

Electrocardiograms for High School Student Athletes

House Secondary Education & Career Development Subcommittee



OPPAGA

Office of Program Policy Analysis and Government Accountability

DECEMBER 1, 2021

Project Scope and Methodology

As directed by the Legislature, OPPAGA collected information on the following

- Benefits and challenges of requiring EKG assessments for student athletes
- Cost of EKG assessments
- Accuracy of EKG assessments
- Current school district practices related to requiring or recommending EKGs for student athletes
- Nationally recognized or accepted criteria to identify athletes who should receive an EKG assessment

Interviews

OPPAGA interviewed numerous organizations and individuals

- Florida High School Athletic Association official
- Program administrators in other states
- American medical organizations and physicians
- Florida school district administrators

Literature Review

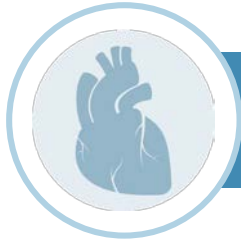
OPPAGA reviewed literature to identify benefits and challenges of EKG assessments and leading medical organizations' positions related to requiring EKGs for student athletes

District Survey

OPPAGA surveyed the athletic directors in Florida's 67 county-based school districts to identify current district practices on requiring or recommending EKG assessments for student athletes and the rationale leading to these policies

Background

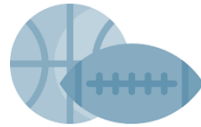
Sudden Cardiac Death



Though rare, sudden cardiac death is the leading cause of non-traumatic deaths among young athletes



Incidence of sudden cardiac death among high school athletes ranges from **1 in 23,000** to **1 in 300,000**



Intense athletic activity can trigger sudden cardiac death



Athletes often have no symptoms or obvious injury prior to sudden cardiac death



Hypertrophic cardiomyopathy is the leading cause of sudden cardiac death in athletes

Conditions That Can Lead to Sudden Cardiac Death	Prevalence
Hypertrophic cardiomyopathy	1 in 500 in general population Ranges from 1 in 1,426 to 1 in 1,667 in athletes
Arrhythmogenic right ventricular cardiomyopathy	Ranges from 1 in 1,000 to 1 in 5,000
Wolff-Parkinson-White syndrome	1 in 769
Long QT syndrome	1 in 2,500

Electrocardiogram Assessments



EKG assessments may detect certain heart abnormalities by recording the heart's electrical signals and providing information on strength, speed, rhythm, and number of heart beats

EKG assessments may help identify 60% of diagnoses related to **sudden cardiac death**

EKG Process



- ✓ Non-invasive
- ✓ Takes a few minutes
- ✓ Electrodes placed on chest record electrical signals
- ✓ If **abnormal results** are found, the individual may be recommended to seek **follow-up with a cardiologist**

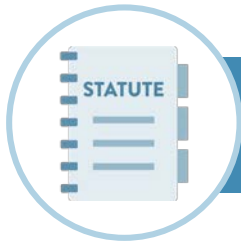
Related Diagnoses



- ✓ Hypertrophic Cardiomyopathy
- ✓ Wolf-Parkinson-White
- ✓ Brugada Syndrome
- ✓ Long QT Syndrome
- ✓ Arrhythmogenic Right Ventricular Cardiomyopathy

Requirements in Florida and Other States

Florida High School Athletic Association



Chapter 1006.20 (1), F.S. , designates the Florida High School Athletic Association (FHSAA) as the governing nonprofit organization of athletics in Florida public schools

Statutory Requirements



FHSAA must adopt bylaws that require student athletes to undergo a medical evaluation annually and be cleared to participate in interscholastic sports



The evaluator must be a licensed physician, a licensed osteopathic physician, a licensed chiropractic physician, a licensed physician assistant, or a certified advanced practice registered nurse



The evaluation must include medical history and a physical assessment

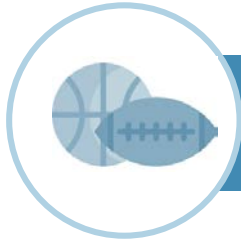


The evaluation form must incorporate cardiovascular screening recommendations from the American Heart Association and advise students to complete a cardiovascular assessment, which may include an EKG assessment



