

CERTIFIED ATHLETIC TRAINERS' KNOWLEDGE OF THE NATA POSITION
STATEMENT: EXERTIONAL HEAT ILLNESSES

by

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I dedicate this research to Dr. Brian Ragan. Dr. Ragan assisted me throughout the entire process. This thesis would not be possible without his help and dedication. He not only pushed me to do my best work, but motivated me to push past what I thought was good enough. I will be forever grateful for the time he dedicated to helping me throughout this entire process.

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ABSTRACT

Every year there are an abundant amount of exertional heat illnesses (EHIs) cases among athletes and those numbers are currently on the rise. The occurrence of EHIs has increased over time. From the years 1931-1959 there was only 5 players' deaths reported in relation to EHIs compared to the 103 players reported to have died from 1960-2000 (Health Research Funding, 2015). The occurrence of EHIs are on the rise and we need medical professionals provided care that have the knowledge to recognize and treat these conditions. Certified athletic trainers (ATs) should be aware of the position statements provided for them concerning these illnesses. The National Athletic Trainers' Association (NATA) develops position statements to provide ATs with the most current research concerning illnesses like EHIs. This study was used to develop a psychometrically sound test to assess the knowledge of ATs on the NATA position statement: Exertional Heat Illnesses. It will be used to show ATs what knowledge they need to have compared to what they already know.

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CHAPTER I

INTRODUCTION

Every year there are an abundant amount of exertional heat illness (EHIs) cases among athletes and those numbers are currently on the rise. The occurrence of EHIs has increased over time. From the years 1931-1959 there was only 5 players' deaths reported in relation to EHIs compared to the 103 players reported to have died from 1960-2000 (Health Research Funding, 2015). One statistic shows from the years 2010 to 2014, there was 22 confirmed deaths by exertional heat stroke in the United States (Tripp, Eberman, & Smith, 2015). In a three-month reporting period, the month of August accounted for the majority of reported EHIs. That month alone accounted for almost 82.5% of the EHIs reported in a three-month period (Tripp et al., 2015). The occurrence of EHIs are on the rise and we need medical professionals provided care that have the knowledge to recognize and treat these conditions. For example, when rapidly recognized and treated, exertional heat exhaustion has a 100% survival rate (Health Research Funding, 2015).

Korey Stringer was an offensive tackle with the Minnesota Vikings. Korey was participating in team training camp in 2001 and suffered from an exertional heat stroke that ultimately took his life (Korey Stringer Institute, 2010). Stringer's wife then started the Korey Stringer Institute (KSI) to spread awareness of this condition. She was able to join forces with doctors and athletic trainers to make this institution possible and it opened in 2010. The KSI now partners with the NFL, National Athletic Trainers Association (NATA), and other groups to help spread awareness of sudden death, specifically heat illnesses, among athletes.

Exertional heat illnesses range from exercise-associated muscle cramps to exertional heat strokes. All of which can become serious emergencies if not handled properly. Education and knowledge are key factors in recognizing and treating EHIs. So many cases occur because there was no one there to educate and monitor to athletes have they participated in their particular sport. Certified athletic trainers (ATs) are employed by secondary schools, colleges, and clinical settings across the United States.

The National Athletic Trainers' Association (NATA) has published guidelines in the form of position statements for medical professionals to follow as best practice. These guidelines are updated frequently as new research emerges regarding EHIs specifically. Making sure that medical professionals stay current with the guidelines is a problem faced as the incidences of EHIs continue to rise.

Purpose Statement

The purpose of this study is to assess the knowledge ATs have regarding the new 2015 NATA Heat Illness Management Guidelines by designing a psychometrically sound knowledge test.

Hypothesis

Based on the answers given by the certified athletic trainers participating in this test, we will see that more certified athletic trainers have knowledge of the NATA Heat Illness Management Guidelines.

Limitations

A limitation of this study is the sample size of certified athletic trainers. This is an area of concern within the study. A smaller sample size does not always provide the most accurate information for a population as a whole. Sixty participants are considered stable

parameters for a test construct design like this. There is also vulnerability in who is answering the questions. There is no way to guarantee with an electronic test that they certified athletic trainers are the participants taking the test.

Study Implications

Exertional heat illness is a growing problem among athletes across the United States. Every year the number of cases reported are increasing. It is vital to have trained professionals on sight that have the knowledge and ability to recognize, manage, and treat those illnesses. Having knowledge of the most recent position statement released by the NATA gives those professionals the equipment necessary in handling those situations. The results of this study are beneficial because it will confirm that certified athletic trainers do have the knowledge necessary to recognize, manage, and treat these EHIs.

Key Terms

Thermoregulation. This is the process the body uses to maintain a normal core body temperature (Casa et al., 2015).

Exertional heat stroke. Most severe heat illness. When the body temperature rises about 104 degrees, the organs begin to shut down across the body causing a stroke to occur (Casa et al., 2015).

Exertional heat exhaustion. This is the inability to effectively exercise in the heat. Cardiovascular insufficiency, hypotension, energy depletion, and central fatigue are secondary factors involved (Casa et al., 2015).

Exercise-associated muscle cramps. These are sudden or sometimes progressively and noticeably evolving, involuntary, painful contractions of muscles during or after exercise (Casa et al., 2015).

Hyponatremia. Occurs when there is a serum sodium concentration less than 130mEq/L (Almond et al., 2005).

Heat syncope. Also known as dizziness, occurs in unfit or heat-unacclimatized persons who stand for a long period of time in the heat (Casa et al., 2015).

Exercise-induced hyperthermia. Hyperthermia is when the body's core temperature rises above normal and safe levels. Hyperthermia can lead to more serious conditions like heat strokes (McDermott et al., 2009).

Heat acclimatization. Involves progressively increasing the intensity and duration of physical activity and phasing in protective equipment (Casa et al., 2015)

CHAPTER II

LITERATURE REVIEW

The month of August accounts for 82.5% of the exertional heat illnesses (EHIs) reported in the United States (Tripp et al., 2015). Common EHIs are exercise-associated muscle cramps, exertional heat stroke, exertional heat exhaustion, heat syncope, exercise-induced hyperthermia, and hyponatremia. The NATA has proposed guidelines in the management of these illnesses. The purpose of this study is to see what knowledge certified athletic trainers (ATs) have regarding the new 2015 NATA Heat Illness Management Guidelines.

Exertional Heat Illnesses

Prevalence. Exertional heat illnesses are very common in athletics. Guidelines have been developed in which medical professionals are to follow from preseason acclimation periods, and to recognize and treat the EHI's. Through this research, medical professionals have been able to quickly recognize signs of EHI, determine the type, and begin treatment.

Types. Exertional heat illnesses present in different forms, from mild to severe. Those illnesses are distinguished by signs and symptoms as well as conditions in which they present.

Exertional heat stroke. Exertional heat stroke is defined as a severe heat illness induced by strenuous exercise, often occurring in a hot environment that causes the thermoregulatory system to be overwhelmed (LaZore, 2014). Heat strokes can be a result of dehydration, overheating, or unexplainable incident. Heat strokes present very rapidly and sometimes without warning. The person may begin to feel light headed at first and

then slowly digress from there. From the years 2010-2014, there was 22 confirmed deaths by exertional heat stroke in the United States (Tripp et al., 2015).

Exertional heat exhaustion. This is the inability to effectively exercise in the heat (Casa et al., 2015). Factors involved in heat exhaustion include energy depletion, hypotension, cardiovascular insufficiency, and central fatigue (Casa et al., 2015). Exertional heat exhaustion generally occurs in hot and humid environments, however depending on the intensity of the exercise, it could occur in normal environments (Casa et al., 2015).

Exercise-associated muscle cramps. Muscle cramps occur suddenly in most cases. They are due to dehydration. Sometimes these muscle cramps can occur over time progressively getting noticeably worse. Muscle cramps however are not directly related to elevated body temperature (Casa et al., 2015). This condition is not as severe as others, but gone untreated can elevate to a serious condition.

Heat syncope. Heat syncope is also known as orthostatic dizziness (Casa et al., 2015). A common population to suffer from heat syncope is the unfit or those people who have not completed the heat acclimatization period. The type of clothing people wears to work or exercise plays a factor in the occurrence of heat syncope. This condition commonly occurs within the first week of exposure to those conditions.

Exercise-induced hyperthermia. When the thermoregulatory systems within the body are interrupted, there are adverse effects that occur (Clements et al., 2002). Hyperthermia is when the body's core temperature rises above normal and safe levels. Hyperthermia can lead to more serious conditions like heat strokes. It is vital to begin the cooling process when hyperthermia is expected in order to prevent any further damage

from occurring (McDermott et al., 2009). Cold water immersion and ice immersion have shown significant difference made in ten minutes and then continued to help past that point (Clements et al., 2002).

Hyponatremia. Hyponatremia is defined as a serum sodium concentration less than 130mEq/L (Almond et al., 2005). The person may start to over-drink, have nausea, dizziness, muscle twitching, tingling, headache, exhaustion, seizures, and edema to name a few symptoms. This condition is potentially fatal if not treated promptly. It is vital to have person follow hydration protocols. It is important to consume water, however it is also dangerous to over-drink (Casa et al., 2012).

Signs and symptoms. Medical professionals are taught to recognize signs of EHI. Some include, high body temperature, rapid but weak pulse, slurred speech, light headedness, clammy skin, lack of sweating, nausea, and headache (Hoffman et al., 2014). It is vital to recognize symptoms early and determine which type of EHI the person is experiencing. Once the medical professional has determined the EHI in which the person is experiencing, they will be able to treat the situation in the proper manner.

Management

Athletic Training Requirements

Certified athletic trainers. Position statements issued by the National Athletic Trainers' Association (NATA) update athletic trainers' knowledge base on exertional heat illnesses (EHIs) and its management when those cases arise. It is important that an AT can tell the difference between the types of EHIs so that they can treat it properly. ATs must be equipped with this information in order to quickly recognize and treat or manage any illness that might present itself. ATs must possess the tools and knowledge

necessary to handle different types of EHIs. In the athletic field, it is not a question of if a heat related incident will occur, it is really just a matter of having the knowledge and being prepared for when it does occur.

Education. In order to become an athletic trainer, you must first complete a bachelor's degree in athletic training. The athletic training program must be approved by the Commission on Accreditation of Athletic Training (CAATE). CAATE provided standards that each athletic training program must uphold and meet. Upon graduation, athletic training students must sit for the Board of Certification (BOC) examination. This exam is a nationwide test that students must pass in order to become a BOC certified athletic trainer.

Licensure, certification, registration. In order to practice in certain states, an athletic trainer must be either licensed, certified, or registered depending on the state. For example, the state of Tennessee requires their athletic trainers to be licensed through the Department of Health Board of Athletic Trainers. These regulations are set by the individual state. All athletic trainers practicing within certain states must adhere to their regulations regarding knowledge of EHIs.

Continuing education units. To uphold an athletic training certification, provided by the BOC, and most state credentials, athletic trainers must complete continuing education units (CEUs). These have to be recorded and then reported every three years to the BOC. Athletic trainers are required to report 50 CEUs every two years. CEUs are subdivided into four categories, BOC approved provider programs, professional and scholarly activities, post certification college/university coursework, and non-BOC approved programs (BOCcatc.edu). Athletic trainers must complete a certain

amount of CEUs within each of these categories. Within these categories, EHI topics are available for additional education.

Athletic Training Guidelines

NATA position statements. The National Athletic Trainers' Association (NATA) has a group of position statements that provide information on how emergency situations should be handled including planning and preventing sudden death, information on exertional heat illnesses specifically, and also heat acclimatization guidelines for secondary schools. These position statements are not law; they are well researched best practices recommended for healthcare professionals to follow. Research has been done by judges in the field to provide the most up to date information, knowledge, and treatment protocols on specific illnesses or situations. Recently, NATA has released new guidelines on managing exertional heat illnesses (Casa et. al., 2015). These new guidelines hone in on some of the issues from the previous guidelines in more details. They provide advances in research that were not seen in the previous guidelines. They also include sections like return to activity after an EHI, which gives ATs more information on how to handle EHIs even after the athlete has been released from the doctor. This helps ATs formulate a plan to return those athletes back to full activity while still being under a doctor's advice and orders.

Preparation. Athletic trainers are given recommendations that preparation is the key to success when handling these type situations (Anderson, Courson, Kleiner, McLoda., 2002). Position statements provide recommendations to have plans in place called emergency action plans (EAP) to handle these types of situations in the most efficient way possible (Casa et al., 2012). EAPs are vital in emergency management

because they serve as the guideline for everyone in the organization to follow. Heat protocols are also a way that we as a profession prepare for EHIs in the field. Each state has their own protocol related to temperatures and practice plans. It is imperative that ATs have the knowledge of these protocols in their own states and abide by them.

Return to play. Return to play is imperative in the recovery process after suffering from an EHI. Your body is compromised and has to have the time to acclimate back into physical activity. After suffering from an EHI, no matter the severity, it is not recommended to return within the same day (Casa et. al, 2015). It is important for the person to be asymptomatic, as well as completed the acclimatization period over again before returning.

Devices to Measure and Manage Body Temperature

Measuring body temperature. The most accurate way to measure core body temperature is rectal temperature (Binkley, Beckett, Casa, Kleiner, & Plummer, 2002). Some other ways to measure body temperature are oral, tympanic, axillary, and ingestible thermometers. These are affective to get an idea of where the general area of the temperature is, however rectal is the most precise. Rectal temperature is not always accessible in the work force. If an AT works in a high school setting, they are less likely to use this method because it takes parental consent and they have so many ethical and personal issues to worry about. The age and gender of the athlete plays a big role. It is not feasible to do a rectal temperature on the sideline of a football game because it causes an invasion of privacy (Casa et al., 2007).

Management methods to control body temperature. You should always start a treatment with assessing all the vitals. Taking temperature measurements would be

included in this to determine if it is a heat issue the patient or athlete is dealing with (Smith, 2005). Depending on the exact exertional heat condition, it is vitally important to cool the body temperature down to as close to normal as possible. Cooling to 102 degrees is ideal to stabilize the athlete while waiting on EMS to arrive. Generally practiced methods in athletic training are cold whirl pools, ice bags, cold towels, misting fans, fans, and shade. A study has shown that cold water immersion is the most effective and efficient way to cool the body temperature (Mazerolle, et al., 2010). It is crucial to keep the athletes hydrated in heat conditions (Binkley, et al., 2002).

Psychometrically Sound Test Development

Currently there is no psychometrically sound test involving knowledge of this position statement. This section is to show what a brief description on how item analysis is used in the creation of the test within the study.

Item analysis. Item analysis is used to determine if an individual item is useful as part of a test in its entirety. This analysis is applied to a test given to a sample group before it is distributed for the real examination period. Item analysis is used to find out the effectiveness of each individual part of the test (Shohamy, 2003).

Item difficulty. Item difficulty is used to determine how challenging a particular item is. There is an equation to calculate this answer. Item difficulty is found by dividing the number of correct answers given by the total number of people in the group. When forming a test, the creator does not want an item to be too easy or too difficult (Shohamy, 2003).

Item discrimination. Item discrimination allows the creator to see if the items are created well. If more of the higher scorers get the item correct, then it is discriminated

well. As well as the other side, if lower scorers get the item correct, then it is most likely a poorly created question. Items that fall within the acceptable range are considered good items (Shohamy, 2003).

Item determination. Item determination needs to fall in acceptable ranges for both item difficulty as well as item discrimination to be included in the final version of the test.

CHAPTER III

METHODS

The purpose of the study is to analyze certified athletic trainers' knowledge regarding the 2015 NATA position statement: Exertional Heat Illnesses. The following sections in this chapter will discuss the design of the study, participants involved, instruments used, procedures followed, and the data analysis.

Design

This study is an iterative test construction design. The study and the Exertional Heat Illness Knowledge Test (KEHI-Test) have been approved by the Middle Tennessee State University's Institutional Review Board (IRB).

Participants

Participants will be athletic trainers, certified by the Board of Education (BOC) and are currently practicing clinically. The study would need a minimum of 60 volunteers to participate in the study according to industry standards. Athletic trainers who have not taken the BOC will be excluded from this study or who are not practicing clinically.

Instruments

A test is a good way to access knowledge of athletic trainers across the United States. The instrument used in this study is the Exertional Heat Illness Knowledge Test (KEHI-Test)

KEHI-Test. This test will contain a demographic section as well as a multiple choice quiz, testing knowledge of the athletic trainers pertaining to the 2015 NATA position statement: Exertional Heat Illnesses. It will include items regarding types of exertional heat illnesses, recognition and management, awareness of changes, prevention

strategies, and patient encounters involving various exertional heat illnesses. The test will need 36-40 items.

Contemporary judges. Using contemporary judges for the research study allowed the researchers to establish validity of current practice knowledge when creating the items. Judges were not experts in the field but were selected for their experience related to heat illnesses. Judges included a paramedic with twenty-two years in the field, two currently practicing athletic trainers, one with sixteen years and one with forty-one years of experience, and two athletic training professor with past experience as clinically practicing athletic trainers. One professor has five years of clinical practice and then fourteen years academically. The other professor practiced clinically for four years and then has had eight years of academic experience.

Blueprint. Judges were selected based off of their experience with EHIs. Judges where sent an email with an explanation of the research study and an inquiry asking for their participation as clinical judges.

The researcher created six components of importance regarding the information in this study. Components included awareness, knowledge of conditions, prevention strategies, recognition and management strategies, clinical practices, and patient encounters. These components were based off of key domains addressed in the position statement.

