Implementation of a Standardized Screening Tool and Referral Process for Sports Physicals

by

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A DNP Project Manuscript
Submitted in Partial Fulfillment of the Requirements for the
Doctor of Nursing Practice Degree

University of Maryland School of Nursing
May 2020

Abstract

Problem & Purpose: Sudden cardiac death (SCD) from hypertrophic cardiomyopathy (HCM) is the leading cause of death in student athletes 12-25 years of age in the United States (US). To decrease the risk of SCD, the American Heart Association (AHA) recommends preparticipation screenings using a standardized cardiac screening tool. The purpose of this project is to implement a standardized screening tool and referral process for sports physicals in an urgent care center to identify those at risk.

Methods: During implementation of this quality improvement project, the urgent care's preparticipation sports physical form was updated to include the screening recommendations from the AHA. These changes were communicated through multiple modalities to increase provider and staff awareness of the practice change.

Results: Over 14-weeks, 70 student athletes presented for preparticipation sports physicals and 24 (34%) of these athletes were screened utilizing the updated screening tool. Of the 70 total athletes screened, four screened "at-risk" and were cleared for sports activity without referral for the recommended cardiovascular evaluation.

Conclusion: Improvements in screening student athletes using the AHA guidelines were made, however follow-up with referrals to cardiology for athletes at risk was not completed. Future recommendations to improve the process may include incorporating forms into the electronic health record with the inclusion of pop-up alerts for a cardiology referral for any student athlete that identifies with risk for heart disease.

Introduction

Sudden cardiac death (SCD) from hypertrophic cardiomyopathy (HCM) is the leading cause of death in student athletes 12-25 years of age in the United States (US) (Maron, Doerer, Haas, Tierney, & Mueller, 2009). SCD is defined as an unexpected sudden death caused by an undiagnosed cardiac structural abnormality; it is estimated that athletes are three times more likely to experience SCD than nonathletes (Rossi, Claiborne, & Fetter, 2018). The US National Registry of Sudden Death in Athletes assembles data on the deaths of athletes who engage in an organized team or individual sport requiring regular training and competition (Maron, Haas, Ahluwalia, Murphy, & Garberich, 2016). A total of 2,406 deaths were reported to the national registry from 1980-2011 in athletes aged 19 ± 6 years on average, with a confirmed cardiovascular diagnosis in 842 (35%) of these athletes (Maron et al., 2016).

To decrease the risk of SCD, the American Heart Association (AHA) recommends preparticipation cardiac screenings with a 14-element cardiac screening tool for all student athletes and electrocardiograms (ECG) for at risk student athletes only (Garritano & Willmarth-Stec, 2015). After meeting with the Chief Medical Officer (CMO) of a local urgent care center, it was determined that the AHA's 14-element screening tool was not being utilized when performing preparticipation sports physicals and their interest was to include this screening to be current with the recommended guidelines. The purpose of this project was to implement a standardized screening tool and referral process for sports physicals in an urgent care center.

Literature Review

The need for a standardized cardiac screening tool and referral process during student athlete preparticipation sports physicals was the focus of this literature review. The review begins with the evidence supporting the need to incorporate a standardized cardiac screening tool

during preparticipation sports physicals to identify athletes at risk for SCD. This discussion is followed by a review of how family history and clinical symptoms play a key role in identifying athletes at risk for SCD. Finally, the review concludes with current evidence regarding care for those athletes identified as at-risk for SCD and why routine testing for all athletes is not recommended.

There is currently, a lack of standardization of preparticipation physical evaluations (PPEs), which has created confusion among providers and does not address the primary goal of protecting the athlete from injury or death (Conley et al., 2014). The following systematic reviews outline the reasons for needing standardization of the sports physical and the benefits of its standardization. Conley et al. (2014), enforced the need for standardization of the PPE, due to variation in expertise among providers, to ensure appropriate evaluation during all preparticipation sports physicals. Maron et al. (2014) reported that the use of the standardized preparticipation history and physical examinations in athletes has diagnosed new cases of HCM, therefore potentially saving athletes lives. Lastly, Mirabelli, Devine, Singh, & Mendoza (2015) explained that the AHA's standardized cardiac screening tool maximizes the health of sports participants because it included inquiries into risk factors for and symptoms of potentially life-threatening or disqualifying illnesses. This illustrated how the use of the AHA's tool played a crucial role in identifying athletes at risk for SCD. After analysis of the aforementioned systematic reviews, the consensus recommendation was for all student athletes to undergo the AHA's standardized history and physical screening for congenital and genetic heart disease during their preparticipation sports physical (Conley et al., 2014; Maron et al., 2014; Mirabelli et al., 2015).