The student must file the pre-participation physical evaluation form with the school, including the results of the cardiovascular assessment, if the cardiovascular assessment was completed

Florida Student Athlete Health Requirements



The FHSA, as directed by statute, requires student athletes to satisfactorily pass a medical evaluation, but does not require EKG assessments

The required medical evaluation includes the elements below

Student Information



- ✓ Name
- ✓ Address
- ✓ Age
- ✓ Emergency contact
- ✓ Physician contact

Medical Information



- ✓ Illness history
- ✓ Family history
- ✓ Medication use
- ✓ Symptomology

Physical Evaluation



- ✓ Height
- ✓ Weight
- ✓ Vision
- ✓ Hearing
- ✓ Medical
- ✓ Musculoskeletal

Physician Approval



Physicians may label the student as

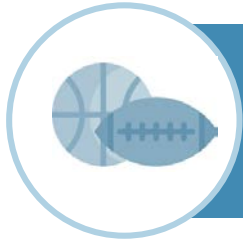
1. Cleared without limitation
2. Not cleared for certain sports
3. Cleared after completing evaluation/rehabilitation

Consent and Release from Liability



- ✓ Concussion information
- ✓ Sudden cardiac arrest information
- ✓ Heat-Related illness Information

FHSAA Pre-Participation Physical Evaluation Form



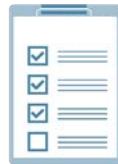
The FHSAA form advises all student athletes to undergo a cardiovascular assessment, which could include an EKG assessment, and the form includes several medical history questions related to sudden cardiac death risk

Cardiovascular Language



“...we are hereby advised that the student should undergo a cardiovascular assessment, which may include such diagnostic tests as electrocardiogram (EKG), echocardiogram (ECG) and/or cardio stress test.”

Medical History Questions



The form asks **41 questions** of all students

The following questions, taken directly from the pre-participation physical evaluation form, related to sudden cardiac death symptoms

- Have you ever had chest pain during or after exercise?
- Have you ever passed out during exercise?
- Have you ever been dizzy during or after exercise?
- Have you ever been told you have a heart murmur?
- Have you had high blood pressure or high cholesterol?
- Has a physician ever denied or restricted your participation in sports for any heart problems?
- Has any family member or relative died of heart problems or sudden death before age 50?

Medical Expert Recommendations and Florida Practices



Florida's current practices are generally in line with expert recommendations; however, some recommended screening questions are not included in FHSAA's pre-participation physical evaluation form

Comparison of Screening Questionnaires



The American Heart Association developed a **14-item checklist** to identify individuals at risk of heart abnormality. In addition to a four-point physical, the checklist includes

- **Seven** personal medical history questions
- **Three** family history questions



While the FHSAA's current pre-participation physical evaluation form includes seven of these questions, one personal history question and two family history questions on the American Heart Association's checklist currently are not included in the FHSAA pre-participation physical evaluation form

Two States Have EKG-Related Requirements for Students



Currently, Florida's requirements focus broadly on cardiovascular health; Texas and Pennsylvania recently passed legislation addressing EKG assessments

Florida



s.1006.20, F.S

Statutory Requirements

- Requires the pre-participation physical evaluation form to
 - Advise students to complete a cardiovascular assessment, which may include EKGs
 - Incorporate American Heart Association cardiovascular screening recommendations
- Authorizes FHSAA to enact bylaws related to student eligibility; FHSAA policy
 - Provides information to students and parents about sudden cardiac arrest
 - Requires all students and coaches to take an annual course on sudden cardiac arrest

Applicable to: High school and middle school students who participate in sports that are sponsored or sanctioned by the FHSAA

Texas



HB 76 (2019)

Statutory Requirements

- School district must provide information about sudden cardiac arrest and EKG assessments to students
- Students must be notified of the availability of EKG assessments

