Journal of Athletic Training 2011:46(5):533–542

www.nata.org/jat

Evidence-Based Medicine and the Recognition and Treatment of Exertional Heat Stroke, Part II: A Perspective From the Clinical Athletic Trainer

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Context: Exertional heat stroke (EHS) is one of the leading causes of death in athletes. Certified athletic trainers (ATs) demonstrate strong knowledge of recommended practices with EHS but are apprehensive in implementing 2 basic procedures: rectal temperature assessment and cold water immersion. This apprehension might lead to deaths from EHS that could have been prevented.

Objective: To investigate why collegiate and high school ATs do not implement best practices for the recognition and treatment of EHS.

Design: Qualitative study.

Setting: In-person focus groups consisting of 3 to 6 collegiate or high school ATs.

Patients or Other Participants: A total of 19 ATs (9 men, 10 women; age = 36 ± 10 years, length of certification = 12 ± 9 years) employed at either the collegiate (n = 10) or high school (n = 9) level participated in the study.

Data Collection and Analysis: Interviews were transcribed verbatim, and data were analyzed using deductive data analysis. Peer review and multiple-analyst data triangulation were conducted to establish trustworthiness of the data.

Results: Five emergent themes explained the lack of evidence-based practice (EBP) regarding recognition and treatment of EHS. Three themes (lack of knowledge, comfort level, lack of initiative) were common in both the collegiate and high school settings, and 2 separate themes (liability concerns, lack of resources) were present in the high school setting.

Conclusions: Our findings are consistent with those in the literature on EBP and EHS. Regardless of clinical setting, ATs have basic information on recognition and treatment of EHS, but 5 themes act as barriers to implementing proper management in the clinical setting. Workshops or hands-on training sessions need to be made available to improve students' comfort levels so ATs will implement EBP into everyday settings.

Key Words: rectal temperature, cooling, heat illnesses

Key Points

- Lack of confidence strongly influenced clinicians' selection of assessment and treatment methods.
- Formal training might increase athletic trainers' comfort with the skills of rectal temperature assessment and cold-water immersion.

The topic of exertional heat stroke (EHS) has received much attention in recent literature and news media, probably because of the potential catastrophic nature of the condition. Unfortunately, the interest in the condition is related to the number of unnecessary deaths from EHS that occur annually.[1–9] Each year, EHS is one of the 3 leading causes of death among athletes, and it has been identified as the most frequent cause of athletic fatality in the past 5 years.[9] However, these deaths are preventable with proper recognition of the condition via an accurate core temperature assessment and immediate cooling of the patient. Both the National Athletic Trainers' Association (NATA)[8] and the American College of Sports Medicine (ACSM)[3] have recommended obtaining an accurate body temperature assessment via rectal thermometry (T_{re}). Cold-water immersion (CWI) is the criterion standard for rapid whole-body cooling of patients with EHS.[3,8] The effectiveness of rapid cooling after obtaining a core temperature via T_{re} has been verified in the literature, and the efficacy of the 2 techniques in combination is supported by the lack of fatalities seen in events, such as the Falmouth Road Race and the Marine Corps Marathon, where they are routinely practiced.[10–13]

Several devices that use myriad technologies and locales to estimate body temperature, such as oral, axillary, tympanic, and temporal devices, are available. Many medical care providers use them, but the devices often provide inaccurate body temperature data for people who have been exercising,[10,14] in part because the mechanisms can be affected by wind, rain, and direct sunlight.[10] Rectal thermometry devices provide the most accurate and practical body temperature measures regardless of environmental conditions.[10,15] When an athlete exercises in

the heat, core temperature rises differently from the way skin, oral, and axillary temperatures rise. Obtaining a reliable body temperature is crucial to making an accurate diagnosis of EHS. Many conditions (eg, exertional sickling, hyponatremia, head injury) can present with similar medical warning signs, so the clinician must distinguish among them to provide appropriate and efficient treatment to reduce potential associated morbidity.[16] Rapid body cooling via CWI is the most effective way to rapidly decrease core body temperature, provides the greatest chance of survival for the athlete with EHS, and decreases the risk of complications.[11] Researchers have proposed many cooling modalities, and although many of these modalities will cool an athlete with EHS, they are not as effective or practical as CWI.[11,17,18] For these reasons, the athletic medical staff must understand these steps and the ramifications of not implementing these recommendations to prevent unwarranted complications or death.

Athletic trainers (ATs) are the critical link in reducing the number of deaths associated with EHS because they are often the first responders when a potential case arises. Understanding this responsibility and adhering to the NATA Code of Ethics, an AT must be prepared to implement the most appropriate diagnostic tools and treatments for a successful outcome.[19] Athletic trainers are well aware of the efficiency of T_{re} and CWI, but they do not implement these methods in their daily practices. In fact, Mazerolle et al[1] revealed that fewer than 20% of ATs obtain an athlete's body temperature using T_{re}, and fewer than 50% use CWI to rapidly cool a patient with EHS.[1] These findings, which are similar to those of a pilot investigation of high school (HS) ATs, are perplexing because of the high percentage of ATs indicating awareness of the policies outlined in the NATA position statement on exertional heat illnesses (EHI).[20] Therefore, the purpose of our study was to discover why ATs are not using their knowledge of best practices in their clinical settings regarding recognition and treatment of EHS. We intended to build on the findings of Dombek et al[20] and Mazerolle et al[1] to further understand this disconnect. Our investigation was guided by the following research questions: (1) What barriers exist to hinder an AT's ability to implement knowledge into clinical practice? (2) What role does educational preparation play in this reluctance to implement best practice?

