ARE ATHETIC TRAINERS PREPARED TO MANAGE SUDDEN CARDIAC ARREST?

A THESIS

Submitted to the Faculty of the School of Graduate Studies and Research
of
California University of Pennsylvania in partial fulfillment of the requirements for the degree of

Master of Science

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California, Pennsylvania
2016

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THESIS APPROVAL

Graduate Athletic Training Education

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ACKNOWLEDGEMENTS

I would like to thank everyone who has helped me throughout this process. My deepest appreciation goes to the most important people in my life: my parents, my boyfriend, my brother and sister, and my friends. The constant support I received from each of you means the world to me. I love you all and thank you.

A special thanks goes to my thesis chairperson, Dr. Michael Meyer, and my other thesis committee members Dr. Carol Biddington and Mark Lesako. You all have been a huge help in guiding and inspiring me to complete this study. Without you guys, none of this could have been possible.

Lastly, thank you to my fellow athletic trainers who took the time out of their day to complete my survey. You were extremely helpful in achieving success with my survey.

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INTRODUCTION

Sudden cardiac arrest is the leading cause of death in athletes. This tragedy kills an athlete on average every three days.[1] This brings to light the the gaps in preparedness that athletic trainers are expected to obtain. Sudden cardiac arrest is fatal in individuals who do not receive immediate cardiopulmonary resuscitation followed by defibrillation. For each minute until defibrillation, survival rates decrease between 7-10%.[1] Athletic trainers have all the tools necessary to be prepared to manage sudden cardiac arrest. This includes proper training, conducting preparticipation physical exams, having all the necessary equipment, and having a proper emergency action plan.

As athletic trainers, our job is to be prepared to handle any type of emergency. This starts with having the proper training. Athletic trainers must demonstrate ongoing certification in Emergency Cardiac Care (ECC) and be current with the ECC requirements.[2]

Preparticipation screening is critical to identify any underlying abnormalities. According to the American

Heart Association, competitive athletic prescreening consisting of a targeted personal/family history and preparticipation physical exams (PPE) are all beneficial to identify at risk athletes. However, despite PPEs, healthy appearing athletes may harbor unsuspected cardiovascular diseases with the potential to cause death. This raises the need for athletic trainers to be able to identify sudden cardiac arrest signs and symptoms correctly and respond appropriately.[1,3,4]

Athletic trainers should be prepared by having an Emergency Action Plan (EAP), which they should practice and review on an annual basis.[1,5,6] The contents that are recommended within the EAP include establishing an effective communication system, training of anticipated responders in CPR and AED use, access to an AED for early defibrillation, acquisition of necessary emergency equipment, and coordination and integration of on-site responder with the local EMS system.[5,6] The EAP should target a collapse to EMS call time and CPR initiation of less than one minute. A second target goal of less than three to five minutes from collapse to defibrillation shock is strongly recommended.[5,6] A rapid system of communication must be in place linking all athletic facilities and practice fields to the EMS system. Athletic trainers should

always be prepared and trained with the appropriate equipment in case a sudden cardiac arrest situation arises.[1,5,6]

Improved education in the recognition of SCA, enhanced emergency preparedness, training in current CPR protocols, and increased access to AEDs for early defibrillation are necessary to improve survival from SCA in sports.[1,5,6] The purpose of this study is to examine how prepared athletic trainers are in the management of sudden cardiac arrest. The information found from the survey will potentially help enlighten the athletic training field to show how prepared athletic trainers are and where emphasis should be placed in SCA management education.

METHODS

The primary purpose of this study was to review current literature on sudden cardiac arrest and evaluate how prepared athletic trainers are in the management of sudden cardiac arrest. This section includes the following subsections: research design, preliminary research, subjects, instruments, procedures, hypotheses, and data analysis.

RESEARCH DESIGN

This research used a descriptive research design exploring how prepared athletic trainers are in the management of sudden cardiac arrest through a survey. The strength of the study was that content validity was determined after a review by a panel of experts. Another strength was that the subjects had the ability to take the survey electronically and anonymously on their own time. A limitation of this study was that only athletic trainers from District Two were surveyed. Another limitation of the study design was that subjects may not have completed the survey honestly.

PRELIMINARY RESEARCH

There was a panel of three experts who reviewed the study. The panel was handpicked and was asked directly by the researcher. The members included two certified athletic trainers and one physical therapist. The researcher was looking for the expert's opinion on the survey along with comments and revisions on questions and overall presentation of the survey.

SUBJECTS

The subjects (n=151) that were used for this study were volunteer collegiate male and female athletic trainers from District 2 of the NATA which includes: Pennsylvania, Delaware, New Jersey, and New York. They were randomly selected through the NATA Research Foundation. The study was approved by the Institutional Review Board at California University of Pennsylvania (Appendix C1) prior to any data collection. The cover letter and survey was distributed electronically to the athletic trainers.

Informed consent was assumed by the subject's participation in the survey. Each participant's identity remained confidential and was not included in the study.

INSTRUMENTS

The survey titled "Preparedness of Athletic Trainers in Managing Sudden Cardiac Arrest" (Appendix C2) was distributed using Survey Monkey. The survey consisted of six sections. The first section comprised of demographic questions including sex, age, state residence, and college division they work at. The second section asked questions pertaining to their preparticipation cardiovascular screenings for their athletes. The third section asked whether their Athletic Training facility has both an AED and an EAP. The fourth section asked questions about the different features of their Emergency Action Plans. The next section asked questions about the characteristics of plans for use of their AED. The last section asked questions directed toward the colleges without AEDs. There were thirty questions for the entirety of the survey.

The survey was developed based off an article by Dr. Anna Monroe, "Emergency Planning for Sudden Cardiac Events

in North Carolina High Schools".[7] Multiple attempts were made to contact the author directly for the survey, but there was no response. Questions were developed based off of the study's tables and findings that were in the article.[7] There were also questions that were developed based off of the American Heart Association Guidelines, "Preparticipation Cardiovascular Screening of Young Competitive Athletes: Policy Guidance".[8]

PROCEDURES

The researcher obtained approval from the IRB at California University of Pennsylvania (Appendix C1) before any research was conducted. The study was distributed through an email link to District 2 Athletic Trainers through the NATA Research Foundation. To be able to send the survey out to (N=1000) athletic trainers, the researcher obtained approval from NATA's Senior Knowledge Initiatives Coordinator. Instructions for the survey were included in the email along with a link to take the survey. In addition, accompanying the survey was a cover letter (Appendix C3) explaining the purpose of the study. The survey was open for two weeks (14 days). A follow-up email

was sent after the first week (after day 7) encouraging the participants to complete the survey.

HYPOTHESES

The following hypotheses were based previous research and the researcher's intuition based on review of the literature.

1. There will be an AED within 1-5 minutes of walking and shocking a collapsed athlete.
2. There will be an AED at all venues

DATA ANALYSIS

This was a descriptive study aimed at gathering data related to Athletic Trainers preparation and management of SCA. The data was analyzed using SPSS version 22.

1. A chi-square goodness of fit test will be used to determine if there will be an AED within 1-5 minutes of walking and shocking a collapsed athlete.

2. A chi- square goodness of fit test will be used to determine if there will be an AED at all venues.

RESULTS

Demographic Information

NATA District 2 Athletic Trainers (n= 151) voluntarily participated in this study. Table 1 represents age of Athletic Trainers in District 2 who participated in the survey. A majority of the ATS were between the ages of 26-31 (23.18%) and 38-43 (22.52%)

Table 1. Age of ATs

Classification	Frequency	Percent
<18	0	0%
20-25	26	17.22%
26-31	35	23.18%
32-37	21	13.91%
38-43	34	22.52%
44-49	20	13.25%
50-55	6	3.97%
56-61	4	2.65%
>61	5	3.31%

Table 2 represents the sex of ATS in District 2 who participated in the survey. There were an equal number of females (50%) and males (50%) that were representative of the sample.

Table 2. Sex of ATs

Characteristic	Frequency	Percent
Female	74	50%
Male	74	50%

Table 3 represents the collegiate division that the AT is currently working at. The majority of the ATs are working at Division III (39.86%), followed by Division II (31.76%), and lastly Division I (28.38%).

Table 3. Collegiate Division Settings of ATs

Classification	Frequency	Percent
Division III	59	39.86%
Division II	47	31.76%
Division I	42	28.38%

Table 4 represents the state that the AT is currently residing in. The majority of ATs were residing in Pennsylvania (48.98%), followed by New York (33.33%), followed by New Jersey (15.65%), and then Delaware (2.04%).