The AHA's screening tool includes specific personal and family history questions to assess for any clinical warning signs for or family history of cardiovascular disease. A large population-based cohort study in Denmark exposed a significant increase in risk of cardiovascular disease in relatives of SCD victims (Ranthe et al., 2013). A survey provided to families of sudden cardiac arrest (SCA) victims revealed that 72% of these victims had at least one cardiovascular symptom before SCA and 27% reported a family member had suffered sudden death before age 50 because of a heart condition (Drezner et al., 2012). Due to data exposing that a high percentage of athletes did experience symptoms prior to SCD, experts from a systematic review by Maron et al. (2014), believed that athletes' warning symptoms were previously misinterpreted, disregarded, or not solicited by their healthcare provider during their PPE. Some of the reasons for this were related to the concern of expensive specialty evaluation and the idea that the majority of patients were likely to be unaffected or have a benign finding, when in fact these athletes may have been at risk for injury or SCD (Maron et al., 2014). The results of these studies outlined the importance of screening student athletes for both a history of cardiac symptoms, as well as a family history of sudden death or genetic heart disease.

In conclusion, this literature review examined evidence supporting the need to incorporate a standardized cardiac screening tool into preparticipation sports physicals and the critical role that clinical symptoms and family history play in identifying athletes at risk for SCD. Based on the evidence supporting the standardized screening of student athletes for a personal and family history of cardiovascular disease, an updated pre-participation screening tool was developed for ChoiceOne urgent care (see Appendix B). Overall, the literature recommended the consistent use of the AHA's 14-element screening tool for all sports physicals and referral to cardiology for all at-risk athletes identified in a primary or urgent care setting.

Theoretical Framework

The theoretical framework that will be discussed in this paper is Lewin's Change Theory. This theory was developed in the 1940's by Kurt Lewin, a social psychologist, and consists of three phases: unfreezing, changing, and refreezing (Shirey, 2013). Lewin's change theory was used to guide this quality improvement project. During the unfreezing stage, the problem identified was the inconsistent screening of student athletes for congenital and genetic heart disease. The change identified was to implement a standardized screening tool and referral process to be used during all sports physicals at an urgent care center. Also during this phase, meetings were conducted with the CMO of the urgent care center to provide him with the evidence behind this change solution and garner his support.

During the changing phase, educational videos and links to informative articles regarding the change were provided for all staff to view via their online education program, TEAMS. Also, the CMO communicated to all staff the requirement to complete the updated screening tool during all sports physicals. During the refreezing stage barriers to the project's success were identified and addressed and data was shared with leadership about the athletes who were identified as at-risk, and if those athletes were referred to a cardiologist prior to athletic clearance. In conclusion, the use of Lewin's change theory was key to guiding the successful implementation of this practice change.

Methods

This quality improvement project addressed the problem that the form used for pre-participation sports physicals at this urgent care did not include all screening questions and physical exam techniques that have been recommended by the AHA to identify student athletes at risk for congenital and genetic heart disease. The population and setting included all student

athletes presenting to this urgent care location for their preparticipation sports physical. The use of the updated form that included the AHA's recommendations had the potential to impact the 70 athletes who were screened at this urgent care center during the project implementation, as well as, all family members of those athletes identified at-risk.

This quality improvement project began with updating the preparticipation sports physical form to include the recommendations from the AHA and having the form approved by the CMO. Next, I met with University of Maryland Medical Center's head of pediatric cardiology to obtain expert advice to create the educational sports physical video. This video was created to be used as a reference for providers to ensure they were performing a comprehensive history and physical on all student athletes, as well as to give them examples of when they should refer a student athlete to a cardiologist prior to athletic clearance. The voice-over PowerPoint was created per the request of the CMO to educate the providers on the changes made to the urgent care's PPE form and what findings warranted a referral to cardiology.

To support this new practice and process change, a the voice-over PowerPoint was emailed to staff and uploaded to the organization's online educational platform, TEAMS. Then, a trifold poster and laminated notecards were implemented as an in-clinic reminder of the updates to the form and a quick reference for providers when performing sports physicals to know when to refer a patient to cardiology. Halfway through implementation, the CMO emailed all staff instructing them to use the updated PPE form even if the students bring their own form and to fill it out completely, including a request for medical assistants to check the student's blood pressure in both arms. This was done in response to providers using the patient's school forms instead of the new AHA updated preparticipation form.

During the implementation period, weekly chart audits were performed on every chart with a chief complaint of "sports physical." For each of these charts, a review was done to evaluate whether or not a patient screened "at-risk" for congenital or genetic heart disease. For those who screened "at-risk," an assessment on whether the patient was cleared or given a referral to cardiology for further evaluation was noted.

Data was gathered weekly through chart audits of all visits that were coded as a preparticipation sports physical at this urgent care center. Data collection included the total number of athletes who presented to this clinic for a sports physical and were screened with the urgent care's updated screening tool. This number was compared to the total number of athletes who presented to this clinic for a sports physical to determine the percentage of student athletes who were screened at this clinic using the updated screening tool. Data was also analyzed by inputting the total number of athletes referred to cardiology over the total number of athletes screened who were identified as at-risk for congenital or genetic heart disease to determine the percentage of at-risk athletes who were referred to cardiology prior to athletic clearance. See Appendix C for data analysis tool. Data was also collected to compare the implementation period data to the same time period one year prior for evaluation.