METHODS

Study Design

Maxwell[21] described qualitative research as especially suited for gaining understanding and meaning, identifying critical influences, and, consequently, generating theory about those influences and experiences. In our study, we wanted to capitalize on this concept and develop a theory to explicate why a disconnect exists between actual practice and the recommendations of the NATA regarding recognition and treatment of EHS.[1,20] In-person focus group sessions were used to gain insight because they have been demonstrated to provide rich data through interactions of group members, in which one person's response can stimulate further discussion.[22] This method is most beneficial when the purpose of the research is to dig deeper into a specific topic area. We wanted to use previously obtained data to further uncover attitudes and beliefs and to provide specific examples of a particular experience encountered by the sample population.[23,24] Before focus group sessions were conducted, each participant was instructed to complete a background questionnaire to document demographic information and experiences with EHS. The questions assessing the participant's knowledge of and experiences with EHS were scored using a Likert scale. Each question associated with a Likert scale involved the participant's comfort or familiarity with certain factors involved in EHS, and each scale was numbered from 1 to 10, with 1 indicating *not comfortable* or *not familiar* and 10 indicating *very comfortable* or *very familiar* (Appendix 1). The participants were not given any more information about the scale.

Participants

All participants were recruited at the 2009 Annual Meeting of the NATA, held in San Antonio, Texas, using a convenience and snowball sampling technique.[21–23] Participants consisted of 19 ATs working in the HS (n = 9) or collegiate (n = 10) setting (Table 1). They were separated into 5 focus groups: 2 groups of HS ATs and 3 groups of collegiate ATs (focus group 1 included 3 participants; focus group 2, 4; focus group 3, 3; focus group 4, 6; and focus group 5, 3). All participants were enrolled based on predetermined criteria, including current Board certification for at least 5 years and employment in one of the aforementioned clinical settings. Participants represented NATA districts 1, 2, 3, 6, 7, and 8. All participants provided written informed consent, and the University of Connecticut Institutional Review Board approved the study.

Procedures

Pilot testing was conducted with a small group of collegiate ATs before data collection to help with focus group facilitation and clarity of the interview guide, which was developed by a panel of athletic training professionals and experts in the areas of heat illness and qualitative methods. After reviewing the pilot test, we made small modifications to the interview guide, including grammatical changes for readability and ordering of questions for more effective flow (Appendix 2). Four focus group sessions were conducted in person at the 2009 Annual Meeting of the NATA in San Antonio, Texas. One focus group interview with collegiate ATs was not held in this setting because of scheduling conflicts and unexpected meetings at the conference. This group of ATs, who lived near each other, agreed to participate in a separate focus group session at a neutral conference room after the convention. Each focus group session included a 2-member research team: a moderator (B.P.M.) and a person taking field notes (D.E.P.). The focus group sessions were structured and followed the interview guide (Appendix 2). Interview guides were meant to guide discussion on the topic of EHS and not to interrogate participants

Table 1. Demographic Information of the Participants (Mean ± SD)

	Participants		
Characteristic	All (N = 19)	Collegiate (n = 10)	High School (n = 9)
Age, y	36 ± 10	33 ± 7	40 ± 10
Sex			
Male	9	4	5
Female	10	6	4
Experience, y	12 ± 9	9 ± 6	16 ± 11

about their practice beliefs. The interview guide was configured to focus on ATs' knowledge and practice beliefs regarding recognition and treatment of EHS. All focus group sessions were recorded on audiotape and video to ensure accuracy in transcription. All 5 focus group sessions were transcribed verbatim, and all participants were assigned pseudonyms to ensure confidentiality. After initial transcription and before data analysis, the participants reviewed the transcripts from the focus group interviews to clarify statements they made. We selected member checking, multiple-analyst data triangulation, and data triangulation to establish trustworthiness of our data.[22,23] Data triangulation was ascertained by interviewing both collegiate and HS ATs, and multiple-analyst data triangulation proceeded as described later.[22]

Data Analysis

Interview transcripts were analyzed using open coding in data analysis as described by the grounded theory approach to qualitative research.[23,25] During this process, the analysis was guided by the overall purpose and research questions of the study. Two researchers (S.M.M., B.P.M.) independently reviewed the transcripts line by line to identify commonalities; this step was used to ensure accuracy and reduce researcher bias during data interpretation.[23] After emerging themes were identified, conceptual tags were given to capture their meanings. Next, researchers used a more selective coding process to highlight the core concepts and make connections among the emerging themes regarding the lack of implementation of evidence-based practice (EBP). After final themes were identified using the grounded theory approach, the 2 researchers shared findings to ensure consistency in analysis. When this was complete and when the researchers had reached agreement, the final themes and visual model were shared with the research team.