Judges were then emailed the list of components. They were asked to rank the components in order of importance using a listing scale, 1-6 as well as give feedback if anything else needed to be included in the study. Judges were asked to select whether they agreed or disagreed with the components. Once the judges gave their feedback,

components were dropped if over 50 percent of the judges did not agree with the it. At this point, patient encounters were eliminated from the study leaving a total of five components.

Another email was sent to the judges, asking them to assign a weight to each component. The weighted components helped the researcher to identify the number of items that needed to be assigned to each component. The weight of the components was based off of a hundred percent system. They were given examples that divided the hundred percent across the components, depending on how important they thought the components where. Table 1 shows the example weighted chart presented to the judges.

Table 1. *Example of Weighted Chart of Components*

Domains	Example %'s	Your %'s	Initials/Comments
Awareness		20%	
Knowledge of Conditions		20%	
Prevention Strategies		20%	
Recognition and Management Strategies		20%	
Clinical Practices		20%	
Total		100%	100%

Item development. Based on the weighted components, there was a 46 item test created. Items were broken into different groups based on the components and weights. Two judges were asked to review the items in each component and eliminate any items that they deemed unfit for the testing purposes and to ensure they were included in the right sections. If the two judges agreed on the item it was retained, however if they disagreed, a third expert was asked to give their opinion as the tie breaker.

Test construct. Four certified athletic trainers, picked at random, were asked to review the test for readability. Their responsibility was to just read over the test, without answering questions, and determine if the test was laid out correctly. They were asked to highlight and circle anything that they did not understand. The items were then modified, and the test was created in its final version. The KEHI-Test was then sent out to the participants and the study was completed.

Procedures

Recruitment. Participants will be recruited by email, through the NATA database as well as through direct contact by program directors. Informed consent will be presented at the beginning of the test. The participants will be required to electronically consent before beginning the test. This consent is to ensure the participants know that the quiz is voluntary and anonymous.

Test administration. Test administrators will email a link to the test to the participants via Survey Monkey. They will have two weeks to complete the KEHI-Test and return it.

Data cleaning. Data cleaning will be done to ensure the most accurate information. If the participant did not at least complete 60% of the quiz, the data will be discarded.

Data Analysis

To analyze the data, Iteman and SPSS will be used to get descriptive statistics. Iteman is used for item analysis. Item analysis is a procedure to determine if the items involved in the test were useful to the test as a whole. This analysis will provide information on the effectiveness of the test as a whole. Item analysis is split into three

parts, item difficulty, item discrimination, and item determination. The item difficulty (P) lets the creator know if an item is too easy or too hard. Criteria for this shows that the item must fall within the range of P: $.32 < P < .92$. Item discrimination (r_{pbis}) $r_{pbis} > .19$, shows how well the item differentiate top performers differ from the low performers. Item determination needs to fall in acceptable ranges for both item difficulty as well as item discrimination to be included in final version of the KEHI-Test.

CHAPTER IV

RESULTS

The knowledge of exertional heat illnesses test (KEHI-Test) was developed in order to design a psychometrically sound test to assess the knowledge of athletic trainers (ATs) knowledge of exertional heat illnesses. This instrument focused on the NATA position statement: Exertional Heat Illnesses. Using the position statement, the instrument items was divided into five different categories. The KEHI-Test was sent to approximately 200 ATs. This chapter will be used to discuss the demographics of the participants, and the results found within the KEHI-Test using tables and statistics calculated with the assistances of the Itemen descriptive statistics software.

Demographics of the Participants

The demographics collected from the participants included gender (Figure 1), region they are located (Figure 2), years of experience (Figure 3), and employment status (Figure 4). There were approximately 200 emails sent out to ATs across the United States. There was 71 ATs that began the KEHI-Test, and 62 of those participants completed the test. This gave the test a 35.5% response rate. Most participants had in-between 2 and 4 years of experience, however it ranged from less than 6 months to 30 years of experience. Participants were mainly from the Southeast region, 35 participants of the 61. There was a majority of fulltime employees that took the test, but there was also graduate assistances as well as part-time employees. There was variety within the participants that responded.

Figure 1. *Gender*

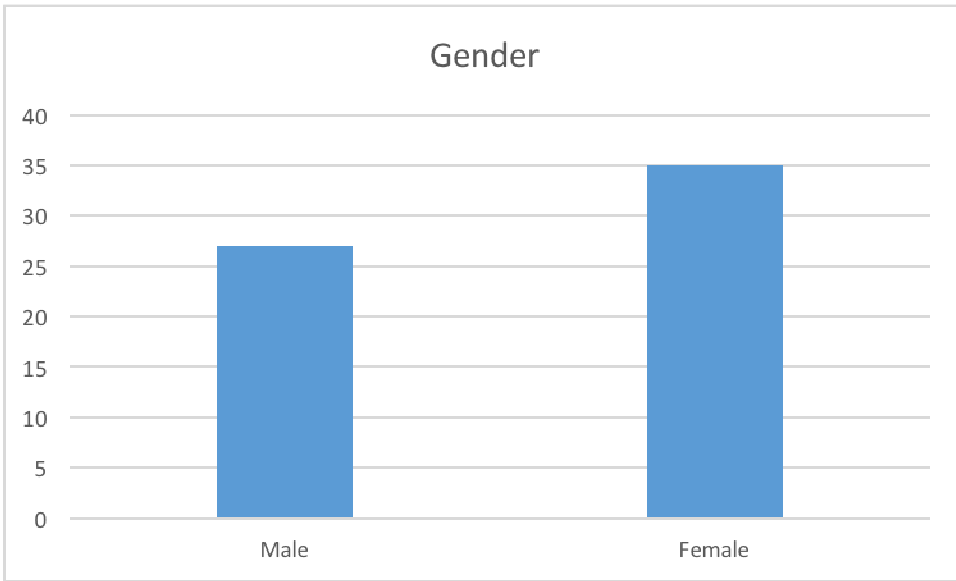


Figure 2. *Region ATs are Located*

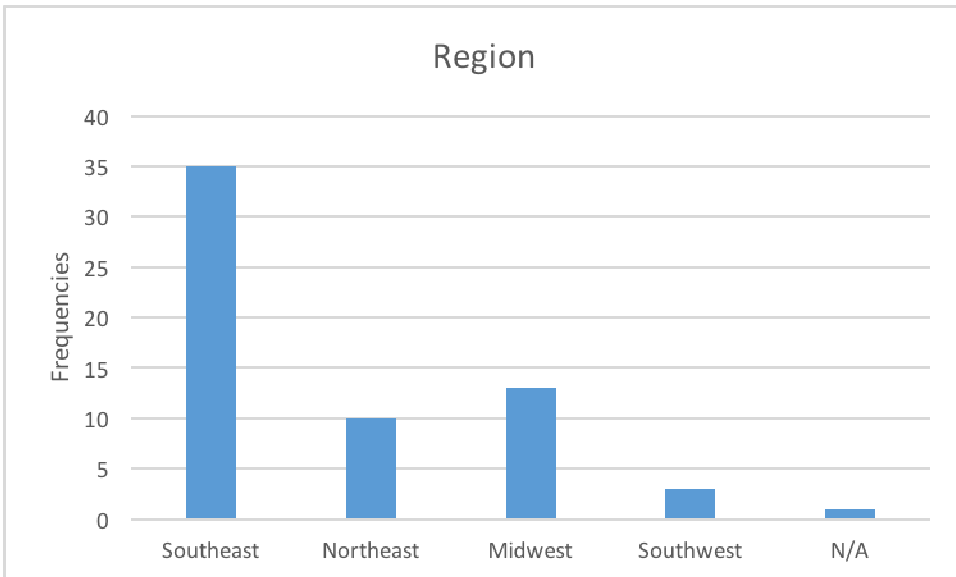
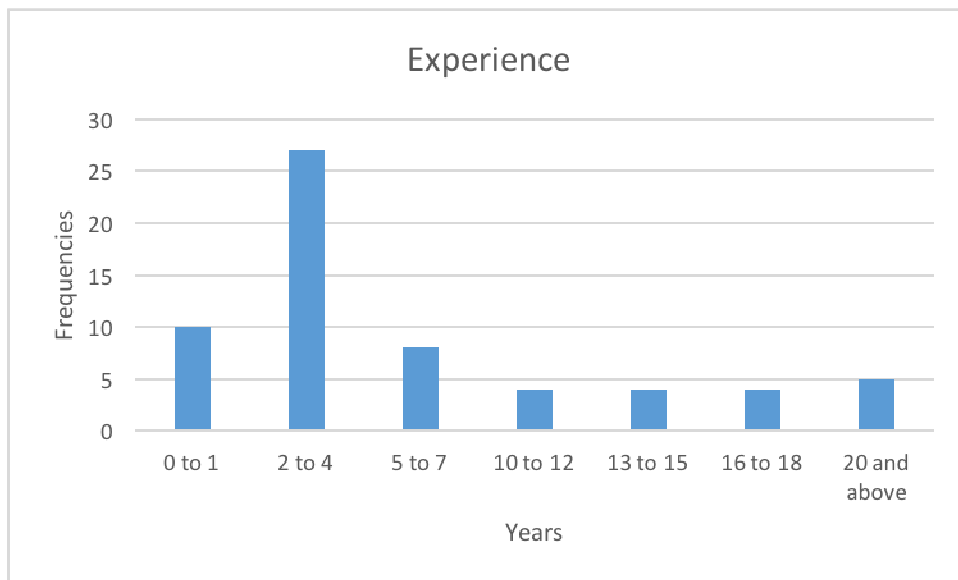
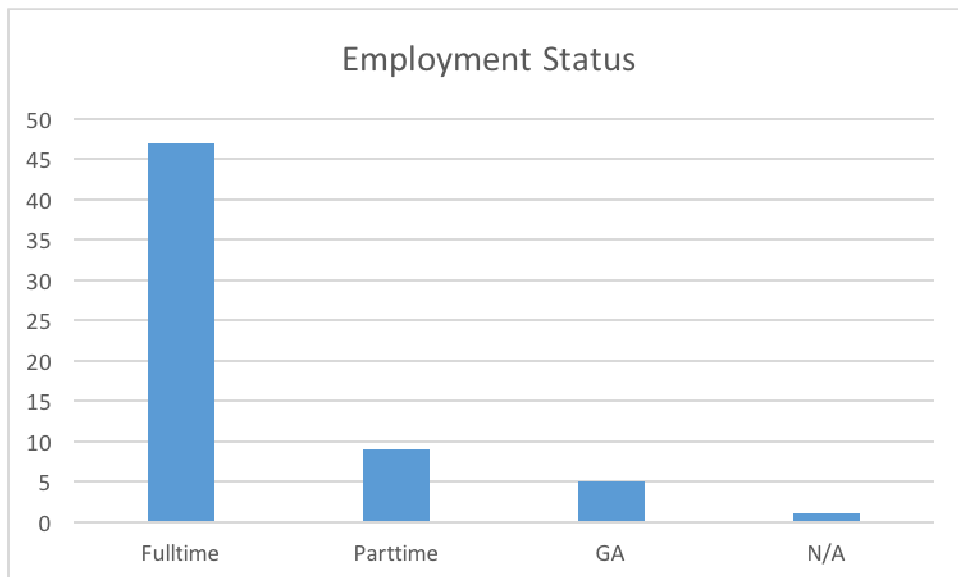
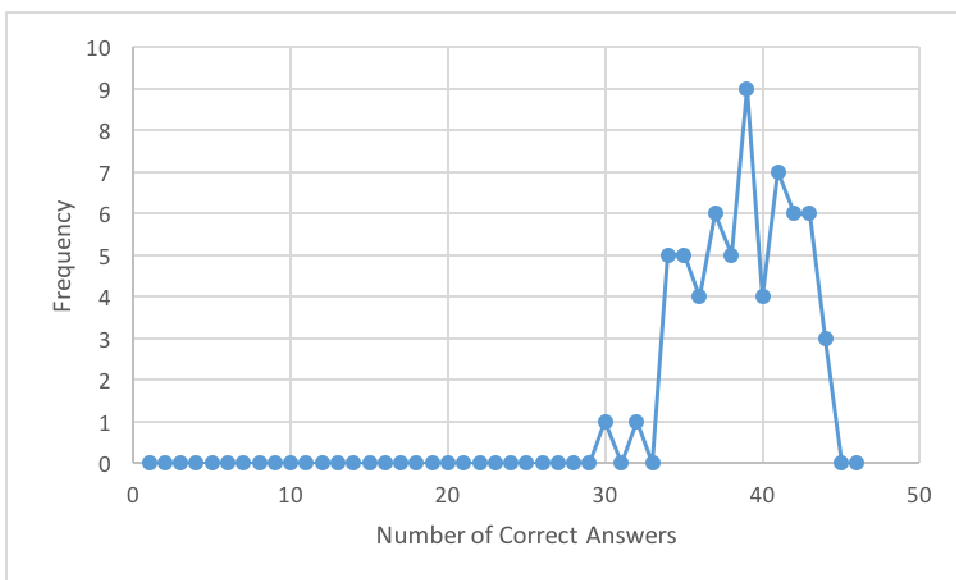


Figure 3. *Years of Experience*Figure 4. *Employment Status*

Overall Performance

The distribution of the scores, as shown in figure 5 was skewed the the left. This means that most of the participants got more correct responses then wrong responses. The number of correct responses ranged from 30 to 44 correct answers out of a possible 46 questions. Percentage wise, this would be 65% to 95.6% correct on average. These percentages could be explained if the test was too simple or if the ATs taking the KEHI-Test were knowledgeable of the position statement and had the knowledge of the items.

Figure 5. *Distribution of Scores*



Items

Item determination for each item was based on item difficulty (P) and point biserial correlation (PR). Item determination was either keep, drop, or revise. After reviewing the items, 34 items were on the keep list, 6 items were dropped, and 5 items were left to be revised. Items were divided into the categories mentioned before. In the awareness category, there was 4 total items, and 2 were dropped from the section.

Knowledge of conditions had 13 total items, 11 remained, 1 was revised, and 1 was dropped. The recognition and management category began with 9 total items, 1 was dropped, and 2 were revised. The clinical practices category had 12 items, 2 were dropped and 2 were revised, leaving 10 total items. Finally, the prevention strategies category had 8 items, all were kept with 1 being revised. Revised final test can be found in Appendix E.

Table 2: *Item, P, PR, and Determination*

ITEM	P	PR	DETERMINATION	ITEM	P	PR	DETERMINATION
1	1		Keep	24	0.92	0.4	Keep
2	0.94	0.14	Drop	25	0.89	0.27	Keep
3	0.89	0.15	Drop	26	0.95	0.35	Keep
4	1		Keep	27	1		Keep
5	0.89	0.08	Revise	28	0.85	0.32	Keep
6	0.98	0.15	Keep	29	0.95	0.21	Keep
7	0.98	0.35	Keep	30	0.85	0.35	Keep
8	0.6	0.49	Keep	31	0.84	0.31	Keep
9	0.94	0.36	Keep	32	1		Keep
10	0.71	0.31	Keep	33	1		Drop
11	0.92	0.03	Keep	34	1		Revise
12	0.89	0.29	Keep	35	1		Keep
13	0.26	0.2	Keep	36	1		Revise
14	0.97	0.18	Keep	37	0.58	0.26	Keep
15	0.79	0.19	Keep	38	0.68	-0.04	Drop
16	0.94	0.26	Keep	39	0.76	0.57	Keep
17	0.19	0.06	Drop	40	0.47	0.57	Keep
18	0.85	0.27	Keep	41	0.55	0.55	Keep
19	1		Revise	42	0.47	0.56	Keep
20	0.9	0.14	Drop	43	0.94	0.16	Revise
21	0.94	-0.06	Revise	44	0.65	0.17	Keep
22	0.85	0.34	Keep	45	1		Keep
23	1		Keep	46	1		Keep

CHAPTER V

DISCUSSION

The purpose of this study was to develop a knowledge test of the NATA position statement: Exertional Heat Illnesses for athletic Trainers. The test was designed to be psychometrically sound. Using research found in literature, contemporary judges, and the position statement, items were created to add into the KEHI-Test. The KEHI-Test will be used to assess the knowledge of practicing athletic trainers on the NATA position statement: Exertional Heat Illnesses. This study is important because when rapidly recognized and treated, exertional heat exhaustion has a 100% survival rate (Health Research Funding, 2015). That is just one example of how vital knowledge of exertional heat illnesses is for practicing athletic trainers. This chapter will discuss the findings of the study as well as describe what can be used to further the study of this topic.

Athletic Trainers Knowledge of Exertional Heat Illnesses

Performance areas. The results showed that most ATs had fairly well performance within each section of the test. Items in the awareness section were dropped more significantly than in any other section. However, that section also contained the lowest amount of questions. The results of the test could play in two directions. The items could have been too easy, which will be discussed later on, or the ATs participating in the test could have had the knowledge of the position statements. Position statements are documents that are considered the best practices due to research done. ATs are suppose to know what the best practices are. ATs across the board very likely have read the position statement and have knowledge of exertional heat illnesses. They knew the answers to the test. This

would produce good results for the profession, rather than the test. The statistics would show that the questions were too easy, however it could also be looked at that ATs do have the knowledge they need to have covering exertional heat illnesses.

Continuing education units. To maintain an athletic training certification, ATs have to complete continuing education units (CEUs). When completing CEUs, ATs are allowed to pick and chose which they would like to complete. There is not a set standard that says they have to complete CEUs based on EHIs. Position statements are a great way to get the information to all ATs rather then them getting the information through optional CEUs.

