

Perceived Relative Advantage of Intravenous Rehydration being a standard
protocol for Certified Athletic Trainers

by

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A Thesis Submitted in Fulfillment
of the Requirements for the Degree of
Masters of Science in Health and Human Performance

Middle Tennessee State University
December 2014

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ABSTRACT

Heat-related illnesses are a common occurrence in all types of sports, and can have the ability to have devastating effects on the individual. Because of the harmful effects, intravenous injection of rehydrating fluids has been proposed as an effective treatment option. Currently there are twenty-five to thirty thousand Certified Athletic Trainers (ATC's) in the U.S. Of these ATC's one thousand participants were randomly chosen by the NATA to receive the survey for completion. The proposed research question examined asks what effect will Athletic Trainers' perception of the relative advantage of IV rehydration fluids for treating heat-related illnesses have on their support for a change of the traditional hydration treatment protocol for heat-related illnesses? Descriptive analyses was yielded results about how ATC's answered the questions used for analysis. Cross tabulations and Logistic Regression was used for analysis. Significant results were found with Logistic Regression. The proposed hypothesis was supported by the statistical results when controlling for years of experience as a Certified Athletic Trainer, Athletic Trainers who perceive the relative advantage of intravenous administration of hydration fluids as becoming protocol for treating heat-related illnesses are more likely to support a change in the protocol than are Athletic Trainers that support the traditional treatment for heat-related illnesses was supported by the statistical data.

Key Words- Dehydration, rehydration, intravenous injections, heat illness, fluid deficit, athletic training

TABLE OF CONTENTS

LIST OF FIGURES.....	v
LIST OF TABLES.....	vi
LIST OF APPENDICES.....	vii
CHAPTER I: Introduction.....	1
Purpose of the Research	2
Hypothesis.....	2
Limitations.....	2
Study Implications.....	3
CHAPTER II: Review of Literature	4
Athletic Trainers.....	5
Heat-Related Illness.....	5
Dehydration	6
Hydration (Oral and Intravenous)	7
Relationship of Rehydration and Heat Illness.....	8
Relationship of Dehydration and Heat Illness.....	10
Relationship of Weather and Heat Illness	12
Relationship of the Type of Sport and Heat Illness.....	13
Summary	14
Research Question	15
Hypothesis.....	15
CHAPTER III: Methodology.....	17
Introduction.....	17
Participants.....	17
Design	18
Variable Measurement.....	18

Instruments	19
Data Entry	20
Data Analysis	20
CHAPTER IV: Results	21
Table 1	23
Table 2	24
Table 3	25
CHAPTER V: Discussion	26
Hypothesis	26
Methodology	27
Further Studies	28
Conclusion	28
REFERENCES	30
APPENDICES	33
APPENDIX A- Certified Athletic Trainer Survey	34
APPENDIX B- Survey Cover Letter	38
APPENDIX C- Institutional Review Board Approval Letter	40

LIST OF FIGURES

	Page
Figure 1. Determinants of support for change in protocol.....	16

LIST OF TABLES

	Page
Table 1. Participant Characteristics, 2014 Certified Athletic Trainer Survey.....	23
Table 2. Characteristics (%) of EMS and Certified Athletic Trainers adopting IV use....	24
Table 3. Logistic Regression Analysis Summary of Adopting IV use	25

LIST OF APPENDICES

	Page
Appendix A Certified Athletic Trainer Survey.....	34
Appendix B Survey Cover Letter.....	38
Appendix C Institutional Review Board Letter.....	40

CHAPTER I

INTRODUCTION

Heat-related illnesses are one of the foremost leading causes of deaths and disabilities among high school athletes in the United States. Annual estimates show that more than 9,000 high school athletes are affected by a heat-related illness. Most often, heat related illnesses happen due to insufficient hydration methods. Even though some heat-related illnesses might not be a life-threatening emergency, they can escalate quickly into a medical emergency if not treated properly. This is why there is such a high need for the presence of highly trained personnel, such as Certified Athletic Trainers, at all sporting events including practices. Even with trained personnel available and an emergency action plan that encompasses appropriate treatment, heat-related illnesses can and still do occur.

The high risk involved with contracting a heat-related illness and the devastating effects it can have on an athlete's ability to perform during competition have caused discussions to investigate other means of hydrating athletes. One possibility is the use of intravenous injections. This study looks to examine the effectiveness of intravenous injections of rehydration fluids and the adoption among the Athletic Training profession as a suitable means of treating heat-related illnesses.

Purpose of the Research

The purpose of this study was to study Certified Athletic Trainers (ATC) perceived relative advantage for adopting intravenous rehydration for treating heat-related illnesses. The research question is: When Controlling for years of experience as a Certified Athletic Trainer, what effect will Athletic Trainers' perceived relative advantage of IV rehydration fluids for treating heat-related illnesses have on their support for a change of the traditional oral hydration treatment protocol for heat-related illnesses?