Table 4. State Residency

Classification	Frequency	Percent
Pennsylvania	72	48.98%
New York	49	33.33%
New Jersey	23	15.65%
Delaware	3	2.04%

Hypothesis Findings

The hypotheses were tested at an alpha level of .05.

A chi- square goodness of fit test was used to determine if there will be an AED within 1-5 minutes of walking and shocking a collapsed athlete. There was significant deviation from the hypothesized value found (χ^2 (1) = 111.293, p > .001).

Conclusion: Majority of the athletic trainers who responded have access to an AED that is within 1-5 minutes of walking and shocking a collapsed athlete.

Table 5. Chi- Square Goodness of Fit for an AED being within 1-5 minutes of walking and shocking a collapsed athlete

Type	**n**	**X^2**	**p value**
Yes	120	111.293	.000
No	3		

A chi- square goodness of fit test was used to determine if there will be an AED at all venues. There was

significant deviation from the hypothesized value found (χ^2 (1) = 55.122, p > .001).

Conclusion: Most ATs have an AED at all venues.

Table 6. Chi- Square Goodness of Fit for an AED being at every venue.

Type	**n**	**X^2**	**p value**
Yes	104	55.122	.000
No	21		

Additional Findings

In addition to hypotheses testing, descriptive testing was used for the rest of the survey as well. Some findings that were found to be important are listed in the tables below.

Table 7 represents the athletic trainers the responded that their athletic training facility has an Emergency Action Plan. Majority (82.8%) reported that they do have one. Only a small portion (0.7%) reported that their facility does not have one. 16.6% of the athletic trainers

did not complete the entire survey which is noted with a N/A.

Table 7. AT Facility has an Emergency Action Plan

Classification	Frequency	Valid Percent
Yes	125	82.8%
N/A	25	16.6%
No	1	0.7%
Unsure	0	0.0%

Table 8 represents the athletic trainers that reported that their athletic training facility has at least 1 AED. All of the athletic trainers who responded to this question reported that they have at least 1 AED, (83.4%). There was 16.6% that did not finish taking the entire survey.

Table 8. AT Facility has at least 1 AED

Classification	Frequency	Valid Percent
Yes	126	83.4%
N/A	25	16.6%
No	0	0.0%
Unsure	0	0.0%

Table 9 represents the athletic trainers who reported what elements are included in their preparticipation

cardiovascular screenings. Majority reported that they include a personal history (95.2%), a family history (94.4%), and a physical examination (89.7%). A small portion (2.4%) reported they were unsure.

Table 9. Elements of PPE Cardiovascular Screening

Classification	Frequency	Valid Percent
Personal History	120	95.2%
Family History	119	94.4%
Physical Examination	113	89.7%
Unsure	3	2.4%

DISCUSSION

The following section will include: 1) Discussion of Results, 2) Conclusions, and 3) Recommendations.

Discussion of Results

This study focused on how prepared athletic trainers are in managing sudden cardiac arrest. Athletic trainers have all the tools necessary to manage sudden cardiac arrest. The clinical presentation of sudden cardiac arrest in athletes is abrupt, and arrhythmia is usually instantaneous, which is why the first responder must be well prepared to reach, evaluate, and treat the athlete before death. The tools of preparedness in combatting sudden cardiac arrest is access to an AED, implementing and practicing an Emergency Action Plan, proper training in treating and recognizing SCA, and conducting thorough preparticipation physical exams.

The National Athletic Training Association (NATA) convened an Inter- Association Task Force to develop consensus recommendations on emergency preparedness and management of SCA in high school and college athletic programs. The task force included representatives from 15

national organizations with special interest in SCA in young athletes and a multidisciplinary group of health care professionals from athletic training, cardiology, electrophysiology, emergency medicine, emergency medical technicians, family medicine, orthopaedics, paramedics, pediatrics, physical therapy, and sports medicine. The Task Force published this set of guidelines in 2007 for essential elements of emergency planning for SCA. This includes ensuring a sufficient system for communicating with EMS, providing access to an automated external defibrillator and other necessary equipment to be utilized by trained responders, and practicing and perfecting a written Emergency Action Plan. These NATA guidelines are based off of other previously published guidelines such as the Medical Emergency Response Plan Initiative from the American Heart Association and the Guidelines for Emergency Medical Care in School from the American Academy of Pediatrics. This was to establish a standardized approach that all high schools and colleges should implement when preparing for cardiac emergencies.[1]

This study was to assess overall SCA emergency preparedness. The results from the survey showed that athletic trainers are prepared to manage SCA in regards to

the fact that the athletic trainer is able to successfully shock an athlete within 1-5 minutes of them collapsing and that there is an AED at every venue. The data for AEDs yielded encouraging results. There seems to be good coordination with EMS with respect to knowledge of the presence of an AED. The majority of athletic trainers reported that there is a large amount of people who are trained to use the AED. Majority of the respondents reported that athletic trainers, athletic training students, first responders, health services, coaches, athletic director, campus police, and public safety are all trained to use an AED. An additional finding that was extremely positive was that not a single athletic trainer responded that they did not have at least 1 AED in their athletic training facility.

The majority of the athletic trainers who responded to the survey, have established an Emergency Action Plan (82.8%). However, the details of the emergency action plans were not surveyed because of a malfunction in survey monkey. Some key measures that were not addressed are: visibility of EAP at every athletic venue, targeting a collapse-to-EMS call time and CPR initiation of <1 minute, and targeting a collapse to first AED shock within 3-5

minutes within the EAP. Future research could benefit these areas. Majority of the athletic trainers however did report that they practice their EAP at least once or more than once throughout the year.

In regards to the preparticipation cardiovascular screening of athletes portion of the survey, athletic trainers responded that 95.24% conduct a personal history, 94.44% conduct a family history, and 89.68% conduct a physical examination. Majority of the respondents inquired in the personal history section about exertional chest pain/discomfort (83.3%), unexplained syncope/ near syncope (81.8%), excessive exertional and unexplained dyspnea/fatigue associated with exercise (78.6%), prior recognition of a heart murmur (87.3%), and elevated systemic blood pressure (80.16%). While majority answered in the family history section of the PPE that they question about premature death in their family before the age of 50 years due to heart disease (92.9%) and specific knowledge of certain cardiac conditions in family members (84.9%)the percent that answered they ask about disability from heart disease in a close relative was only 60.32%. According to the American Heart Association, both the risk of heart disease and risk factors for heart disease are strongly

linked to family history.[9] If a relative (regardless of sex) has suffered a heart attack, one would have a great risk for developing heart disease.[9] This needs to be considered when an athletic trainer is conducting the family history section of a PPE. The American Heart Association recommends an inclusion of auscultation for heart murmurs, palpation of femoral pulses, examination for physical stigmata of Marfan Syndrome, and brachial artery blood pressure.[8] These cardiac screening recommendations are essential for identifying cardiovascular risks associated with physical activity. The physical component of the PPE portion of the survey, athletic trainers responded that they are looking for a heart murmur (82.5%), listening to brachial artery pulse (68.3%), and looking at the physical stigmata of Marfan Syndrome (52.4%). However, only a few (16.67%) are feeling femoral pulses to exclude aortic coarctation. When asked if they refer athletes who have positive findings on their cardiovascular PPE, 2.38% reported that they do not. While this may seem like a small percentage, it can be the reason for the death of an athlete, because they did not receive further evaluation of a cardiac abnormality.

Conclusions

After reviewing the results from this study, it is concluded that majority of athletic trainers are prepared in managing SCA because they have timely access to an AED that is 1-5 minutes away from walking and shocking a collapsed athlete. This study also found that majority of venues have access to an AED. These findings are compliant with the NATA Task Force Recommendations. While most of the findings in this survey were positive, there is always room for improvement in the management of SCA. Improving preparticipation cardiovascular physical exams and posting emergency action plans at every venue with targeted goals is essential for SCA preparedness. Research on the topic of SCA has provided the athletic training profession, as well as other medical professions, with valuable new knowledge over the last few years. The key to reducing the percentage of athletic deaths from SCA is found in proper preparedness in managing it.

Recommendations

Recommendations include surveying other districts within the NATA and at different settings such as high schools. This would give a better idea of how prepared athletic trainers are in managing sudden cardiac arrest.

Another possible area to be researched is the details of the preparticipation exam personal and family history section and identifying specific factors that could relate to SCA.

Another recommendation includes surveying the details of the Emergency Action Plans. This includes if it is posted at every athletic venue, contains targeted goals, and who is involved in the EAP.

A cardiologist on the panel of experts could also be beneficial for future reference in this study. Having a specialist's recommendations on a survey dealing with sudden cardiac arrest could increase the reliability and possibly change the questions being asked to the participants.