RESULTS

Three major themes emerged from data analysis to explain the disconnect between recommendations and clinical practices of HS and collegiate ATs regarding EHS: (1) lack of knowledge, (2) comfort level, and (3) lack of initiative. These 3 themes were found across both the collegiate and HS settings, whereas 2 additional themes, (1) liability concerns and (2) lack of resources, also were identified by HS ATs. Figure 1 highlights the overall findings of the study, and Figures 2 and 3 illustrate the findings based on clinical setting.

Lack of Knowledge

Lack of knowledge about EHS began initially in the participants' undergraduate AT experiences and continued to mount throughout their professional careers. Comments such as "If you use immersion [to treat an athlete with EHS] they'll go into shock," "I'd take a tympanic temperature if we had time [to determine core body temperature]," and "They will stop sweating [if they have EHS]" were common during focus group sessions. Several comments also were similar to those of Sally, who said, "There is going to have to be something specific datawise to say that we should measure it [rectal temperature]," demonstrating that participants do not remain informed of the most current research and the NATA's position statements or that they believe the device is not necessary. Incorrect knowledge and not stay-

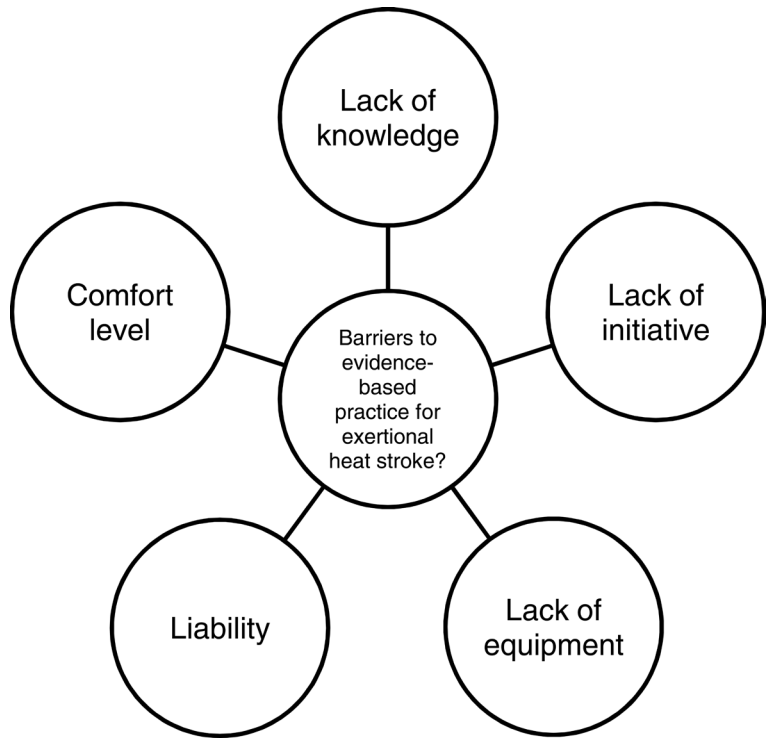

Figure 1. Overall themes.

ing informed about the literature on EHS perpetuated an AT's failure to implement EBP regarding EHS.

Comfort Level

Throughout the focus group discussions and regardless of clinical setting, we found that ATs were uncomfortable with various aspects associated with the recognition and treatment of EHS. This theory of comfort level was reinforced by participants' responses to the series of questions asked before focus group sessions, in which they rated their levels of comfort on a 10-point Likert scale ranging from 1 (*not comfortable*) to 10 (*very comfortable*). Table 2 provides a summary of these responses. Kyle, a collegiate AT, said, "It has to do with the squeamishness that most of us have with sticking a thermometer up somebody's butt." Sally, an HS AT, mirrored Kyle's viewpoint: "We're dealing with minors, you know." Commonly, the ATs discussed discomfort with the NATA position statement on EHI,[8] including using T_{re} and CWI (Table 2). The most common factor contributing to a lack of comfort with the skills associated with recognition and management of EHS was a lack of training. Many participants reflected that, during their academic preparation, skill instruction regarding T_{re} and CWI was limited and not covered as in depth as other concepts, such as evaluating the ankle or learning cardiopulmonary resuscitation. In addition, many participants thought they had limited exposure to actual cases of EHS. This lack of preparation and real-life exposure limited an AT's level of comfort using T_{re} and CWI when addressing EHS. Linda explained, "Part of the reason that we don't use [rectal temperature devices] is because we were never trained on how to use it [during entry-level education]." Many of the ATs at the HS level expressed concern because their athletes are still children. Sue said, "I'm not taking a rectal temperature unless I absolutely have to, and with a[n] HS athlete it's just too close for comfort." Insufficient comfort level was a major theme expressed in both groups. For this group of ATs, a lack of training during their academic preparation and exposure to actual cases of EHS contributed to feelings of discomfort with implementation of recommended practices.