Applicable to: High school students who participate in sports that are sponsored or sanctioned by the Texas University Interscholastic League³

Pennsylvania



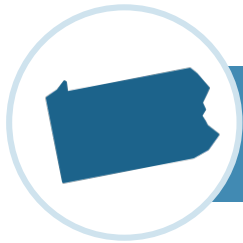
Act 73 (2020)

Statutory Requirements

- School district must provide information about sudden cardiac arrest and EKG assessments to students and parents
- Students must be notified of the option to request EKG assessments
- Coaches must complete an annual course on sudden cardiac arrest
- Students with sudden cardiac arrest symptoms must obtain clearance before sports play (see next slide)

Applicable to: All students engaged in athletic activity

Pennsylvania: Additional Relevant Requirements



Pennsylvania requires students who have ever displayed signs or symptoms of sudden cardiac arrest to obtain a physician's clearance before returning to sports

Warning Signs



Warning signs can occur before, during, or after activity

Examples include

- Dizziness
- Fainting
- Shortness of breath
- Chest pains



Required Follow-Up



The student must obtain an evaluation by a licensed physician, certified registered nurse practitioner, or cardiologist

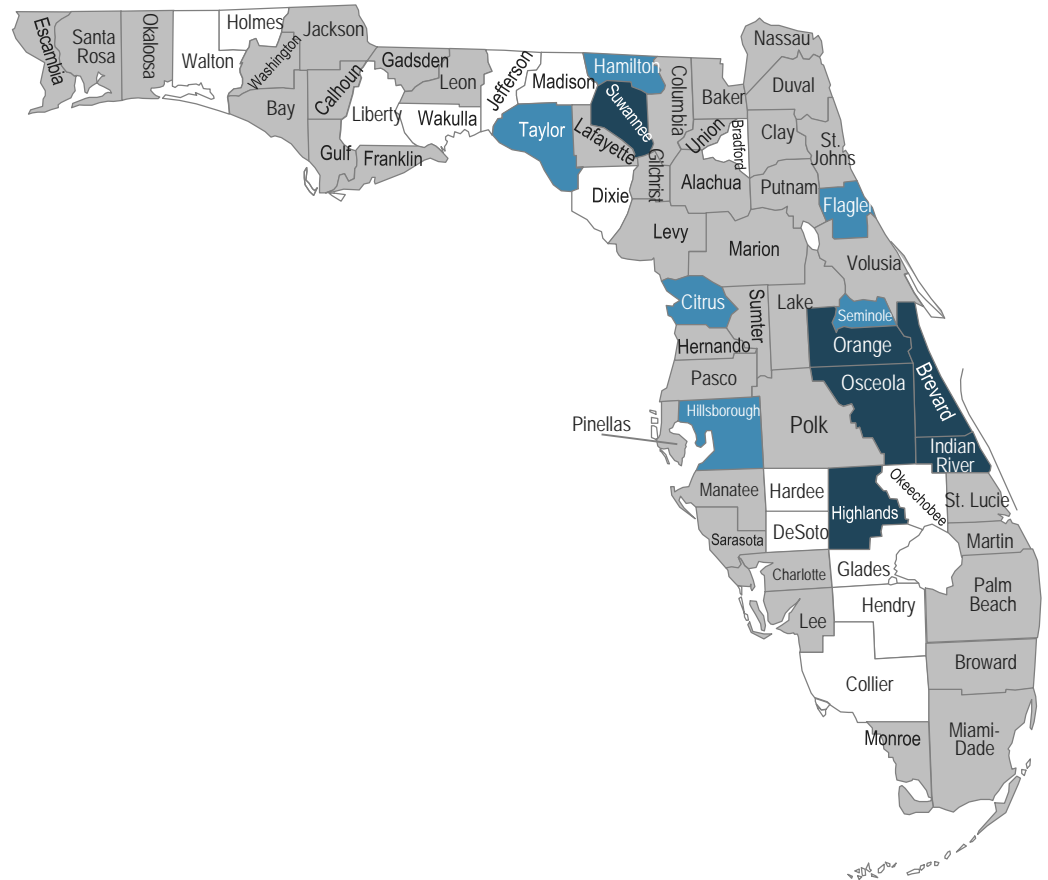
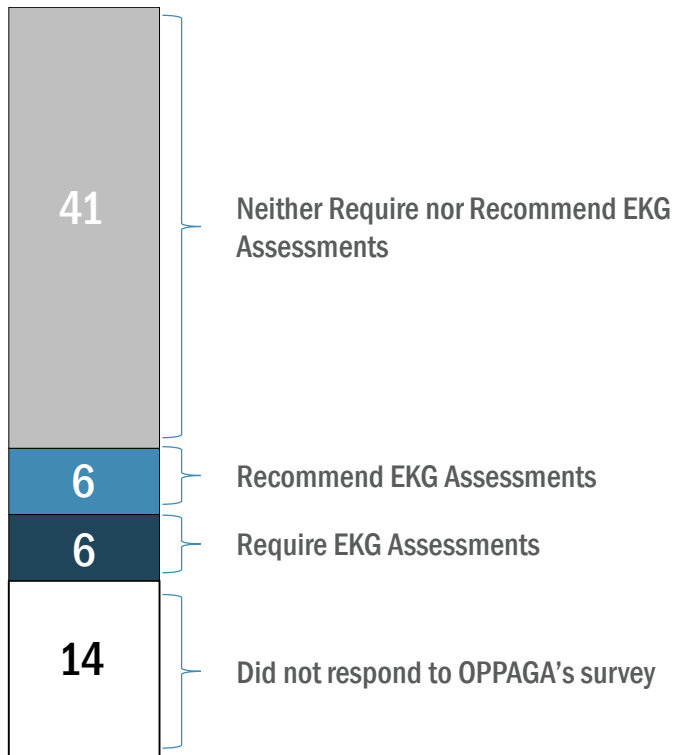
The student must receive clearance in writing to return to play

