sustained a concussion, been unconscious or lost memory from a blow to the head? YES \_\_\_ NO \_\_\_  
If yes, describe in detail:

3. Broken a bone or sprained/strained/dislocated any muscles or joints? YES \_\_\_ NO \_\_\_  
If yes, describe in detail

4. Fainted or "blacked out"? YES \_\_\_ NO \_\_\_  
Was this during or immediately after exercise? YES \_\_\_ NO \_\_\_  
If yes, describe in detail

5. Experienced chest pains, shortness of breath, or "heart racing"? YES \_\_\_ NO \_\_\_  
If yes, explain

6. Had a recent history of fatigue and unusual tiredness? YES \_\_\_ NO \_\_\_

7. Been hospitalized, visited an emergency room or had a significant medical illness? YES \_\_\_ NO \_\_\_

8. Since the last physical, has there been a sudden death in the family or have any members of the family (under the age of 50) had a heart attack or heart trouble? YES \_\_\_ NO \_\_\_  
If yes, explain

9. Since your last physical have you started taking any other ("new") medications either over the counter (OTC) or prescribed drugs by your doctor? YES \_\_\_ NO \_\_\_  
If yes, name of medication and dosing

Have any medications been stopped? YES \_\_\_ NO \_\_\_  
if yes, name of medication

10. Additional comments/explanations (please indicate to which question number the comments refer)

Printed name & signature of Parent/Guardian \_\_\_\_\_  
SCHOOL NURSE REVIEW

Name of Student's Healthcare provider \_\_\_\_\_

Date: \_\_\_\_\_ Signature of School Nurse \_\_\_\_\_  
SCHOOL DISTRICT PHYSICIAN REVIEW (IF NECESSARY)

Date \_\_\_\_\_ Signature of School District Physician \_\_\_\_\_

**APPENDIX I****EXCERPTS FROM: CURRENT PRACTICE: NEW JERSEY ADMINISTRATIVE CODE**

- 6A:16-2.2 Required health services (f) each student medical examination shall be conducted at the medical home of the student. If a student does not have a medical home, the school district shall provide this examination at the school physician's office or other comparably equipped facility.
  - 1. For the purpose of the physical examination required in (h) below, the student's parent may choose either the school physician or their own private physician
  - 2. A full report of the examination shall be maintained as part of the student's health record.
  - New Jersey Code "physical examination" means the examination of the body by a professional licensed to practice medicine or osteopathy or an advanced practice nurse. The term includes very specific required by statute as stated in N.J.A.C.6A:16-2.2 (f). [Physician Assistant?]
  - 6A:16-2.3 Health Services Personnel-(a) the district board of education shall appoint at least one school physician pursuant to N.J.S.A. 18A: 40-1. ...  
The school physician shall be currently licensed by the New Jersey Board of Medical Examiners in medicine or osteopathy whose training and scope of practice includes child and adolescent health and development.
  - 3. The school physician shall provide, at a minimum, the following services:
    - iv. Physical examinations conducted in the school physician's office or other comparable equipped facility for students who do not have a medical home or whose parent had identified the school as the medical home for the purpose of the sports physical examination.
    - v. Provision of written notification to the parent stating approval of the student's participation in athletics based upon the medical report;
    - vi. Direction for other professional duties of other medical staff;
    - vii. Written standing orders that shall be reviewed and reissued before the beginning of each school year
    - viii. Establishment of standards of care for emergency situations and medically related case involving students and school staff.
    - ix. Assistance to the certified school nurse or noncertified nurse in conducting health screenings of students and staff and assistance with the delivery of school health services;
    - x. Review, as needed, of reports and orders from a student's medical home regarding student health concerns;
- 6A16-2.2, 1. (2) The medical report for participation on a school sponsored interscholastic or intramural athletic team or squad shall include a determination from the examining physician, advanced practice nurse or physician's assistant.

#### Website Resources

- Sudden Death in Athletes at: [www.suddendeathinathletes.org](http://www.suddendeathinathletes.org)
- Hypertrophic Cardiomyopathy Association [www.4hcm.org](http://www.4hcm.org)
- American Heart Association [www.heart.org](http://www.heart.org)

#### Collaborating Agencies:

American Academy of Pediatrics  
New Jersey Chapter  
3836 Quakerbridge Road, Suite 108  
Hamilton, NJ 08619  
(p) 609-842-0014  
(f) 609-842-0015  
[www.aapnj.org](http://www.aapnj.org)

American Heart Association

1 Union Street, Suite 301  
Robbinsville, NJ, 08691  
(p) 609-208-0020  
[www.heart.org](http://www.heart.org)

New Jersey Department of Education  
PO Box 500  
Trenton, NJ 08625-0500  
(p) 609-292-4469  
[www.state.nj.us/education/](http://www.state.nj.us/education/)

New Jersey Department of Health  
and Senior Services  
P. O. Box 360  
Trenton, NJ 08625-0360  
(p) 609-292-7837  
[www.state.nj.us/health/](http://www.state.nj.us/health/)

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# Sudden Cardiac Death in Young Athletes



## The Basic Facts on Sudden Cardiac Death in Young Athletes



American Academy of Pediatrics  
DEDICATED TO THE HEALTH OF ALL CHILDREN™

New Jersey Chapter



American Heart Association

Learn and Live

## SUDDEN CARDIAC DEATH IN YOUNG ATHLETES

**S**udden death in young athletes between the ages of 10 and 19 is very rare. What, if anything, can be done to prevent this kind of tragedy?