Lack of Initiative

Lack of initiative was operationalized as minimal initiative to make changes to their emergency action plans or their policies and procedures or as time constraints in daily workloads. Both collegiate and HS ATs struggled with this in different ways (Figures 2 and 3). Collegiate AT Frank said, "It's hard to make changes until something happens, where it affects someone, and they see they need to make the change." High school AT Scott said, "It's not worth changing anything if it's been very successful and we haven't had any problems with it." Some participants expressed concerns about the daily effort (eg, setup, cleaning), the time it would take before and after each practice, and the type of supplies necessary to set up and break down a CWI tub as reasons they currently did not use it. Bob explained, "We don't have [CWI] because of the setup and breakdown every day." Another AT echoed Bob's concern: "Yeah, we don't have it, but like [Bob] said, because of the setup and breakdown every day." Overall, a lack of initiative and time to make changes based on current research was seen across both collegiate and HS settings.

Liability Concerns

Liability concerns were a common barrier to implementation of EBP for HS ATs, primarily because of the ages of the athletes (Figure 3). The liability issues were focused mostly on T_{re} rather than CWI primarily because the technique is viewed as invasive and a breach of the patient's privacy. When discussing why she does not obtain rectal temperature, Sue said, "It's a kid, you know. I've heard of athletic trainers getting sued for looking at a groin because it was [seen as a] sexual advance [rather than an evaluation of an injury]. I really don't want to put my license on the line for that." Joe said, "To use the rectal temperature, I would have to do it without their consent. I don't need to do it; I'm calling 9-1-1." The role of sex was also a concern regarding the legality of obtaining rectal temperature, in which a male or female AT would obtain a measurement in a minor of the other sex.

Lack of Resources

For HS ATs, a lack of equipment and resources created apprehension about implementation of appropriate measures. In several instances, HS ATs discussed not having the budget for the expenses associated with T_{re} or CWI. When asked whether they had T_{re} available as one of their temperature assessments, 4 HS ATs responded, "No," and the rest said they had thermometers that could be used rectally, but they would not assess body temperature that way. In addition, if they used a method to cool athletes, most HS ATs relied on whirlpools that were in the athletic training room but not necessarily close to the fields, or

Table 2. Familiarity and Comfort With Different Aspects of Addressing Exertional Heat Stroke (Mean ± SD)

Aspect	Participants	
	Collegiate	High School
How familiar are you with the NATA's position statement on exertional heat illnesses?[8]	4 ± 2	4 ± 2
How comfortable are you with the information in the NATA's position statement on exertional heat illnesses?[8]	5 ± 3	4 ± 2
How comfortable are you with dealing with a heat stroke?	6 ± 2	8 ± 1
How familiar are you with obtaining a rectal temperature?	4 ± 3	4 ± 2
How comfortable are you with obtaining a rectal temperature?	5 ± 3	3 ± 3
How familiar are you with using cold-water immersion as a cooling technique?	6 ± 2	9 ± 1
How comfortable are you with using cold-water immersion as a cooling technique?	7 ± 3	8 ± 2

Abbreviation: NATA, National Athletic Trainers' Association.

All values are based on a 10-point Likert scale, with 1 indicating *not familiar* or *not comfortable* and 10 indicating *very familiar* or *very comfortable.*

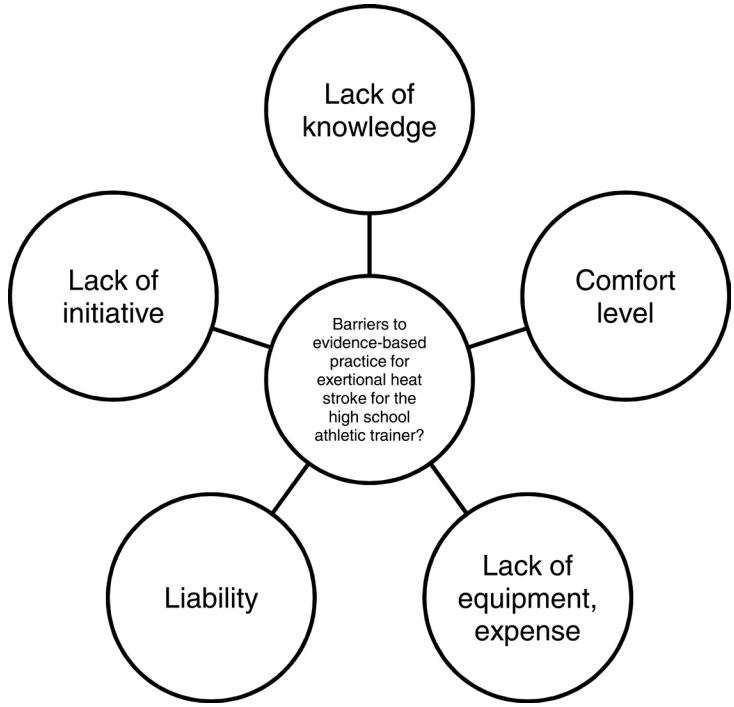

Figure 2. Secondary school themes.