Florida School District Requirements

EKG Assessment Requirements Based on School District Athletic Directors' Survey Responses



Most (41 of 53) respondents to OPPAGA's survey said that the district does not require or recommend EKG assessments for student athletes



Districts that Require or Recommend EKG Assessments: Associated Grade Levels and Sports



Most districts that require or recommend EKG assessments typically apply the policy to high school athletes and sports governed by the FHSAA



Grade Levels to Which the Policy Applies

11 Districts apply the policy to **high school students**

7 Districts also apply the policy to **middle school students**



Sports to Which the Policy Applies

11 Districts apply the policy to **FHSAA governed sports** →

5 Districts also apply the policy to **middle school sports**

FHSAA-Governed Sports

- Baseball
- Basketball
- Beach volleyball
- Bowling
- Competitive cheerleading
- Cross country
- Flag football
- Football
- Golf
- Lacrosse
- Soccer
- Softball
- Swimming & diving
- Tennis
- Track and field
- Volleyball
- Water polo
- Weightlifting
- Wrestling

Rationale for EKG Assessment Approaches



Most districts that require or recommend EKG assessments cite a general understanding of cardiac issues as the reason; districts cited several reasons for not requiring or recommending EKGs for student athletes

Ten Districts Cited Reasons for Requiring or Recommending EKGs for Student Athletes

- General awareness of cardiac issues (8 districts)
- A student in another district suffered a cardiac event (5 districts)
- A student in their district suffered a cardiac event (4 districts)
- Due to other districts' policies (4 districts)
- Parents' interest or requests (2 districts)

Nine Districts Cited Reasons for Not Requiring or Recommending an EKG Policy for Student Athletes

- Issues with equal access for students (4 districts)
- Feasibility of program implementation (3 districts)
- Cost of implementation (3 districts)
- Current requirements and information are sufficient (3 districts)
- Legal issues or advice (2 districts)

District Opt-Out and Return-to-Play Approaches



Two of the districts that require EKG assessments allow parents to opt-out, but require physician clearance after an abnormal EKG assessment result

Of the districts that **require** EKG assessments...