The research question will be evaluated with the following hypothesis and an analysis will be conducted on the responses of the Athletic Trainer Survey.

Hypothesis

When controlling for years of experience as a Certified Athletic Trainer, Athletic Trainers who perceive the relative advantage of intravenous administration of hydration fluids as becoming protocol for treating heat-related illnesses are more likely to support a change in the protocol than are Athletic Trainers that support the traditional treatment for heat-related illnesses.

Limitations

One of limitations to this study is the amount of time ATC's have to answer the research survey. The survey will be available to respond to for only a limited amount of time. Athletic Training is a highly time consuming job profession. Because of the increased hours that ATCs' work reduce the return percentage of

participants in this study. Also, the time of year has its limitations on a ATCs' ability to answer a research survey. This survey was distributed between August and September. These months are busy times for ATCs because of football and basketball.

Study Implications

With the prevalence of heat related illnesses increasing to extreme numbers, this study may be beneficial to help create better ways for Certified Athletic Trainers (ATC's) to help treat heat related illnesses among athletes. This study will allow ATC's to give their opinion on how they perceive the beneficial effects of intravenous rehydration versus oral rehydration for heat related illnesses. It may also be useful in making State officials aware of the importance of an Athletic Trainer in any athletic setting.

CHAPTER II

REVIEW OF LITERATURE

This review of literature seeks to find relevant articles and studies that can answer the proposed research question: What effect will Athletic Trainers' perception of the relative advantage of IV rehydration fluids for treating heat-related illnesses have on their support for a change of the traditional hydration treatment protocol for heat-related illnesses? Hydration strategies and protocols for counteracting the effects of heat-related illnesses in athletic competition have been a growing area of discussion for many years. When there is adequate time, the vast majority of athletes can reach a proper hydrated state by drinking and consuming a proper diet (Givan & Diehl, 2012). One topic that has been discussed as a possible solution to the problem of managing heat-related illness is intravenous hydration therapy and its effectiveness. There have been many research studies conducted that have examined the mechanisms of heat-related illnesses, ways of recognizing those illnesses, appropriate protocols for their evaluation and treatment, and accurate descriptions for return to play guidelines for an athlete that has sustained a heat-related illness. There have also been studies designed to educate the athletic population to help reduce the risks of heat-related illnesses. In regards to intravenous therapy, the research is relatively marginal and inconclusive about it being an effective way of treating heat-related illnesses. Regardless of the limited amount of conclusive studies

concerning intravenous therapy, there are still many published journal articles that have explicit guidelines for the management of heat-related illnesses.

Athletic Trainers

Athletic Training has been a growing occupation, especially in athletic settings. This is due to the occupation's particular skill sets. Athletic Trainers (ATs) are highly skilled professionals that are trained for many situations including the evaluation and treatment of heat-related illnesses (Binkley, Beckett, Casa, Kleiner, & Plummer, 2002). In these particular situations the primary goal of the athletic trainer is to properly address the level of dehydration and give proper treatment through any means necessary to achieve hydration (Binkley et al., 2002). It is the job of the athletic trainer to have an emergency plan in place that addresses these issues (Anderson, Courson, Kleiner, McLoda, 2002). Even with a heat-related illness plan that includes all necessary precautions and treatment methods necessary, heat-related illnesses frequently occur (Binkley et al., 2002).

Heat-Related Illness

Heat-related illnesses are a very common occurrence in high school athletics. They can have devastating effects on an athlete's body including sudden death (Casa, Guskiewicz, Anderson, Courson, Heck, Jimenez et al., 2012). A surveillance study that was conducted by Yard, et al. found that a total of 118 heat-related illnesses were reported from the 100 schools that were

analyzed. It was reported that football had the highest incidence rate with 4.5 per 100,000 athletes exposed (Yard, Gilchrist, Haileyesus, Murphy, Collins, McIlvain et al., 2010). A similar study was published by Kerr, Casa, Marshall, and Comstock in the American Journal of Preventative Medicine and showed almost identical statistics with football athletes accounting for 4.42 per 100,000 athletes exposed (Kerr, Casa, Marshall, Comstock, 2013). Even though the incidence of developing a heat-related illness are higher in football, all sports are still susceptible (Yard, et al. 2010; Kerr et al., 2013).

Dehydration

Dehydration in clinical practice, as opposed to a physiological definition, is defined as the loss of body water, with or without salt, at a rate greater than the body can replace it (Thomas, Todd, Lawthorne, Levenson, Rubenstein, Smith et al., 2008). Dehydration among the athletic population has the effect to alter the cardiovascular and thermoregulatory functions that can inhibit an athlete's ability to perform (van Rosendal, Osborne, Fassett, Lancashire, Coombes, 2010). Many of the signs and symptoms that are associated with heat-related illnesses have dehydration as a common indication (Binkley et al., 2002). During any form of exercise the body's primary way to regulate core body temperature is through sweating and evaporation (Casa, Armstrong, Hillman, Montain, Reiff, Rich et al., 2000). If the body is unable to evaporate the sweat then the body's core temperature rises rapidly (Casa et al., 2000). A position statement published by Casa et al. in the *Journal of Athletic Training* reports that dehydration of 1% to

2% of the body's weight will start to have compromising effects and negatively influence performance, and further reports that a 3% reduction of the body's initial weight can further reduce the physiological function and increase the risk that an athlete has to develop a heat-related illness (Casa et al., 2000). This is why there is such an importance to have guidelines available for all participants to follow for proper hydration procedures (Casa et al., 2000).