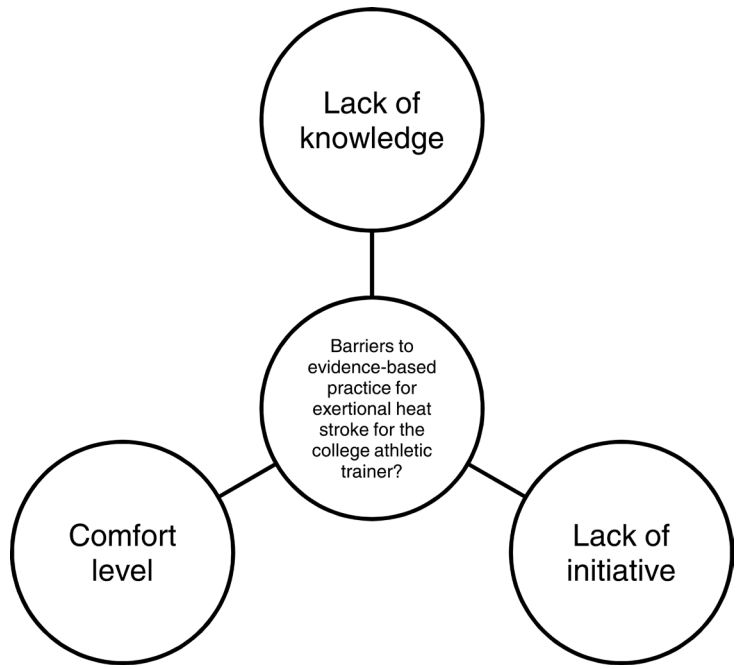

Figure 3. Collegiate themes.

on "kiddie" pools or tarps. Another issue that was discussed centered on ice supply. Participants thought maintaining cold drinking water during competition was a priority and a reason they could not maintain a CWI tub. Bob said, "I just wouldn't have the ice to maintain [CWI]. By the second or third day of practice my ice machine would be empty." Sally agreed: "We are always low on ice, but we need a lot because the water comes out at 80[°F; 26.7°C] or 90°[F; 32.2°C] from the wall, and we need a lot to cool it down, and there is nothing left for submersion afterward, which is tough."

In addition to small budgets, many ATs expressed concern about appropriate staffing at their clinical settings. Jeff discussed his current situation:

> We are very spread out; we have teams all over the place, and I'm the only AT, so you depend on the coaches to recognize

and treat it. They're all certified in CPR [cardiopulmonary resuscitation] and first aid, but how much training they get in heat-related illness is a whole new ball game. I don't think they touch too much on that when they do CPR and first-aid training, so I'm not sure how some of the coaches would react if we had a problem; it could end up being a problem.

Sue agreed that her situation was similar:

> Our facilities are so spread out [over town] that we are not able to be at everything. So our baseball and softball field is 10 to 15 miles away from school, so it's really hard, and the coaches are not well educated enough. I feel like when we're there, yes, we're prepared, but whenever we're not, they're not.

The recurring opinion from HS ATs was centered on concern with adequate medical coverage, and although their coaches are certified in CPR, they discussed not being able to provide appropriate medical coverage. Implementation of recommended practices is hindered by deficient medical coverage, budgetary constraints, and even a lack of ice for management of potential EHS in the HS setting.

Overall, HS and collegiate ATs mentioned 5 themes causing a gap between EBP and clinical practice regarding recognition and treatment of EHS. Both HS and collegiate ATs showed (1) lack of knowledge, (2) substandard comfort level, and (3) lack of initiative affecting the way they recognize and treat EHS. In addition, (1) liability concerns and (2) lack of resources were 2 additional themes expressed by HS ATs.

DISCUSSION

Athletic trainers are encouraged to use EBP in the evaluation, diagnosis, and treatment of athletic injuries.[26,27] Currently, the evidence substantiates the use of T_{re} and CWI as the most appropriate techniques in the diagnosis and treatment of EHS. Despite this evidence, we know that most ATs do not use these 2 methods in daily practice.[1,20] A catastrophic event due to EHS will remain a possibility because of the disconnect between EBP and clinical practice that has been identified by other researchers[1,20] and in our study.

Lack of Knowledge

Although it is not an entirely new concept, only recently has EBP been popularized in the athletic training profession. The foundations of EBP are centered on patients and focused on the best available methods, as documented by current research concentrated on diagnostic tests, treatment techniques, and preventive programs.[28] The push for a more evidence-based model within athletic training is not meant to replace clinical judgment but rather is intended to improve clinical practice through scientific rigor to provide optimal care and assess the effectiveness of daily clinical practices.[28,29] The challenges to implementing EBP are entrenched in the amount of time associated with reviewing clinically relevant literature, the lack of formal training in the process or concept of EBP, and the rapid growth of the medical literature. Furthermore, researchers have documented that health care professionals rely heavily on previous formal training when determining clinical management.[30] This is similar to the perspective of the participants in our study, in which the education they received is not consistent with the current stance outlined by Binkley et al.[8] Many of our participants' perceptions and knowledge of EHS do not reflect the current scope of practice as scientifically documented. Furthermore, although many of the participants reported reading the NATA position statement on EHI,[8] they had not received formal training or practice with the skills of T_{re} and CWI as they had with skills such as CPR or spine boarding. This lack of both knowledge and structured hands-on training has created a domino effect: Clinicians leave school without the skills necessary to manage a case of EHS. These consistent insufficiencies directly influence ATs' preferences to use alternative methods regardless of scientific evaluation or validity. Although clinical practices are constantly changing and being improved based on EBP, the clinician is responsible for staying informed about new research by reading NATA position statements and the professional literature and participating in continuing education opportunities. As medical professionals, ATs should strive to provide the best care to all their athletes on a daily basis. Staying informed about current EBP is crucial in achieving this goal. As shown in Figure 2, if the cycle is not broken, nothing will change clinically, and this gap will not be eliminated.