2



Have a process to allow students to opt-out of the initial EKG assessment requirement

3



Do not have a process to allow students to opt-out of the initial EKG assessment requirement

Of the districts that **require or recommend** EKG assessments...

9



Require physician clearance after an abnormal EKG assessment result; the districts have no process to allow these students to participate in athletics without physician clearance

2

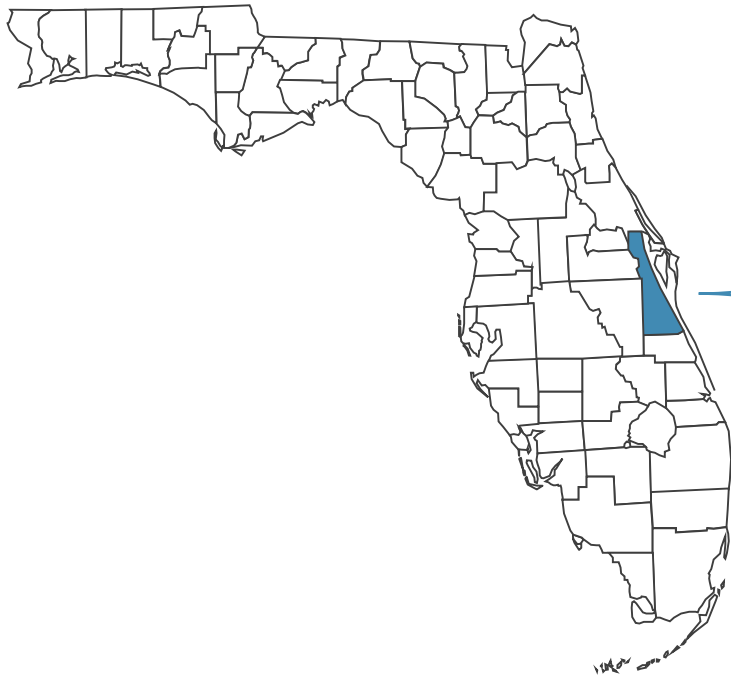


Two districts were unsure if students with abnormal EKG assessment results could participate in sports without clearance from a physician

Brevard County School District's Opt-Out Policy



In the Brevard County School District, over one-third of student athletes opted out of receiving an EKG assessment in 2020-21



Brevard County School District began requiring EKG assessments in School Year 2019-20