Items

Easy items. The descriptive statistics of this study showed that the test was too easy across the board. There was questions in which every participant got correct. For example, no one scored less than a 65% on the KEHI-Test, which means that all the participants got at lease 30 of the 46 questions correct. ATs are required to sit for a national certification test upon completion of their undergraduate degree. This exam is provided by the Board of Certification. On this examination, ATs are expected to make at minimum, a 500 out of a total 800 (Board of Certification, 2013). This score would be a 62.5% or higher, therefore all participants in the KEHI-Test show a passing score based off of these industry standards. Some items would be considered basic knowledge of ATs, so those would be accepted to be answered correctly across the board. Some items however were considered too easy. Those items were either dropped or revised. Dropped items were considered not important to the overall goal of the study. The descriptive

statistics and point biserial number showed us which items to drop, which to revise, and which to keep the same.

Revised items. Revised items were those items that needed to be included but worded a different way to make them either more understandable or more difficult depending on the question. This items showed a point biserial correlation that was close to the acceptable range, however needed some tweaking to make it a psychometrically sound item. Items revised were left on the test due to there importance to the subject being addressed. Those items with a 100% correct rate are expected to be answered correctly due to the nature of the career of athletic training. Those are important items to the study in determining if athletic trainers do in fact know what they are suppose to be knowledgeable of.

Acceptable difficulty & poor discrimination. There were 6 items in this study that were considered too difficult and dropped from the study. These items had the lowest number of participants get them right. Dropping items based on the statistics is a judgment call. The investigator has to decide whether the item can be revised to become an or psychometrically sound item or if it's worth including in the next revision of the test.

Limitations

The sample size of this study was considered low. To get a true reading of the knowledge of ATs across the United States, you would need a response rate greater than 71 participants. This response rate would not produce reliable results on the knowledge of ATs.

Future Research

This study is just the beginning of finding out what knowledge ATs have on the NATA position statement: exertional heat illnesses. This pilot test showed that although some good items were created, there still needs to be further research to create a complete psychometrically sound test. Further testing can be done on a larger population using the revised KEHI-Test, to get a larger assessment of the knowledge of ATs. After revising the test until it is psychometrically sound, the KEHI-Test can be used for research in testing knowledge of ATs, not only with the position statement, but the exertional heat illnesses in general. As research continues, the knowledge of ATs should continuously grow bigger.

Conclusion

The results of this study showed that athletic trainers are knowledgeable in the content found in the NATA position statement: Exertional Heat Illnesses. The KEHI-Test started with 46 items, divided into 5 categories. It was sent out to practicing ATs from different regions of the United States. Those ATs were asked to forward it along. The test had 71 replies with 62 participants completing the KEHI-Test. After analyzing the results of the study, the KEHI-Test now has 41 psychometrically sound items. This is only the beginning of research into the knowledge of ATs on exertional heat illnesses.

REFERENCES

- Almond, C., Shin, A., Fortescue, E., Mannix, R., Wypij, D., Binstadt, B., & ... Greenes, D. (2005). Hyponatremia among runners in the Boston Marathon. *New England Journal of Medicine*, 353(15), 1550.
- Andersen, J., Courson, R., Kleiner, D., & McLoda, T. (2002). National Athletic Trainer Association position statement: Emergency planning in athletics. *Journal of Athletic Training (National Athletic Trainers' Association)*, 37(1), 99-104.
- Armstrong, L. E., Casa, D. J., Millard-Stafford, M., Morgan, D. S., Pyne, S. W., & Roberts, W. O. (2007). American College of Sports Medicine position stand. Exertional heat illness during training and competition. *Medicine and Science in Sports and Exercise*, 39(3), 556-572.
- Binkley, H., Beckett, J., Casa, D., Kleiner, D., & Plummer, P. (2002). National Athletic Trainers' position statement: Exertional heat illnesses. *Journal of Athletic Training (National Athletic Trainers' Association)*, 37(3), 329-343.
- Board of Certification. (2013). Exam Development & Scoring.
- Brower, K. A., Stemmans, C. L., Ingersoll, C. D., & Langley, D. J. (2001). An investigation of undergraduate athletic training students' learning styles and program admission success. *Journal of Athletic Training*, 36(2), 130-135.
- Casa, D. D., Becker, S. M., Ganio, M. S., Brown, C. M., Yeargin, S. W., Roti, M. W., & ... Maresh, C. M. (2007). Validity of devices that assess body temperature during outdoor exercise in the heat. *Journal of Athletic Training (National Athletic Trainers' Association)*, 42(3), 333-342.

- Casa, D. J., & Csillan, D. (2009). Preseason heat-acclimatization guidelines for secondary school athletics. *Journal of Athletic Training*, 3, 332.
- Casa, D. DeMartini, J., Bergeron, M., Csillan, D., Eichner, E., Lopez, R., & ... Yeargin, S. (2015). National athletic trainers' association position statement. Exertional heat illnesses. *Journal of Athletic Training*, 50(9), 986-1000. Doi: 10.4085/1062-6050-50.9.07
- Casa, D. J., Guskiewicz, K. M., Anderson, S. A., Courson, R. W., Heck, J. F., Jimenez, C. C., & ... Walsh, K. M. (2012). National Athletic Trainers' Association position statement: preventing sudden death in sports. *Journal of Athletic Training*, 1, 96.
- Clements, J., Casa, D., Knight, J., McClung, J., Blake, A., Meenen, P., & ... Caldwell, K. (2002). Ice-water Immersion and cold-water immersion provide similar cooling rates in runners with exercise-induced hyperthermia. *Journal of Athletic Training (National Athletic Trainers' Association)*, 37(2), 146-150.
- Cochrane, L., Olson, C., Murray, S., Dupuls, M., Tooman, T., & Hayes, S. (2007). Gaps between knowing and doing: Understanding and assessing the barriers to optimal health care. *Journal of Continuing Education in The Health Professions*, 27(2), 94-102.
- Ganio, M. m., Brown, C. M., Casa, D. J., Becker, S. M., Yeargin, S. W., McDermott, B. P., & ... Maresh. C. M. (2009). Validity and reliability of devices that assess body temperature during indoor exercise in the heat. *Journal of Athletic Training (National Athletic Trainers' Association)*, 44(2), 124-135.

- Harrelson, G., & Leaver-Dunn, D. (1998). A comparison of learning styles between two CAAHEP accredited athletic training programs. *Journal of Athletic Training (National Athletic Trainers' Association)*, 33(2), S62.
- Hart, G.R., Anderson, R.J., Crumpler, C.P., et al. (1981). Epidemic classical heatstroke: Clinical characteristics and course of 28 patients. *Medicine*, 61, 189.
- Health Research Funding. (2015, March 23). 17 Shocking heat exhaustion statistics.
- Hoffman, M. D., Rogers, I. R., Joslin, J., Asplund, C. A., Roberts, W. O., & Levine, B. D. (2014). Managing collapsed or seriously ill participants of ultra-endurance events in remote environments. *Sports Medicine (Auckland, N.Z.)*,
- Kerr, Z.Y., Marshall, S.W., Cornstorck, R.D., Casa, D.J. (2014). Exertional heat stroke management strategies in United States high school football. *American Journal of Sports Medicine*, 42(1), 70-77. doi:10.1177/0363546513502940
- Korey's Story. Korey Stringer Institute. Retrieved from <http://ksi.uconn.edu/about/koreys-story/>
- LaZore, N. (2014). Exertional heat stroke management strategies in United States high school football: Letter to the editor. *American Journal of Sports Medicine*, 42(8), NP45-6. doi:10.1177/0363546514541045
- Lipman, G. S., Eifling, K. P., Ellis, M. A., Gaudio, F. G., Otten, E. M., & Grissom, C. K. (2013). Wilderness Medical Society practice guidelines: Wilderness medical practice guidelines for the prevention and treatment of heat-related illness. *Wilderness & Environmental Medicine*, 24351-361. doi:10.1016/j.wem.2013.07.004

- Lipman, G. S., Eifling, K. P., Ellis, M. A., Gaudio, F. G., Otten, E. M., & Grissom, C. K. (2014). Keeping a broad perspective: Reply regarding the Wilderness Medical Society practice guidelines for the prevention and treatment of heat-related illness. *Wilderness & Environmental Medicine, 25*(2), 251-252.
doi:10.1016/j.wem.2014.02.004
- Lipman, G., Eifling, K., Ellis, M., Gaudio, F., Otten, E., & Grissom, C. (n.d). The importance of keeping cool: Reply regarding the Wilderness Medical Society practice guidelines for the prevention and treatment of heat-related illness. *Wilderness & Environmental Medicine, 25*(2), 247-249.
- Mazerolle, S. S., Scruggs, I. C., Casa, D. J., Burton, L. J., McDermott, B. P., Armstrong, L. E., & Maresh, C. M. (2010). Current knowledge, attitudes, and practices of certified athletic trainers regarding recognition and treatment of exertional heat stroke. *Journal of Athletic Training (National Athletic Trainers' Association), 45*(2), 170-180.
- McDermott, B. P., Casa, D. J., Ganio, M. S., Lopez, R. M., Yeargin, S. W., Armstrong, L. E., & Maresh, C. M. (2009). Acute whole-body cooling for exercise-induced hyperthermia: A Systematic Review. *Journal of Athletic Training, 1*, 84.
- Professional Programs. CAATE. Retrieved from caate.net/professional-programs/
- Shohamy, E., (2003). The Power of Tests. A critical perspective on the uses of language tests.
- Smith, J. E. (2005). Cooling methods used in the treatment of exertional heat illness. *British Journal of Sports Medicine, 39*(8), 503-507.

- Speedy, D., Rogers, I., Noakes, T., Thompson, J., Guirey, J., Safih, S., & Boswell, D. (2000). Diagnosis and prevention of hyponatremia at an ultradistance triathlon. *Clinical Journal of Sport Medicine, 10*(1), 52-58.
- Stradley, S. L., Buckley, B. D., Kaminski, T. W., Horodyski, M., Fleming, D., & Janelle, C. M. (2002). A nationwide learning-style assessment of undergraduate-athletic training students in CAAHEP-accredited athletic training programs. *Journal of Athletic Training, 37*(4 Supply), S141-S146.
- Tripp, B., Smith, M., Eberman, L. (2015). Exertional heat illnesses and environmental conditions during high school football practices. *American Journal of Sports Medicine, 43*(10), 2490-2495. Doi: 10.1177/0363546515593947

APPENDICES

APPENDIX A: KEHI-Test

Demographics

Please indicate your sex: _____ Male _____ Female

You have been a certified athletic trainer for _____ Years.

What region of the United States do you currently practice? (Northeast, Southeast, Midwest, Northwest, Southwest, etc.) _____

What state do you currently practice in? _____

What is your job title? _____

What is your employment status? _____

How long have you held this position? _____

How many locations have you previously worked at? _____

Questions

Please answer the questions in the following quiz. Questions will be formatted as matching, true/false, and multiple choice questions.

Awareness

1. Which of the following is not one of the three core components of sports medicine services involving exertional heat illnesses?

- A. recognition
- B. treatment
- C. curing
- D. prevention

2. Are these recommendations laws or just guidelines following the most up to date research?

- A. laws
- B. guidelines

3. The strength of each recommendation follows the Strength of Recommendation taxonomy.

- A. True
- B. False

4. The purpose of this position statement is to present best-practice recommendations for the prevention, recognition, and treatment of exertional heat illnesses.

- A. True
- B. False

Knowledge of Conditions

5. When is the onset of Exercise-associated muscle cramps?

- A. sudden
- B. overtime
- C. after workouts
- D. all of the above

Match the following conditions, 6-10 with their definitions, A-E.

- 6. Heat Syncope
 - 7. Heat Exhaustion
 - 8. Exertional Heat Injury
 - 9. Exertional Heat Stroke
 - 10. Exercise-Associated Muscle Cramps
- A. Sudden or progressively evolving, involuntary, painful contractions of skeletal muscle during or after exercise
 - B. Most severe heat illness
 - C. Moderate to severe heat illness characterized by organ and tissue injury associated with sustained high body temperature resulting from strenuous exercise and environmental heat exposure
 - D. Orthostatic dizziness
 - E. Elevated core body temperature and is often associated with a high rate or volume of skin blood flow, heavy sweating, and dehydration.

11. Body cooling serves two purposes: returning blood flow from the skin to the heart and lowering core body temperature.

- A. True
- B. False

12. What conditions warrant immediate return to play after symptoms have subsided?

- A. Heat Stroke
- B. Heat Exhaustion
- C. Heat Syncope
- D. Exercise-Associated Muscle Cramps

13. Thermoregulation is a complex interaction of the CNS, skin, and digestive system to maintain core body temperature.

- A. True
- B. False

14. Where is the CNS temperature-regulation center located in the body?

- A. Abdomen
- B. Hypothalamus
- C. Liver
- D. Heart

15. What is the most common EHI experienced by athletes?

- A. Heat Stroke
- B. Heat Exhaustion
- C. Exercise-Associated Muscle Cramps
- D. Heat Syncope

16. WBGT stands for Wet-Bulb Globe Temperature.

- A. True
- B. False

17. Which of these is not a nonenvironmental risk factor?

- A. Heat Acclimatization
- B. Dehydration
- C. Exercise Intensity
- D. Excessive Clothing or Equipment

Recognition and Management

18. What is the critical threshold at which the core body temperature must not rise above?

- A. 105 degrees F
- B. 100 degrees F
- C. 99 degrees F
- D. 110 degrees F

19. When are athletes typically at the greatest risk of exertional heat illnesses?

- A. Physically fit
- B. Currently sick
- C. Eat healthy
- D. Maintain good hydration

20. What are not contraindications of proceeding in the acclimatization period? Involving the athlete's health.

- A. Currently sick with viral infection
- B. Dehydrated
- C. Physical fit and healthy
- D. Currently have symptoms of heat illness

21. What is essential for treating exertional heat illnesses in the acute stages?

- A. Body Cooling
- B. Fluid Replacement
- C. Stop exercise immediately
- D. All of the Above

Match each condition, 22-25 with the symptom, A-D that is unique to that condition.

- 22. Exercise-Associated Muscle Cramps
- 23. Heat Syncope
- 24. Exertional Heat Exhaustion
- 25. Exertional Heat Stroke
 - A. Tunnel Vision
 - B. Transient Muscle Cramps
 - C. Central Nervous System Changes
 - D. Profuse Sweating

- 26. What should be considered in the recovery of EHIs?
 - A. Asymptomatic
 - B. Normal blood work
 - C. Normal core body temperature
 - D. All of the above

Clinical Practices

Match the following exertional heat illnesses, 27-30 with their treatments, A-D.

- 27. Exertional Heat Stroke
- 28. Exertional Heat Exhaustion
- 29. Heat Syncope
- 30. Exercise-Associated Muscle Cramps
 - A. Ice and massage of muscles
 - B. Shaded area, elevate legs, rehydrate
 - C. Lower core body temperature within 30 minutes, activate EMS
 - D. Remove excess clothing and equipment to facilitate cooling

- 31. What temperature do you want to lower the core body temperature to within 30 minutes?
 - A. 105 degrees F
 - B. below 102 degrees F
 - C. between 103-104 degrees F

- 32. Who should be educated to recognize exertional heat illness?
 - A. Coaches
 - B. Athletic Trainers
 - C. Athletes
 - D. All of the above

- 33. Who is to be part of the sports medicine team?
 - A. Athletic Trainers
 - B. EMS
 - C. Medical Doctor
 - D. All of the above

- 34. What should be available at practice when environmental conditions warrant?
 - A. Cold water

- B. Ice Tub
- C. Ice towels
- D. All of the above

35. What is the clinical gold standard for measuring core body temperature?

- A. Rectal
- B. Tympanic
- C. Oral
- D. Axillary

36. What are the 2 main diagnostic criteria for EHS?

- A. CNS Dysfunction
- B. Elevated core body temperature
- C. Profuse sweating
- D. A and B
- E. A and C

37. What is recommended for patients recovering from EHS regarding return to play?

- A. Cooled and sent home
- B. Resume modified activity within 1 month with a physician's clearance
- C. Asymptomatic with normal blood work
- D. All of the above

38. What is the rest period for patients recovering from EHS?

- A. 7-21 days
- B. One week
- C. Once month
- D. 30 days

Prevention Strategies

Match the following Days, 39-42 to the appropriate heat acclimatization guideline, A-D.

39. Day 1-2

40. Day 3-4

41. Day 5

42. After Day 6

- A. Helmets Only
- B. Five hours of total practice
- C. Helmets and Shoulder pads
- D. Full pads

43. When should you do screenings for risk factors of heat illness?

- A. After injury
- B. Pre participation physicals
- C. At practice

D. During evaluation of suspected injury

44. How long is the acclimatization period as recommended in these guidelines?

A. 5 days

B. 7 to 14 days

C. 30 days

D. 2 days

45. Heat acclimatization involves progressively increasing the intensity and duration of physical activity and phasing in protective equipment.

A. True

B. False

46. How often should players have access to fluids and given breaks?

A. Every 2 hours

B. Once a practice

C. Every 30 minutes

D. Whenever the coach feels like it

APPENDIX B: Recruitment Script

Hello,

You are being asked to participate in a Middle Tennessee State University research project regarding *Certified Athletic Trainers' Knowledge of the NATA Position Statement: Exertional Heat Illnesses* by completing a test. The test will take approximately twenty minutes of your time. There are no foreseeable risks or direct benefits, but your responses will help parents, coaches and health care providers be aware of the reality of exertional heat illnesses and that it may be preventable if recognized and managed properly. All information collected will remain confidential. Your participation as a subject is completely voluntary and you may withdraw at any time. If you have any questions or concerns, please contact the Kirstie Jones at 904-412-1524 or kj3j@mtmail.mtsu.edu. By continuing on, you provide consent to participate in this research project.