Specifically identifying the division that the athletic trainer works at with their specific answers could

also shed some light on the differences seen between work settings.

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APPENDICES

Review of the Literature

Sudden cardiac arrest affects more than 400,000 people annually in the United States and is the leading cause of sudden death among young athletes.[1] Cardiac catastrophes can occur in the absence of prior symptoms; however, proper training, knowledge, and emergency preparedness, can make all the difference.[1] Death due to sudden cardiac arrest that is witnessed can be successfully managed in some cases. However, most people who experience this condition die because of prolonged response time from onset of the fatal arrhythmia to defibrillation by trained treatment providers. Sudden cardiac arrest can be mistaken for other causes of collapse and athletic trainers should be trained to recognize sudden cardiac arrest in athletes with special focus on potential barriers such as inaccurate rescuer assessment of pulse or respirations, occasional or agonal gasping, and myoclonic jerking or seizure like activity.[1,2]

Athletes are considered the healthiest members of society and their unexpected death during training or physical activity stimulates debate and scrutiny over pre participation screening evaluations and appropriate emergency planning for athletic events. The following

literature explores all the different factors that contribute to sudden cardiac death and the athlete. Through the examination of all these different studies and reviews, the hope is to discover how prepared athletic trainers should be in management of sudden cardiac arrest.

Etiology/Background

The most common cause of sudden cardiac arrest in athletes younger than 35 years is a consequence of an underlying cardiac abnormality.[4] According to the American Heart Association, the cardiac problems that can cause sudden cardiac arrest include hypertrophic cardiomyopathy (HCM), anomalous origin of the left main coronary artery, other coronary abnormalities, myocarditis, and ruptured aortic aneurysm. Other causes of sudden cardiac arrest include cardiac concussion, drug related difficulties, and underlying coronary artery disease causing myocardial infarction with an associated fatal arrhythmia.[1] HCM is the most common cause of SCD in athletes. It is defined by unexplained and usually asymmetrical left ventricle hypertrophy with a maximal left ventricle wall thickness greater than 15 mm and a non-dilated ventricle. It is very

common for the diagnosis of HCM to be difficult because competitive athletes can have physiologic hypertrophy.[4] Elliot et al., especially focused on this cardiac problem, being that it is the most common in sudden cardiac death in athletes. He listed five established risk factors for SCD in HCM. They are a history of recurrent syncope, family history of SCD, severe left ventricle hypertrophy with a maximum wall thickness of more than 30 mm, abnormal blood pressure response to exercise in patients younger than 40 years, and non-sustained ventricular tachycardia. Elliot et al demonstrated that patients with two or more risk factors had significantly lower than six year survival rates compared to those with zero or one risk factor. [1,4,5]

Harmon et al., in the British Journal of Sports Medicine, examined collegiate athletes aged 17-24 years old. They looked retrospectively at five years of deaths from 2004-2008. They documented nine cases of sudden cardiac death per year. They looked at the statistics of sex, race, and sport. High risk subgroups were African American male basketball players.[21] This is similar to another study conducted by Israel in the Indian Heart Journal, hypertension predisposes independently to SCD via

left ventricular hypertrophy. This is very similar to HCM except that there is loss of parallel orientation of myofibers and resulting disarray may cause ventricular fibrillation. They also found that there is a greater prevalence of hypertension in African American men compared to white/caucasian men. [20]

Preparticipation Screening

Currently, according to the American Heart Association, they have recommended that competitive athletic prescreening consist of a targeted personal history, family history and physical examination. This recommendation outlines twelve key prescreening elements such as a history of elevated systemic blood pressure, knowledge of certain cardiac conditions in family members, and the presence of a heart murmur- that are designed to identify, or at least raise the suspicion of cardiovascular diseases that place certain athletes at risk. The athletes then receive ECGs, echocardiograms, and other follow-up tests only if the screening indicates the presence of a problem. Despite pre-participation screening, healthy

appearing athletes may harbor unsuspected cardiovascular diseases with the potential to cause death.[13]

Emergency Preparedness

Many health-related organizations have guidelines for managing sudden cardiac arrest during athletic practices and competitions. However, these guidelines have not directly linked emergency planning and sudden cardiac arrest management in athletics. The National Athletic Training Association convened an Inter- Association Task Force in 2006 to develop consensus recommendations on emergency preparedness and management of SCA in both high school and collegiate athletic programs. All the following recommendations are in agreement with the American Heart Association guidelines as well as for cardiopulmonary resuscitation and emergency cardiovascular care.

EMERGENCY ACTION PLAN RECOMMENDATIONS

The biggest strategy to combat SCD in student athletes is the level of emergency response preparedness. Studies according to Garritano et al., indicate that only 40% of high schools practice and review their EAP on an annual

basis.[19] The chance of survival of a person experiencing sudden cardiac arrest is reported to decline by 5% to 10% each minute the condition is left untreated. [1] White et al, reported that in a community in which target responders, including EMS personnel and police, were equipped with AEDs, and that the response time was improved 5.4 minutes resulting in a 49% survival rate in patients with SCA.

Establishing an Emergency Action Plan is the first step that every institution or organization that sponsors athletic activities should prepare. Core elements to an effective EAP include establishing an efficient communication system, training of likely first responders in CPR and AED use, acquiring the necessary emergency equipment, providing a coordinated and practiced response plan, and ensuring access to early defibrillation. The plan should identify the person and/or group responsible for documentation of personal training, equipment maintenance, actions taken during the emergency, and evaluation of the emergency response. The EAP should be developed by school personnel in consultation with local EMS personnel, school public safety officials, on-site first responders, and school administrators. It is important to designate an EAP

coordinator, which is usually an athletic trainer, team physician, nurse, or sports administrator. The EAP should be reviewed at least annually with athletic trainers, team and consulting physicians, athletic training students, school and institutional safety personnel, administrators, and coaches. The EAP should be coordinated with local EMS agency and integrated into the local EMS system. The local EMS agency should also conduct a "preincident" survey to identify any problems or poorly accessible areas for EMS personnel. The National Collegiate Athletic Association recommends that all institution-sponsored collegiate practices or competitions, as well as out of season practices and skills sessions have an EAP. Access to early defibrillation is critical in the management of SCA and developing an EAP; several time-sensitive intervals must be considered to increase the probability of a successful resuscitation for an SCA victim. The EAP should target a collapse-to-EMS call time and CPR initiation of less than 1 minute. A second target goal of less than three to five minutes from time of collapse to first shock is strongly recommended. Schools and institutions sponsoring athletic programs must determine if this target time interval of less than five minutes from collapse to defibrillation can

be achieved by athletic trainers/health care provider. A rapid system for communication must be in place linking all athletic facilities, practice fields, and other parts of the campus to the EMS system. A plan must be in place to efficiently direct EMS personnel to the location through a properly placed communication network. The communication network can be developed through existing telephones, cellular telephones, walkie-talkies, alarms, or an intercom system that links rescuers directly to the EMS or to a central location responsible for contacting the EMS and activating on-site responders. This will prevent critical delays. These communication systems should be checked before each practice or competition to ensure proper working order. A back up communication plan should be in place in case the primary communication system fails. In each EAP, should be the listing of emergency numbers as well as the street address of the venue and specific direction to guide EMS personnel. When activating the EMS system, the caller should alert the EMS to the condition of the athlete and the first aid treatment rendered to improve the onsite transfer of care to EMS personnel when they arrive on the scene. Within the emergency action plan, other things that should be addressed include making sure

keys to the gates or padlocks are easily accessible. The athletic trainer, staff member, and coach should have the appropriate keys. If there is an elevator within the building it must be established if it can accommodate a spine board or gurney. Carrying contact information for all athletes, coaches, and other personnel at all times, particularly when traveling. For minors, signed consent forms should also be available when traveling.

All necessary emergency equipment should be at the site or quickly accessible, and personnel must be trained in advance to use it properly. Resuscitation equipment should be placed in a central location that is highly visible and near a telephone or other means of activating the EMS system. All school staff should also be instructed on the location of the emergency equipment, and none of the equipment should be placed in a locked box, cabinet, or room that could delay emergency care.

- The basic resuscitation equipment for management of SCA should include:[1]
  - A pocket mask or barrier shield device for rescue breathing

- AED for early defibrillation
- AED application supplies.
  - heavy-duty scissors to remove clothing and expose the chest
  - towel to dry the chest
  - razor to shave chest hair
  - aluminum chlorhydrate spray
  - extra set of AED pads

In life threatening emergencies, an athlete should be transported by EMS personnel to the most appropriate receiving facility that is staffed and equipped to deliver optimal emergency care. Emphasis should be placed on having an ambulance on-site at high risk events. If an ambulance is on-site, a location should be designated that allows rapid access to enter and exit the venue. Each site should post written directions to guide EMS personnel to specific athletic facilities on campus.