Hydration (Oral and Intravenous)

Two of the most important purposes for rehydrating are to decrease the rate of hyperthermia and to maintain athletic performance (Casa et al., 2000). Water is the major component of the human body and accounts for over 70% of lean body mass (Casa, Guskiewicz, Anderson, Courson, Heck, Jimenez et al., 2012). This is why the importance of continued hydration is of such concern to an athlete.

Proper hydration can be achieved in two ways. One hydration technique is through oral ingestion of fluids. Oral hydration is considered as the most practical way of replenishing the body's fluid reservoirs (McDermott, Casa, Lee, Yamamoto, Beasley, Emmanuel et al., 2013). Another consideration that has been studied as a viable means of rehydrating an athlete is through intravenous infusion (Givan et al., 2012). Intravenous infusions can be administered as fast as 50-60ml per minute (Givan et al., 2012). This technique has also been

proposed as a performance enhancing aid and a more efficient way to achieving a hydrated state (Givan et al., 2012).

Relationship of Rehydration and Heat Illness

There is clear evidence to support that rehydration during a bout of exercise is beneficial to the body's recovery time as well as decreasing susceptibility of heat related illnesses (Shirreffs, 2009). Rehydration can be achieved in two ways. One of the preferred and more practical ways is oral consumption. Another way, which in recent years has gotten some attention, is by intravenous infusion. Many journals have been published that address the importance of fluid consumption for athletes. Casa et al. published a position statement in *The Journal of Athletic Training* about the importance of proper fluid replacement for the athletic population. It states that proper hydration during exercise will positively influence the cardiovascular system as well as help with thermoregulation of the body which makes athletes less susceptible to heat-related illnesses (Casa et al., 2000).

Recently, there have been several articles that focus on which rehydration technique works the best. An article published by van Rosendal et al. in *Sports Medicine* researched which rehydration technique was better. The journal article generally stated that when an athlete is suspected to be suffering from a heat-related illness that fluid is typically administered via intravenous infusion (van Rosendal et al., 2010). This holds to the belief that intravenous infusions are a

quicker way of rehydrating the body after an exercise session and can also help with increasing exercise performance. However, when compared to oral hydration there were no findings that supported that intravenous hydration was a better and more efficient way of increasing performance outcomes (van Rosendal et al., 2010). Results did support that intravenous rehydration provides a more rapid replenishment of the body's fluids and the restoration of normal plasma volume levels as compared to oral hydration (van Rosendal et al., 2010). Another article was reported that contradicted the previous research statement. It reported that intravenous rehydration showed little benefits and that oral rehydration may actually be a superior (McDermott, Casa, Lee, Yamamoto, Beasley, Emmanuel et al., 2013).

Another report published by van Rosendal et al. in *Medicine and Science in Sports and Exercise* assessed performance benefits with rehydration with intravenous fluids and oral glycerol. The study reported that when intravenous infusion and oral glycerol were compared with oral hydration there were significant findings ($p < 0.05$) of performance benefits (van Rosendal et al., 2012). It was also reported that plasma volume was restored faster with the combination of intravenous infusions combined with oral glycerol than other hydration techniques tested (van Rosendal et al., 2012). Another study that compared the two forms of rehydration was published by van Rosendal et al. in *Sports Medicine*. The aim of this study was to determine if intravenous administration gave an advantage (van Rosendal et al., 2010). It stated that although there are

some advantages to intravenous infusion, most evidence is sequential (van Rosendal et al., 2010)

Rogers and other research associates published a study in the *Clinical Journal of Sports Medicine* comparing intravenous infusion versus oral. This was an intervention study that used ultramarathon runners as the test subjects. After a race the participating runners were placed into two groups. One group received a hypertonic saline solution via orally and the other received the same solution intravenously. It was found that there was no conclusive evidence to support that either intervention was more effective than the other (Rogers, Hook, Stuemple Hoffman, Hew-Butler, 2011).

One study focused primarily on the oral consumption of water. Khamnei, Hosseinlou, and Zamulu explored the effect that water temperature had on the voluntary consumption of water. This study suggested that with the increased voluntary consumption of fluids that thermoregulation of the body would be more efficient and would be at less risk of developing heat related illnesses (Khamnei, Hosseinlou, Zamaulu, 2011). They found that voluntary drinking was increased with water at a temperature of 16 degrees Celsius (Khamnei et al., 2011).