Comfort Level

Our participants acknowledged not receiving formal training in the skill sets of T_{re} and CWI during their educational training, which has been identified as a potential barrier to EBP.[30] Athletic training students (ATSs) learn best when instructors provide opportunities for structured, hands-on practice.[31,32] We also know that ATSs seek authentic experiences to reinforce classroom learning and to gain confidence in their skills.[32] Therefore, we can infer that when an ATS does not receive formal training, he or she is less apt to develop clinical competence and confidence in those skills upon entering the workforce and will rely on formal training regardless of best practices. The results of the Likert-scale questions were interesting because the average comfort levels for addressing EHS were 6 for collegiate and 8 for HS ATs. The average familiarity and comfort with the NATA position statement on EHI[8] were 4 and 5, respectively, for collegiate and 4 and 4, respectively, for HS ATs. This suggests that although ATs seem comfortable when addressing EHS, they might not be diagnosing and treating it correctly based on the NATA position statement.[8] Another possibility may be the participants' perceptions of heat-related conditions; they are very comfortable treating the more common heat-related conditions, such as heat cramps and exhaustion, but are not comfortable treating EHS. The high scores on the Likert scale also might indicate the participants' lack of appreciation for the seriousness of the condition and the likelihood of its incidence. The concept of *lack of comfort* with the skills of T_{re} and CWI has been cited as a major barrier to implementation of these practices.[1] We recognize that taking a rectal temperature or using CWI can be uncomfortable for both the patient and the medical provider; however, this should not trump implementation of appropriate medical care or diagnosis, especially considering that dying of EHS is preventable. As medical professionals, ATs should be able to act as professionals and take a rectal temperature without reservation. The NATA position statement on EHI[8] clearly states that T_{re} is the recommended method of obtaining a body temperature and that CWI is the most efficient way to cool a patient with EHS.[8] Therefore, these methods should be taught and practiced in the classroom and used in the clinical setting without discomfort or fear of liability. More continuing education opportunities that incorporate hands-on learning and

practice of these skills on human or anatomic models should be available and mandatory. This would increase clinicians' comfort levels with important skills that are not used daily. It also would make the use of the recommended methods, such as T_{re} and CWI, for the assessment and treatment of EHS more common because we know that clinicians rely on skill and expertise when determining clinical practices.[30,33,34] Many instructional methods have been designed to address high-risk educational competencies but rarely are used for clinical skills.[33,34] However, effectiveness and the development of confidence and competence depend on realism and practical application.[33,34] Many procedures that ATs are required to do, such as a physical examination for a possible adductor strain, can be uncomfortable, but that is not a good reason to omit them and would not hold up in court.

Lack of Initiative

Lack of initiative is the last theme demonstrated by both collegiate and HS ATs and was not found previously regarding barriers to implementation of best practices pertaining to EHS.[1] In the collegiate setting, policies seemed not to have changed because the head AT did not agree with proposed changes or was apprehensive about changing them. Another plausible explanation is the apprehension of younger AT professionals, including full-time staff members, graduate assistants, and ATSs, in voicing their own practice beliefs, voicing their knowledge on the topic, or challenging the authority of their superiors. Furthermore, they might have faced lack of support from those above the head AT, including athletic administrators or team physicians. However, in the HS setting, lack of initiative stemmed from a lack of time or resources to support the necessary changes in policies and emergency action plans. Regardless of clinical setting, this finding is alarming because these practicing ATs are allowing fear and apprehension to thwart the implementation of best practices. These lifesaving procedures are vitally important for an AT providing care for patients with EHS.[8,12] Ultimately, this identified lack of initiative is a violation of the NATA Code of Ethics,[19] which insists that ATs adhere to rules, regulations, and practices as established by the governing bodies. Furthermore, as noted with regard to comfort level, this defense will not hold up in court, especially in an HS setting in which the AT plays a major role in developing the school's emergency action plan and treatment regulations. However, one point of contention is the role of team physicians and their practice beliefs regarding EHS. This information has not been identified, and future investigators should examine the effect team physicians have on the ATs' implementation of T_{re} and CWI and on schools' development of EHS policy. Concluding that they hold a strong influence over ATs' decisions and implementation of best practices is plausible because an AT serves under their supervision; knowledgeable team physicians might be key in moving toward EBP. Regardless, ATs, particularly in the HS setting, might include language in their standing orders to describe the steps for evaluating life-threatening conditions, which should include T_{re} and CWI for EHS.