The goal should be to reach a response time of less than one minute from collapse to EMS call, first aid and

CPR as appropriate, and in case of SCA, shock time of less than three to five minutes from initial collapse. Essential elements of emergency planning for SCA include training anticipated responders in CPR and AED use, establishing an effective communication system, ensuring access to early defibrillation, coordinating and integrating onsite responder and AED programs with the local EMS system, and practicing and reviewing the response plan[1,2,3,7]

RECOGNITION OF SCA

There are some signs and symptoms that may be misinterpreted by the athletic trainer as SCA. These barriers include inaccurate rescuer assessment of pulse or respirations. Occasional or agonal gasping can occur in the first minutes after SCA and may be misinterpreted as normal breathing.[23] Occasional gasping does not represent adequate breathing and should not prevent rescuers from initiating CPR. According to Drezner et al., rescuers fail to recognize the absence of a pulse in 10% of pulseless victims and fail to detect a pulse in 40% of victims with a pulse.[6] Athletic trainers must understand these potential barriers and obstacles to recognizing SCA as inaccurate assessments result in critical delays or even failure to

activate the EMS system, initiate CPR, and provide early defibrillation.

Some other symptoms athletes may experience that an athletic trainer should be prepared for:[23]

Table 1. Signs and Symptoms of Sudden Cardiac Arrest

☐ Tachycardia
☐ Fatigue
☐ Feeling of dizziness
☐ Loss of consciousness
☐ Chest pain
☐ Shortness of breath
☐ Weakness
☐ Palpitations
☐ Vomiting

Training

Athletic trainers must be able to demonstrate ongoing certification in Emergency Cardiac Care.[34] Athletic trainers need to be current with the ECC requirements throughout the reporting period and their ECC certification must include all the following: Adult CPR, Pediatric CPR, Second Rescuer CPR, AED, Airway obstruction, and Barrier devices.

For treatment to be successful, it is critical for providers to be prepared with a sequence of responses. This chain of survival, recommended by the American Red Cross, includes prompt emergency medical system activation, early cardiopulmonary resuscitation by a first or target responder in less than two minutes, early defibrillation, early advanced life support, and late advanced life support.[6] These links must have as short of a time delay as possible to increase survival rates.[1, 6,12]

Early CPR and Early Defibrillation

The American Heart Association's Chain of Survival depicts critical actions required to treat life threatening emergencies. The links within this include:

- Early access to the emergency response system
- Early CPR to support circulation to the heart and brain until normal heart activity is restored
- Early defibrillation to treat cardiac arrest caused by ventricular fibrillation
- Early advanced care by EMS and hospital personnel

Early CPR can enable the heart to survive longer when it is in fibrillation. Larson et al., calculated that a 5.5% per minute decrease in survival and attributed 2.2% of that decline to each minute of delay in CPR initiation.[1] CPR at best can deliver 60 to 80 mm Hg of pressure to the heart only generating approximately 30% of the cardiac output. This is why it is critical to have early defibrillation. According to Weisfeldt and Brecker, outcomes may be better if the shock of the AED is always preceded by a brief period of CPR compared to immediate defibrillation.[1] Thus as SCA increases, initial chest compressions and oxygen delivery to vital tissues may take priority over defibrillation in some patients, with the delay of shock delivery until 1-2 minutes of CPR has been completed.[5,22,23] However, according to Glen et al, more than 95% of athletes

who survived, received defibrillation shock in the first minute of arrest.[1] Each minute of delay in initiating defibrillation after SCA lasting 9.4 minutes leads to a 5% to 10% decrease in a person's survival, even if they had been receiving CPR during that time. Not all athletes can be treated with electric defibrillation shocks. If pulseless electric activity is occurring, the heart muscle is not responding to electric activity, CPR is required over the AED.[1]

Early Advanced Life Support and Late Advanced Life Support

Defibrillation, early intubation techniques, external pacemakers, cardiac medications, and early transport to cardiac care units or emergency departments complete this link to survival. With the prompt activation and arrival of EMS, high quality CPR and AED, and the smooth transition of the care of the athlete from the athletic trainer to the EMS begin early advanced life support treatment. The late advanced life support is the full spectrum of advanced life support offered through emergency departments and cardiac care units, their staff and cardiologists and cardiovascular surgeons. If the athletic care medical team

is not well prepared, the athlete will not survive to take advantage of this late advanced life support treatments. [1]

Management of SCA in an unwitnessed collapse

According to Drezner et al., if the athlete is found collapsed and unresponsive and the time lapse from onset of SCA is unknown, rescuers may consider five cycles or 2 minutes of CPR before checking the rhythm and attempting defibrillation. After a prolonged cardiac arrest, a brief period of CPR can deliver oxygen and energy substrates.

Management of SCA in a witnessed collapse

Several management steps can be taken simultaneously when a person is present during a witnessed SCA. Beginning with initial assessment of responsiveness, by tapping the shoulder. If an AED is not readily available, assessment of airway should be next. If the victim is breathing CPR is not required and breathing should be continually reassessed. If normal breathing is not detected within ten seconds, rescue breathing should be provided. The rate of rescue breathing should be 1 breath every 5-6 seconds, or about 10-12 breaths per minute. If there is no breathing and no pulse CPR should be initiated. Effective chest

compressions in adults are performed by placing the heel of the hands on the lower half of the sternum and depress the chest at a depth of two inches. The universal rate is at least 100 compressions per minute. The AED should be applied as soon as it arrives. CPR should continue while attaching the AED leads.[6,12,23,24]

National Athletic Training Competencies

According to the National Athletic Training Association, the 5th edition of the Athletic Training Education Competencies provides educational program personnel and others with the knowledge, skills, and clinical abilities to be mastered by students enrolled in professional athletic training education programs. Mastery of these set competencies provides the entry-level athletic trainer with the capacity to provide athletic training services to clients and patients of varying ages, lifestyles, and needs. The Commission on Accreditation of Athletic Training Education (CAATE) requires that the competencies be instructed and evaluated in each accredited

professional athletic training education program. These competencies serve as a companion document to the accreditation standards, which identify the requirements to acquire and maintain accreditation, published by the CAATE. The Competencies that are associated with sudden cardiac arrest can be found in Table II (Appendix C4).

Summary Statement

The most important factor in SCA survival is the presence of a trained rescuer who can initiate CPR and has access to early defibrillation. The athletic community is in a unique position to have trained coaches, officials, and other targeted responders, and, in some circumstances, on-site athletic trainers, school nurses, and team physicians respond immediately to SCA at organized athletic events and practices. Comprehensive emergency planning is needed for high school and college athletic programs to ensure an efficient and structured response to SCA.[1,2,3,13,27,28] Essential elements to an EAP include establishing an effective communication system, training of

anticipated responders in CPR and AED use, access to an AED for early defibrillation, acquisition of necessary emergency equipment, coordination and integration of on-site responder and AED programs with the local EMS system, and practice and review of the response plan. High suspicion of SCA should be maintained in any collapsed and unresponsive athlete, with application of an AED as soon as possible for rhythm analysis and defibrillation if indicated.[28,29] Interruptions in chest compressions for rhythm analysis and shock delivery should be minimized, and rescuers should be prepared to resume CPR, beginning with chest compressions, as soon as a shock is delivered. Improved education in the recognition of SCA, enhanced emergency preparedness, training in current CPR protocols, and increased access to AEDs for early defibrillation are needed to improve survival from SCA in athletics.[30,31]

Sudden cardiac death is continuing to persist in athletics. As athletic trainers, our job is to continue our knowledge of the subject in any way we can and always be prepared to manage it. It is critical that athletic trainers recognize SCA, the symptoms, treatment methods, management, and prevention skills, all through the required

training. The literatures reviewed are great tools to contribute to the investigation of learning how athletic trainers should be prepared in managing sudden cardiac arrest.

In order to be properly prepared to manage sudden cardiac arrest, athletic trainers must be aware of the recognition of sudden cardiac arrest and the potential barriers that may interfere with this. Pre participation screening test should be implemented prior to the beginning of the athlete's season. This should include a thorough family and personal history and physical examination. Athletes who are identified as at risk or who present with a potential cardiac problem, should be followed up with appropriate testing such as an ECG or echocardiogram.

Establishing an Emergency Action Plan is essential to combating sudden cardiac arrest. It should contain all the core elements in relation to the communication system, emergency equipment, plan of action, and appropriate personnel numbers. This plan should be practiced and reviewed annually.