### What is sudden cardiac death in the young athlete?

Sudden cardiac death is the result of an unexpected failure of proper heart function, usually (about 60% of the time) during or immediately after exercise without trauma. Since the heart stops pumping adequately, the athlete quickly collapses, loses consciousness, and ultimately dies unless normal heart rhythm is restored using an automated external defibrillator (AED).

### How common is sudden death in young athletes?

Sudden cardiac death in young athletes is very rare. About 100 such deaths are reported in the United States per year. The chance of sudden death occurring to any individual high school athlete is about one in 200,000 per year.

Sudden cardiac death is more common: in males than in females; in football and basketball than in other sports; and in African-Americans than in other races and ethnic groups.

### What are the most common causes?

Research suggests that the main cause is a loss of proper heart rhythm, causing the heart to quiver instead of pumping

blood to the brain and body. This is called *ventricular fibrillation* (*ven-TRICK-you-lar fib-roo-LAY-shun*). The problem is usually caused by one of several cardiovascular abnormalities and electrical diseases of the heart that go unnoticed in healthy-appearing athletes.

The most common cause of sudden death in an athlete is *hypertrophic cardiomyopathy* (*hi-per-TRO-fic CAR-dee-oh-my-OP-a-thee*) also called HCM. HCM is a disease of the heart with abnormal thickening of the heart muscle, which can cause serious heart rhythm problems and blockages to blood flow. This genetic disease runs in families and usually develops gradually over many years.

The second most likely cause is *congenital* (*con-JEN-ih-ah*) (i.e., present from birth) *abnormalities of the coronary arteries*. This means that these blood vessels are connected to the main blood vessel of the heart in an abnormal way. 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:

- *Myocarditis* (*my-oh-car-DIE-tis*), an acute inflammation of the heart muscle (usually due to a virus).

- **Dilated cardiomyopathy**, an enlargement of the heart for unknown reasons.

- **Long QT syndrome** and other electrical abnormalities of the heart which cause abnormal fast heart rhythms that can also run in families.



- **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.

#### Are there warning signs to watch for?

- In more than a third of these sudden cardiac deaths, there were warning signs that were not reported or taken seriously. Warning signs are:
- 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 - awareness of the heart beating unusually (skipping, irregular or extra beats) during athletics 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

#### What are the current recommendations for screening young athletes?

New Jersey requires all school athletes to be examined by their primary care giver ("medical home") or school physician at least once per year. The New Jersey Department of Education requires use of the specific Annual Athletic Pre-Participation Physical Examination Form.

This process begins with the parents and student-athletes, answering questions about **symptoms** during exercise (such as chest pain, dizziness, fainting, palpitations or shortness of breath); and questions about **family health history**.

The primary care giver needs to know if any family member died suddenly during physical activity or during a seizure. They also need to know if anyone in the family under the age of 50 had an unexplained sudden death such as drowning or car accidents. This information must be provided annually for each



exam because it is so essential to identify those at risk for sudden cardiac death.

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



#### When should a student athlete see a heart specialist?

If the primary care provider or school physician has concerns, a referral to a child heart specialist, a pediatric 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, which is an ultrasound test to allow for direct visualization of the heart structure, will likely also be done. The specialist may also order a treadmill exercise test and a monitor to enable a longer recording of the heart rhythm. None of the testing is invasive or uncomfortable.

#### Can sudden cardiac death be prevented just through proper screening?

A proper evaluation should find most, but not all, conditions that would 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 care giver. With proper screening and evaluation, most cases can be identified and 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. An AED is also life-saving for ventricular fibrillation caused by a blow to the chest over the heart (commotio cordis).

The American Academy of Pediatrics/New Jersey Chapter recommends that schools:

- Have an AED available at every sports event (three minutes total time to reach and return with the AED)
- Have personnel available who are trained in AED use present at practices and games.
- Have coaches and athletic trainers trained in basic life support techniques (CPR)
- Call 911 immediately while someone is retrieving the AED.

**EMERGENCY ACTION PLAN CHECKLIST**

The following elements are recommended in the development of a comprehensive emergency action plan (EAP) for sudden cardiac arrest (SCA) in athletics. Actual requirements and implementation may vary depending on the location, school, or institution.

**I. Development of an Emergency Action Plan**

- Establish a written EAP for each individual athletic venue.
- Coordinate the EAP with the local EMS agency, campus public safety officials, on-site first responders, administrators, athletic trainers, school nurses, and team and consulting physicians.
- Integrate the EAP into the local EMS response.
- Determine the venue-specific access to early defibrillation (<3 to 5 minutes from collapse to first shock recommended).