Results

The changes in structure that occurred during this project include the implementation of the updated screening tool, updated referral process, and education of staff and providers on the new process for completing the PPE. The changes in process that occurred during this project were the different modalities used to communicate the change. For example, utilizing voiceover PowerPoints, email communications, poster board presentations, and laminated flashcards.

Chart audits showed that during the same time frame as this implementation period one year prior, in 2018, 44 sports physicals were completed and 8/44 (18%) used the center's PPE form. Of those student athletes, 7/44 (16%) screened "at-risk" based on the recommendations from the AHA and 0/7 (0%) of them were referred to cardiology prior to athletic clearance. After auditing all charts coded as a preparticipation sports physical at this urgent care center during the implementation period, it was found that 24/70 (34%) of student athletes were screened with the updated screening tool. Figure 1 demonstrates the weekly breakdown of the percentage of student athletes screened using the updated tool. Of the 70 athletes screened, four screened "at-risk" based on the recommendations from the AHA. Three were at-risk due to family history of sudden cardiac death before the age of 50 (their grandparents) and one was identified at-risk due to question eight: "Have you ever had discomfort, pain, or pressure in your chest during exercise?" None of the at-risk athletes were referred for cardiovascular evaluation and all were cleared for sports activity. The ages of the student athletes who presented for preparticipation sports physicals ranged from six to twenty-two years of age. Refer to Figure 2.

After the first half of the project implementation, a summary of the data gathered was shared with the CMO. As a result of low compliance with the updated screening tool, the CMO communicated with all staff to utilize the updated form and to complete two blood pressures during all sports physicals. Forty-five percent of student athletes were screened using the updated form after this communication was sent, compared to the prior 32%. In addition, 5/11 (45%) of student athletes had two blood pressures performed after the communication was sent midway through implementation, whereas none of the student athletes who had physicals prior to this communication (0/59) had two blood pressures checked.

Lastly, chart audits from pre-implementation excluded six student athletes' sports physicals because they were incomplete. During the quality improvement project's implementation period, only one student athletes' sports physical was excluded due incompleteness. Incompleteness of the PPE included student athletes' with either a missing history or a missing physical in their chart.

One of the unintended consequences from this project was an added time commitment for providers when they were required to complete duplicate work for the student athletes who brought their own form. Another unintended barrier to this project was being unable to confirm understanding of the implementation procedures with all involved parties due to the numerous staff members who rotated through this location. An unexpected benefit from this project was the creation of the educational voiceover PowerPoint. This education was not originally part of the implementation plan, however, since it was requested by the CMO, it is now an extra resource for staff to access and refer to in the future. It may have helped to reinforce the importance of this work and remind providers about the essential history and physical findings that identify a student athlete at-risk.

Discussion

The comparison of the pre-implementation results with the results during project implementation demonstrate that the education, communication, and reminders implemented for the providers helped improve compliance with the use of the updated formalized screening tool during sports physicals at this urgent care center. However, there was no improvement with the implementation of the standardized referral process for at-risk student athletes. This coincides with the belief expressed in a systematic review by Maron et al. (2014) that providers likely disregard or misinterpret warning signs because of the concern for the expense of specialty

evaluation and the idea that the majority of patients are likely to be unaffected or have a benign finding.

After comparing the compliance of the providers' use of the updated screening tool before and after the CMO's communication reveals that compliance increased after this intervention. If this communication had been completed earlier, it may have improved the overall compliance rates during the full implementation period. It was discovered that implementing a quality improvement project in this setting with such a large number of providers who rotate through this center, made it very difficult to educate and confirm understanding from all who participated in the project. This was likely a contributor to the lower than anticipated compliance rates.

Lewin's change theory was used successfully to help guide this quality improvement project and can be used now to promote its sustainability. The unfreezing stage was used to identify the barriers encountered during the implementation of this project. One of the major barriers encountered was that many patients brought their own PPE form and providers would perform the history and physical based on that form, even if it did not have the recommendations from the AHA. Evidence from the literature review highlights that the lack of standardization of PPEs has created confusion among providers and does not address the primary goal of protecting the athlete from injury or death (Conley et al., 2014; Moulson, Kuljic, Mckinney, Taylor, Hopman, & Johri, 2018). During the changing phase, ideas to overcome these barriers were identified; for example, it is recommended that we spread this standardized tool throughout this large medical system, and even the state of Maryland, to prevent screening student athletes with tools that do not adhere to the recommended guidelines. During the refreezing stage of Lewin's

change theory, these recommended changes will be put into practice in order to identify all student athletes at risk for congenital or genetic heart disease.