Relationship of Dehydration and Heat Illness

During exercise the body's sweat output often exceeds that of the fluid intake by an athlete (Khammel et al., 2011). This results in fluid deficits (Khammel et al., 2011). An article published by McDermott et al. in the *Journal*

of Strength and Conditioning Research reported that fluid replacement that is not sufficient for the amount of water lost can result in cardiovascular strain and poor blood pressure recovery (McDermott et al., 2013). Without proper fluid replacement, dehydration can quickly begin to have negative effects on an athlete's body and make them more susceptible to heat-related illnesses (Casa et al., 2000). The susceptibility to dehydration starts to begin when athletes deplete hydration levels by 1% to 2% of their pre-practice body weight (Casa et al., 2000). This decrease in percent of hydration can then start to have compromising physiological function and negatively influence performance (Casa et al., 2000). This is why appropriate protocols are needed to help aid in the prevention of heat-related illnesses. Although most injuries that occur in athletics are relatively minor, or some have life-threatening results, injuries are unpredictable and can occur without warning (Anderson et al., 2002).

Anderson et al. published a position statement in *The Journal of Athletic Training* with regards to emergency planning in athletics. Because heat-related illnesses can quickly develop into a more severe and life-threatening issue, it is necessary for this type of illness to be included in an emergency action plan (Anderson et al., 2002). Organizations that sponsor athletic events have a responsibility to develop an emergency action plan that can be executed immediately and to provide suitable standards of health care to all sports participants (Anderson et al., 2002).

Water is a vital element of the human body. It is accountable for approximately 73% of lean body mass (Casa et al., 2000). In 2000, Casa et al. published a position statement in the *Journal of Athletic Training* that includes the National Athletic Trainers' Association management of fluid replacement for athletes. The position statement provides specific recommendations regarding fluid replacement. The treatment method mentioned in this position statement is mostly in regards to oral hydration. However, it does discuss the importance of intravenous injections being a vital component if the condition worsens and positive results are not being noticed (Casa et al., 2000).

Relationship of Weather and Heat Illness

Hyperthermia is one of the main causes of heat-related illnesses (Kerr et al., 2013). When hyperthermia exceeds the cells' ability to tolerate thermal stress then there is an increased risk of cellular damage (Kerr et al., 2013). Heat-related illnesses can include a large variety of illnesses and can escalate into a medical emergency if treated improperly (Binkley et al., 2002). Problems that arise from heat-related illnesses can range from something minor such as heat cramps to a medical emergency such as heat stroke (Binkley et al., 2002). There have been articles published that focus on the prevalence of heat-related illnesses as they relate to environmental risk factors such as temperature and humidity.

An article published by Kerr et al. in the *American Journal of Preventative Medicine* showed that there is an estimated 9,000 high school athletes that are treated for exertional heat-related illnesses annually (Kerr et al., 2013). The risk factors that are mentioned are hot and humid weather conditions (Kerr et al., 2013). It also mentions that the majority of the cases reported were during the month of August when most Fall sports are getting started and before any of the youth kids are acclimated to the weather (Kerr et al., 2013).

Another article was published by Yard et al. in which data were collected from the Centers for Disease Control (CDC) surveillance study among high school sports. Most heat-related illnesses occurred during the month of August (Yard et al., 2010). This is the time when most high school sports start pre-season workouts and training (Yard et al., 2010). Environmental risk factors in this study that contributed to the development of a heat-related illness included temperature, humidity, wind speed, and radiant heat (Yard et al., 2010).

Relationship of the Type of Sport and Heat Illness

There has been some research that studies the relationship between the sport athletes' play and the prevalence of heat-related illness. Surveillance studies conducted by the CDC reported that all players and sports are susceptible to heat-related illnesses. However, football players have the highest rate (4.5 per 100,000) of time lost heat-related illnesses among high school athletes (Yard, 2010). This football rate is 10 times higher than all other sports

combined (Yard, 2010). It also reported that the majority of the time lost by football players was sustained in the month of August (Yard et al., 2010).

Another study that was recently published showed the same results as found in the previous study. Football contributed to the most time lost in high school sports (4.42 per 100,000), and time lost to heat related illnesses was reported as 11.4 times higher than other sports that were surveyed (Kerr et al., 2013). Both studies also had the same contributors to time lost. The first factor that contributed to the time lost was temperature and humidity. The second contributing factor was returning athletes to play after not being properly acclimated to the practicing environments (Yard et al., 2010). The *Journal of Athletic Training* now has a position statement regarding the proper acclimatization of athletes. The position statement provides strict guidelines that consist of a 14 consecutive day procedure for return to play (Casa & Csillan, 2009). This ensures that the athletes do not rush into practice so fast therefore minimizing the development of heat-related illnesses (Casa et al., 2009).

Summary

This literature review was designed to gather evidence and gain knowledge for the proposed research question: What effect will Athletic Trainers' perception of the relative advantage of IV rehydration fluids for treating heat-related illnesses have on their support for a change of the traditional hydration treatment protocol for heat-related illnesses?