The policy applies to student athletes in grades 7-12



Parents can opt-out for any reason

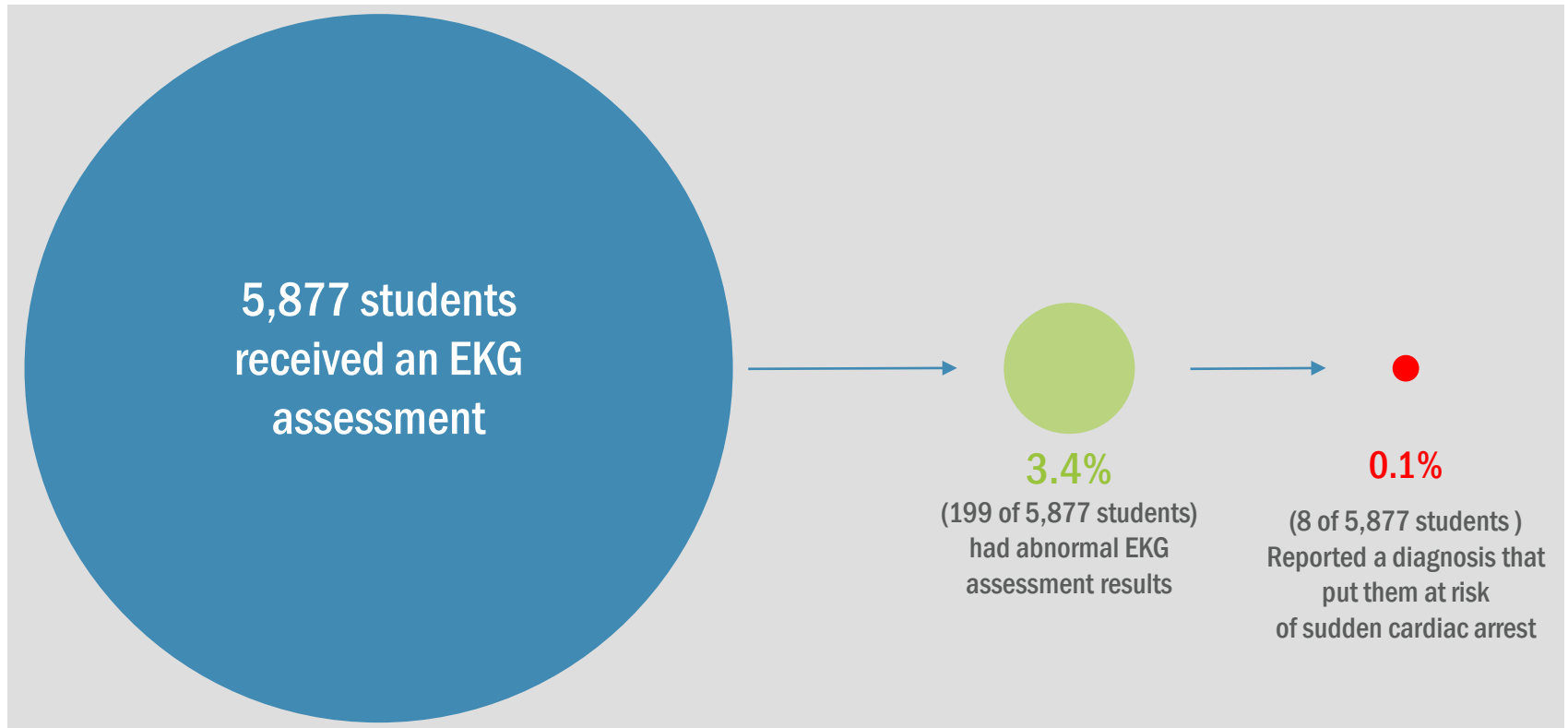


In School Year 2020-21, **35%** of student athletes **opted out** of receiving an EKG assessment

Study of Brevard County School District



A study conducted of Brevard County School District showed fewer than 1% of student athletes that received an EKG assessment in 2019-20 had a heart condition that put them at risk for sudden cardiac arrest

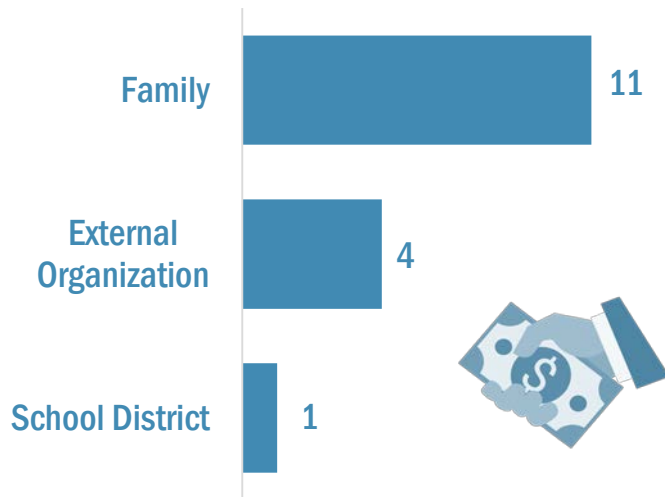


Districts that Require or Recommend EKG Assessments: Assessment Process



Families cover the cost of EKG assessments and, in some instances, may receive assistance

Who Pays for EKG Assessments



Availability of EKG Assessments

- Student athletes may receive EKG assessments from a **family physician** (8 districts)
- Student athletes may receive EKG assessments through a district partnership with an **external organization** such as Who We Play For or Advent Health (8 districts)
- Student athletes may receive an EKG assessment during a district-organized “**physical night**” at a designated location with physicians to conduct EKG assessments (8 districts)