Lastly, performing student athletes' PPEs in the urgent care setting were difficult due to the lack of time and specialized knowledge from the providers in recognizing who is at risk for congenital or genetic heart disease. The providers in urgent care generally see between 30 and 50 patients per day and are under pressure to move patients through quickly to achieve greater patient satisfaction scores. Higher patient satisfaction scores are rewarded with bonuses to the providers and lower scores can threaten their job security. This fast-paced environment does not allow providers much time for a thorough history and physical, much less, time to educate the student athletes and their family members on the risk associated with congenital and genetic heart disease and the need for cardiology clearance in an otherwise seemingly healthy athlete. The findings from this quality improvement project are not intended to create generalizable knowledge beyond this setting and group of patients.

Conclusion

As a result of barriers experienced in this quality improvement project, recommendations can be made. For example, to address those student athletes requesting completion of an alternate PPE form, all schools and athletic organizations in Maryland should consider updating their forms to include the AHA's recommendations; this would allow the patients to be screened per the AHA's recommendations whether or not this center's PPE form is used. Another recommendation would be to have the urgent care provider order an EKG in clinic on any student athlete found to be "at-risk." This allows the provider to then use their clinical judgement to determine if further evaluation by a cardiologist is needed prior to athletic clearance. Finally, a recommendation to incorporate the updated form into the urgent care center's electronic health

record and to have pop-up alerts for a cardiology referral for any student who screens positive on any component that puts them at risk for congenital or genetic heart disease, per the AHA's recommendations.

Overcoming the barriers faced during the implementation of this project can help promote its sustainability and facilitate its spread to other urgent care centers within this organization. The broader goal would be to use the AHA form for all preparticipation sports physicals on student athletes in order to eliminate SCD and save lives.

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Table 1

Evidence Review Table

Author(s), year	Study objective/intervention or exposures compared	Design	Sample (n)	Outcomes studied (how measured)	Results	Level and Quality Rating
Drezner, Fudge, Harmon, Berger, Campbell, & Vetter, 2012	To determine the prevalence of warning symptoms and family history in a cohort of children and young adults who suffered sudden cardiac arrest (SCA).	Retrospective, cross-sectional survey	Families of sudden cardiac arrest victims who returned a completed survey (n=87)	A survey was provided to all members of Parent Heart Watch, a national organization of parents and families with a child who suffered SCA, using an online survey administration system and all members were contact via email with an invitation to participate. A reminder email was sent once weekly for three weeks to members who did not respond and a paper copy was provided to participants without internet access.	Seventy-two percent of SCA victims were reported by their parents to have at least one cardiovascular symptom before SCA, with fatigue (44%) and near-syncope/lightheadedness (30%) rated as the two most common. Twenty-seven percent of families reported a family member had suffered sudden death before age 50 because of a heart condition.	6B
Ranthe et al., 2013	To examine the risk of cardiovascular disease (CVD) in relatives of young SCD victims, compared with the general population.	Prospective population-based cohort study	All SCD victims aged 1-35 years of age in Denmark between 2000-2006 (n=470), plus their first- and second-degree relatives (n=3073).	The incidence of CVD in relatives with family history of SCD in the young was compared to that of the general population using standardized incidence ratios.	CVDs co-aggregated significantly with SCD in families, with young first-degree relatives at greatest risk. Results clearly indicate that family members of young SCD victims should be offered comprehensive and systematic screening, with focus on the youngest relatives.	4B

Conley, Bolin, Carek, Konin, Neal, & Violette, 2014	To disseminate best practice recommendations to athletic trainers for administration of preparticipation sports physicals and identification of disqualifying conditions.	Systematic Review	Number of studies reviewed and included in recommendation development (n=138)	Systematic review of evidence and studies on the development and delivery of preparticipation sports evaluation and an assessment of the benefits and harms of alternative options for athletes.	A comprehensive medical and family history should be obtained from every sports participant. The screening physical should include vital signs, vision testing, cardiovascular, neurologic, musculoskeletal, and general medical examination. ECGs are not recommended for routine screening.	1B
Maron et al., 2014	To determine best practice for detection of cardiovascular disease (CVD) in healthy athletes 12-25 years of age.	Systematic Review	Number of studies reviewed and included in guideline development (n=283)	Systematic review of evidence and studies on the preparticipation sports exam and routine use of the 12-lead ECG as a screening tool for detection of CVD during these physicals.	The AHA's 14-element screening tool is recommended without the use of the 12-lead ECG during sports physicals. The ECG should only be used at the discretion of a trained cardiologist for athletes identified as at-risk for CVD.	1C
Maron, B., Levine, Washington, Baggish, Kovacs, & Maron, M., 2015	To determine best practice for identifying cardiac abnormalities or diseases that are potentially responsible for sudden death in athletes.	Systematic Review	Number of studies reviewed and included in guideline development (n=39)	Systematic review of evidence and studies on preparticipation sports evaluation and an assessment of the benefits and harms of alternative options for athletes.	The AHA 14-point screening guidelines or those of other societies should be the standard to complete a history and physical to screen for genetic/congenital cardiovascular abnormalities	1C
Mirabelli, Devine, Singh, & Mendoza, 2015	To provide guidance on maximizing the health of athletes and promote their safe participation in sports.	Systematic Review	Number of studies reviewed and included in guideline development (n=38)	Systematic review of evidence and studies on preparticipation sports evaluation and an assessment of the benefits and harms of alternative options for athletes.	All patients undergoing a preparticipation sports evaluation should be questioned about specific symptoms and family history suggestive of underlying cardiac conditions and the physical exam should focus on the cardiac and musculoskeletal systems. ECG screening and blood and urine testing is discouraged unless patients are symptomatic.	1C