The ability of an Athletic Trainer to administer intravenous fluids to an athlete suffering from a heat-related illness should be further reviewed. Heat-related illnesses have an effect on all individuals that are physically active, especially those participating in sports (Nelson, Collins, Comstock, McKenzie, 2011). It has also been stated that deaths due to heat-related illnesses are one of the top preventable deaths in sports (Yard et al., 2010). Also, as reported by many research articles, there is not enough conclusive evidence about the effects that intravenous rehydration can have on the reduction of heat-related illnesses.

Research Question

When controlling for years of experience as a Certified Athletic Trainer, what effect will Athletic Trainers' perception of the relative advantage of IV rehydration fluids for treating heat-related illnesses have on their support for a change of the traditional hydration treatment protocol for heat-related illnesses?

Hypothesis

When controlling for years of experience as a Certified Athletic Trainer, Athletic Trainers who perceive the relative advantage of intravenous administration of hydration fluids as becoming protocol for treating heat-related illnesses are more likely to support a change in the protocol than are Athletic Trainers that support the traditional treatment for heat-related illnesses.

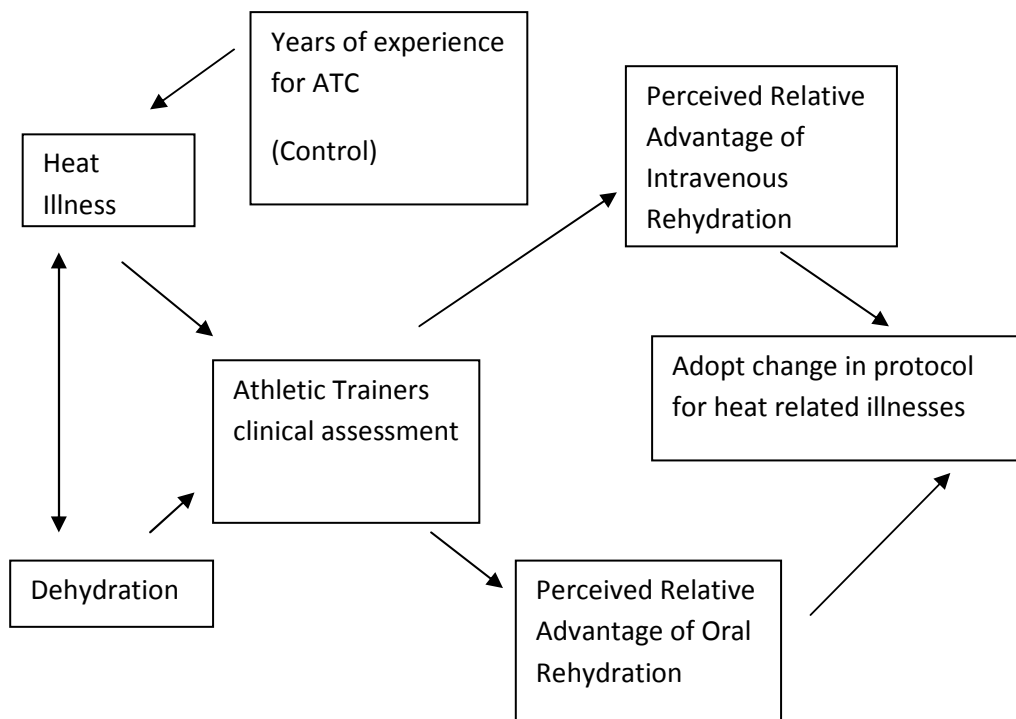


Figure 1. Determinants of support for change in protocol

CHAPTER III

METHODOLOGY

Introduction

The purpose of the study was to examine the Certified Athletic Trainers' perceived relative advantage of adopting intravenous rehydration as a standard protocol for heat related illnesses. The hypothesis that will be tested is, when controlling for years of experience as a Certified Athletic Trainer, Athletic Trainers who perceive the relative advantage of intravenous administration of hydration fluids as becoming protocol for treating heat-related illnesses are more likely to support a change in the protocol than are Athletic Trainers that support the traditional treatment for heat-related illnesses. In order to test the hypothesis, Athletic Trainers surveys will be analyzed and a conclusion of the results will be determined.

Participants

The participants for this study will be Certified Athletic Trainers (ATC's). There are currently twenty five to thirty thousand ATC's in the U.S. Access for the participants will be gained through the National Athletic Trainers Association (NATA) website. The NATA offers a research survey service to all of its members. I will then submit the questionnaire using the NATA website. After filling out a survey criteria form, the NATA will submit the survey to 1000 randomly selected registered members based upon the research criteria

submitted by the researcher. Following the survey will be an emailed cover letter describing the purpose of this study and what information is trying to be gathered. This cover letter will also contain the attached link to Free Online Surveys where the ATC's can submit their results.