[Click here to access the KEHI-Test.](#)

Thank you!

Kirstie Jones

APPENDIX C: Informed Consent

Informed Consent

Middle Tennessee State University

Project Title: Certified Athletic Trainers' Knowledge of the NATA position statement: Exertional Heat Illnesses

Purpose of Project: Every year there are an abundant amount of exertional heat illness cases among athletes and those numbers are currently on the rise. Education and knowledge of those providing care to these athletes are key factors in the recognition and treatment of these illnesses. The purpose of this study is to build a knowledge test to analyze certified athletic trainers' knowledge regarding the 2015 NATA position statement: Exertional Heat Illnesses.

Procedures: You are being asked to participate in this study as a certified athletic trainer. The test will only take approximately 20 minutes to complete. This test is voluntary and you can withdraw at any time without penalization. The test will be completed electronically. By clicking the link to start the test, you will be giving your consent. The test will be completed and returned electronically.

Risk/Benefits: The risk for this research is minimal. Participants will be completing a test that does not put them in harm of the administrators. Data collected will be anonymous and the test will be collected online, so the researchers and committee members will be the only people who have access to the data. There will be no benefits to you as participants directly but it will give your insight on your knowledge levels of current practices.

Confidentiality: Confidentiality will be used to protect you as the athletic trainers participating in the research. Once completed, the test will be returned to the researcher and stored in a password protected file. Researchers will be the only individuals with access to this file.

Principal Investigator/Contact Information: Kirstie Jones; kj3j@mtmail.mtsu.edu; 904-412-1524

Participating in this project is voluntary, and refusal to participate or withdrawing from participation at any time during the project will involve no penalty or loss of benefits to which you might otherwise be entitled. All efforts, within reason, will be made to keep the personal information in your research record private but total privacy cannot be promised, for example, your information may be shared with the Middle Tennessee State University Institutional Review Board. In the event of questions or difficulties of any kind during or following participation, you may contact the Principal Investigator as indicated above. For addition information about giving consent or your rights as a participant in this study, please feel free to contact the MTSU Office of Compliance at (615) 494-8918.

Consent

I have read the above information and my questions have been answered satisfactorily by project staff. I believe I understand the purpose, benefits, and risks of the study and give my informed and free consent to be a participant.

Signature

Date

APPENDIX D: IRB Approval

**IRB** INSTITUTIONAL REVIEW BOARD Office of

Research Compliance, 010A Sam Ingram Building, 2269 Middle
Tennessee Blvd Murfreesboro, TN 37129

IRBN007 – EXEMPTION DETERMINATION NOTICE

Thursday, June 09, 2016

Investigator(s): Investigator(s') Email(s):

Department: Study Title: Protocol ID:

Clayton Faircloth, Robin Hunt, Kirstie Jones, James Farnsworth, Dr. Joey Gray, and Dr. Brian Ragan

cf3q@mtmail.mtsu.edu; rh4p@mtmail.mtsu.edu; kj3j@mtmail.mtsu.edu ;jlf6g@mtmail.mtsu.edu; joey.gray@mtsu.edu;

brian.ragan@mtsu.edu

Health and Human Performance

Evaluation of the Measurement Properties of Athletic Training Knowledge

Tests

16-1289

Dear Investigator(s),

The above identified research proposal has been reviewed by the MTSU Institutional Review Board (IRB) through the **EXEMPT** review mechanism under 45 CFR 46.101(b)(2) within the research category (2) *Educational Tests* A summary of the IRB action and other particulars in regard to this protocol application is tabulated as shown below:

IRB Action	EXEMPT from further IRB review***	
Date of expiration	NOT APPLICABLE	
Sample Size	180 Participants	
Participant Pool	Athletic Trainers	
Mandatory Requirements	Must collect informed consent	
Additional Restrictions	ATs recruited from the NATA member database	
Comments	N/A	
Amendments	Date	N/A
	N/A	Post-Approval Amendments

***This exemption determination only allows above defined protocol from further IRB review such as continuing review. However, the following post-approval requirements still apply:

- Addition/removal of subject population should not be implemented without IRB approval
 - Change in investigators must be notified and approved
 - Modifications to procedures must be clearly articulated in an addendum request and the proposed changes must not be incorporated without an approval

- Be advised that the proposed change must comply within the requirements for exemption
 - Changes to the research location must be approved – appropriate permission letter(s) from external institutions must accompany the addendum request form
 - Changes to funding source must be notified via email (irb_submissions@mtsu.edu)

IRBN007 Version 1.2 Revision Date 03.08.2016

Institutional Review Board Office of Compliance Middle Tennessee State University

- The exemption does not expire as long as the protocol is in good standing
- Project completion must be reported via email (irb_submissions@mtsu.edu)
- Research-related injuries to the participants and other events must be reported within 48 hours of such events to compliance@mtsu.edu The current MTSU IRB policies allow the investigators to make the following types of changes to this protocol without the need to report to the Office of Compliance, as long as the proposed changes do not result in the cancellation of the protocols eligibility for exemption:
 - Editorial and minor administrative revisions to the consent form or other study documents
 - Increasing/decreasing the participant size The investigator(s) indicated in this notification should read and abide by all applicable post- approval conditions imposed with this approval. [Refer to the post-approval guidelines posted in the MTSU IRB's website](#). Any unanticipated harms to participants or adverse events must be reported

to the Office of Compliance at (615) 494-8918 within 48 hours of the incident. All of the research-related records, which include signed consent forms, current & past investigator information, training certificates, survey instruments and other documents related to the study, must be retained by the PI or the faculty advisor (if the PI is a student) at the secure location mentioned in the protocol application. The data storage must be maintained for at least three (3) years after study completion. Subsequently, the researcher may destroy the data in a manner that maintains confidentiality and anonymity. IRB reserves the right to modify, change or cancel the terms of this letter without prior notice. Be advised that IRB also reserves the right to inspect or audit your records if needed. Sincerely,
Institutional Review Board Middle Tennessee State University Quick Links: [Click here](#) for a detailed list of the post-approval responsibilities. More information on exempt procedures can be found [here](#).

APPENDIX E: Content Experts' Resumes

BRAD ROHLING, M.Ed., ATC, LAT
 126 Auburn Ct, Murfreesboro, TN 37128
 (615) 473-1654
Bradley.rohling@mtsu.edu

EDUCATION

Auburn University, Auburn AL 12/02	6/00-
M.Ed. in Higher Education Administration	
Middle Tennessee State University, Murfreesboro, TN 5/00	7/96-
B.S. in Athletic Training Minors: Psychology, Athletic Coaching	

PROFESSIONAL EXPERIENCE

NHC Sports Medicine/Tennessee Orthopaedic Alliance , Murfreesboro, TN Present	4/04-
<i>Coordinator of Athletic Training Outreach Program</i> Provided and supervised sports medicine coverage for ten high schools Responsible for recruiting and supervising Graduate Assistants and staff Created county-wide concussion policy including ImPACT baseline testing Liaison between local physicians and high school sports medicine programs Director of County wide pre-participation physicals	
Middle Tennessee State University , Murfreesboro, TN 12/14	8/14-
<i>Adjunct Faculty-Health and Human Performance Department</i> Instructor for ATHT 4820-Organization and Administration of Athletic Training	
Auburn University Sports Medicine , Auburn, AL 3/04	7/02-
<i>Graduate Assistant Athletic Trainer</i> Assist Head Football Athletic Trainer in daily operations Responsible for educating second year student athletic trainers	
SportsMed Outreach , Opelika, AL 3/04	8/00-
<i>Athletic Trainer</i> Outreach athletic training services to regional high schools	

Middle Tennessee State University, Murfreesboro, TN 8/96 -
6/00

Athletic Training Student

Rotations with all varsity sports

INTERNSHIPS

Tennessee Titans (Oilers) Football Club, Nashville, TN 6/98-
8/98

Athletic Training Intern

Assisted athletic training room staff I all aspects of an NFL summer camp's activities

RELATED EXPERIENCE

TSSAA Sports Medicine Advisory Committee Member 2015-

Present

TATS Secondary Schools Chairperson 2015

Present

TATS Secondary Schools Co-Chairperson 2014-
2015

Accredited Clinical Instructor MTSU Athletic Training Education Program 2005-

Present

Guest Lecturer MTSU Athletic Training Education Program 2004-

Present

Guest Lecturer Cumberland University Athletic Training Education Program 2012-

Present

Rutherford County Health Science Advisory Committee 2011-

Present

TSSAA A.F. Bridges Sportsmanship Award Contributor of the Year 2011-
2012

TSSAA State High School 5A/6A Football Championships Athletic Trainer 2007,
08, 10

Keynote Speaker MTSU High School Athletic Training Symposium 2008

TSSAA State High School Basketball Championships Athletic Trainer 2005,
06, 08

Tennessee East/West Shrine All-Star Football Classic Head Athletic Trainer 2004

Gaylord Hotels Music City Bowl Assistant Athletic Trainer 2003-
2004

Capital One Bowl Assistant Athletic Trainer 2002-
2003

SEATA Student Symposium Lab Instructor 2001-
2003

Chick-Fil-A Peach Bowl Graduate Assistant Athletic Trainer 2001-
2002

Florida Citrus Bowl Graduate Assistant Athletic Trainer 2000-
2001

Auburn Tigers Summer Football Camp Athletic Trainer
2003

2000-

MEMBERSHIPS

National Athletic Trainers' Association
Southeast Athletic Trainers' Association
Tennessee Athletic Trainers' Society
Tennessee Athletic Trainers' Society High School Sports Medicine Committee

HONORS AND CERTIFICATES

BOC Certified # 020102130
Tennessee Board of Athletic Trainers Licensure # 873
ImPACT Trained Athletic Trainer
Middle Tennessee State University Dean's List
Middle Tennessee State University Athletic Academic Honor Roll
American Red Cross First Aid Certified
American Red Cross CPR/AED Certified

PROFESSIONAL REFERENCES

Tim Tackett
Athletic Director
Rutherford County Schools
2240 Southpark Dr
Murfreesboro, TN 37128
(615) 584-4434
tackettt@rcschools.net

Michael Jordan, MD
Tennessee Orthopaedic Alliance
1800 Medical Center Parkway
Suite 200
Murfreesboro, TN 37129
(615) 504-4901
jordanmr@toa.com

Melodie McCarver, M.A.
Contract Account Manager
NHC Rehabilitation
1927 Memorial Blvd
Murfreesboro, TN 37129
(615) 896-7244
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Jimmy Phillips, PT, ATC, LAT
Physical Therapist

NHC Sports Medicine/Tennessee Orthopaedic Alliance
1800 Medical Center Parkway
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Murfreesboro, TN 37129
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James (Jim) H. Mackie, M.Ed., ATC, LAT

12133 Cheyenne Trail
 Jacksonville, FL 32223
 904.477.9291 (M)
 jdmackie@comcast.net

EDUCATION

A.A. Polk Junior College, Winter Haven, FL 1971
 B.S. Physical Education, University of Florida, Gainesville, FL 1974
 M.A., Ed., Eastern Kentucky University, Richmond, KY 1976
 Completion of Masters Course work at University of Florida,
 Gainesville, FL Summer 1975 (Actual degree date: May 1976)

PROFESSIONAL EXPERIENCE

- Student Athletic Trainer, University of Florida, Gainesville, FL 1972-74
- Graduate Assistant Athletic Trainer, Eastern Kentucky University,
 Richmond, KY 1974-75
- Part-time Assistant Athletic Trainer and Equipment Manager, University of Florida,
 Gainesville, FL 1975-76
- Assistant Athletic Trainer, University of Florida, Gainesville, FL July 1976-July 1988
- Athletic Trainer, Braintree Rehabilitation Hospital, Braintree, MA August 1988-July
 1992
- Head Athletic Trainer/Supervisor, Riverside Hospital Sports Medicine,
 Jacksonville, FL July 1992-July 1996
- Athletic Trainer, Baptist\St. Vincent's Sports Medicine, Jacksonville, FL
 July 1996-December 1999
- Athletic Trainer, Healthsouth, Jacksonville, FL January 2000-August 2002
- Athletic Trainer, St. Vincent's Rehab & Sports Medicine, Jacksonville, FL
 September 2002-October 2003
- Supervisor of Athletic Training, St. Vincent's Rehab & Sports Medicine,
 Jacksonville, FL October 2003-2009
- Owner – Operator Athletic Training and Sports Medicine Services, LLC. 2010 –
 present
 - Jacksonville Sports Medicine Program, Administrative consultant &
 Education / Event Coordinator
 - Athletic Trainer – Trinity Christian Academy
 - CPR / AED / First Aid Instructor
- Athletic Trainer, Florida High School All-Star Football Game 1972, 1974-82
- Clinician for Sports Medicine Workshop, University of Central Florida, 1978-81
- Course Teacher, In-Service Teacher Workshop on Athletic Injuries, Lake County,
 Florida School System, 1977-78
- Clinician on Athletic Training on state and local levels, 1976-present
- Assisted in teaching Athletic Training Courses at University of Florida and
 Eastern Kentucky University, Graduate and Undergraduate Level, 1974-88

- Athletic Trainer: Florida Pole Vault School, 1976-82
Florida Baseball Camp, 1977-78
Florida Basketball Camp, 1983-88
- Coordinator and Provider of Athletic Training Services while at UF:
Ohio Valley Conference Track & Field Championship, 1975
Olympic Development Track & Field Clinic, 1979
Florida Relays (Track & Field), 1976-85
Southeastern Conference Championships: Men's Tennis 1977 & 1987;
Men's Cross Country 1981; Men's Baseball 1978, 1980, 1982
NCAA Men's Golf Championship, Greenleaf, FL 1985
Gator Gallop Run, 1978-85 (3-4,000 participants)
- Speaker at American Podiatry Association 68th Annual Meeting, Hollywood, FL
"The Relationship of the Athletic Trainer and Podiatry", August 1980
- Instructor: Cramer Athletic Training Coaches Workshop, 1984-87
- Graduate Assistant Athletic Trainer at Eastern Kentucky University, 1974-75
Responsibilities with all sports
- Speaker: Sports Medicine Programs and In-Service Presentations, Braintree
Rehabilitation Hospital, Braintree, MA 1988-1992
- Athletic Trainer: Boston Marathon Medical Staff, 1991 & 1992
- Aquatic Therapy and Work Hardening Program, Braintree Hospital, 1988-92
- Jacksonville Sports Medicine Program, 1992-present
 - Consultant and Program Development
 - Clinical Speaker at educational event
 - Oversee Concussion Baseline assessments program for 24 schools
 - Provider for pre participation physical examinations
- Medical Services Coordinator: Bausch & Lomb Tennis Championships, 1993-96
- Medical Coordinator and Athletic Trainer: Gate River Run USA 15K Road Race
Championship, 1994-2002
- Interim Manager Riverside Hospital Rehabilitation Services and Sports Medicine
Department, summer 1994
- Athletic Trainer for Jacksonville Bullets Pro Hockey Team, winter 1995
- Completed Frontline Leadership Course (12-week Leadership Module) at St. Vincent's
Medical Center 1995
- Athletic Training Liaison and Clinical Instructor / Preceptor for Jacksonville Lizard
Kings Professional Hockey Team, 1995-1998
- Speaker: Mid-Florida Physical Therapy Symposium, Ocala FL "Ankle Rehabilitation
Techniques", January 1996
- Assisted with production of video featuring Athletic Trainers & EMS personnel on
the proper management and working relationship between the two groups in the
management of a cervical spine injury. Produced in cooperation with the City of
Jacksonville, FL, Fire & Rescue and shown annually on Cable Access Educational
TV for Emergency Personnel, Fall 1995
- Coordinated a program "On the Field Emergency and Management of Injuries
Course" for Athletic Trainers and EMS personnel, August 1995
- Volunteer at 1997 Summer Olympics in Atlanta, GA for Poly-Clinic serving athletes in

the Olympic Village

- Speaker: Mid-Florida Physical Therapy Symposium, Ocala, FL "Functional Rehabilitation Techniques for the Shoulder", January 19, 1997
- Medical Services Coordinator, PGA – MS150 Bike Tour 1996-2000
- Medical Services Coordinator, Jacksonville Marathon 1999-present
- Chapter Director, HOPE *worldwide*–Jacksonville (non-profit faith based volunteer organization) 2001-present
- Served as chair of National Chapter Advisory Board 2010-11
- Athletic Trainer for Hoop It Up and Air It Out events at various times
- Coordinator for “Let’s Get Ready” a preseason performance enhancement workshop for high school athletes, July 2004
 - Athletic Trainer for Trinity Christian Academy 2002, 2003, 2010, 2013, 2014 State of Florida Football Champions
 - Coordinated program “Family Practice Physicians Regarding Techniques for Injections,” Amelia Island, FL with Dr. Joe Czerkowski
 - Coordinated program for Family Practice Physicians & Residents “On the Field Emergency Care of the Injured Athlete”, St. Vincent’s Hospital, Jacksonville, FL 1995
 - University of North Florida, Instructor for Summer 2006 course; Orthopaedic Upper Extremity Assessment, Athletic Training Curriculum
 - University of North Florida Athletic Training Education, Preceptor, 1998 – 1999 & 2012 - present

CREDENTIALS

- Certified Member NATA No. 785946, Certified February 18, 1975 #000900079
- State of Florida License #AL180
- Current American Red Cross Certification First Aid
- Current CPR / AED Certification (American Heart Assn.)
- Current CPR / AED Instructor (American Heart Assn.)
- Preceptor Athletic Training Program University of North Florida
- Previously Licensed as Athletic Trainer, Massachusetts Serial #384206 1988-92
- Previously Licensed as Emergency Medical Technician, Massachusetts 1991

AWARDS AND ACCOMPLISHMENTS

"Founders Research Award", North Florida Chapter, National Multiple Sclerosis Society, May 1985

"Backbone Award", Presented by the membership of the Southeastern Athletic Trainers Association to the Outstanding Assistant Athletic Trainer within District 9 of the NATA, 1987.