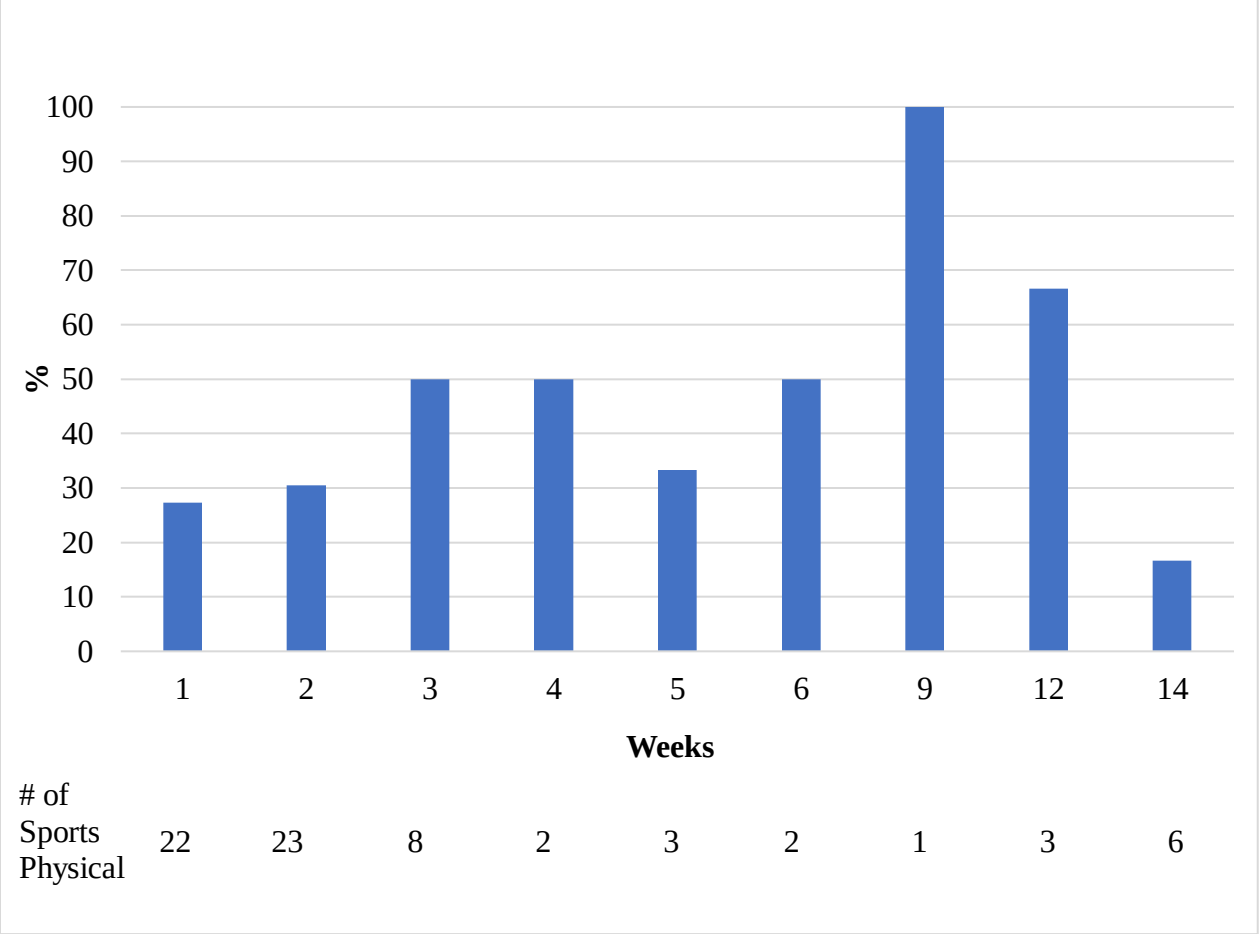

Figure 1. Percentage of Student Athlete's Screened Using the American Heart Association's Recommendations