For this study to be completed, Institutional Review Board (IRB) approval will be needed. This will help ensure the protection of the human subjects in this study. Names will also remain anonymous to further help in the protection of ATC's that participate in this survey. Keeping the names anonymous is necessary for the protection of the ATC since answers could have an effect on their job. Informed consent will be gained for the participation of this survey as the participating ATC's will be agreeing to answer the survey.

Design

This study is going to be a cross-sectional study. This means that the participants for this study will be asked for information at only one time and then given a window of opportunity in which they may choose to participate and answer the survey. Upon completion of this survey and resubmission the participating ATC will have given their consent as they may choose not to respond to the survey.

Variable Measurement

The independent variable for this research is the perceived relative advantage of intravenous rehydration as a standard of protocol for ATCs when

treating athletes for heat related illnesses. This means, does an ATC perceive intravenous rehydration as a better and more effective way of rehydrating athletes that are suffering from a heat related illness. This variable will be measured with a survey that asks the participating ATC various questions concerning this topic. The control variable for this research will be the years of experience an ATC has. The control variable will also be measured using the survey.

The dependent variable for this research will be support for adopting a change in protocol for heat related illnesses. Again, this variable will also be measured using questions from the survey to assess whether or not ATCs agree or disagree with adopting this intervention as necessary to help protect the athletes.

Instruments

The instrument used for this study will be the survey that is distributed among the Certified Athletic Trainers (ATC's). Free online surveys is used to distribute the surveys. This is a website that surveys can be distributed and returned electronically. This website will provide a more efficient way of gathering the data, compared to mailing surveys through the post offices. Free online surveys is also a more cost efficient method as compared to mailing costs. Finally, the NATA's research survey service will be utilized in completing this research. The NATA provides this service to all registered members and

distributes the survey to 1000 randomly selected registered athletic training members based upon the criteria identifying the targeted survey population.

Data Entry

The survey was sent out through an email from the NATA research survey service. When the surveys were completed, it was returned to the Freeonlinesurveys website and stored as data. Once the collection time window had closed, the responses were exported from Freeonlinesurveys into an excel spreadsheet. From this sheet data was cleaned and then placed in SPSS format. In SPSS, the data analysis was conducted.

Data Analysis

Using the survey data, the relationship between Certified Athletic Trainers perceived relative advantage of intravenous hydration and adopting intravenous hydration as a protocol for treating heat related illness can be determined. Based upon the participant's answers from the survey returned by email to the Freeonlinesurvey website, descriptive analysis will be calculated using SPSS. Also, In SPSS the data analysis will be conducted using a cross-tabulation and a logistic regression. Final conclusions will be drawn after the data analysis is completed.

CHAPTER IV

RESULTS

A fifteen question survey was sent to 1,000 Certified Athletic Trainers. This survey was sent to help gain awareness of Certified Athletic Trainers acceptance of adopting intravenous (IV) rehydration as a standard of protocol for the treatment of heat related illnesses. Of the 1,000 surveys that were sent out using the National Athletic Trainers Organization (NATA), 310 surveys were completed and returned. All 310 of the surveys returned were used in the analysis after the data were cleaned. This section will show the descriptive and frequency analysis of the data used. A table will be used to present the responses of the participants and from each of the questions used to conduct the analysis percentages of how they answered will also be shown. It will also use Cross-tabulation and Logistic Regression analysis tables. This tables will be used to show any significant results.

Table 1 shows the descriptive analysis used to conduct this analysis. When asked “How many years of experience do you have as an active Certified Athletic Trainer?” respondents answered with an average of 12.73 years of experience and had a standard deviation of 12.76. Next when asked, “How many athletes did you diagnose last August with heat-related illnesses?” Out of 310 of the responses it showed an average of 3.19 athletes that have suffered from a heat-related illness and had a standard deviation of 5.50.

Table 1 also shows the frequency analysis for the questions containing categorical variables. The questions “Have you had to call Emergency Medical Services (EMS) regarding further assistance with the treatment of a heat-related illness within the last year?” It shows that out of the 310 total responses used for analysis that a total of 63 ATCs, 20.32% of the respondents, reported in the survey that they did have to call EMS for further assistance with the treatment of heat related illness within the last year. It also shows analysis for the question, “Would you adopt IV hydration therapy as proficiency for Certified Athletic Trainers?” The table shows that 214 (69.03%) would agree to adopt IV use as a proficiency for Certified Athletic Trainers.

Table 1*Participant Characteristics, 2014 Certified Athletic Trainer Survey (N = 310)*

Characteristic	<i>M</i>	<i>SD</i>
Years of experience	12.73	12.76
Athletes with heat-related illnesses	3.19	5.50
	<i>n</i>	<i>%</i>
Athletic Trainers needing EMS assistance		
EMS was called	63	20.32%
EMS was not called	247	79.68%
Athletic Trainers adopting IV use		
Would adopt IV	214	69.03%
Would not adopt IV	96	30.97%

Table 2 was used to show a Cross-tabulation analysis. This analysis was used to summarize the data between Certified Athletic Trainers (ATC) that have called Emergency Medical Service for further assistance with heat related illnesses and ATCs attitude towards adopting IV use. It showed that 71.4% of the ATC responses that have had to call EMS would support adopting IV use. It also showed that 68.4% of the athletic trainers that have not called EMS would adopt IV use.