Partnerships in Florida



Who We Play For is a Florida-based nonprofit organization that helps provide EKG assessments to student athletes in school districts



- Partners with eight Florida school districts to provide low-cost EKG assessments
- Medical technicians, nurses, and/or medical assistants administer EKG assessments
- Volunteer cardiologists interpret EKG assessment results
- Students with abnormal results are contacted and advised to see a cardiologist for follow-up
- Works with other non-profits to provide EKG assessments
 - Michael Abt Jr. Have a Heart Foundation
 - Jessica Clinton MVP Foundation
 - Breanna Vergara Foundation

Potential Challenges Associated With Requiring EKG Assessments for Student Athletes

Challenges Cited by Districts That Require or Recommend EKG Assessments



Some responding districts that require or recommend EKG assessments noted challenges



Five districts reported challenges including...

- Cost of administering and interpreting the assessment (2 districts)
- Identifying qualified medical professionals to interpret the assessment (1 district)
- Cost of follow-up care (1 district)
- Implementing a new practice (1 district)

EKG Assessment Initial Cost and Follow Up



EKG assessments and follow-up procedures can be expensive

Procedure	Florida Average	Florida Minimum and Maximum
EKG	\$84	\$74-\$102
Cardiology Specialist Visit	\$229	\$192-\$275
Heart Ultrasound With Blood Flow Study	\$650	\$500-\$832



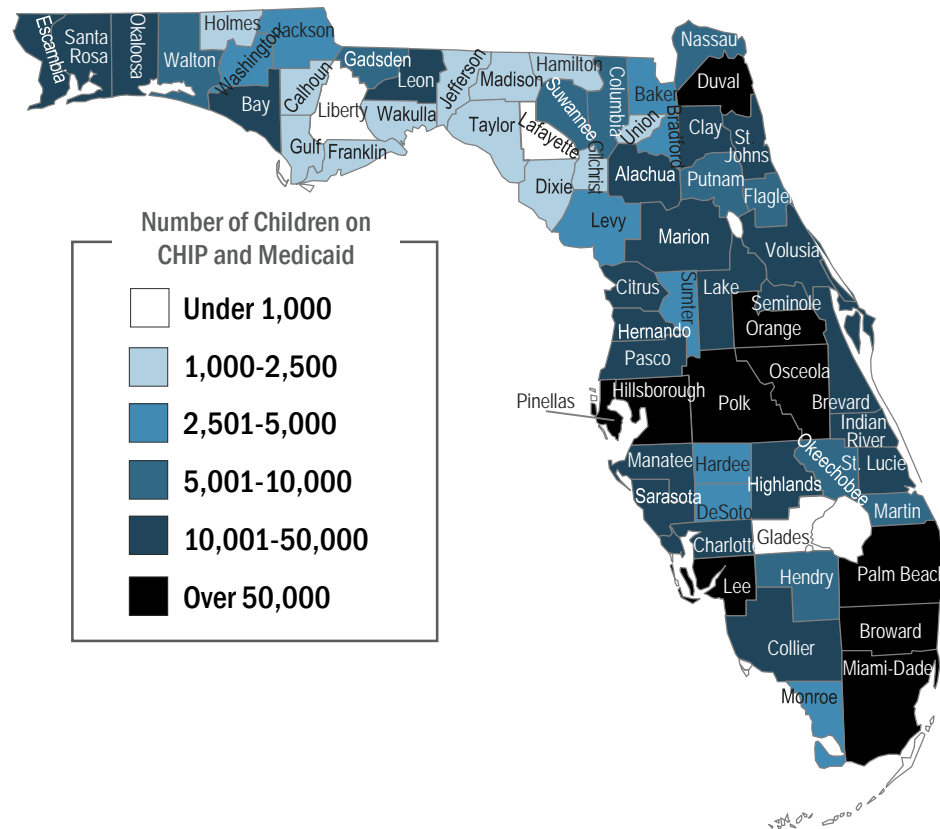
- In eight school districts, Who We Play For provides initial EKG assessments for **\$20 per student**
- Insurance companies may not cover the cost of EKG assessments for asymptomatic individuals