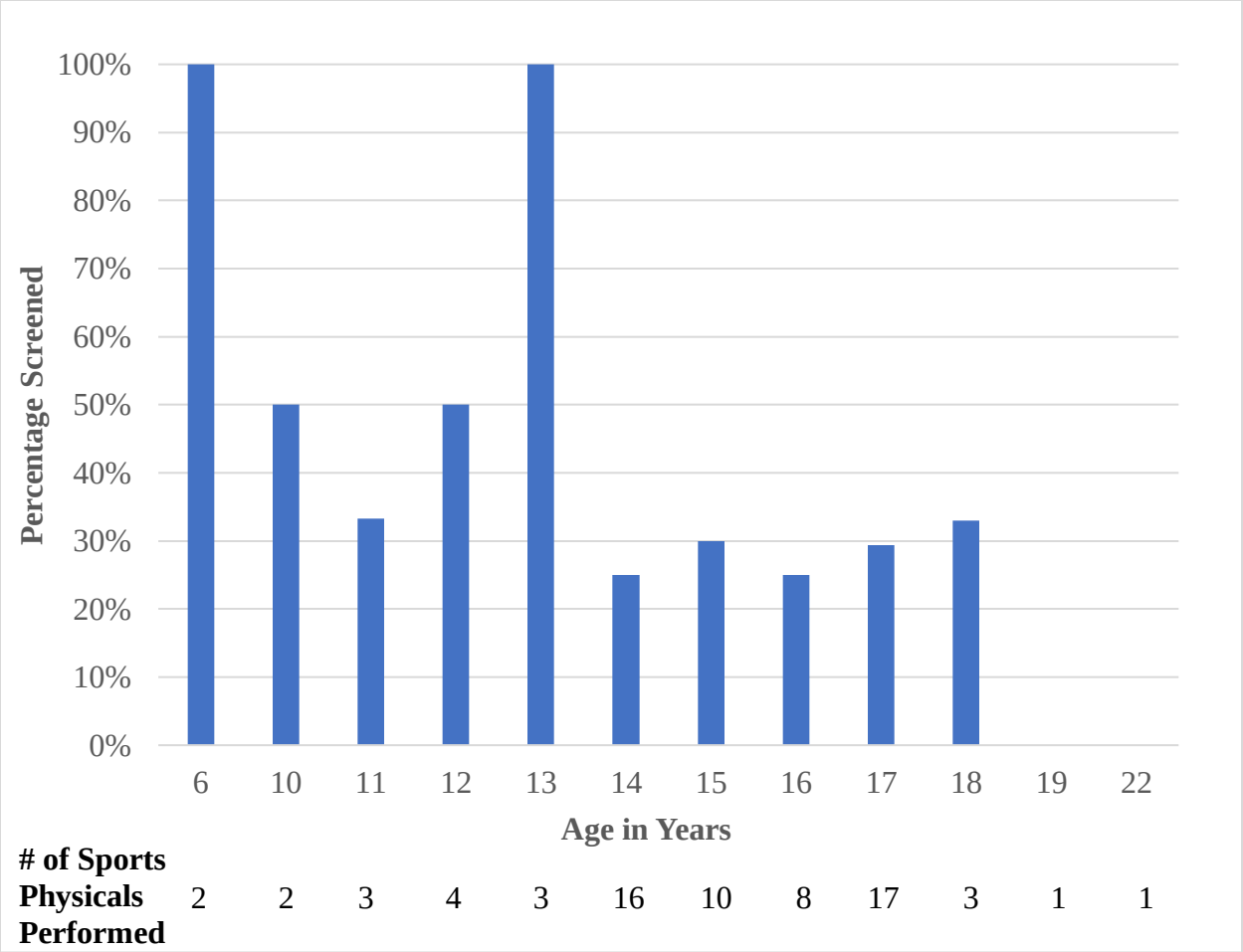

Figure 2. Percentage of Student Athlete's Screened By Age Using the American Heart Association's Recommendations

Appendix A

The 14-Element AHA Recommendations for Preparticipation Cardiovascular Screening of Competitive Athletes

Medical History*

Personal history:

1. Chest pain/discomfort/tightness/pressure related to exertion
2. Unexplained syncope/near-syncope**
3. Excessive exertional and unexplained dyspnea/fatigue or palpitations, associated with exercise
4. Prior recognition of a heart murmur
5. Elevated systemic blood pressure
6. Prior restriction from participation in sports
7. Prior testing for the heart, ordered by a physician

Family history:

8. Premature death (sudden and unexpected, or otherwise) before age 50 attributable to heart disease in ≥1 relative
9. Disability from heart disease in close relative <50 y of age
10. Hypertrophic or dilated cardiomyopathy, long-QT syndrome, or other ion channelopathies, Marfan syndrome, or clinically significant arrhythmias; specific knowledge of certain cardiac conditions in family members

Physical Examination

11. Heart murmur***
12. Femoral pulses to exclude aortic coarctation
13. Physical stigmata of Marfan syndrome
14. Brachial artery blood pressure (sitting position)****

*Parental verification is recommended for high school and middle school athletes.
**Judged not to be of neurocardiogenic (vasovagal) origin; of particular concern when occurring during or after physical exertion.
***Refers to heart murmurs judged likely to be organic and unlikely to be innocent; auscultation should be performed with the patient in both the supine and standing positions (or with Valsalva maneuver), specifically to identify murmurs of dynamic left ventricular outflow tract obstruction.
****Preferably taken in both arms.