Primary member of a team to establish legislation for State of Florida Licensure of Athletic Trainers. Signed as law, May 1995

National Athletic Trainers Association Athletic Training Service Award, June 1999

Athletic Trainers Association of Florida Hall of Fame Inductee, April 1999

St. Vincent's Medical Center Service to the Poor Recognition Nomination, September 2003.
 Initiated acquisition of Automated Electronic Defibrillator (AED) for Trinity Christian Academy, 2003.
 Florida Georgia Blood Alliance, Outstanding Program Director for Non-profit organization, HOPE *worldwide* / Jacksonville, 2002.
 Recipient of National Athletic Trainers Association "Most Distinguished Athletic Trainer" Award, June 2004.
 Recipient of the "District Award" Southeast Athletic Trainers, NATA District 9, April 1, 2006.

RESPONSIBILITIES

University of Florida, Gainesville, FL: 1975-1988

Assist with Athletic Training services and Football Equipment, 1975-76.
 Coordinate Baseball Travel Plans, 1975-83.
 Supervise Athletic Training Services for Spring Sports Program and assist Football Program, 1976-82.
 Supervision of Harmon-Lee Field house, Equipment and Facilities for Baseball, Cross Country, Track & Field, and Tennis, 1976-82.
 Purchasing and Inventory of Equipment for Baseball and Track, 1976-83.
 Administrative and Organizational Responsibilities with Athletic Training and Medical Staff, 1975-88.
 Supervision of Athletic Training for Basketball and Spring Sports Programs, 1982- 88.
 Coordinate Travel and Meal Arrangements for Men's Basketball Program, 1982-88.
 Assist with Football and other sports as part of the Athletic Training Staff, 1976-88.

Braintree Hospital, Braintree, MA: 1988-1992

Participated in Sports Therapy Out-Patient Rehabilitation and served as Athletic Trainer for Brockton High School, Brockton, MA, fulfilling contract with Braintree Hospital and Brockton High School for football and all sports.

Riverside Hospital, Jacksonville, FL: 1992-1997

Supervisor of Athletic Training for Rehabilitation and Physical Therapy Services of Riverside Hospital coordinated and provided Athletic Training Services for nine high schools and numerous community services and events, Served as Systems Administrator North Florida Student Injury Tracking Program.

Baptist/St. Vincent's Health System, Jacksonville, FL: 1997-1999

Staff Athletic Trainer, Aquatics Program Assistant, athletic training services, and coverage for various high schools.

Healthsouth Rehabilitation and Sports Medicine, Jacksonville, FL: 1999-2002

Staff Athletic Trainer, Clinical responsibilities and provided athletic training coverage at the Bolles School for all sports.

St. Vincent's Rehab & Sports Medicine, Jacksonville, FL: 2002-2009

Staff Athletic Trainer; assist with Aquatics Program, provided athletic training services for area high school such as Trinity Christian Academy, Coordinator of

Family Practice & Podiatry Residents Sports Medicine Rotation Program, and Supervisor of Athletic Training

Owner / Operator: Athletic Training & Sports Medicine, LLC 2010 – present

Serving as an Independent contractor with the following at various times:

- Trinity Christian Academy, Certified Athletic Trainer
- Jacksonville Sports Medicine Program, Program Development
- American Heart Association Instructor for CPR / AED
- GE Aviation / Unison Industries
- Medical Coordinator, Jacksonville Marathon
- PRN with Heartland Rehabilitation

CIVIC & PROFESSIONAL INVOLVEMENT

- Member National Athletic Trainers Association, 1972-present
- Member Eastern Athletic Trainers Association NATA, District 1, 1988-92
- Member Southeast Athletic Trainers Association, NATA District 9, 1972-88, 1992-present
- Member Athletic Trainers Association of Florida, 1983-89, 1992-present
- Athletic Trainers Association of Florida President, 1983-87, 1995-97
Vice-President, 1993-95
Placement Committee Chair, 1992-94
Chairman History & Archives Committee, April 2002- April 2006
- National Athletic Trainers Association Placement Committee, 1993-95
- National Athletic Trainers Association, Secretary / Treasurers Committee 2001-2012
- National Athletic Trainers Association Public Relations District 9 Representative, January 2005 – June 2006
- Secretary, National Athletic Trainers Association, District 9 and Southeast Athletic Trainers Association (SEATA): 1999 – June 2006
- Treasurer National Athletic Trainers Association, District 9 and Southeast Athletic Trainers Association; (SEATA) June 2006 – 2012
- Volunteer North Florida Chapter National Multiple Sclerosis Society
- Chapter Director, HOPE *worldwide* / Jacksonville; Faith based not for profit volunteer organization with health and education emphasis for children, the elderly and the poor. 1997 – present. Past Chair, National Chapter Advisory Board and current member of the National Leadership Group
 - Affiliated with Hands On Jacksonville
 - Numerous Chapter awards
- President, Board of Trustees, Jacksonville Church of Christ, Jacksonville, FL January 2005 January 2007
- Member Board of Athletic Training, Appointed by Jeb Bush, Governor, State of Florida, March 2006 – 2010
- President – Southeast Athletic Trainers Association, 2012- June 2016

CONFERENCES ATTENDED

- Medical Aspects of Sports Seminar, University of Tennessee, Memphis, TN, July 1976.
- American Podiatry Association Annual Meeting, 1980.
- USOC-Major League Baseball Shoulder Symposium, Tampa, FL, 1981.
- National Athletic Trainer Association Annual Clinical Symposium 1972, 1974-present.
- Southeastern Athletic Trainers Association Annual Meeting 1974-87, 1995-present.
- Eastern Trainers Association Annual Meeting, 1989-92.
- Baseball Medicine and The Team Trainer, sponsored by the Boston Red Sox and
 - Major League Baseball, January 1990.
- The Knee: Current Concepts, American Academy of Orthopaedic Surgeons, Boston, MA, November 1990.
- Attendance at other conferences on a variety of subjects, i.e.: Drug Education,
 - Aquatic Therapy (Burdenko Institute), etc.
- Major League Baseball Conference, Atlanta GA. 199?
- Athletic Trainers Association of Florida, Annual Clinical Symposium 1993-present.
- Numerous In-services present by staff members
- Pre-Hospital Care of the Spine Injured Athlete, Presented by Shands Hospital, Jacksonville, FL
- Current Research & Rehabilitation for the Shoulder & Knee, George Davies, 2005
- Therapeutic benefits of Kinesio taping 2012
- Speaker Volusia County Sports Medicine Workshop
- Orlando Orthopedics Conference, February 2013
- First Coast Sports Injury Symposium & Concussion Update, annually 2011 – present – Attendee and Program Development Coordinator
- FASMed conference – Florida Alliance of Sports Medicine Conference – Orlando FL July 2014

PAPERS PUBLISHED, OTHER SPEAKING ENGAGEMENTS, & GRANTS OBTAINED

- "Custom Made Harness Answer To Recurring Dislocations", Cramer First Aider, November 1984, Vol. 54, No. 3.
- Grant: North Florida Injury Tracking Program; \$17,500 from Riverside Hospital and Riverside Hospital Foundation to secure four Laptop Computers and I-Track Injury Tracking Software.
- “H” Magazine June 2005 Issue, “Prevention of Back Injuries”

Sports Medicine Quarterly, Publication of St. Vincent's Health System from
Rehabilitation and Sports Medicine for parents and coaches
Contributor - BUZZ Magazine – numerous sports medicine related topics
Obtained Grant 2013-2015 Baptist Community Health for Concussion Education and
Baseline Testing, 25 k grant
Obtained Grant 2015-2017 Baptist Community Health for Concussion Education and
Baseline Testing, 25 k grant
Website: www.atsjax.com

REFERENCES

- Mr. Robert Sefcik, ATC, LAT, Executive Director, Jacksonville Sports Medicine
Program, 3563 Philips Highway, Building E, Suite 502, Jacksonville, FL 32207,
904-202-4332
- Dr. Joseph Czerkawski, MD, Baptist Health & Sports Medicine,
Jacksonville, FL, 904-396-0000.
- Dr. Stephen Lucie, MD, Orthopaedic Surgeon, Jacksonville Orthopaedic Institute,
Jacksonville, FL 904-346-3465.
- Dr. Kevin Murphy, MD, Orthopedic Surgeon, Southeast Orthopaedic Specialists, 10475
Centurion Parkway, Suite 220, Center One, Jacksonville, FL 32256, 904-634-
0640
- Mr. Chris Patrick, ATC, LAT, Assistant Athletic Director for Sports Health, Retired
University of Florida Athletic Association, Gainesville, FL, 356-375-1165.

KRISTIN L. PHILLIPS

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Kristi.phillips@mtsu.edu

EDUCATION

Auburn University, Auburn AL

M.Ed. Educational Foundations, Leadership and Technology, 1999

Major: Higher Education and Administration

Univeristy of Illinois, Urbana-Champaign, IL

B.S. Kinesiology with emphasis in Athletic Training, 1997

PROFESSIONAL EXPERIENCE

Middle Tennessee State Univeristy

August 2002-

Present

Clinical Coordinator/Instructor

- Served as the clinical coordinator and instructor for the only CAATE accredited public institutions in the state of Tennessee.
- Responsible for revising the clinical instructor manual.
- Host Approved Clinical Instructor workshops on Middle Tennessee State University's campus.
- Assign 40-45 students to affiliation sites and then visit affiliation sites to ensure credentialing standards are being met for our athletic training students.
- Mentor graduate assistants serving as our clinical instructors.
- Advise 93 students currently in the athletic training education program and observation students applying to the program.
- Provide advisement to students who display an interest in the athletic training education program.
- Set up new affiliation sites yearly for our athletic training students.

- Helped prepare and collect all data for CAATE reaccreditation.
- Sponsor athletic training students to local, regional, and national athletic training conferences.
- Maintain 40-45 student portfolios to demonstrate the learning overtime concept
- Maintain 15-20 clinical instructor portfolios.
- Act as a Student Athletic Trainer Association faculty representative.
- Organize observation student's assignments and hours in the athletic training room, maintain all paperwork included in the application process, and conduct interviews for entrance into the program.
- Serve on department faculty committees.
- Organize the Student Athletic Trainer awards banquet yearly

Auburn University
2002

August 2001-July

Assistant Athletic Trainer

- Primary sport coverage for Men's and Women's Track and Field.
- Supervise graduate assistant athletic trainers and student athletic trainers responsible for Men's and Women's tennis and golf.
- Responsible for getting Auburn University CEU provider status.
- Maintain correspondence with alumni through a quarterly letter.
- Responsible for scheduling of all student and staff monthly inservices.
- Responsible for organizing and carrying out end of the semester oral and written exams for our student athletic trainers.

Middle Tennessee State University
2001

July 2000-August

Assistant Athletic Trainer

- Primary sport coverage for Women's Basketball.
- Direct supervision of student athletic trainers in the undergraduate athletic training education program.
- Supervise graduate assistant athletic trainers responsible for softball, track, and volleyball.
- Coordinate and maintain pre-participation history and insurance forms for all athletes.
- Responsible for graduate assistant application, scheduling interviews, and itineraries.

Charleston Southern University
2000

July 1999-July

Assistant Athletic Trainer

- Coordination and management of daily coverage for 8 women's sports: basketball, track and field, cross country, volleyball, tennis, softball, golf and soccer.
- Assisted with the clinical education of student athletic trainers.
- Coordinated and maintained pre-participation history and insurance forms for all athletes.

Auburn University
July 1999

August 1997-

Graduate Assistant Athletic Trainer

- Delivered athletic training coverage for varsity football.
- Assisted with clinical and competency education of student athletic

trainers as well as inservice presentations.

- Provided fiscal management for athletic training purchases.
- Helped in the organization of state and regional athletic training meetings.
- Provided coverage for summer football camps.
- Performed other administrative duties as assigned by the Director of Sports Medicine.

University of Illinois
1997

August 1993-July

Student Athletic Trainer

- Clinical experience included providing care to football, swimming, track and field, volleyball, and soccer athletes.

TEACHING EXPERIENCE

Middle Tennessee State University

August 2002-Present

Department of Health and Human Performance

Instructor for the following classes:

Introduction to Athletic Training: Modern principles in care, prevention, and management of sports injuries.

Rehabilitation Techniques: Methods and techniques used in the selection and application of rehabilitation techniques.

Clinical 3000: Psychomotor skills in the application of protective equipment.

Clinical 3001: Psychomotor skills used in the evaluation and assessment of injuries to the lower extremity.

Clinical 3002: Psychomotor skills used in the evaluation and assessment of injuries to the upper extremity.

Clinical 3003: Psychomotor skills used in the rehabilitation of musculoskeletal injuries.

Modalities Lab: Psychomotor skills relevant to the use of modalities.

Upper Extremity Evaluation: Evaluation and assessment of injuries to the upper extremity and thorax.

Lower Extremity Evaluation: Evaluation and assessment of injuries to the lower extremity and lumbar spine.

Pathology: Pathology of special problems and general medical conditions of athletes and others involved with physical activity.

Senior Seminar: Preparation for the BOC exam and discussion of current research in athletic training and sports medicine.

Kinesiology: The study of human movement.

Practicum in Athletic Training: Internship in a non-traditional athletic training setting at a physical therapy site.

Topics in Athletic Training: Various taping techniques for athletic training students and coaches

Human Structure and Movement: The study of anatomical structures, biomechanics, and how those relate to everyday activity and movement.

Middle Tennessee State University
2008

July 2002-

Continuing Studies Massage Therapy Program

Instructor for the following classes:

Kinesiology

Anatomy and Physiology I & II

Middle Tennessee State University
2001

August 2000-May

Department of Health, Physical Education, Recreation & Safety

Instructor for the following classes

First Aid and Safety: Deals with first aid measures and accident prevention

Topics in Athletic Training: Various taping techniques for athletic training students and coaches

Introduction to Athletic Training

Clinical 3003: Psychomotor skills used in rehabilitation techniques.

Auburn University
1999

Summer 1998,

Cramer Student Athletic Trainer Workshop

Onsite workshop coordinator

Workshop lecturer covering the following topics: nutrition, heat illnesses, knee evaluation, ankle evaluation, massage, etc.

ASSOCIATED EXPERIENCE

SEC Student Athletic Trainer Workshop

Served as co-coordinator for the event

Spring 1999

Workshop lecturer covering knee and ankle evaluation

Spring 1998,

1999

National Athletic Trainers' Association Board of Certification

Model for the certification exam

June 1998

Examiner for the certification exam

2000-present

SEC Officials Physical Testing

Spring, Fall

1998

Assisted in the organization and height/weight station of the physical exam
 Member of the Tennessee Athletic Trainers Society Annual Meeting Committee 2002-2009
 Chair, Tennessee Athletic Trainers Society Scholarship Committee 2010-present
 Tennessee Health Occupations Students of America Spring 2006
 Served as a judge for the local HOSA organization
 Presenter for Student SEATA Conference in Atlanta, GA
 Topic: Unique Taping Techniques 2007, 2008, 2010-present
 Topic: Kinesiotaping 2012-present

CERTIFICATIONS AND LICENSES

BOC, Inc Certification #079702561 June 1997-present
 Tennessee Licensed Athletic Trainer August 2002-present
 NATA Member 1994-present
 Professional Rescuer certified 2005-present
 BOC Examiner certified 1999-2007
 Clinical Instructor Educator 2003-present

MICHELLE C. BOLING, PhD, ATC, LAT

Contact information:

University of North Florida

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1 UNF Drive

Email: m.boling@unf.edu

Jacksonville, FL 32224

EDUCATION

University of North Carolina at Chapel Hill, Chapel Hill, NC Doctor of Philosophy in Human Movement Science, Biomechanics Concentration (2008) School of Medicine, Division of Allied Health Sciences **Dissertation:** *A Prospective Investigation of Biomechanical Risk Factors for Anterior Knee Pain*

University of Kentucky, Lexington, KY Master of Science in Kinesiology and Health Promotion, Athletic Training Concentration (2004) College of Education, Department of Kinesiology and Health Promotion **Thesis:** *The Effect of a Functional Rehabilitation Program on EMG Activity and Pain in Patellofemoral Pain Syndrome Patients*

University of North Carolina at Chapel Hill, Chapel Hill, NC Bachelor of Arts, Exercise and Sport Science, Athletic Training Concentration (2002) College of Arts and Sciences, Department of Exercise and Sport Science **Honors Thesis:** *The Effect of Active Hip Adduction on VMO Activity and VMO:VL Ratio during a Squatting Motion*

PROFESSIONAL EXPERIENCE

Curriculum Experience

University of North Florida, Jacksonville, Florida Associate Professor, Undergraduate Athletic Training Program, Department of Clinical and Applied Movement Sciences, Brooks College of Health (2013-present) Program Director, Undergraduate Athletic Training Program (2013-present) Assistant Professor, Undergraduate Athletic Training Program, Department of Clinical and Applied Movement Sciences, Brooks College of Health (2008-2013) Clinical Education Coordinator, Undergraduate Athletic Training Program (2011-2013)

University of North Carolina at Chapel Hill, Chapel Hill, NC Instructor, Department

of Exercise and Sport Science, College of Arts and Sciences (2004-2008)

Clinical Experience

University of North Carolina at Chapel Hill, Chapel Hill, NC (2004-2006) Staff Athletic Trainer: Responsible for coverage of Baseball and mentoring of graduate assistant athletic trainers and undergraduate athletic training students.