Liability Concerns

Liability concerns was one of 2 themes more prevalent with HS than collegiate focus group participants. This finding was expected because most athletes at the HS level are minors, which imposes myriad issues. These include obtaining parental consent, gaining understanding of the techniques being used. and overcoming the negative connotations associated with those intervention guidelines, particularly with T_{re}. This trepidation is understandable, but ATs are medical professionals and need to remember their codes, which will protect them as they implement these valid and reliable measures as long as they act professionally and have adequate suspicion of EHS before implementation.[19] Similar conclusions can be drawn for the use of an automated external defibrillator in the treatment of a potential cardiac condition and for implementation of T_{re} and can help dictate appropriate treatment, which can save a life. Application of an automated external defibrillator in some instances might lead to exposure of the bare chest; however, regardless of pad placement and skin exposure, the treatment must be implemented. This mindset should transfer to application of T_{re} and CWI despite its potential awkwardness.

Many participants in focus group interviews did not use proper medical terminology when discussing issues regarding T_{re} and CWI. Words such as *kids* and comments such as "sticking a thermometer up somebody's butt" were used throughout the interviews, demonstrating some ATs' disregard for the seriousness of the condition and their lack of knowledge of best practices. This improper use of terminology might reflect their lack of training and true understanding of the effectiveness, ease of use, and practicality of T_{re}. When discussing the proper steps for diagnosing this potentially fatal condition, ATs need to use the most appropriate language, including "assessing body temperature of the patient via T_{re}." Transitioning to this language not only solidifies the AT's place in the health care field but also might alleviate some misconceptions about T_{re} use in the clinical setting. Furthermore, without proper use of terminology, particularly related to T_{re} and CWI, the AT will be unable to educate and convince parents, coaches, and athletic administrators about the necessity of the measures. Regardless of clinical setting, the AT must demonstrate confidence and professionalism when addressing a potential case of EHS because this approach can ease much of the tension and misgivings that might accompany T_{re} and CWI. Furthermore, the AT must begin to embrace the notion that T_{re} and CWI are best practices and begin to implement these practices with confidence. The NATA endorses these practices, as outlined in the position statement on EHI, which provides the necessary written document to support their use.[8] However, one recommendation might be that a coach or the athletic director should be present when the AT uses one of these devices to ensure appropriate care and to protect both parties.

Lack of Resources

Lack of resources or athletic coverage is a struggle that most HS ATs face.[1] However, purchasing T_{re} devices and CWI tubs should not exceed an athletic training budget. In an emergency, a rectal temperature can be obtained via most standard thermometers, which every AT should have. A T_{re} device can be purchased for less than $200, which fits into most athletic training budgets. However, if this is not possible, rectal temperature can (and should) still be measured with a standard thermometer. Staff should read the thermometer's manual carefully because it will indicate whether the thermometer can be used rectally and whether the device measures temperatures equal to or greater than 104°F (40.03°C). Supplies associated with CWI include consumable items such as ice and water and, for a small cost (approximately $150), a polyethylene tub. Moreover, some

of the participants indicated a concern with running out of ice, which was necessary to help maintain the hydration of their athletes. A simple solution can include purchasing additional bags of ice daily at a local convenience store or having regular ice delivery. This cost should fit within an AT's budget, considering the documented efficiency of cooling a patient with a dangerously elevated core temperature.[17,18] Researchers have shown that schools with AT services and sports medicine supply budgets provide higher levels of medical care than schools without them.[35] Again, our results and those of researchers studying barriers to the use of recommended practices for the recognition and treatment of EHS have demonstrated a clear picture; a lack of previous training and complete understanding of EHS has led ATs to avoid purchasing or even requesting the necessary equipment for the accurate diagnosis of potential EHS and the appropriate tools to adequately treat affected athletes.

Limitations

Although the ATs who participated in our study represented a random sample from the HS and collegiate settings, the findings might not represent fully the educational training, practice beliefs, and experiences of all ATs. We recognize that the sample was small compared with the number of ATs employed in both clinical settings; however, we wanted to gain further insights into barriers to the use of EBP and the recognition and treatment of EHS as identified in the literature. In the future, perhaps a more homogeneous sample would help strengthen the findings and expose more setting-specific barriers. We also recognize that using focus groups as the data collection method has its own limitations, such that participants might have felt pressured to provide similar responses. Future investigators might choose to use individual interviews to confirm our findings.

Future Research

In the future, researchers should include surveys and interviews of different health care professionals who are involved in the recognition and treatment of EHS. This population would include coaches, parents, team physicians, emergency medical technicians, paramedics, and emergency department physicians. With information from all these realms, a consistent reason for this disconnect might emerge. We assumed that rectal temperature assessment is frowned on by people who are unaware of the reason for its use. However, no investigators have examined the response of parents, administrators, coaches, and others who are told about the use of T_{re} and how it can lead to the successful outcome for a patient with EHS. Formal and continuing education experiences also might help identify a connection between the type of education received and clinical practice. This should begin with hands-on sessions at national meetings, such as the NATA, so appropriate methods can be taught, questions can be answered, and skills can be practiced.