(Maron et al., 2014)

Appendix B

ChoiceOne Urgent Care's Sports Physical Examination Form with the AHA's Recommendations

ChoiceOne URGENT CARE

Sports Physical Examination

Please print and fill-out this form completely on both sides.

Student's Name:_____ Student's Grade:_____

Age:_____ Date of Birth: _____/ _____/ _____

Phone:_____ Sport:_____

Father's Name:_____ Mother's Name:_____

Height:_____ Weight:_____ Blood Pressure Left Arm: _____/ _____ Blood Pressure Right Arm: _____/ _____

Heart Rate:_____ Vision: R 20/ _____ L 20/ _____ Corrected? ❑ Yes ❑ No

MEDICAL	Normal?	Abnormal Findings
Appearance • Marfan stigmata (kyphosocoliosis, high-arched palate, pectus excavatum, arachnodactyly, arm span > height, hyperlaxity, myopia, MVP, aortic insufficiency)	❑	
Eyes/ears/nose/throat • Pupils equal • Hearing	❑	
Heart • Murmurs (auscultation standing, supine, +/- Valsalva) • Location of point of maximal impulse (PM)	❑	
Pulses • Femoral	❑	
Lungs	❑	
Abdomen	❑	
Genitourinary (males only)	❑	
Skin • HSV, lesions suggestive of MRSA, tinea corporis	❑	
Neurologic	❑	
MUSCULOSKELETAL		
Neck	❑	
Back	❑	
Shoulder/arm	❑	
Elbow/forearm	❑	
Wrist/hand/fingers	❑	
Hip/thigh	❑	
Knee/leg/ankle	❑	
Foot/toes	❑	
Fuctional: Duck-walk, Single leg hop	❑	

CLEARANCE
THIS SECTION MUST BE COMPLETED AND SIGNED BY THE ATTENDING PROVIDER

Cleared for full Physical Activity: ❑ Yes ❑ No Date of Exam: _____/ _____/ _____

If no, explain:_____

_____

_____

Provider's Signature:_____ Print Name:_____

C1_SPE 11/18

HISTORY

Pre-participation Physcial Examination
Explain "Yes" answers below. Circle questions you don't know the answer to.

	YES	NO
1. Has a provider ever restricted your participation in sports for any reason?	❑	❑
2. Do you have an ongoing medical condition? (ex.diabetes or asthma)	❑	❑
3. Are you currently taking any prescription or over-the-counter medicines or pills?	❑	❑
4. Do you have allergies to any medicines, pollens, foods or stinging insects?	❑	❑
5. Have you ever had unexplained difficulty breathing, fatigue or palpitations associated with exercise?	❑	❑
6. Have you ever passed out or nearly passed out DURING exercise?	❑	❑
7. Have you ever passed out or nearly passed out AFTER exercise?	❑	❑
8. Have you ever had discomfort, pain, or pressure in your chest during exercise?	❑	❑
9. Does your heart race or skip beats during exercise?	❑	❑
10. Has your provider ever told you that you have?: (Check all that apply):		
❑ High blood pressure ❑ A heart murmur		
❑ High cholesterol ❑ A heart infection		
11. Has a provider ever ordered a test for your heart? (ex. ECG, echocardiogram)	❑	❑
12. Has anyone in your family died for no apparent reason?	❑	❑
13. Does anyone in your family have a heart problem?	❑	❑
14. Has a family member died of a heart problem before the age of 50?	❑	❑
15. Does anyone in your family have a history of Hypertrophic or dilated cardiomyopathy, long-QT syndrome, other ion channelopathies or clinically significant arrhythmias?	❑	❑
16. Does anyone in your family have Marfans Syndrome?	❑	❑
17. Have you ever spent the night in a hospital?	❑	❑
18. Have you ever had surgery?	❑	❑
19. Have you ever had an injury, like a sprain, muscle or ligament tear, or tendonitis that caused you to miss a game/practice? **If yes, circle affected area below.**	❑	❑
20. Have you ever had any broken or fractured bones or dislocated joints? **If yes, circle affected area below.**	❑	❑
21. Have you ever had an injury that required x-rays, MRI, CT, surgery, injections, rehabilitation, physical therapy, a brace, a cast, or crutches?	❑	❑