Athletic trainers must be demonstrating ongoing certification in Emergency Cardiac Care, be current with

the ECC requirements, and be certified in: Adult CPR, Pediatric CPR, Second Rescuer CPR, AED, Airway Obstruction, and Barrier devices. They also must follow the Chain of Survival of early access to the emergency response system, early CPR to support circulation, early defibrillation, and early advanced life support by EMS. By reviewing all the necessary requirements and recommendations athletic trainers should have the necessary means to properly care for sudden cardiac arrest.

APPENDIX B

The Problem

Statement of the Problem

Death due to sudden cardiac arrest can be preventable in many cases, yet it is the number one cause of death among athletes. Unfortunately, sudden cardiac arrest can be mistaken for other causes of collapse, which can lead to treatment delays. Increased training, better emergency preparedness, and correct identification of sudden cardiac arrest can make the difference in life and death. Training and preparedness are all keys to being successful when managing sudden cardiac arrest. If athletic trainers know the best methods of preparedness in response, equipment, and signs and symptoms, survival rates of SCA could possibly increase.

The purpose of this study is to investigate how prepared athletic trainers are in managing sudden cardiac arrest. The number one goal of athletic trainers is to give the best health care possible to athletes. This issue in the field of athletic training is extremely important and this investigation could help determine if athletic trainers are prepared to manage sudden cardiac arrest.

Definition of Terms

The following definitions of terms will be defined for this study:

Hypertrophic Cardiomyopathy- primary disease of the myocardium (the muscle of the heart) in which a portion of the myocardium is hypertrophied (thickened) without any obvious cause, creating functional impairment of the cardiac muscle. It is a leading cause of sudden cardiac death in young athletes

Preparticipation Physical Exam- A physical exam that may be required by law before a child or adolescent can participate in school-related sports; PPEs are intended to detect any cardiovascular or musculoskeletal condition that may increase risk of injury or death

Sudden Cardiac Arrest- condition in which the heart suddenly and unexpectedly stops beating. If this happens, blood stops flowing to the brain and other vital organs.

Sudden Cardiac Death- unexpected death due to cardiac causes that occurs in a short time period in a person with known or unknown cardiac disease.

Basic Assumptions

The following are basic assumptions of the study:

1) The survey will have content validity after a review by a panel of experts.

2) The subjects will be honest when they completing the survey and to the best of their ability.

Limitations of the Study

The following are possible limitations of the study:

1) Not every athletic trainer from District 2 will respond.

2) Subjects can be inconsistent in responses.

3) Only athletic trainers from District 2 will be surveyed.

Significance of the Study

Sudden cardiac arrest affects more than 400,000 people annually in the United States and is the leading cause of death among athletes.[1] The sudden unexpected death of an athlete may be the biggest tragedy athletic trainers experience. With this, brings to the forefront many gaps in knowledge regarding how to prepare and manage these tragic events. Sudden cardiac death could possibly be prevented, so it is extremely critical that healthcare professionals understand every aspect of the pathology. Training and preparedness are both keys to being successful when coming in contact with an athlete that has undergone cardiac arrest. Emergency preparedness, through a structured and detailed emergency action plan that is specific with every athletic venue

and encompass emergency communication, personnel, equipment, and transportation to appropriate emergency facilities is essential.[1] Another critical aspect of emergency preparedness is early defibrillation. "A target goal of less than three to five minutes from the time of collapse to the first shock" is strongly recommended.[1] Management is also key to success. This is where proper training comes into play. Athletic trainers need to be prepared in CPR, AED, and through the identification of cardiac arrest. Athletic trainers are expected to know the best methods of response, equipment, and always be properly prepared. In doing this, survival rate could dramatically increase.

This subject is extremely important because it can determine between life and death. As athletic trainers, it is our job to give the best care we can and continue to increase our knowledge in all areas. Most athletes who experience sudden cardiac arrest die because of prolonged response time from onset of the fatal arrhythmia to defibrillation by the treatment provider.[3] The goal of this investigation is to determine if athletic trainers are properly prepared to manage a sudden cardiac arrest situation. In doing so, the results can help determine gaps in preparation as well as areas athletic trainers exceed in preparation.

APPENDIX C

ADDITIONAL METHODS

APPENDIX C1

Institutional Review Board –

California University of Pennsylvania

California University of Pennsylvania

55

Proposal Number

Date Received

IRB Review Request

Institutional Review Board (IRB) approval is required before beginning any research and/or data collection involving human subjects

Submit this form to instreviewboard@calu.edu or Campus Box #109

Project Title: Are Athletic Trainers Prepared to Manage Sudden Cardiac Arrest

Researcher/Project Director [redacted]

Phone# (717) 495-7078 *E-mail Address SHE3719@calu.edu*

Faculty Sponsor (if researcher is a student) [redacted]

Department Health Science

Anticipated Project Dates [redacted] *to* 3/2017

Sponsoring Agent (if applicab/e) [redacted]

Project to be Conducted at California University of Pennsylvania

Project Purpose: CMThesis 0Research O Class Project O Other

Keep a copy of this form for your records.

Required IRB Training

All researchers must complete an approved Human Participants Protection training course. The training requirement can be satisfied by completing the CIT! (Collaborative Institutional Training Initiative) online course at http://www.c.itiprognun.org *New users should affiliate with "California University of Pennsylvania" and select the "All Researchers Applying for IRB Approval"course option. A copy of your certification of training must be attached to this IRB Protocol. If you have completed the training within the past 3 years and have already provided documentation to the IRB, plea.ve provide the following:*

Please attach a typed, detailed summary of your project AND complete items 2 through 6.

Provide an overview of your project-proposal describing what you plan to do and how you will go about doing it. Include any hypothesis(ses)or research questions that might be involved and explain how the information you gather will be analyzed. All items in the Review Request Checklist, (see below) must be addressed.

The purpose of this study is to examine if Athletic Trainers are prepared to manage sudden cardiac arrest. The following will be discussed: research design, subjects, instruments, procedures, hypothesis, and data analysis. This research will use a descriptive design for the study. The subjects that will be used for this study will be 1000 volunteers from the population of District II Collegiate Athletic Trainers from the NATA Research Foundation. Informed consent will be assumed by the subject's participation in the survey. Each participant's identity and personal information will remain anonymous and will not be included in the study. The survey consists of six sections. The first section is comprised of demographic questions that include gender, age, college division that they work at, and the state they reside in. The next section is comprised of questions pertaining to preparticipation cardiovascular screening of athletes. The third section is comprised of two questions about whether they have an AED as well as an Emergency Action Plan. The third section has questions about the characteristics of their Emergency Action Plan. The fourth section is questions about the characteristics of their AED. The last section is aimed toward the colleges that do not have an AED. Hypotheses for this study include: 1. There will be an AED within 1-5 minutes of walking and shocking a collapsed athlete. 2. There will be an AED at all venues. A chi- square goodness of fit test will be used to determine the hypotheses. All responses will be anonymous and stored on a password protected university server. The survey was reviewed by a panel of two athletic trainers and one physical therapist to ensure content validity.

The researcher will obtain approval from the IRB at California University of Pennsylvania before any research is conducted. The study will be distributed through an email to District II Collegiate Athletic Trainers. Instructions for the survey will be included in the email along with the link to take the online survey. In addition, accompanying the survey will be a cover letter that explains the purpose of the study. The survey will be open for a total of two weeks. A follow up email will be sent after the first week, encouraging participants to complete the survey.

I. Section 46.11 of the Federal Regulations state that research proposals involving human subjects must satisfY certain requirements before the IRB can grant approval. You should describe in detail how the following requirements will be satisfied. Be sure to address each area separately.
(text boxes will expand to fit responses)

a.How will you insure that any risks to subjects are minimized? If there are potential risks, describe what will be done to minimize these risks. If there are risks, describe why the risks to participants are reasonable in relation to the anticipated benefits.

The risks to the participants in this study are minimal due to the fact that participation is limited to the completion of a survey. All responses will be confidential. The survey results will be kept on password protected accounts, and once all data is collected it will be entered into an electronic spread sheet on a secure server. Subject participation is completely voluntary, as noted in the cover letter, and the subjects can end participation at any moment without any penalty.

b.How will you insure that the selection of subjects is equitable? Take into account your purpose(s). Be sure you address research problems involving vulnerable populations such as children, prisoners, pregnant women, mentally disabled persons, and economically or educationally disadvantaged persons. If this is an in-class project describe how you will minimize the possibility that students will feel coerced.