Cost of EKG and Follow-Up Testing



For children under CHIP and Medicaid, the cost of an EKG assessment is covered if the assessment is ordered by a physician; however, if universal EKG assessments for all high school student athletes were required, statutory changes likely would be needed to ensure coverage of the assessments

Children's Health Insurance Program (CHIP) and Medicaid



Medical Community Support

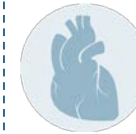
Medical Organization Support



No major medical organizations in the United States support required EKG assessments without physician recommendation

Positions on Universal EKG Assessments

Organization	Support?
American Academy of Pediatrics	No
American College of Cardiology	No
American Heart Association	No
American Medical Society for Sports Medicine	No
U.S. Preventive Services Taskforce	No
European Society of Cardiology	Yes
International Olympic Committee	Yes



These organizations support EKG assessments for individuals with symptoms, individuals with a family history, and/or as deemed necessary by a physician

Reasons for Lack of Support



Reasons major medical organizations provide for not supporting universal EKG assessments include lack of scientific support and implementation issues



Scientific Issues

- Lack of scientific consensus supporting testing of asymptomatic individuals
- EKG assessments do not detect all issues that may lead to sudden cardiac death



Implementation Issues

- Inequitable access to health care
- Quality control of technicians
- Availability of pediatric cardiologists for follow up
- Potential liability for false-negative results
- Potential public opposition
- Potential unnecessary invasive follow-up testing

EKG Assessment Accuracy



According to the American Heart Association's policy guidance and a meta-analysis on sudden cardiac death in young athletes, interpretations of EKG assessment results can result in inaccurate conclusions

False Positive Results

A false positive means detecting an issue when there is no underlying problem

False positive EKG assessment results range

- **1.3% to 2.8%** for human readings
- **2.3% to 5%** for computer readings

Based on an estimate of 208,885 total student athletes provided by 44 districts, between **2,716 and 10,444 student athletes** in these districts could require follow-up due to false positive results in the initial EKG assessments

False Negative Results

A false negative means not detecting an issue when there is an underlying problem

False negative EKG assessment results range

- **10% to over 90%** depending on the abnormality

Diagnosis	False-Negative Rate
Hypertrophic Cardiomyopathy	≥ 10%
Long QT Syndrome	≈25%-30%
Congenital Coronary Anomalies	≥ 90%

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**FLORIDA LEGISLATURE OFFICE OF PROGRAM POLICY ANALYSIS AND
GOVERNMENT ACCOUNTABILITY**

OPPAGA supports the Florida Legislature by providing data, evaluative research, and objective analyses that assist legislative budget and policy deliberations.

Executive Summary

Background

Though rare, sudden cardiac death is the leading cause of non-traumatic death among young athletes; EKG assessments may help identify diagnoses associated with sudden cardiac death through a quick, non-invasive procedure

Florida's Requirements

The Florida High School Athletic Association does not currently require EKG assessments but requires all students to be cleared via a pre-participation physical evaluation screening and recommends cardiovascular screening

Other States' Requirements

Texas and Pennsylvania have adopted EKG assessment-related legislation for student athletes; neither state requires EKG assessments for all athletes

School District Policies

Forty-one of the 53 Florida districts that responded to OPPAGA's survey neither require nor recommend EKG assessments for student athletes; 6 districts recommend EKG assessments and 6 districts require EKG assessments

Implementation Challenges

Districts that require or recommend EKG assessments for their student athletes identified challenges including cost and feasibility of implementing a large program; initial EKG assessments can be affordable through partnerships but the costs associated with follow-up procedures can be expensive

Medical Community Support

No major medical organization in the United States supports universal EKG assessment screening; reasons for lack of support include potential for inaccurate results, inequitable access to health care, and quality control of technicians