CIRCLE HERE FOR QUESTIONS 19-21

Head	**Elbow**	**Upper Back**	**Knee**	**Neck**
Forearm	**Lower Back**	**Calf/Shin**	**Shoulder**	**Hip**
Chest	**Foot/Toes**	**Thigh Ankle**	**Upper Arm**	
Hand/Fingers				

22. Have you ever had a stress fracture?	❑	❑
23. Have you had an x-ray for atlantoaxial (neck) instability?	❑	❑

	YES	NO
24. Do you regularly use a brace or assistive device?	❑	❑
25. Has a provider ever told you that you have asthma or allergies?	❑	❑
26. Do you cough, wheeze, or have difficulty breathing during or after exercise?	❑	❑
27. Is there anyone in your family with asthma?	❑	❑
28. Have you ever used an inhaler or taken asthma medicine?	❑	❑
29. Were you born without and/or are you missing a kidney, eye, testicle, or other organ?	❑	❑
30. Have you had infectious mononucleosis (mono) within the last month?	❑	❑
31. Do you have any rashes, pressure sores, or other skin problems?	❑	❑
32. Have you ever had herpes skin infection?	❑	❑
33. Have you had a head injury/concussion?	❑	❑
34. Have you been hit in the head and been confused or lost memory?	❑	❑
35. Have you ever had a seizure?	❑	❑
36. Do you have headaches with exercise?	❑	❑
37. Have you ever had numbness, tingling, or weakness in arms or legs after being hit?	❑	❑
38. Have you ever been unable to move your arms after being hit?	❑	❑
39. When exercising in the heat, do you have severe muscle cramps or become ill?	❑	❑
40. Has a provider ever told you that you or a family member has sickle cell trait/disease?	❑	❑
41. Have you had eye or vision problems?	❑	❑
42. Do you wear glasses/contacts?	❑	❑
43. Do you wear protective eyewear, such as goggles or a face shield?	❑	❑
44. Are you happy with your weight?	❑	❑
45. Are you trying to lose or gain weight?	❑	❑
46. Has anyone recommended you change your weight or eating habits?	❑	❑
47. Do you limit what you eat?	❑	❑
48. Do you have any concerns you want to discuss with the provider?	❑	❑

Explain "Yes" answers below

_____

_____

_____

_____

_____

_____

Notice to Patient/Parents:
Because ChoiceOne Urgent Care has limited access to your complete medical history, the sports physical performed today should not be considered comprehensive. You should always consult with your primary care physician and share the results of our examination with them. If there are any concerns regarding the results of your examination today, you should consult with your primary care physician before engaging in any strenuous activities.

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

Athlete's Signature: _____ Date: _____/ _____/ _____

Parent or Guardian's Signature: _____ Date: _____/ _____/ _____

(S. Burger, personal communication, January 22, 2019)

Appendix C

Data Analysis Tool

Week	#sports physicals seen in clinic	#sports physicals screened with updated tool	#students identified at risk	#at-risk students provided cardiology referral
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
Total				

Appendix D

Permission to Use Copyrighted Instruments from the American Heart Association

American Heart Association.

Inv #15041-CSCHAFER

May 21, 2019

PRINT COPYRIGHT USE AGREEMENT

Chelsea Schafer
University of MD, Baltimore
125 Starhill Lane
Catonsville, MD 21228-5449

Dear Ms. Schafer:

Amount Due: **$300.00 U.S. FUNDS (WAIVED)** This is a fee for service and not a charitable contribution). Our tax id number is 13-5613797. **Please consider this letter an invoice.**

Approval of this request is contingent upon receipt of a $300.00 U.S Funds (WAIVED) processing fee and a signed copy of this Agreement (including Exhibit A.) Please send a check (drawn on a U.S. Bank or an international money order) payable to the American Heart Association with a copy of this Agreement to PO Box 841750, Dallas, Texas, 75284-1750. Bank transfer or credit card payment information will be provided upon request.

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Upon receipt of payment and the signed agreement, permission will be granted on your original request. **Your cancelled check or credit card statement will be your receipt.**

Signature of Requestor Chelsea Schafer RN

Printed Name Chelsea Schafer

Date 5/30/19

Publication Name – Circulation.2007;115:1643-1655
Recommendations and Considerations Related to Preparticipation Screening for Cardiovascular Abnormalities in Competitive Athletes: 2007 Update

Specifically:
Page 1646, Figure. The 12-Element AHA Recommendations for Preparticipation Cardiovascular Screening of Competitive Athletes

Citation/Credit Line:

For Use In:

a print only version of the above referenced material will be used in the student's doctoral project titled "Implementation of a standardized screening tool and referral process for sports physicals at an urgent care center". If the student decides at a later date to publish the paper/AHA material, the request **must** be submitted to the AHA for review/approval before the AHA material is published.