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 stokes (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 stokes. 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 in 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 (BOCatc.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

<table>
<thead>
<tr>
<th>Domains</th>
<th>Example %’s</th>
<th>Your %’s</th>
<th>Initials/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness</td>
<td>20%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge of Conditions</td>
<td>20%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prevention Strategies</td>
<td>20%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recognition and Management Strategies</td>
<td>20%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinical Practices</td>
<td>20%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
<td></td>
</tr>
</tbody>
</table>

**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 $P: .32 > < .92$. 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*

![Gender](chart1)

Figure 2. *Region ATs are Located*

![Region](chart2)
Figure 3. *Years of Experience*

![bar chart showing years of experience with frequencies](image)

Figure 4. *Employment Status*

![bar chart showing employment status](image)
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

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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


Professional Programs. CAATE. Retrieved from caate.net/professional-programs/


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. Perfuse 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:

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<tr>
<td>Participant Pool</td>
<td>Athletic Trainers</td>
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***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)

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 6/00-
12/02
M.Ed. in Higher Education Administration

Middle Tennessee State University, Murfreesboro, TN 7/96-
5/00
B.S. in Athletic Training
Minors: Psychology, Athletic Coaching

PROFESSIONAL EXPERIENCE
NHC Sports Medicine/Tennessee Orthopaedic Alliance, Murfreesboro, TN 4/04-
Present
Coordinator of Athletic Training Outreach Program
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 8/14-
12/14
Adjunct Faculty-Health and Human Performance Department
Instructor for ATHT 4820-Organization and Administration of Athletic Training

Auburn University Sports Medicine, Auburn, AL 7/02-
3/04
Graduate Assistant Athletic Trainer
Assist Head Football Athletic Trainer in daily operations
Responsible for educating second year student athletic trainers

SportsMed Outreach, Opelika, AL 8/00-
3/04
Athletic Trainer
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


Athletic Training Intern
Assisted athletic training room staff in 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 2000-2003

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
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tackettt@rcschools.net

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

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Contract Account Manager
NHC Rehabilitation
1927 Memorial Blvd
Murfreesboro, TN 37129
(615) 896-7244
mmcarver2@comcast.net

Jimmy Phillips, PT, ATC, LAT
Physical Therapist
NHC Sports Medicine/Tennessee Orthopaedic Alliance
1800 Medical Center Parkway
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Murfreesboro, TN 37129
(615) 278-1634
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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,
- 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;
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

- 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
  - Coordinated program “Family Practice Physicians Regarding Techniques for Injections,” Amelia Island, FL with Dr. Joe Czerkawski
  - 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 the “District Award” Southeast Athletic Trainers, NATA District 9, April 1, 2006.

RESPONSIBILITIES

Assist with Athletic Training services and Football Equipment, 1975-76.
Coordinate Baseball Travel Plans, 1975-83.
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
- 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
- President – Southeast Athletic Trainers Association, 2012- June 2016
CONFERENCES ATTENDED

- National Athletic Trainer Association Annual Clinical Symposium 1972, 1974-present.
- Baseball Medicine and The Team Trainer, sponsored by the Boston Red Sox and
- Attendance at other conferences on a variety of subjects, i.e.: Drug Education,
  - Aquatic Therapy (Burdenko Institute), etc.
- 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

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.
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
KRISTIN L. PHILLIPS  
1902 Jose Way, Murfreesboro, TN 37120  
(615)217-7593  
Kristi.phillips@mtsu.edu

EDUCATION

Auburn University, Auburn AL
M.Ed. Educational Foundations, Leadership and Technology, 1999
Major: Higher Education and Administration

University of Illinois, Urbana-Champaign, IL
B.S. Kinesiology with emphasis in Athletic Training, 1997

PROFESSIONAL EXPERIENCE

Middle Tennessee State University  
Clinical Coordinator/Instructor  
August 2002- Present

- 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
August 2001-July 2002

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     July 2000-August 2001
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     July 1999-July 2000
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     August 1997-July 1999
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
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, 2002-2008

Continuing Studies Massage Therapy Program
Instructor for the following classes:
- Kinesiology
- Anatomy and Physiology I & II

Middle Tennessee State University, 2001

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, Summer 1998, 1999

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 2006
  Served as a judge for the local HOSA organization
Presenter for Student SEATA Conference in Atlanta, GA
  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
Office: (904) 620-1563
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.


BIBLIOGRAPHY


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


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.*


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


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


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


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


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


*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.*


**Invited Presentations**

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


Learning Lab, National Athletic Trainers’ Association Annual Clinical Meeting and Symposium, “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


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


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

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


*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


*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


*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)

*Bimechanical Risk Factors for Anterior Knee Pain in Male and Female Midshipmen*

US group: Women and Girls’ Initiative Role: Principal Investigator  Funding Awarded: $2,500


*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*

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**Department of Clinical and Applied Movement Sciences**


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

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


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

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. Perfuse 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