University of Kentucky, Lexington, KY (2002–2004) Graduate Assistant Athletic Trainer: Responsible for coverage of Men's/Women's Tennis and Cheerleading. Graduate student supervisor of Shively athletic training room and undergraduate athletic training students.

Carolina Courage, Women's United Soccer Association, Chapel Hill, NC (2001-2002) Athletic training student intern.

BIBLIOGRAPHY

Refereed Journal Publications DiStefano, LS, Martinez, JC, Crowley, E, Matteau, E, Kerner, M, **Boling, MC**, Nguyen, A, Trojian, TH. Maturation and sex differences in neuromuscular characteristics of youth athletes. *Journal of Strength and Conditioning Research*. (accepted May 2015)

Begalle, RL, Walsh, MC, McGrath, ML, **Boling, MC**, Blackburn, JT, Padua, DA. Ankle dorsiflexion displacement during landing is associated with initial contact kinematics but not joint displacement. *Journal of Applied Biomechanics*, 2015.
<http://dx.doi.org/10.1123/jab.2013-0233>.

Boling, MC, Padua, DA. Relationship between hip strength and trunk, hip, and knee kinematics during a jump-landing task in individuals with patellofemoral pain. *International Journal of Sports Physical Therapy*, 2013, 8(5): 661-669.

Nguyen, AD, **Boling, MC**, Slye, C, Hartley, E, Parisi, G. Various methods for assessing static lower extremity alignment: Implications for prospective risk-factor screenings. *Journal of Athletic Training*, 2013, 48(2): 248-257.

Walsh, M, **Boling, MC**, McGrath M, Blackburn, JT, Padua, DA. Lower extremity muscle activation influences knee flexion angle during a jump-landing task. *Journal of Athletic Training*, 2012, 47(4): 406- 413.

Macrum, EC, Bell, DR, **Boling, MC**, Lewek, MD, Padua, DA. Limiting ankle dorsiflexion range of motion alters lower extremity kinematics and muscle activation patterns during a squat. *Journal of Sport Rehabilitation*, 2012, 21:144-150.

Bolgia, LA, **Boling, MC**. An update for the conservative management of patellofemoral pain syndrome: A systematic review of the literature from 2000 to 2010. *International Journal of Sports Physical Therapy*, 2011, 6(2): 112-125.

Padua, DA, **Boling, MC**, DiStefano, LJ, Onate, JA, Beutler, AI, Marshall, SW. Reliability of the Landing Error Scoring System-Real Time, a clinical assessment tool of jump-landing biomechanics. *Journal of Sport Rehabilitation*, 2011, 20(2):145-156.

Boling, MC, Padua, DA, Marshall, SW, Guskiewicz, K, Pyne, S, Beutler, A. Gender differences in the incidence and prevalence of patellofemoral pain syndrome. *Scandinavian Journal of Medicine and Science in Sports*, 2010, 20: 725-730. doi: 10.1111/j.1600-0838.2009.00996.x.

Boling, MC, Padua, DA, Marshall, SW, Guskiewicz, K, Pyne, S, Beutler, A. A prospective investigation of biomechanical risk factors for patellofemoral pain syndrome: the JUMP-ACL cohort. *American Journal of Sports Medicine*, 2009, 37(11): 2108-2116.

Padua, DA, Marshall, SW, **Boling, MC**, Thigpen, CA, Garrett, WE, Beutler, AI. The Landing Error Scoring System (LESS) is a valid and reliable clinical assessment tool of jump-landing biomechanics: the JUMP-ACL study. *American Journal of Sports Medicine*, 2009, 37(10): 1996-2002.

Nguyen, A, **Boling, MC**, Levine, B, Schultz, SJ. Relationship between lower extremity alignment and the quadriceps angle. *Clinical Journal of Sports Medicine*, 2009, 19: 201-206.

Boling, MC, Padua, DA, Creighton, RA. Concentric and eccentric torque of the hip musculature in individuals with and without patellofemoral pain. *Journal of Athletic Training*, 2009, 44(1): 7-13.

Liu, H, **Boling, MC**, Padua, DA, Creighton, RA, Weinhold, P. In vivo evaluation of patellar tendon stiffness in individuals with patellofemoral pain syndrome. *Applied Bionics and Biomechanics*, 2008, 5(2): 59-63.

Bennett, DR, Blackburn, JT, **Boling, MC**, McGrath, M, Walusz, HA, Padua, DA, The

relationship between anterior tibial shear force during a jump landing task and quadriceps and hamstring strength. *Clinical Biomechanics*, 2008, 23: 1165-1171.

Boling, MC, Bolgla, LA, Mattacola, CG, Uhl, TL, Hosey, RG. Outcomes of a weight-bearing rehabilitation program for patients diagnosed with patellofemoral pain syndrome. *Archives of Physical Medicine and Rehabilitation*, 2006, 87(11): 1428-1435.

Boling, MC, Padua, DA, Blackburn, JT, Petschauer, MA, Hirth, CJ. Hip adduction does not affect VMO amplitude or VMO:VL ratios during a dynamic squat exercise. *Journal of Sport Rehabilitation*, 2006, 15:195-205.

Manuscripts Under Review In Refereed Journals Bolgla, LA, **Boling, MC**, DiStefano, MJ, Mace, KD, Fithian, DC, Powers, CM. National Athletic Trainers' Association Position Statement: Management of individuals with patellofemoral pain. *Journal of Athletic Training*. (submitted October 2014)

Nguyen, A, Zuk, EF, Baellow, AL, Pfile, KR, DiStefano, L, **Boling, MC**. Longitudinal changes in hip strength and range of motion in female youth soccer players: Implications for ACL injury. *Clinical Journal of Sports Medicine*. (submitted October 2015)

Invited Commentaries **Boling, MC**. Clinical Commentary: Research considerations based on the evidence for the incidence and prevalence of patellofemoral pain syndrome. *Physical Therapy Reviews*, 2010, 15(1): 40.

Book Chapters Padua, DA, **Boling, MC**, Prentice, WE. Chapter 21: Rehabilitation of knee injuries. In: Prentice, WE (ed). *Rehabilitation Techniques for Sports Medicine and Athletic Training*, 6th Edition. Thorofare, NJ: SLACK Incorporated, 2015.

Boling, MC, Beutler, AI. Chapter 6: Patellofemoral injuries. In: Starkey, C (ed). *Athletic Training and Sports Medicine: An Integrated Approach*, 5th Edition. Burlington, MA: Jones and Bartlett Learning, 2012.

Padua, DA, **Boling, MC**, Prentice, WE. Chapter 21: Rehabilitation of knee injuries. In: Prentice, WE (ed). *Rehabilitation Techniques for Sports Medicine and Athletic Training*, 5th Edition. New York, NY: McGraw-Hill, 2010.

Padua, DA, Thigpen, CA, Brown, CN, **Boling, MC**, Goerger, B. Chapter 13: Current concepts in injury prevention. In: Clark, MA, Lucett, SC (ed). *NASM Essentials of Sports Performance Training*. Philadelphia, PA: Lippincott, Williams and Wilkins, 2010.

Refereed Abstract Publications & Presentations Hartley, EM, **Boling, MC**. Are baseline measures of balance and functional movement associated with incidence of ankle sprains? *Journal of Athletic Training*, 2015, 50(6): S104. *Presented at National Athletic Trainers' Association Annual Clinical Symposia and AT Expo, June 2015, St. Louis, MO.*

Rozzi, SL, Nguyen, A, Parisi, GL, Slye, CA, Burt, A, Rossi, M, **Boling, MC**. The influence of activity rating scale scores on lower extremity kinematics and kinetics during a jump-cut task. *Journal of Athletic Training*, 2015, 50(6): S148. *Presented at National Athletic Trainers' Association Annual Clinical Symposia and AT Expo, June 2015, St. Louis, MO.*

Goto, S, Gross, MT, Blackburn, JT, Berkoff, DJ, **Boling, MC**, Padua, DA. Lower extremity bony alignment influences hip and knee kinematics during a jump-landing. *Journal of Athletic Training*, 2015, 50(6): S152. *Presented at National Athletic Trainers' Association Annual Clinical Symposia and AT Expo, June 2015, St. Louis, MO.*

Van Wert, KM, Baellow, AL, Keith, JL, **Boling, MC**, Nguyen, A. Influence of static lower extremity alignment on lower extremity kinematics across functional tasks. *Journal of Athletic Training*, 2015, 50(6): S199. *Presented at National Athletic Trainers' Association Annual Clinical Symposia and AT Expo, June 2015, St. Louis, MO.*

Baellow, AL, Zuk, EF, **Boling, MC**, DiStefano, LJ, Pfile, KR, Nguyen, A. Influence of hip strength and range of motion on landing kinematics across maturation groups in youth athletes. *Journal of Athletic Training*, 2015, 50(6): S201. *Presented at National Athletic Trainers' Association Annual Clinical Symposia and AT Expo, June 2015, St. Louis, MO.*

Nguyen, A, Crisafulli, GA, Keith, JL, Baellow, AL, **Boling, MC**. Influence of hip strength on lower extremity kinematics differs among functional tasks. *Journal of Athletic Training*, 2015, 50(6): S269. *Presented at National Athletic Trainers' Association Annual Clinical Symposia and AT Expo, June 2015, St. Louis, MO.*

Zuk, EF, Baellow, AL, **Boling, MC**, DiStefano, LJ, Pfile, KR, Nguyen, A. Longitudinal changes in lower extremity strength and range of motion in female youth soccer players. *Journal of Athletic Training*, 2015, 50(6): S302. *Presented at National Athletic Trainers' Association Annual Clinical Symposia and AT Expo, June 2015, St. Louis, MO.*

Boling, MC, Nguyen, A, Yau, R, Cameron, KL, Beutler, A, Padua, DA, Marshall, S.

Movement characteristics associated with the development of chronic knee pain. *Osteoarthritis and Cartilage*, 2015, 23(S2): A60. *Presented at 2015 OARSI World Congress on Osteoarthritis, May 2015, Seattle, WA.*

Stanley, L, Buckley, B, Joyce, C, **Boling, M**, Padua, D, Thigpen, C. Effects of a customized exercise intervention program in adolescent basketball players. *Journal of Orthopaedic and Sports Physical Therapy*, 2015, 45(1): A54.

Presented at American Physical Therapy Association Combined Section Meeting, February 2015, Indianapolis, IN.

Martinez, JC, **Boling, MC**, Nguyen, A, Trojian, TH, DiStefano, LJ. Influence of lower leg injuries on landing kinematics of female adolescent athletes. *Journal of Athletic Training*, 2014, 49(3): S40. *Presented at National Athletic Trainers' Association Annual Clinical Symposia and AT Expo, June 2014, Indianapolis, IN.*

Pfile, KR, **Boling, MC**, DiStefano, LJ, Nguyen, A. The side plank as a measure of core stability is not associated with landing biomechanics. *Journal of Athletic Training*, 2014, 49(3): S99. *Presented at National Athletic Trainers' Association Annual Clinical Symposia and AT Expo, June 2014, Indianapolis, IN.*

Baellow, AL, **Boling, MC**, DiStefano, LJ, Pfile, KR, Nguyen, A. Landing kinematics differ between adolescents with high and low values of asymmetrical unilateral hip rotation. *Journal of Athletic Training*, 2014, 49(3): S157. *Presented at National Athletic Trainers' Association Annual Clinical Symposia and AT Expo, June 2014, Indianapolis, IN.*

Gaven, SL, **Boling, MC**, Russell, DM, Van Lunen, BL. Trunk and lower extremity biomechanics in individuals with patellofemoral pain during a single leg drop landing pre and post an isolated hip fatigue protocol. *Journal of Athletic Training*, 2014, 49(3): S204. *Presented at National Athletic Trainers' Association Annual Clinical Symposia and AT Expo, June 2014, Indianapolis, IN.*

Curtis, TM, McAlister, E, Holcombe, M, **Boling, MC**. Non-contact hip dislocation in male high school football player. *Journal of Athletic Training*, 2014, 49(3): S260. *Presented at National Athletic Trainers' Association Annual Clinical Symposia and AT Expo, June 2014, Indianapolis, IN.*

Boling, MC, Nguyen, A, Padua, DA, Marshall, SW, Cameron, KL, Beutler, AI. Gender-

specific biomechanical profiles for the development of patellofemoral pain. *British Journal of Sports Medicine*, 2014, 48:e7. Presented at 3rd International Patellofemoral Pain Research Retreat, September 2013, Vancouver, Canada.

Nguyen, A, Padua, DA, Marshall, SW, Cameron, KL, Beutler, AI, **Boling, MC**. Kinematic and strength differences between males and females with a history of patellofemoral pain. *British Journal of Sports Medicine*, 2014, 48:e29-e30. Presented at 3rd International Patellofemoral Pain Research Retreat, September 2013, Vancouver, Canada.

Boling, MC, Nguyen, A, Padua, DA, Marshall, SW, Cameron, KL, Beutler, AI. Gender-specific biomechanical profiles for the development of patellofemoral pain. *Journal of Athletic Training*, 2013, 48(3): S92. Presented at National Athletic Trainers' Association Annual Clinical Symposia and AT Expo, June 2013, Las Vegas, NV.

Baellow, AL, Nguyen, A, **Boling, MC**. Comparisons of gluteus medius activation between weight bearing and non-weight bearing limbs during a functional assessment of hip abduction strength. *Journal of Athletic Training*, 2013, 48(3): S145.

Presented at National Athletic Trainers' Association Annual Clinical Symposia and AT Expo, June 2013, Las Vegas, NV.

Nguyen, A, Baellow, AL, **Boling, MC**. Understanding the role of hip muscle activation in controlling lower extremity motion during functional tasks. *Journal of Athletic Training*, 2013, 48(3): S170. Presented at National Athletic Trainers' Association Annual Clinical Symposia and AT Expo, June 2013, Las Vegas, NV.

DiStefano, LJ, Trojian, TH, Nguyen, A, **Boling, MC**. Pubertal and sex differences in lower extremity kinematics during a cutting task. *Journal of Athletic Training*, 2012, 47(5): e3. Presented at ACL Research Retreat VI, March 2012, Greensboro, NC.

Boling, MC, Padua, DA, Marshall, SW, Nguyen, A, Cameron, KL, Beutler, AI. A comparison of lower extremity strength and static alignment in individuals at risk for anterior cruciate ligament injury and individuals at risk for patellofemoral pain syndrome. *Journal of Athletic Training*, 2012, 47(3): S68. Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2012, St. Louis, MO.

Nguyen, A, **Boling, MC**, Varone, AN, Buckley, BD, Keene, KL, DiStefano, LJ.

Influence of static lower extremity alignment on joint kinematics during the overhead squat test in adolescent athletes. *Journal of Athletic Training*, 2012, 47(3): S40. Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2012, St. Louis, MO.

Padua, DA, **Boling, MC**, Goerger, BM, Beutler, AI, Marshall, SW. Prospective differences in lower extremity biomechanics between ACL injured and healthy individuals. *Journal of Athletic Training*, 2012, 47(3): S18. Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2012, St. Louis, MO.

Hunnicut, JL, Nguyen, A, DiStefano, LJ, Buckley, B, **Boling, MC**. Hip range of motion predicts dynamic lower extremity alignment in adolescent athletes. *Journal of Athletic Training*, 2012, 47(3): S124. Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2012, St. Louis, MO.

Rabe, JT, Nguyen, A, DiStefano, LJ, Buckley, BD, **Boling, MC**. Relationship between static lower extremity alignment and landing mechanics in adolescent athletes. *Journal of Athletic Training*, 2012, 47(3): S126. Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2012, St. Louis, MO.

Begalle, RL, Padua, DA, **Boling, MC**, Goerger, BM, Beutler, AI, Marshall, SW. Biomechanical differences exist in the injured and uninjured limb of individuals with prior meniscal injury. *Journal of Athletic Training*, 2012, 47(3): S147. Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2012, St. Louis, MO.

DiStefano, LJ, **Boling, MC**, Buckley, B, Trojian, TH, Joseph, MF, Varone, AN, Nguyen, A. Influence of Hip Strength and Range of Motion on Medial Knee Displacement in High School Athletes. *Journal of Athletic Training*, 2012, 47(3): S150.

Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2012, St. Louis, MO.

Boling, MC, Nguyen, A, Buckley, B, DiStefano, LJ. Influence of hip strength and flexibility on qualitative jump-landing performance in adolescent males and females. *Medicine and Science in Sports and Exercise*, 2012, 44(5): S441-442. Presented at the American College of Sports Medicine Annual Meeting, May 2012, San Francisco, CA.

Nguyen, A, **Boling, MC**, Varone, AN, Keene, KL, DiStefano, LJ. Influence of hip flexibility on dynamic alignment during the overhead squat test in adolescent athletes. *Medicine and Science in Sports and Exercise*, 2012, 44(5): S717. Presented at the American College of Sports Medicine Annual Meeting, May 2012, San Francisco, CA.

Boling, MC, Nguyen, A, Marshall, SW, Padua, DA, Beutler, AI, Cameron, KL, Kelly, DR. The role of hardiness in predicting future development of patellofemoral pain syndrome in military cadets. Presented at The NIH Pain Consortium 7th Annual National Institutes of Health Symposium on Advances in Pain Research, May 2012, Bethesda, MD.

Boling, MC, Padua, DA, Marshall, S, Beutler, AI. A preliminary analysis of gender specific risk factors for patellofemoral pain syndrome. *Journal of Orthopaedic and Sports Physical Therapy*, 2012, 42(6): A33. Presented at 2nd International Patellofemoral Pain Research Retreat, September 2011, Ghent, Belgium.