The selection is through random selection through the National Athletic Training Association. There is no forcing of a subject to volunteer. There is also no cohorsion due to the fact that there will be no individuals holding it against the subject if the survey is done or not done.

c.How will you obtain informed consent from each participant or the subject's legally authorized representative and ensure that all consent forms are appropriately documented? Be sure to attach a copy of your consent form to the project summary.

The survey cover letter containing the link to the survey will state that the subject has the right to not participate or discontinue participation at any time. Informed consent will be implied by submission of the survey. This will be stated implicitly in the survey cover letter.

d.Show that the research plan makes provisions to monitor the data collected to insure the safety of all subjects. This includes the privacy of subjects' responses and provisions for maintaining the security and confidentiality of the data.

The survey was developed using Survey Monkey and all results are on a password protected account. All data will be coded with a subject number and not the subjects name or associated with other identifiable information. Once the data is received, the results will be entered into a password protected electronic spread sheet and held on a secure server. Only the researcher and advisor will have access to the passwords to access the data.

2. *Check the appropriate box(es) that describe the subjects you plan to target.* 3

[X] *Adult volunteers*	D *Mentally Disabled People*
D *CAL University Students*	D *Economically Disadvantaged People*
D *Other Students*	D *Educationally Disadvantaged People*
D *Prisoners*	D *Fetuses or fetal material*
D *Pregnant Women*	D *Children Under 18*
D *Physically Handicapped People*	D *Neonates*

. 4. *Is remuneration involved in your project? Yes or* _X *No. If yes, Explain here.*

5. *Is this project part of a grant? Yes or* X *No If yes, provide the following information:*

Title of the Grant Proposal _____

Name of the Funding Agency _____

Dates of the Project Period _____

~~6. Does your project involve the debriefing of those who participated? Yes or [X]No If Yes, explain the~~ *debriefing process here*

7. *If your* ~~project involves a questionnaire orinterview, ensure that it meets the requirements indicated in the~~ *Survey/Interview/Questionnaire checklist.*

Survey/Interview/Questionnaire Consent Checklist cvo2J2091

This form MUST accompany all IRB review requests
Does your research involve ONLY a survey, interview or questionnaire? YES-Complete this form
NO-You MUST complete the "Informed Consent Checklist"-skip the remainder of this form
Does your survey/interview/questionnaire cover letter or explanatory statement include:

[X] (1) Statement about the general nature of the survey and how the data will be used?
[X] (2) Statement as to who the primary researcher is, including name, phone, and email address?

[X] (3) FOR ALL STUDENTS: Is the faculty advisor's name and contact information provided?

[X] (4) Statement that participation is voluntary?

[X] (5) Statement that participation may be discontinued at any time without penalty and all data discarded?
[X] (6) Statement that the results are confidential?

[X] (7) Statement that results are anonymous?

[X] (8) Statement as to level of risk anticipated or that minimal risk is anticipated? (NOTE: If more than minimal risk is anticipated, a full consent form is required-and the Informed Consent Checklist must be completed)
[X] (9) Statement that returning the survey is an indication of consent to use the data?

[X] (10) Who to contact regarding the project and how to contact this person?

[X] (11) Statement as to where the results will be housed and how maintained? (unless otherwise approved by the IRB, must be a secure location on University premises)
[X] (12) Is there text equivalent to: "Approved by the California University of Pennsylvania Institutional Review Board. This approval is effective nn/nnlnn and expires mm/mm/mm"? (the actual dates will be specified in the approval notice from the IRB)?
[X] (13) FOR ELECTRONIC/WEBSITE SURVEYS: Does the text of the cover letter or explanatory statement appear before any data is requested from the participant?
[X] (14) FOR ELECTONIC/WEBSITE SURVEYS: Can the participant discontinue participation at any point in the process and all data is immediately discarded?

Informed Consent Checklist (v021209)

This form MUST accompany all IRB review requests

Does your research involve ONLY a survey, interview, or questionnaire?

X YES-DO NOT complete this form. You MUST complete the "Survey/Interview/Questionnaire Consent Checklist" instead.

NO-Complete the remainder of this form.

1. Introduction (check each)
   - U (1.1) Is there a statement that the study involves research?
   - U (1.2) Is there an explanation of the purpose of the research?
2. Is the participant. (check each)
   - U (2.1) Given an invitation to participate?
   - U (2.2) Told why he/she was selected.
   - U (2.3) Told the expected duration of the participation.
   - U (2.4) Informed that participation is voluntary?
   - U (2.5) Informed that all records are confidential?
   - U (2.6) Told that he/she may withdraw from the research at any time without penalty or loss of benefits?
   - U (2.7) 18 years of age or older? (if not, see Section #9, Special Considerations below)
3. Procedures (check each).
   - U (3.1) Are the procedures identified and explained?
   - U (3.2) Are the procedures that are being investigated clearly identified? U (3.3) Are treatment conditions identified?
4. Risks and discomforts. (check each)
   - U (4.1) Are foreseeable risks or discomforts identified?
   - U (4.2) Is the likelihood of any risks or discomforts identified?
   - U (4.3) Is there a description of the steps that will be taken to minimize any risks or discomforts? U (4.4) Is there an acknowledgement of potentially unforeseeable risks?
   - U (4.5) Is the participant informed about what treatment or follow up courses of action are available should there be some physical, emotional, or psychological harm?
   - U (4.6) Is there a description of the benefits, if any, to the participant or to others that may be reasonably expected from the research and an estimate of the likelihood of these benefits?
   - U (4.7) Is there a disclosure of any appropriate alternative procedures or courses oftreatment that might be advantageous to the participant?
5. Records and documentation. (check each)
   - U (5.1) Is there a statement describing how records will be kept confidential?
   - U (5.2) Is there a statement as to where the records will be kept and that this is a secure location? U (5.3) Is there a statement as to who will have access to the records?

6. For research involving more than minimal risk (check each),

U (6.1) Is there an explanation and description of any compensation and other medical or counseling treatments that are available if the participants are injured through participation?

U (6.2) Is there a statement where further information can be obtained regarding the treatments?

U (6.3) Is there information regarding who to contact in the event of research-related injury?

7. Contacts.(check each)

U (7.1) Is the participant given a list of contacts for answers to questions about the research and the participant's rights?

U (7.2) Is the principal researcher identified with name and phone number and email address?

U (7.3) FOR ALL STUDENTS: Is the faculty advisor's name and contact information provided?

8. General Considerations (check each)

U (8.1) Is there a statement indicating that the participant is making a decision whether or not to participate, and that his/her signature indicates that he/she has decided to participate having read and discussed the information in the informed consent?

U (8.2) Are all technical terms fully explained to the participant?

U (8.3) Is the informed consent written at a level that the participant can understand?

U (8.4) Is there text equivalent to: "Approved by the California University of Pennsylvania Institutional Review Board. This approval is effective nn/nn/nn and expires mm/mm/mm"? (the actual dates will be specified in the approval notice from the IRB)

9. Specific Considerations (check as appropriate)

U (9.1) If the participant is or may become pregnant is there a statement that the particular treatment or procedure may involve risks, foreseeable or currently unforeseeable, to the participant or to the embryo or fetus?

U (9.2) Is there a statement specifying the circumstances in which the participation may be terminated by the investigator without the participant's consent?

U (9.3) Are any costs to the participant clearly spelled out?

U (9.4) If the participant desires to withdraw from the research, are procedures for orderly termination spelled out?

U (9.5) Is there a statement that the Principal Investigator will inform the participant or any significant new findings developed during the research that may affect them and influence their willingness to continue participation?

U (9.6) Is the participant is less than 18 years of age? If so, a parent or guardian must sign the consent form and assent must be obtained from the child

U Is the consent form written in such a manner that it is clear that the parent/guardian is giving permission for their child to participate?

U Is a child assent form being used?

L] Does the assent form (if used) clearly indicate that the child can freely refuse to participate or discontinue participation at any time without penalty or coercion?

U (9.7) Are all consent and assent forms written at a level that the intended participant can understand? (generally, 8th grade level for adults, age-appropriate for children)

California University of Pennsylvania Institutional Review Board
Review Request Checklist (v021209)

This form MUST accompany all IRB review requests.
Unless otherwise specified, ALL items must be present in your review request.

Have you:

[X] (1.0) FOR ALL STUDIES: Completed ALL items on the Review Request Form? Pay particular attention to:

[X] (1.1) Names and email addresses of all investigators

[X] (1.1.1) FOR ALL STUDENTS: use only your CalU email address)

[X] (1.1.2) FOR ALL STUDENTS: Name and email address ofyour faculty research advisor

[X] (1.2) Project dates (must be in the future-no studies will be approved which have already begun or scheduled to begin before final IRB approval-NO EXCEPTIONS)

[X] (1.3) Answered completely and in detail, the questions in items 2a through 2d?