Once the crosstabs analysis was conducted a Chi-Square test was then run to test for any significant data between the two variables tested. This resulted in a significance value, or p -value of .645 which was not significant with a significance level set at $p < .05$. Use of EMS assistance is not related to an ATC's support of IV use.

Table 2

*Characteristics (%) of EMS and Certified Athletic Trainers adopting IV use
2014 Certified Athletic Trainer IV Survey (Weighted N = 310)*

Characteristic	Would Adopt IV %	Would not Adopt IV %	<i>n</i>	X^2	<i>df</i>	<i>p</i>
Athletic Trainers needing EMS assistance	(n = 214)	(n = 96)		0.212	1	0.645
Called EMS	71.43%	28.57%	63			
Did not call EMS	68.42%	31.58%	247			

Table 3 shows a Logistic Regression analysis. This analysis was conducted to show the significance of the relationships between the dependent variable, adopting IV use for Certified Athletic Trainers, and the other independent variables. The independent variables used were, Athletic Trainers' needing further assistance from EMS for a heat-related illness, years of

experience an Athletic Trainer has, and the amount of heat-related illnesses that an athlete has suffered. Relationships were analyzed for each of these independent variables to determine if there was any significant relationships among them. Once analysis was conducted for all of the relationships the following conclusion was determined. The variable relationships indicating the need for Emergency Medical Service was not significant in this analysis. However, a significant value of $p < .001$ was found for the variable indicating the years of experience. It shows that the more years of experience that a Certified Athletic Trainer has, the more likely it is that they would support the adoption of IV use for treating heat-related illnesses (O.R.=1.052). This model explains 12.3% of the variation in adoption of IV use.

Table 3

Logistic Regression Analysis Summary of Adopting IV use

Variable	B	SE	Odds ratio	Wald statistic	p
Adopt IV use (n = 310)					
Constant	-1.518	.194		61.062	< .001
Years of Experience	.051	.010	1.052	27.985	< .001

CHAPTER V

DISCUSSION

This study provided the opportunity to examine the research question when controlling for years of experience as a Certified Athletic Trainer, what effect will Athletic Trainers' perceived relative advantage of IV rehydration fluids for treating heat-related illnesses have on their support for a change of the traditional oral hydration treatment protocol for heat-related illnesses? For the analysis a cross-tabulation analysis was conducted using results from questions from the Certified Athletic Trainer IV survey. Another analysis was also conducted using Logistic Regression. This analysis also used the results from the Certified Athletic Trainer IV survey.

This chapter will also include further discussion of the results from all of the analysis conducted, review the hypothesis used for this study, and summarize the study with the conclusion.

Hypothesis

The hypothesis used in this research study was: When controlling for years of experience as a Certified Athletic Trainer, Athletic Trainers who perceive the relative advantage of intravenous administration of hydration fluids as becoming protocol for treating heat-related illnesses are more likely to support a change in the protocol than are Athletic Trainers that support the traditional treatment for heat-related illnesses.

The Chi-Square analysis that was run revealed that this original hypothesis could not be supported after a p -value of .645. This shows that there was no significant relationship between the dependent variable, adopting IV use for heat related illnesses and the independent variable further assistance from EMS for the treatment of heat related illnesses.

A Logistic Regression analysis was ran that did support the original hypothesis. After several tests of interactions between the independent variables, it was concluded that there was a significant value of $p < .001$ when the relationship between the dependent variable was examined only with the years of experience of an ATC. This analysis was a significant and supported the original hypothesis.

Methodology

The biggest issue with this study was the incredibly busy lives of ATCs. Athletic Trainers, as a profession, work many hours with little personal time. Of the 1000 surveys that were distributed to active ATCs only 310 were returned. This was 31% of the intended population that submitted the results. Of the 310 surveys returned 100% of them were used in the research analysis. This was a good representation of the ATCs that received the survey. However, there could have been a greater outcome with returned results if ATCs didn't live such busy lives and were more available.

Further Studies

With heat related illnesses being one of the top contributors to athletic deaths yearly this study should be replicated in the future. This would allow for a comparison between the perceived advantage of intravenous rehydration now and several months in the future. It will also allow for continued debate for which treatment technique would be the most beneficial, oral hydration or IV hydration. With different policies being released regularly about the time restrictions of practices and time of day teams can practice, this topic should stay as an ongoing investigation. This will hopefully succeed to help insure that ATCs are capable of providing the best care possible for the athletes and patients without any restrictions. Also, in future studies a helpful tool that could produce more returns is social media such as twitter. Social media has grown and considering many people are on their phones during most of the day, this could be a powerful tool in future research on this topic.