**II. Emergency Communication**

- Establish an efficient communication system to activate EMS at each athletic venue.
- Establish a communication system to alert on-site responders to the emergency and its location.
- Post the EAP at every venue and near telephones, including the role of the first responder, a listing of emergency numbers, and street address and directions to guide the EMS personnel.

**III. Emergency Personnel**

- Designate an EAP coordinator.
- Identify who will be responsible and trained to respond to a SCA (likely first responders include athletic trainers, coaches, school nurses, and team physicians).
- Train targeted responders in CPR and AED use.
- Determine who is responsible for personnel training and establish a means of documentation.
- Identify the medical coordinator for on-site AED programs.

**IV. Emergency Equipment**

- Use on-site or centrally located AED(s) if the collapse-to-shock time interval for conventional EMS is estimated to be >5 minutes.
- Notify EMS dispatch centers and agencies of the specific type of AED and the exact location of the AED on school grounds.
- Acquire pocket mask or barrier-shield device for rescue breathing.
- Acquire AED supplies (scissors, razor, and towel), and consider an extra set of AED pads.
- Consider bag-valve masks, oxygen delivery systems, oral and nasopharyngeal airways, and advanced airways (eg, endotracheal tube, Combitube, or laryngeal mask airway).

- Consider emergency cardiac medications (eg, aspirin, nitroglycerin).
- Determine who is responsible for checking equipment readiness and how often and establish a means of documentation.

#### **V. Emergency Transportation**

- Determine transportation route for ambulances to enter and exit each venue.
- Facilitate access to SCA victim for arriving EMS personnel.
- Consider on-site ambulance coverage for high-risk events.
- Identify the receiving medical facility equipped in advanced cardiac care.
- Ensure that medical coverage is still provided at the athletic event if on-site medical staff accompany the athlete to hospital.

#### **VI. Practice and Review of Emergency Action Plan**

- Rehearse the EAP at least annually with athletic trainers, athletic training students, team and consulting physicians, school nurses, coaches, campus public safety officials, and other targeted responders.
- Consider mock SCA scenarios.
- Establish an evaluation system for the EAP rehearsal, and modify the EAP if needed.

#### **VII. Post-event Catastrophic Incident Guidelines**

- Establish a contact list of individuals to be notified in case of a catastrophic event.
- Determine procedures for release of information, aftercare services, and the post-event evaluation process.
- Identify local crisis services and counselors.
- Consider pre-established incident report forms to be completed by all responders and the method for system improvement.

#### **GLOSSARY:**

EMS: emergency medical services

CPR: cardiopulmonary resuscitation

AED: automated external defibrillator

## **APPENDIX L**

## **LIST OF TASK FORCE MEETING INVITEES**

### **New Jersey Student Athlete Cardiac Screening Task Force Guest Speakers / Testimonial**

**Lisa Salberg**, Chief Executive Officer, Hypertrophic Cardiomyopathy Association (HCMA) –New Jersey

- Provided HCMA recommendations regarding student cardiac screenings.
- Presented national data on HCM

**Michael Prybicien**, ATC, President of the Athletic Trainers Society of New Jersey Inc.,

- Overview of athletic trainers role in schools
- Rules and licensing for Certified athletic Trainers
- Identified the potential roles of the athletic trainer in emergency response planning in schools

**Pam Gizzy**, RN, School Nurse, Montgomery HS, Montgomery School District

- Reported on the Montgomery School District Student Cardiac Screening
- Total of 211 student screened by Echocardiography (ECHO) and Electrocardiograph (ECG)
- Shared screening findings and cost per child

**Nancy Keleher**, RN

- Raised funds to secure AEDs for police cars in southern New Jersey
- Illustrated police –shift protocol for distribution of AEDs
- Identified key location for AED placement in schools

**Eric Hicken**, Emergency Medical Services (EMS), NJDHSS

- Provided overview of regulation requirements of AEDs for ambulances and licensed agencies in regard to AED training
- Discussed needs for data collection of AEDs in NJ schools
- Securing Grants for AEDs explored

**Steven Georgeson**, MD, Chief of Cardiology, Somerset Medical Center Student Cardiac Research Study

- Shared overview of five year research study at Somerset Medical Center to determine the risk of sudden cardiac death in Central New Jersey High School Students
- The study seeks to determine whether routine cardiac screenings would benefit scholastic athletes and if they should be a required part of preparticipation physicals
- The comprehensive cardiac screenings included blood pressure checks, body measurements, body fat analysis, blood sugar and cholesterol tests and cardiac examination including and electrocardiogram and in some instances echocardiogram

**Senator Fred H. Madden Jr., Legislative District 4 (D – Camden and Gloucester)**

- Sponsored S-1771 which established the Student Athlete Cardiac Screening Task Force
- Provided history of S-1771
- Serves on Senate Health ,Human Services Committee
- Provided guidance to enable task force members to clearly outline recommendations to the legislature
- Supported Task Force efforts

**Michael Wallace, Legislative Aide to Senator Fred Madden Jr.**

- Provided guidance to task force members with recommendations
- Communicated task force member concerns and inquiries to Senator Madden