[X] 2a: NOTE: No studies can have zero risk, the lowest risk is "minimal risk". If more than minimal risk is involved you MUST:

[ ] i. Delineate all anticipated risks in detail;

[ ] ii. Explain in detail how these risks will be minimized;

[ ] iii. Detail the procedures for dealing with adverse outcomes due to these risks.

[ ] iv. Cite peer reviewed references in support of your explanation.

[X] 2b. Complete all items.

[X] 2c. Describe informed consent procedures in detail.

[X] 2d. NOTE: to maintain security and confidentiality of data, all study records must be housed in a secure (locked) location ON UNIVERSITY PREMISES. The actual location (department, office, etc.) must be specified in your explanation and be listed on any consent forms or cover letters.

[X] (1.4) Checked all appropriate boxes in Section 3? If participants under the age of 18 years are to be included (regardless of what the study involves) you MUST:

[ ] (1.4.1) Obtain informed consent from the parent or guardian-consent forms must be written so that it is clear that the parent/guardian is giving permission for their child to participate.

[ ] (1.4.2) Document how you will obtain assent from the child-This must be done in an age-appropriate manner. Regardless of whether the parent/guardian has given permission, a child is completely free to refuse to participate, so the investigator must document how the child indicated agreement to participate ("assent").

[ ] (1.5) Included all grant information in section 5?

[ ] (1.6) Included ALL signatures?

LJ (2.0) FOR STUDIES INVOLVING MORE THAN JUST SURVEYS, INTERVIEWS, OR QUESTIONNAIRES:

LJ (2.1) Attached a copy of all consent form(s)?

LJ (2.2) FOR STUDIES INVOLVING INDIVIDUALS LESS THAN 18 YEARS OF AGE: attached a copy of all assent forms (if such a form is used)?

[_] (2.3) Completed and attached a copy of the Consent Form Checklist? (as appropriate-see that checklist for instruction

[X] (3.0) FOR STUDIES INVOLVING ONLY SURVEYS, INTERVIEWS, OR QUESTIONNAIRES:

[X] (3.1) Attached a copy of the cover letter/information sheet?

[X] (3.2) Completed and attached a copy of the Survey/Interview/Questionnaire Consent Checklist? (see that checklist for instructions)

[X] (3.3) Attached a copy of the actual survey, interview, or questionnaire questions in their final form?

[X] (4.0) FOR ALL STUDENTS: Has your faculty research advisor:

[X] (4.1) Thoroughly reviewed and approved your study?

[X] (4.2) Thoroughly reviewed and approved your IRB paperwork? including:

[X] (4.2.1) Review request form,

[X] (4.2.2) All consent forms, (ifused)

[X] (4.2.3) All assent forms (ifused)

[X] (4.2.4) All Survey/Interview/Questionnaire cover letters (if used)

[X] (4.2.5) All checklists

[X] (4.3) IMPORTANT NOTE: Your advisor's signature on the review request form indicates that they have thoroughly reviewed your proposal and verified that it meets all IRB and University requirements.

[X] (5.0) Have you retained a copy of all submitted documentation for your records?

Project Director's Certification

Program Involving
HUMAN SUBJECTS

The proposed investigation involves the use of human subjects and I am submitting the complete application form and project description to the Institutional Review Board for Research Involving Human Subjects.

I understand that Institutional Review Board (IRB) approval is required before beginning any research and/or data collection involving human subjects. If the Board grants approval of this application, I agree to:

1. Abide by any conditions or changes in the project required by the Board.
2. Report to the Board any change in the research plan that affects the method of using human subjects before such change is instituted.
3. Report to the Board any problems that arise in connection with the use of human subjects.
4. Seek advice of the Board whenever I believe such advice is necessary or would be helpful.
5. Secure the informed, written consent of all human subjects participating in the project.
6. Cooperate with the Board in its effort to provide a continuing review after investigations have been initiated.

I have reviewed the Federal and State regulations concerning the use of human subjects in research and training programs and the guidelines. I agree to abide by the regulations and guidelines aforementioned and will adhere to policies and procedures described in my application. I understand that changes to the research must be approved by the IRB before they are implemented.

Professional (Faculty/Staff) Research

Project Director's Signature

Student or Class Research

Student Researcher's Signature

ıg Faculty Member's Signature

ACTION OF REVIEW BOARD (IRB use only)

The Institutional Review Board for Research Involving Human Subjects has reviewed this application to ascertain whether or not the proposed project:

1. provides adequate safeguards of the rights and welfare of human subjects involved in the investigations;
2. uses appropriate methods to obtain informed, written consent;
3. indicates that the potential benefits of the investigation substantially outweigh the risk involved.

Institutional Review Board
California University of Pennsylvania
Morgan Hall, 310
250 University Avenue
California, PA 15419
instreviewboard@calu.edu
Robert Skwarecki, Ph.D., CCC-SLP,Chair

Dear Ms. Shearer :

Please consider this email as official notification that your proposal titled "Are Athletic Trainers Prepared to Manage Sudden Cardiac Arrest" (Proposal #15-069) has been approved by the California University of Pennsylvania Institutional Review Board as submitted.

The effective date of the approval is 04/09/2016 and the expiration date is 04/08/2017. These dates must appear on the consent form.

Please note that Federal Policy requires that you notify the IRB promptly regarding any of the following:

(1) Any additions or changes in procedures you might wish for your study (additions or changes must be approved by the IRB before they are implemented)

(2) Any events that affect the safety or well-being of subjects

(3) Any modifications of your study or other responses that are necessitated by any events reported in (2).

(4) To continue your research beyond the approval expiration date of 04/08/2017 you must file additional information to be considered for continuing review. Please contact instreviewboard@calu.edu

Please notify the Board when data collection is complete.

Regards,

Robert Skwarecki, PhD, CCC-SLP

Appendix C2

How Prepared Are Athletic Trainers in Managing Sudden Cardiac Arrest Survey

California University of Pennsylvania

California University of Pennsylvania

Department of Health Sciences

Please take a moment to complete this survey evaluating how prepared you are as an Athletic Trainer in managing Sudden Cardiac Arrest. Your responses are confidential and appreciated.

Demographic Information

1. Age:

- o Under the age of 18
- o 20-25
- o 26-31
- o 32-37
- o 38-43
- o 44-49
- o 50-55
- o 56-61
- o >61

Note: If under the age of 18 is checked, subjects will be directed to the Survey Conclusion page and not answer any further question

2. What is your gender?

- o Female
- o Male

3. Collegiate Division:

- o I
- o II
- o III
- o Other [ ]

4. State Residency:

- o Pennsylvania
- o New Jersey
- o Delaware
- o New York

Preparticipation Cardiovascular Screening of Athletes

5. What elements does your PPE have in regards to cardiovascular screening?

- o Personal History
- o Family History
- o Physical Examination
- o Unsure
- o Other ☐

6. What components are part of your athletes' PPE's Personal History Section in regards to cardiovascular screening?

- o Exertional chest pain/ discomfort
- o Unexplained syncope/ near- syncope
- o Excessive exertional and unexplained dyspnea/fatigue, associated with exercise
- o Prior recognition of a heart murmur
- o Elevated systemic blood pressure
- o Other ☐
- o Unsure

7. What components are part of your athletes' Family History section of the PPE in regards to cardiovascular screening?

- o Premature death (sudden and unexpected, or otherwise) before age 50 years due to heart disease, in ≥1 relative
- o Disability from heart disease in a close relative < 50 years of age
- o Specific knowledge of certain cardiac conditions in family members: hypertrophic or dilated cardiomyopathy, long- QT syndrome or other ion channelopathies, Marfan syndrome, or clinically important arrhythmias physical examination
- o Other ☐
- o Unsure

8. What components are part of your athlete's physical examination of the PPE in regards to cardiovascular screening?

- o Heart murmur
- o Femoral pulses to exclude aortic coarctation
- o Physical stigmata of Marfan syndrome
- o Brachial artery blood pressure
- o Other ☐
- o Unsure

9. If any athletes have positive findings on their cardiovascular PPE do you refer them to a specialist?

- Yes
- No
- Unsure

Association between Collegiate Divisions: Emergency Action Plans and Automated External Defibrillators (AEDs)