Conclusion

The purpose of this study was to study and analyze the relationship between Certified Athletic Trainers (ATC) perceived relative advantage for adopting intravenous rehydration for treating heat-related illnesses. This study pursued to answer the research question when controlling for years of experience as a Certified Athletic Trainer, what effect will Athletic Trainers' perceived relative advantage of IV rehydration fluids for treating heat-related illnesses have on their support for a change of the traditional oral hydration

treatment protocol for heat-related illnesses? This study was able to produce some significant results and was also a great tool in assessing ATCs perceived advantage of adopting IV use for heat related illness.

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APPENDICES

APPENDIX A- Certified Athletic Trainer Survey

Participant ID number:_____

Date:_____

Certified Athletic Trainer IV survey

Please take you time and fill in each question as accurately as possible

1. How many years of experience do you have as an active Certified Athletic Trainer?

__ __ (*number of years certified*)

2. What currently describes your employment setting?

1. Rehab Clinic
2. Hospital
3. High School
4. Corporate
5. Military/law enforcement

3. Do you currently have a license to administer IV fluids?

1. Yes
2. No

4. Do you have an emergency action plan to efficiently treat heat-related illnesses that includes hydration protocols?

1. Yes
2. No

5. How many athletes did you diagnose last August with heat-related illnesses?

__ __ (*number of athletes*)

- a. How many of these athletes missed one or more practices?

__ __ (*number of athletes*)

- b. How many of these athletes had a reoccurrence of a heat-related illness?

__ __ (number of athletes)

6. Have you had to call Emergency Medical Services (EMS) regarding further assistance with the treatment of a heat-related illness within the last year?

1. Yes

2. No

7. How many times have you had to call EMS to help with the treatment of heat-related illness within the last year?

__ __ (number of times)

8. Do the athletes that need EMS aid receive intravenous fluid injections?

1. Yes

2. No

9. How many athletes received intravenous fluid injections for the treatment of heat-related illnesses within the last year?

__ __ (number of athletes)

10. Do you feel confident about diagnosing heat-related illnesses?

1. Yes

2. No

11. Do you think intravenous injection of hydrating fluids should become a standard protocol for ATC's treatment of heat-related illness?

1. Yes

2. No

12. Would you feel comfortable administering an IV to an athlete suffering from a heat-related illness?

1. Yes

2. No

13. Would you adopt IV hydration therapy as proficiency for Certified Athletic Trainers?

1. Yes
2. No

APPENDIX B- Survey Cover Letter

Dear Participant,

I am a master's degree candidate at Middle Tennessee State University. I am requesting your help to complete this part of my thesis research. Please follow the link listed below of this letter to the survey titled: Certified Athletic Trainer IV Survey.

This survey is completely anonymous and will take 4-5 minutes of your time to complete. Your name and other information will not be publicly published in any way. Participation in this study is strictly voluntary and you may choose not to participate at any time. If you do choose to complete the survey, you are giving consent for your answers to be included as data for this study. Again, your name and other information will not be publicly published in any way.

As a fellow Certified Athletic Trainer, your knowledge and opinions concerning this topic makes your participation valuable. Please take a few minutes to fill out this anonymous survey you will find by clicking on this link provided and submit by September 30, 2014.

<http://freeonlinesurveys.com/s.asp?sid=b7boqmcwb53uy1d524490>

If you have any problems opening the link, please copy and paste the link into the browser bar and complete.

Thank you very much for your participation.

Sincerely,

Joseph K. Cravey ATC/LAT
Middle Tennessee State University
jkc4i@mtmail.mtsu.edu

Thesis Chair:
Dr. Helen Binkley

APPENDIX C- Institutional Review Board Approval Letter

July 30, 2014

Joseph Kyle Cravey, Dr. Helen Binkley, Dr. Norman Weatherby
Health and Human Performance
jkc4i@mtmail.mtsu.edu, helen.binkley@mtsu.edu

Protocol Title: "Perceived Relative Advantage of Intravenous Hydration being standard protocol"

Protocol Number: 14-358

Dear Investigator(s),

Your study has been designated as exempt. The exemption is pursuant to 45 CFR 46.101 (b)(2) Educational Tests, Surveys, Interviews, or Observations.

The following changes must be reported to the Office of Compliance before they are initiated:

- Adding new subject population
- Adding a new investigator
- Adding new procedures (e.g., new survey; new questions to your survey)
- A change in funding source
- Any change that makes the study no longer eligible for exemption.

The following changes do not need to be reported to the Office of Compliance:

- Editorial or administrative revisions to the consent or other study documents
- Increasing or decreasing the number of subjects from your proposed population

If you encounter any serious unanticipated problems to participants, or if you have any questions as you conduct your research, please do not hesitate to contact us.

Sincerely,

Lauren K. Qualls, Graduate Assistant

Office of Compliance
615-494-8918