CONCLUSIONS

The 5 themes discussed in this article are valid concerns faced by ATs across the United States working in the collegiate and HS settings. Although valid, they do not justify failure to implement recommended management practices. A large amount of research exists regarding EHS, specifically on predispositions, diagnostic efficacy of assessment tools, and the best ways to manage the condition. Evidence must be used clinically to save a person's life and safely return him or her to sport. We know that obtaining a core body temperature via T_{re} and cooling with CWI are the recommended methods in recognizing and treating EHS, respectively.

The fifth edition of the *Athletic Training Educational Competencies* has been approved and will become policy in 2012. Therefore, ATs must now incorporate the content that reflects the most appropriate evidence-based knowledge to ensure clinical proficiency as it relates to T_{re} and CWI, regardless of the clinician's previous training, comfort level, or practice beliefs. We believe that with a culmination of more hands-on learning and practice in the classroom, more effective teaching techniques, and proper use of techniques in the athletic training room, many of the concerns that our participants had regarding EHS will diminish with time.[26,27] The benefit of proper educational training regarding T_{re} and CWI is that every AT should have the necessary tools to treat EHS, regardless of budget. If learning styles change in the classroom and in continuing education, practitioners' comfort levels and initiative also will increase. Although not every setting can be perfect, simple improvements can increase the effectiveness of ATs' efforts in an emergency and save lives.

ACKNOWLEDGMENTS

We thank the ATs who spoke with us at the 2009 Annual Meeting of the National Athletic Trainers' Association about their current practice beliefs.

Appendix 1. Likert Scale Questions

1. How familiar are you with the NATA's position statement on exertional heat illnesses?[8]											
	Not familiar	1	2	3	4	5	6	7	8	9	10	Very familiar
2. How comfortable are you with the information in the NATA's position statement on exertional heat illnesses?[8]											
	Not comfortable	1	2	3	4	5	6	7	8	9	10	Very comfortable
3. How comfortable are you with dealing with a heat stroke?											
	Not comfortable	1	2	3	4	5	6	7	8	9	10	Very comfortable
4. How familiar are you with obtaining a rectal temperature?											
	Not familiar	1	2	3	4	5	6	7	8	9	10	Very familiar
5. How comfortable are you with obtaining a rectal temperature?											
	Not comfortable	1	2	3	4	5	6	7	8	9	10	Very comfortable
6. How familiar are you with using cold-water immersion as a cooling technique?											
	Not familiar	1	2	3	4	5	6	7	8	9	10	Very familiar
7. How comfortable are you with using cold-water immersion as a cooling technique?											
	Not comfortable	1	2	3	4	5	6	7	8	9	10	Very comfortable

Abbreviation: NATA, National Athletic Trainers' Association.

Appendix 2. Interview Guide for Clinicians

1. What were you taught in your athletic training education in regards to EHS (diagnosis and treatment)?
   a. How does your previous education regarding EHS reflect what you practice today in your clinical setting?
   b. Has it changed at all due to research that has been published since you've been certified?
2. What does your policy and procedures manual and/or emergency action plan mention in regards to EHS?
   a. How was it developed?
   b. Who developed it?
   c. How often is it updated?
3. What are some strategies that your athletic training staff uses to limit the occurrence of EHS? Do you involve your coaches?
4. Do you provide any educational workshops or training for coaches and/or athletes regarding EHS?
5. Do you feel that your institution is prepared to handle an EHS case at all of its fields and venues? Why or why not? What could be improved?
   a. At your current setting, about how long would it take after diagnosing an athlete with EHS to initiate cooling?
6. What criteria do you currently use to recognize and treat an EHS (does temperature assessment or cooling occur and if so, what method?)
   a. What is your rationale?
   b. What influences your decision? Have changes been made? Why?
   c. Could anything change your current practice beliefs?
7. Do you have rectal temperature available as one of your methods of temperature assessment?
   a. Do you use it? Why or why not?
   b. Do you feel comfortable using it?
   c. Have you ever been taught/practiced using it properly?
8. Do you have cold-water immersion available as one of your cooling modalities?
   a. Do you use it? Why or why not? (If yes, is it always ready to be utilized for every team?)
   b. Do you feel comfortable using it?
   c. Have you ever been taught/practiced using it properly?
9. What is your return-to-play criteria for full return to participation following an EHS?
   a. Who was involved with establishing the policy?
   b. What is your rationale?
   c. What influences your decision?
10. What might be done to encourage the use of rectal temperature measures in everyday practice?
    a. What can be done to encourage its use and spread awareness to the general public of its effectiveness/importance? (Example—AEDs can expose somebody in public but they have become acceptable/recommended in an emergency situation.)
11. What might be done to encourage the use of cold-water immersion in everyday practice?
    a. What can be done to encourage its use and spread awareness to the general public of its effectiveness/importance?

Abbreviations: EHS, exertional heat stroke; AED, automated external defibrillator.

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