10. Does your Athletic Training facility have an Emergency Action Plan?

- Yes
- No
- Unsure

11. Does your Athletic Training facility have at least 1 AED?

- Yes
- No
- Unsure

Features of Emergency Action Plans

12. Is your Emergency Action Plan visible at every athletic venue?

- Yes
- No
- Unsure
- N/A

13. Does your Emergency Action Plan target a collapse- to EMS call time and CPR initiation of <1 minute?

- Yes
- No
- Unsure
- N/A

14. Does your Emergency Action Plan target a collapse- to first AED shock within 3-5 minutes?

- Yes
- No
- Unsure
- N/A

15. Does your local EMS have access to your Emergency Action Plan?

- Yes
- No
- Unsure
- N/A

16. How often does your Athletic Training facility practice their Emergency Action Plan?

- <Once a year
- >Once a year
- Never
- Unsure
- Other
- N/A

17. How does your Athletic Training facility communicate with EMS during emergencies?

- Cell Phone
- Walkie- Talkie
- Alarm
- Unsure
- Other
- N/A

18. What Medical Professionals are included in your Emergency Action Plan?

- Athletic Trainer
- First Responder
- Athletic Training Student
- Health Services
- Team MD
- EMS
- Health Services

- Campus Police
- Other
- N/A
- Unsure

Characteristics of Plans for Use of Automated External Defibrillator (AED)

19. Is your AED within 1-5 minutes of walking and shocking a collapsed athlete?

- Yes
- No
- Unsure
- N/A

20. Do you have an AED at all venues?

- Yes
- No
- Unsure
- N/A

21. Is EMS aware that your Athletic Training Facility has an AED?

- Yes
- No
- Unsure
- N/A

22. How many AEDs are available in your Athletic Training Facility?

- 1
- 2-5
- 6-10
- >11
- Unsure
- N/A

23. Has your AED ever been used?

- Yes
- No
- Unsure
- N/A

24. How often is your AED maintained?

- o < Once per year
- o > Once per year
- o Never
- o Unsure
- o N/A

25. How many individuals are trained to use an AED at your Athletic Training facility?

- o 1-10
- o 11-20
- o 21-50
- o >51
- o Unsure
- o N/A

26. Who is trained to use the AED in your Athletic Training facility?

- o Athletic Trainer
- o Athletic Training Students
- o First Responder
- o Health Services
- o Coaches
- o Athletic Director
- o Campus Police
- o Public Safety
- o Unsure
- o Other [ ]
- o N/A

Characteristics of Colleges without AEDs

27. Has there been a Cardiac Arrest at your Athletic Training Facility within the past 5 years?

- o Yes
- o No
- o Unsure

28. Are there athletes that are attending who are at risk for Sudden Cardiac Arrest?

- o Yes
- o No
- o Unsure

29. Can EMS achieve call to shock interval in less than 5 minutes?

- o Yes
- o No
- o Unsure

30. What are the barriers to obtaining an AED?

- o I feel it is unnecessary
- o Lack of funds
- o Lack of ability to train people
- o No barriers
- o Other [ ]
- o Unsure

Survey Conclusion: Thank you for your time in completing this survey!

Appendix C3

Cover Letter

California University of Pennsylvania

Date:

Dear:

My name is Cassidy Shearer and I am a graduate student at California University of Pennsylvania, pursuing a Master of Science in Athletic Training. Part of the graduate study curriculum is to complete a research thesis through conducting research. I am conducting a survey to examine how prepared athletic trainers are in managing sudden cardiac arrest. The data will be used to formulate an idea of how prepared Athletic Trainers are.

Collegiate Athletic Trainers from District II will be surveyed; however, your participation is voluntary and you have the right to choose not to participate. You also have the right to discontinue participation at any time during the survey completion process, at which time your data will be discarded. The California University of Pennsylvania Institutional Review Board has reviewed and approved this project. The approval is effective 04/09/2016 and expires 04/08/2017

All survey responses are anonymous and will be kept confidential. Informed consent will be assumed from the

data collected upon return of the survey. Minimal risk is posed by participating as a subject in this study. I ask that you please take this survey at your earliest convenience as it is 30 questions long. If you have any questions regarding this project, please feel free to contact the primary researcher, Cassidy Shearer, LAT, ATC (SHE3719@calu.edu). You can also contact the faculty advisor for this research: Dr. Michael Meyer (meyer_m@calu.edu) Thanks in advance for your participation.

Please click the following link to access the survey:

https://www.surveymonkey.com/r/PDW8QRJ

Thank you for taking the time to take part in my thesis research. I greatly appreciate your time and effort put into this task.

Sincerely,

Cassidy Shearer, LAT, ATC

Primary Researcher

California University of Pennsylvania

250 University Ave

California, PA 15419

SHE3719@calu.edu

Appendix C4

Literature Review Table

Table II. National Athletic Training Association Competencies Associated with Sudden Cardiac Arrest

Explain the etiology and prevention guidelines associated with the leading causes of sudden death during physical activity, including but not limited to: cardiac arrhythmia or arrest
Obtain a thorough medical history that included the pertinent past medical history, underlying systemic disease, use of medications, the patient's perceived pain, and the history and course of the present condition.
Use standard techniques and procedures for the clinical examination of common injuries, conditions, illnesses, and diseases including but not limited to: circulatory assessments (pulse, blood pressure, and auscultation).
Assess and interpret findings from a physical examination that is based on the patient's clinical presentation. This exam can include: Cardiovascular function (including differentiation between normal and abnormal heart sounds, blood pressure, and heart rate).
Obtain a medical history appropriate for the patient's ability to respond.
Demonstrate the ability to perform scene, primary, and secondary surveys.
Relate changes in vital signs to the patient's status.
Differentiate between normal and abnormal physical findings (eg, pulse, blood pressure, heart and lung sounds, oxygen saturation, pain, core temperature) and the associated pathophysiology.
Explain the indications, guidelines, proper techniques, and necessary supplies for removing equipment and clothing in order to access the airway,

Evaluate and/or stabilize an athlete's injured body part.
Differentiate the types of airway adjuncts (oropharygneal airways [OPA], nasopharyngeal airways [NPA] and supraglottic airways [King LT-D or Combitube]) and their use in maintaining a patent airway in adult respiratory and/or cardiac arrest.
Identify cases when rescue breathing, CPR, and/or AED use is indicated according to current accepted practice protocols.
Utilize an automated external defibrillator (AED) according to current accepted practice protocols.
Perform one- and two- person CPR on an infant, child and adult
Utilize a bag valve and pocket mask on a child and adult using supplemental oxygen.
Explain the indications, application, and treatment parameters for supplemental oxygen administration for emergency situations.
Identify the signs, symptoms, interventions and, when appropriate, the return-to participation criteria for: sudden cardiac arrest.
Clinically evaluate and manage a patient with an emergency injury or condition to include the assessment of vital signs and level of consciousness, activation of emergency action plan, secondary assessment, diagnosis, and provision of the appropriate emergency care (eg, CPR, AED, supplemental oxygen, airway adjunct, splinting, spinal stabilization, control of bleeding). [33]

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ABSTRACT

Title: ARE ATHLETIC TRAINERS PREPARED TO MANAGE SUDDEN CARDIAC ARREST

Researcher: Cassidy Shearer LAT, ATC, PES

Advisor: Dr. Michael Meyer PhD, LAT, ATC

Date: May 2016

Research Type: Master's Thesis

Context: Sudden cardiac arrest is the leading cause of death in athlete. It is fatal in individuals who do not receive immediate CPR followed by defibrillation. This brings forefront the gaps in preparedness athletic trainers are expected to obtain. Athletic trainers have all the tools necessary to be prepared to manage this which includes proper training, conducting preparticipation physical exams, and having a proper emergency action plan.

Objective: The purpose of this study was to determine how prepared athletic trainers are in managing sudden cardiac arrest.

Design: Descriptive research design.

Setting: Controlled setting.

Participants: Certified athletic trainers (N=151), who volunteered, within the NATA District 2 were participants.

Interventions: Subjects were sent a survey asking demographics, which included the following: gender, age, collegiate division they work in, and state residency. The survey consisted of questions related to preparticipation cardiovascular physical exams, characteristics of emergency action plan (EAP), and characteristics of plan for use of automated external defibrillator (AED). The subjects completed the survey over

electronically and gave their consent by returning the survey anonymously.

Main Outcome Measures: Majority of ATs are prepared in managing SCA because they have an AED within 1-5 minutes of walking and shocking a collapsed athlete and have an AED at every venue.

Results: The hypotheses in this study were: 1) There will be an AED within 1-5 minutes of walking and shocking a collapsed athlete. 2) There will be an AED at every venue. The data was analyzed using a chi- square goodness of fit test. The results showed that there was a no significant deviation from the hypothesized values found.

Conclusions: Majority of athletic trainers within District 2 are prepared in managing SCA because they are able to shock and collapsed athlete within 1-5 minutes and have an AED at every venue, which complies with NATA guidelines.

Word Count: 335