Boling, MC, Padua, DA, Marshall, SW, Beutler, AI. A comparison of lower extremity muscle strength between individuals with patellofemoral pain syndrome and individuals at risk for future development of patellofemoral pain syndrome. *Journal of Athletic Training*, 2011, 46(3): S28. Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2011, New Orleans, LA.

Padua, DA, **Boling, MC**, Goerger, BM, Beutler, AI, Marshall, SW. Neuromuscular factors influencing external knee valgus moment in males and females. *Journal of Athletic Training*, 2011, 46(3): S29. Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2011, New Orleans, LA.

Hartley, EM, **Boling, MC**, Nguyen, AD, Slye, CA, Parisi, GL. Reliability of various methods for assessment of static lower extremity alignment. *Journal of Athletic Training*, 2011, 46(3): S116. Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2011, New Orleans, LA.

Begalle, RL, Walsh, MC, McGrath, ML, **Boling, MC**, Blackburn, JT, Padua, DA. Sagittal plane ankle motion affects frontal and transverse plane motion at the knee and hip during a jump-landing. *Journal of Athletic Training*, 2011, 46(3): S122. Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2011, New Orleans, LA.

Rozzi, SL, Nguyen, AD, Parisi, GL, Slye, CA, **Boling, MC**. The influence of hip muscle

strength on lower extremity kinematics and kinetics during a cutting task. *Journal of Athletic Training*, 2011, 46(3): S164. Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2011, New Orleans, LA.

Slye, CA, Nguyen, AD, Parisi, GL, **Boling, MC**, Rozzi, SL. Does lower extremity alignment predict hip and knee kinematics during a single leg landing? *Journal of Athletic Training*, 2011, 46(3): S116. Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2011, New Orleans, LA.

Nguyen, AD, Callans, TE, Lopes, ME, DeAngelis, AI, **Boling, MC**. Validity of the single leg triple hop as a clinical predictor of neuromuscular function at the hip. *Journal of Athletic Training*, 2011, 46(3): S172. Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2011, New Orleans, LA.

Parisi, GL, Slye, CA, Nguyen, A, Rozzi, SL, **Boling, MC**. Influence of hip strength on lower extremity joint excursions during single and double leg landings. *Journal of Athletic Training*, 2011, 46(3): S172. Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2011, New Orleans, LA.

Buckley, BD, Joyce, CJ, **Boling, MC**, Thigpen, CA, Padua, DA. Effects of a pre-practice injury prevention program on hip and knee kinematics during a single leg squat. *SEATA 2011 Clinical Symposium Proceedings*. <http://www.seata.org/11csmm/files/> Presented at Southeast Athletic Trainers' Association Annual Clinical Symposium and Members Meeting, March 2011, Atlanta, GA.

Halstead, RE, **Boling, MC**, Bolgla, LA. The relationship between hip muscle strength and lower extremity kinematics in individuals with patellofemoral pain. *Journal of Orthopaedic and Sports Physical Therapy*, 2011, 41(1): A100. Presented at American Physical Therapy Association Combined Section Meeting, February 2011, New Orleans, LA.

Boling, MC, Padua, DA, Marshall, S, Beutler, AI. A preliminary analysis of gender specific risk factors for patellofemoral pain syndrome: the JUMP-ACL study. *Journal of Athletic Training*, 2010, 45(3): S64. Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2010, Philadelphia, PA.

Padua, DA, **Boling, MC**, Goerger, BM, Beutler, AI, Marshall, SW. Differences in jump-landing biomechanics in individuals demonstrating faulty movement patterns on the Landing Error Scoring System. *Journal of Athletic Training*, 2010, 45(3):

S119. Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2010, Philadelphia, PA.

Joyce, CJ, Buckley, BD, **Boling, MC**, Thigpen, CA, Padua, DA. Effects of a customized injury prevention program on hip and knee kinematics during a double leg squat. *Journal of Athletic Training*, 2010, 45(3): S44. Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2010, Philadelphia, PA.

Boling, MC, DiStefano, LJ, Marshall, SW, Beutler, AI, Onate, JA, Padua, DA. Reliability of the Landing Error Scoring System-Real Time (LESS-RT): the JUMP-ACL study. *Journal of Athletic Training*, 2010, 45(5): 535. Presented at ACL Research Retreat V, April 2010, Greensboro, NC.

Joyce, CJ, **Boling, MC**, Buckley, BD, Thigpen, CA, Padua, DA. Three-dimensional lower extremity kinematics predict total score on the Landing Error Scoring System. *Journal of Athletic Training*, 2010, 45(5): 539. Presented at ACL Research Retreat V, April 2010, Greensboro, NC.

Goto, S, Marshall, SW, Beutler, AI, **Boling, MC**, Goerger, BM, Padua, DA. Influence of hip motion, strength and postural alignment on hip internal rotation angle: the JUMP-ACL study. *Journal of Athletic Training*, 2010, 45(5): 528. Presented at ACL Research Retreat V, April 2010, Greensboro, NC.

Boling, MC, Padua, DA, Marshall, SW, Guskiewicz, KM, Pyne, S, Beutler, AI. Biomechanical risk factors for the development of patellofemoral pain: the JUMP-ACL study. *Journal of Orthopaedic and Sports Physical Therapy*, 2010, 40(3): A28. Presented at 1st International Patellofemoral Pain Syndrome Research Retreat, April 2009, Baltimore, MD.

Nguyen, AD, **Boling, MC**, Levine, B, Shultz, SJ. Relationships between lower extremity alignment and the quadriceps angle. *Journal of Orthopaedic and Sports Physical Therapy*, 2010, 40(3): A33. Presented at 1st International Patellofemoral Pain Syndrome Research Retreat, April 2009, Baltimore, MD.

Boling, MC, Padua, DA, Marshall, SW, Guskiewicz, KM, Pyne, S, Beutler, AI. Postural alignment risk factors for patellofemoral pain in a military population: the JUMP-ACL study. *Journal of Athletic Training*, 2009, 44(3): S25. Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2009, San Antonio,

TX.

Padua, DA, Marshall, SW, Beutler, AI, **Boling, MC**. Influence of hip motion and strength on knee valgus angle: the JUMP-ACL study. *Journal of Athletic Training*, 2009, 44(3): S69. *Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2009, San Antonio, TX.*

Abimbola, OO, Bell, DR, **Boling, MC**, Hirth, CJ, Padua, DA. The acute effects of a corrective exercise strategy on knee valgus angle and muscle activity during a squat exercise. *Journal of Athletic Training*, 2009, 44(3): S75. *Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2009, San Antonio, TX.*

Buckley, BD, Thigpen, CA, Joyce, CJ, **Boling, MC**, Padua, DA. Effects of a pre-practice injury prevention program on the Landing Error Scoring System. *Journal of Athletic Training*, 2009, 44(3): S34. *Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2009, San Antonio, TX.*

Joyce, CJ, Buckley, BD, Thigpen, CA, **Boling, MC**, Padua, DA. The relationship between lower extremity kinematics and the Landing Error Scoring System. *Journal of Athletic Training*, 2009, 44(3): S20. *Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2009, San Antonio, TX.*

Walsh, MC, Padua, DA, Blackburn, JT, McGrath, ML, **Boling, MC**. Lower extremity muscle activation influences knee flexion angle during a jump-landing task. *Journal of Athletic Training*, 2009, 44(3): S21.

Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2009, San Antonio, TX.

Macrum, EC, Padua, DA, Lewek, M, **Boling, MC**, Bell, DR. Limited ankle dorsiflexion range of motion alters lower extremity kinematics and muscle activation patterns *Journal of Athletic Training*, 2009, 44(3): S68. *Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2009, San Antonio, TX.*

Boling, MC, Padua, DA, Marshall, SW, Guskiewicz, KM, Pyne, S, Beutler, AI. Gender-specific incidence and prevalence of anterior knee pain in a military population. *Medicine and Science in Sports and Exercise*, 2009, 41(5): 503-504. *Presented at the American College of Sports Medicine Annual Meeting, May 2009, Seattle, WA.*

Boling, MC, Padua, DA, Creighton, RA. Lower extremity mechanics in individuals with and without patellofemoral pain during a stair-stepping task. *Journal of Athletic Training*, 2008, 43(3): S50. *Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2008, St. Louis, MO.*

Padua, DA, Marshall, SW, Beutler, AI, **Boling, MC**. Differences in lower extremity kinematics between ACL injured and non-injured individuals: A prospective cohort study. *Journal of Athletic Training*, 2008, 43(3): S14. *Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2008, St. Louis, MO.*

Kupiec, S, **Boling, MC**, Butler, R, Hirth, C, Kashefsky, H, Prentice, W, Guskiewicz, K. The effect of foot type and use of orthotics on lower extremity muscle timing characteristics. *Journal of Athletic Training*, 2008, 43(3): S18. *Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2008, St. Louis, MO.*

Walusz, H, Padua, DA, **Boling, MC**, McGrath, M, Blackburn, JT. Influence of sagittal plane trunk, hip, and knee flexion angles on peak anterior tibial shear force during a jump-landing task. *Journal of Athletic Training*, 2008, 43(3): S25. *Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2008, St. Louis, MO.*

Goerger, BM, Padua, DA, **Boling, MC**, McGrath, M, Blackburn, JT. Movement variability differs about the joints of the lower extremity. *Journal of Athletic Training*, 2008, 43(3): S26. *Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2008, St. Louis, MO.*

Bennett, DB, Blackburn, JT, **Boling, MC**, McGrath, M, Padua, DA. The relationship between anterior tibial shear force during a jump-landing task and quadriceps and hamstring strength. *Journal of Athletic Training*, 2008, 43(3): S74. *Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2008, St. Louis, MO.*

Marshall, SW, Padua, DA, Beutler, AI, **Boling, MC**, Garrett, W. History of prior ACL injury as a risk factor for incident ACL injury. *Journal of Athletic Training*, 2008, 43(5): 557. *Presented at ACL Injury Retreat-The Gender Bias, April 2008, Greensboro, NC.*

Boling, MC, Marshall, SW, Padua, DA, Beutler, AI. Lower extremity strength as risk factors for ACL injury: preliminary data. *Journal of Athletic Training*, 2008, 43(5):

557. Presented at ACL Injury Retreat-The Gender Bias, April 2008, Greensboro, NC.

Boling, MC, Padua, DA, Creighton, RA. A comparison of isokinetic hip strength in individuals with and without patellofemoral pain. *Journal of Athletic Training*, 2007, 42(2): S115. Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2007, Anaheim, CA.

Padua, DA, Marshall, SW, Beutler, AI, **Boling, MC**, Thigpen, CA. Differences in jump-landing technique between ACL-injured and non-injured individuals: A prospective cohort study. *Journal of Athletic Training*, 2007, 42(2): S85. Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2007, Anaheim, CA.

Hughes, MW, **Boling, MC**, Guskiewicz, K, Padua, DA, Prentice, WE. EMG activity during a functional shoulder exercise: A comparison of cable pulley, rubber tubing, and manual resistance. *Journal of Athletic Training*, 2007, 42(2): S18. Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2007, Anaheim, CA.

Liu H, **Boling, MC**, Padua DA, Weinhold, P. In vivo evaluation of patellar tendon stiffness of patients with patellofemoral pain syndrome. Presented at the Orthopaedic Research Society Annual Meeting, February 2007, San Diego, CA.

Marshall, SW, Padua, DA, Beutler, AI, Wolf, S, **Boling, MC**, Strickland, LJ, Thigpen, C, DeBerardino, TM, Pyne, SW, Tokish, J, Taylor, D, Garrett, WE. Muscle strength, postural alignment, and body mass as risk factors for incident ACL injury: initial results from the JUMP-ACL cohort. Presented at Society of Military Orthopaedic Surgeons Annual Meeting, December 2006, Honolulu, HA.

Boling, MC, Padua, DA, Halverson, SD, Hawkey, TJ. Predictors of knee valgus angle during a lateral step down task. *Journal of Athletic Training*, 2006, 41(2): S65. Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2006, Atlanta, GA.

Padua, DA, Marshall, SW, Beutler, AI, DeMaio, D, Yu, B, Thigpen, CA, **Boling, MC**, Garrett, WE. Anterior tibial shear force and knee valgus angle are influenced by gender, lower extremity kinematics, muscle strength, and landing technique. *Journal of Orthopaedic and Sports Physical Therapy*, 2007, 37(2): A26.

Presented at ACL Injury Research Retreat, April 2006, Lexington, KY.

Boling, MC, Thigpen, CA, Padua, DA, Marshall, SW. Item-specific reliability analyses of the Landing Error Scoring System (LESS). *Medicine and Science in Sport and Exercise*, 2005, 37(5): S124. *Presented at the American College of Sports Medicine Annual Meeting, May 2005, Nashville, TN.*

Boling, MC, Bolgla, LA, Mattacola, CG, Uhl, TL, Hosey, RG. Rehabilitation alters VL and VMO recruitment, decreases pain, and increases function in patients with patellofemoral pain syndrome. *Journal of Athletic Training*, 2005, 40(2): S43.

Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2005, Indianapolis, IN and at Southeastern Athletic Trainers' Association Annual Symposium, April 2005, Atlanta, GA.

Boling, MC, Padua, DA, Blackburn, JT, Petschauer, MA, Hirth, CJ. Active hip adduction does not affect VMO amplitude or VMO:VL ratios during a dynamic squat exercise. *Journal of Athletic Training*, 2003, 38(2): 93. *Presented at National Athletic Trainers' Association Annual Clinical Meeting and Symposia, June 2003, St. Louis, MO.*

Invited Presentations

Feature Presentation, Athletic Trainers' Association of Florida Annual Meeting and Clinical Symposium, "*Evidence-Based Assessment and Management: Patellofemoral Pain.*" April 2013

General Session, Southeast Athletic Trainers' Association Annual Clinical Meeting and Symposium and Members' Meeting, "*Evidence-Based Approach to the Prevention and Management of Patellofemoral Pain.*" March, 2013

Evidence Based Forum, National Athletic Trainers' Association Annual Clinical Meeting and Symposia, "*Can we Prevent ACL Injury and Patellofemoral Pain Syndrome with a Single Intervention?*" June 2011

Learning Lab, National Athletic Trainers' Association Annual Clinical Meeting and Symposia, "*Clinical Assessment of the High Risk Movement Patterns for ACL Injury: The Landing Error Scoring System (LESS).*" June 2010

Learning Lab, National Athletic Trainers' Association Annual Clinical Meeting and Symposia, "*Clinical Evaluation of Static and Dynamic Malalignments: Techniques for*

Assessment and Intervention.” June 2010

Feature Presentation, Southeast Athletic Trainers’ Association Annual Clinical Meeting and Symposium and Members’ Meeting, “*Evidence Based Application Guidelines for an Exercise Program to Address Risk Factors for Patellofemoral Pain Syndrome.*” March 2010

Feature Presentation, National Athletic Trainers’ Association Annual Clinical Meeting and Symposia, “*Preventing, Evaluating and Management of Patellofemoral Conditions: Defining Patellofemoral Pain & Identification of Risk Factors.*” June 2009

Pre-Conference Session, American College of Sports Medicine, Health and Fitness Summit, “*The Final Chapter of Follow the Evidence, Not the Gurus: Evidence Based Application for an Exercise Program to Address Risk Factors for Anterior Knee Pain.*” March 2009

Sports Medicine Lecture Series, Jacksonville Sports Medicine Program, “*Identifying Proposed Risk Factors for Acute and Chronic Knee Injuries.*” January 2009

GRANTS

Current Support

Internal

Boling (PI) (1/2014-12/2016)

Patellofemoral Pain and Serum Biomarkers for Cartilage Turnover and Joint Metabolism: Implications for Future Development of Patellofemoral Osteoarthritis University of North Florida, Brooks College of Health, Dean’s Research Professorship Grant Role: Principal Investigator

Funding Awarded: \$54,000

Completed Support

External

Boling (PI) (7/2010 – 6/2013) *Epidemiology of Patellofemoral Pain Syndrome: Identifying Gender-Specific Risk Factors.* National Institutes of Health, National Institute

of Arthritis and Musculoskeletal and Skin Diseases, Office of Research on Women's Health (R03AR057489) Role: Principal Investigator Funding Awarded: \$145,733

Boling (PI) (9/2007-5/2008)

A Prospective Investigation of Biomechanical Risk Factors for Anterior Knee Pain.

National Academy of Sports Medicine and National Basketball Athletic Trainers' Association Role: Principal Investigator Funding Awarded: \$1,229

Boling (PI) (4/2003-5/2004)

Effect of a Functional Rehabilitation Program on EMG Activity and Pain in Patients with Patellofemoral Pain Syndrome. National Athletic Trainers' Association Osternig Masters Grant Role: Principal Investigator

Funding Awarded: \$1,000

Internal

Boling (PI) (5/2013-8/2013)

Patellofemoral Pain and Serum Biomarkers for Cartilage Turnover: Implications for Future Development of Patellofemoral Osteoarthritis University of North Florida Faculty Proposal Development Grant Role: Principal Investigator

Funding Awarded: \$7,500

Boling (Co-PI) (8/2011-6/2012)

Biomechanical risk factors for Knee Injuries in High School Female and Male Basketball and Soccer Athletes. Us group: Women and Girls' Initiative Role: Co-Principal Investigator

Funding Awarded: \$2,100

Boling (Co-PI) (12/2010-8/2011)

Biomechanical Risk Factors for Knee Injuries in High School Athletes

University of North Florida Faculty Development Research Grant Role: Co-Principal

Investigator Funding Awarded: \$7,500

Boling (PI) (12/2009-5/2010)

The Validity and Reliability of Digital Imagery and Three-Dimensional Motion Analysis in the Measurement of Lower Extremity Static Alignments University of North Florida Student Mentored Academic Research Team (SMART) Grant Role: Principal Investigator/Research Mentor

Funding Awarded: \$1,500

Boling (PI) (12/2008-12/2009)

Biomechanical Risk Factors for Anterior Knee Pain in Male and Female Midshipmen

Us group: Women and Girls' Initiative Role: Principal Investigator Funding Awarded: \$2,500

Boling (PI) (4/2006-5/2007)

A Comparison of Lower Extremity Kinematics, Muscle Activation, and Strength between Individuals with and without Patellofemoral Pain Syndrome University of North Carolina Injury Prevention Center Student Small Grant Role: Principal Investigator

Funding Awarded: \$1,120

Support Not Funded

External

Nguyen (PI) (2015)

Differences in Anatomical, Neuromuscular, and Biomechanical Risk Factors for Knee Injuries Across Stages of Maturation in Youth Soccer Athletes National Athletic Trainers' Association Research and Education Foundation Grant (submitted February 2015)

Role: Co-investigator Funding Requested: \$50,000

Cox (PI) (2012)

National Robotics Initiative: Modular Assistive Cloud Robotics

National Science Foundation Role: Consultant Funding Requested: \$1,496,716

Zhao (PI) (2010)

Complementary and Alternative Medicine (CAM) Use in Treatment of Stroke Patients

National Institutes of Health, Fogarty International Research Center Role: Co-Investigator Funding Requested: \$214,534

Boling (PI) (2009)

Epidemiology of Patellofemoral Pain Syndrome: Identifying Gender-Specific Risk Factors

National Athletic Trainers' Association: Research and Education Foundation Role: Principal Investigator Funding Requested: \$91,443

Marshall (PI) (2009)

Epidemiology of Jump-Landing Movement and ACL Injury

National Institute of Health, National Institute of Arthritis and Musculoskeletal and Skin Diseases Role: Consultant

Funding Requested: \$2,800,000

Boling (PI) (2007)

A Prospective Investigation of Biomechanical Risk Factors for Anterior Knee Pain

National Athletic Trainers' Association Doctoral Dissertation Grant Role: Principal Investigator Funding Requested: \$2,315

Internal

Joyce (PI) (2008)

An Investigation of Factors Influencing the Risk of ACL Injury

University of North Florida Summer Research Grant Role: Co-investigator Funding

Requested: \$7,500

TEACHING ACTIVITIES Undergraduate Courses

University of North Florida, Jacksonville, FL PET 3603C Introduction to Sports Medicine PET 3624C Emergency Management of Athletic Injuries PET 3670 Athletic Training Clinical Instruction I PET 3671 Athletic Training Clinical Instruction II PET 4623 Rehabilitation of Athletic Injuries PET 4632C Therapeutic Modalities PET 4633C Orthopedic and Injury Assessment I PET 4634C Orthopedic and Injury Assessment II PET 4940 Clinical Practice in Athletic Training I PET 4947C Clinical Practice in Athletic Training II

University of North Carolina at Chapel Hill, Chapel Hill, NC EXSS 188 Emergency Care of Injuries and Illnesses EXSS 275L Cadaver Anatomy Laboratory EXSS 365 Evaluation of Athletic Injuries

EXSS 367 Therapeutic Modalities

Graduate Courses

University of North Florida, Jacksonville, FL PHT 7937 Special Topics in Physical Therapy (Spring 2010) PHT 7617 Clinical Inquiry III (Fall 2010)

University of North Carolina at Chapel Hill, Chapel Hill, NC EXSS 705 Applied Statistics and Research Methods Laboratory EXSS 732 Cadaver Anatomy EXSS 738 Laboratory Techniques in Sports Medicine

Research Advising Undergraduate Students

The investigation of neuromuscular variables related to single and double leg squats. Lofton, L., Mansell, N., Slye, C., College of Charleston, *Fall 2010-Spring 2011*

The validity and reliability of digital imagery and three-dimensional motion analysis in the measurement of lower extremity static alignments. Hartley, E., University of North Florida, *Fall 2009-Spring 2010*

Reliability and validity of digital photographs in the measurement of lower extremity alignment. Slye, C., College of Charleston, *Fall 2009-Spring 2010*

Relationships between hip strength and joint motion during a single leg landing activity.

DeAngelis, A., Glymph, M., Hulett, H., College of Charleston, *Fall 2009-Spring 2010*

Validity of the Star Excursion Balance test and single leg triple hop test as functional measures of hip strength. Callans, T., Langston, S., Lopes, M., College of Charleston, *Fall 2009-Spring 2010*

A Comparison of Three Men's Lacrosse Helmets with regard to Cervical Spine Stability. Hibberd, E., University of North Carolina at Chapel Hill, *Fall 2007-Spring 2008*

The effect of myofascial release, stretching, and strengthening on medial knee displacement during an overhead squat. Abimbola, O., University of North Carolina at Chapel Hill, *Spring 2007-Fall 2007*

Graduate Students

Effect of integrated exercise on progressively demanding performances, Goto, S., University of North Carolina at Chapel Hill, Doctoral Dissertation, *Fall 2012-Fall 2014*

Lower extremity biomechanics during single leg drop landings in individuals with patellofemoral pain. Gaven, S., Old Dominion University, Doctoral Dissertation, *Fall 2012-Spring 2013*

The influence of hip muscle strength on lower extremity kinematics during a jump-landing task in individuals with patellofemoral pain syndrome. Halstead, R., University of North Florida, *Fall 2009- Spring 2011*

The effect of limited dorsiflexion range of motion on lower extremity kinematics and muscle activity during an overhead squat. Macrum, E., University of North Carolina at Chapel Hill, Masters Thesis, *Fall 2006-Spring 2008*

The relationship between lower extremity muscle activity and anterior tibial shear force during a jump- landing task. Walsh, M., University of North Carolina at Chapel Hill, Masters Thesis, *Fall 2006-Spring 2008*

The relationship between knee, hip, and trunk flexion angle and anterior tibial shear force during a jump- landing task. Walusz, H., University of North Carolina at Chapel Hill, Masters Thesis, *Fall 2005-Spring 2007*

Influence of quadriceps and hamstrings strength on anterior tibial shear force during a jump-landing task. Bennett, D., University of North Carolina at Chapel Hill, Masters

Thesis, *Fall 2005-Spring 2007*

Effects of static and PNF stretching techniques on muscle performance and vertical jump height. Gage, J., University of North Carolina at Chapel Hill, Masters Thesis, *Fall 2004-Spring 2006*

The effect of foot type on lower extremity muscle activity and center of pressure. Kupiec, S., University of North Carolina at Chapel Hill, Masters Thesis, *Fall 2004-Spring 2006*

A functional overhead pattern of motion in freemotion cable pulley exercise displays higher mean EMG activity than PNF and Theraband. Hughes, M., University of North Carolina at Chapel Hill, Masters Thesis, *Fall 2004-Spring 2005*

PROFESSIONAL SERVICE

Service to Discipline

Editorial Board

Journal of Athletic Training (2013-present) *Journal of Sport Rehabilitation* (2010-present)

Manuscript Reviewer

Knee Surgery, Sports Traumatology, Arthroscopy (2013-present) *Clinical Anatomy* (2012-present) *International Journal of Athletic Therapy and Training* (2012-present) *British Journal of Sports Medicine* (2012-present)

Medicine and Science in Sports and Exercise (2011-present) *Osteoarthritis and Cartilage* (2011-present) *Clinical Biomechanics* (2011-present) *Journal of Biomechanics* (2010-present)

Journal of Sports Sciences (2010-present) *Physical Therapy in Sport* (2010-present) *Scandinavian Journal of Medicine and Science in Sports* (2010-present) *American Journal of Sports Medicine* (2009-present) *International Journal of Sports Medicine* (2009-present) *Journal of Athletic Training and Sports Health Care* (2008-present) *Dynamic Medicine* (2008-present)

Grant Reviewer

Southeast Athletic Trainers' Association (2010-present) Us: Women and Girls' Health Initiative (2010-present) National Athletic Trainers' Association Research and Education Foundation (2007-present)

Committees

Co-Chair, Research and Education Committee, Southeast Athletic Trainers' Association (2015-present) University and College Athletic Training Student Committee, Athletic Trainers' Association of Florida, (2015-present) Jacksonville Sports Medicine Program: Allied Health Advisory Council (2012-present)

Northeast Florida Concussion Task Force (2012-present) Convention Program Committee, Chair of Evidence Based Forums and Researchers' Forum, National Athletic Trainers' Association (2012-2015) Free Communications Committee, National Athletic Trainers' Association Research and Education Foundation (2012-2015) Girls Inc. Rising Leader Society (2012-2015) Health Occupations Students of America, State Competition Judge (2011-2012) Duval County Public School System: Sports Medicine Advisory Committee (2010-2012)

Southeast Athletic Trainers' Association Annual Clinical Symposium and Members' Meeting Abstract Review Committee (2009-present) Evidence-Based Forums and Researchers' Forum Project Team, National Athletic Trainers' Association (2009-2012)

Us: Women and Girls' Health Initiative, Membership Committee (2009-2010)

Service to the University of North Florida

Community-Based Scholar, Selection Committee (2014) Outstanding Undergraduate Teaching Award, University Selection Committee (2013, 2014) Honors Council (2012-2014) Undergraduate Research Advisory Council (2010-present) Human Resources Sick Leave Pool Committee (2011-2013) Ultimate Frisbee Club, Faculty Advisor (2008-2010)

Brooks College of Health

Research and Scholarly Activity Committee, Chair (2012-2014) Brooks and Dean's Professorship Grant Review Committee (2012) Interprofessional Collaboration Committee (2011-2012) Service Award Screening Committee (2009)

Undergraduate Teaching Award Screening Committee (2009) Research and Scholarly

Activity Committee (2008-2010)

Department of Clinical and Applied Movement Sciences

Library Liaison (2011-present) Research Committee (2008-present) Exercise Science Instructor Search Committee (2010)

HONORS & AWARDS

Jacksonville Business Journal, *40 Under 40* (2013)

University of North Florida, *Community Scholar* (2012-2013)

University of North Florida, *Outstanding Undergraduate Teaching Award* (2012)

University of North Florida, *Transformational Learning Opportunity Grant (\$11,000): "Teaching Across Borders: Cross-Cultural Immersion in Athletic Training"* (2011-2012)

University of North Florida, Brooks College of Health, *Excellence in Undergraduate Teaching Award* (2010)

University of North Florida, *Transformational Learning Opportunity Grant (\$1,000): "Expanding the Vision of Athletic Training"* (2010-2011)

University of Kentucky, College of Health Sciences, *Outstanding Alumni* (2007)

University of North Carolina, *Robertson Scholars Program* (2006-2007) University of North Carolina, *Future Faculty Fellowship* (2005) University of North Carolina, *Scholars for Tomorrow Fellowship* (2004-2005)

National Athletic Trainers' Association, *Graduate Scholarship* (2002)

Graduated with Highest Honors from the University of North Carolina at Chapel Hill (2002)

MEMBERSHIPS & CERTIFICATIONS American College of Sports Medicine, Professional Member (2008-present) National Athletic Trainers' Association, Certified Member (2002-present) Southeast Athletic Trainers' Association, Certified Member (2008-present) The Athletic Trainers' Association of Florida, Certified Member (2008-present) American Red Cross, Certified in First Aid/CPR for the Professional Rescuer (2004-present) American Red Cross, Certified Instructor for First Aid and CPR for the

Lay Responder (2004-2008) Athletic Training Board of Certification, Qualified Examiner
(2003-2007)

APPENDIX F: KEHI-Test Revised

Demographics

Please indicate your sex: ____ Male ____ Female

You have been a certified athletic trainer for ____ Years.

What region of the United States do you currently practice?(Northeast, Southeast, Midwest, Northwest, Southwest, etc) ____

What state do you currently practice in? ____

What is your job title? _____

What is your employment status? _____

How long have you held this position? ____

How many locations have you previously worked at? ____

Questions

Please answer the questions in the following quiz. Questions will be formatted as matching, true/false, and multiple choice questions.

Awareness

1. Which of the following is not one of the three core components of sports medicine services involving exertional heat illnesses?

- A. recognition
- B. treatment
- C. curing
- D. prevention

2. The purpose of this position statement is to present best-practice recommendations for the prevention, recognition, and treatment of exertional heat illnesses.

- C. True
- D. False

Knowledge of Conditions

3. Exercise-associated muscle cramps generally occur ____?

- A. suddenly
- B. overtime
- C. after workouts
- D. all of the above

Match the following conditions, 6-10 with their definitions, A-E.

- 4. Heat Syncope
- 5. Heat Exhaustion
- 6. Exertional Heat Injury
- 7. Exertional Heat Stroke
- 8. Exercise-Associated Muscle Cramps

- F. Sudden or progressively evolving, involuntary, painful contractions of skeletal muscle during or after exercise
 - G. Most severe heat illness
 - H. Moderate to severe heat illness characterized by organ and tissue injury associated with sustained high body temperature resulting from strenuous exercise and environmental heat exposure
 - I. Orthostatic dizziness
 - J. Elevated core body temperature and is often associated with a high rate or volume of skin blood flow, heavy sweating, and dehydration.
9. Body cooling serves two purposes: returning blood flow from the skin to the heart and lowering core body temperature.
- C. True
 - D. False
10. What conditions warrant immediate return to play after symptoms have subsided?
- A. Heat Stroke
 - B. Heat Exhaustion
 - C. Heat Syncope
 - D. Exercise-Associated Muscle Cramps
11. Thermoregulation is a complex interaction of the CNS, skin, and digestive system to maintain core body temperature.
- C. True
 - D. False
12. Where is the CNS temperature-regulation center located in the body?
- A. Abdomen
 - B. Hypothalamus
 - C. Liver
 - D. Heart
13. What is the most common EHI experienced by athletes?
- A. Heat Stroke
 - B. Heat Exhaustion
 - C. Exercise-Associated Muscle Cramps
 - D. Heat Syncope
14. WBGT stands for Wet-Bulb Globe Temperature.
- A. True
 - B. False

Recognition and Management

15. What is the critical threshold at which the core body temperature must not rise above?

- A. 105 degrees F
- B. 100 degrees F
- C. 99 degrees F
- D. 110 degrees F

16. The greatest risk of exertional heat illnesses is when athletes are _____?
- A. Physically fit
 - B. Currently sick
 - C. Eat healthy
 - D. Maintain good hydration

17. What is essential for treating exertional heat illnesses in the acute stages?
- A. Body Cooling
 - B. Fluid Replacement
 - C. Stop exercise immediately
 - D. All of the Above

Match each condition, 22-25 with the symptom, A-D that is unique to that condition.

- 18. Exercise-Associated Muscle Cramps
- 19. Heat Syncope
- 20. Exertional Heat Exhaustion
- 21. Exertional Heat Stroke
- E. Tunnel Vision
- F. Transient Muscle Cramps
- G. Central Nervous System Changes
- H. Profuse Sweating

22. What should be considered in the recovery of EHIs?
- A. Asymptomatic
 - B. Normal blood work
 - C. Normal core body temperature
 - D. All of the above

Clinical Practices

Match the following exertional heat illnesses, 27-30 with their treatments, A-D.

- 23. Exertional Heat Stroke
- 24. Exertional Heat Exhaustion
- 25. Heat Syncope
- 26. Exercise-Associated Muscle Cramps
- E. Ice and massage of muscles
- F. Shaded area, elevate legs, rehydrate
- G. Lower core body temperature within 30 minutes, activate EMS
- H. Remove excess clothing and equipment to facilitate cooling

27. What temperature do you want to lower the core body temperature to within 30 minutes?
- A. 105 degrees F
 - B. below 102 degrees F
 - C. between 103-104 degrees F
28. Who should be educated to recognize exertional heat illness?
- A. Coaches
 - B. Athletic Trainers
 - C. Athletes
 - D. All of the above
29. What should be available at practice when environmental conditions warrant?
- A. Cold water
 - B. Ice Tub
 - C. Ice towels
 - D. All of the above
30. What is the clinical gold standard for measuring core body temperature?
- A. Rectal
 - B. Tympanic
 - C. Oral
 - D. Axillary
31. What are the 2 main diagnostic criteria for EHS?
- A. CNS Dysfunction
 - B. Elevated core body temperature
 - C. Profuse sweating
 - D. A and B
 - E. A and C
32. What is recommended for patients recovering from EHS regarding return to play?
- A. Cooled and sent home
 - B. Resume modified activity within 1 month with a physician's clearance
 - C. Asymptomatic with normal blood work
 - D. All of the above

Prevention Strategies

Match the following Days, 39-42 to the appropriate heat acclimatization guideline, A-D.

- 33. Day 1-2
- 34. Day 3-4
- 35. Day 5
- 36. After Day 6

- E. Helmets Only
- F. Five hours of total practice
- G. Helmets and Shoulder pads
- H. Full pads

37. When should you do screenings for risk factors of heat illness?

- A. After injury
- B. Pre participation physicals
- C. At practice
- D. During evaluation of suspected injury

38. How long is the acclimatization period as recommended in these guidelines?

- A. 5 days
- B. 7 to 14 days
- C. 30 days
- D. 2 days

39. Heat acclimatization involves progressively increasing the intensity and duration of physical activity and phasing in protective equipment.

- A. True
- B. False

40. How often should players have access to fluids and given breaks?

- A. Every 2 hours
- B. Once a practice
- C. Every 30 minutes
- D. Whenever the coach feels like it