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ORIGINAL RESEARCH

Athletic Training Educators' Pedagogical Strategies for Preparing Students to Address Sudden Death in Sport

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Context: Educational training programs both impart knowledge and allow students to practice skills to gain clinical competence.

Objective: Understand the educational training provided to athletic training students regarding sudden death in sport beyond exertional heat stroke.

Design: An exploratory, qualitative study using telephone interviews and a quantitative survey instrument.

Setting: Athletic training programs (ATPs) accredited by the Commission on Accreditation of Athletic Training Education.

Patients or Other Participants: Twelve ATP faculty members (7 men, 5 women) currently teaching content related to sudden death in sport participated.

Data Collection and Analysis: One-on-one semistructured telephone interviews were analyzed inductively using a grounded theory approach and open coding. Multiple analyst triangulation and peer review established data credibility.

Results: Four major themes emerged from the data to describe the educational experiences provided to athletic training students regarding sudden death: (1) current trends, (2) regional bias, (3) clinician experience, and (4) instructional methods. The first 3 themes were an illustration of which sudden death conditions were covered in the curriculum, as well as the depth to which each of the concepts was covered. The final theme was a reflection of methods used to deliver the information determined by the first 3 themes.

Conclusions: Similar to previous literature, our participants were guided by the NATA position statements to deliver educational material, used time spent in clinical education to gain hands-on learning, and discourse to facilitate preparedness.

Key Words: Instruction, authentic learning, emergency care

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INTRODUCTION

Athletic training (AT) educators have the autonomy to develop their academic courses to fit their personal instructional styles, professional clinical experiences, and AT students' (ATSs') learning needs, as long as they communicate the information outlined in the National Athletic Trainers' Association[1] (NATA) Educational Competencies. Regardless of the specific content, many educators use a structured, hands-on approach when teaching.[2,3] This is consistent with the ATSs' needs, as they prefer opportunities to have authentic learning experiences that allow for implementation of knowledge and skills while still receiving feedback for improvement.[2–5] There are a variety of instructional methods that provide these experiences, including directed instruction, discourse and feedback, simulations, problem-based learning, and capturing teachable moments during clinical education experiences. Furthermore, the goals and objectives of both the course material and content area often determine the instructional technique selected. In the end, however, the goal is to provide the student with the most realistic opportunity to integrate cognitive knowledge and psychomotor skills to demonstrate clinical proficiency and develop confidence.

In AT education, clinical proficiency development is the primary goal when preparing entry-level practitioners. This is demonstrated by the ATS's ability to effectively execute real patient care across all AT domains before certification.[1] One particular area that requires entry-level competence is emergency care procedures related to preventing sudden death in sport through recognition and proper treatment of sudden illness. Previous researchers[6,7] have shown that athletic trainers, despite having appropriate knowledge regarding recognition and treatment of exertional heat stroke (EHS), often fail to adequately implement that knowledge.[8] This may be because athletic trainers feel ill prepared and uncomfortable using these skills because of a lack of educational training and limited practice.[6,9,10] Furthermore, educators often use more traditional instruction methods, including lecture, discourse, or simulations,[9] to teach EHS skills, which may lack the authenticity necessary for students to fully master their use.

Exertional heat stroke is only one cause of sudden death in athletics, with others including asthma, sudden cardiac death, commotio cordis, diabetes, exertional sickling, head injuries, hyponatremia, hypothermia, lightning, methicillin-resistant *Staphylococcus aureus*, and spinal cord injuries.[11,12] It is important to understand how athletic trainers are being prepared academically to prevent, recognize, and treat these situations. The intent of this study, therefore, was to use the work of Mazerolle and colleagues[6,9,10] as a framework to investigate which content areas and instructional methods AT educators are using to prepare their students to manage potentially life-threatening conditions.

METHODS

Because limited information regarding pedagogical methods of teaching sudden death in sport exists, we chose to use a holistic approach to data collection, including both an exploratory[13] qualitative interview and a quantitative survey instrument to help support the data generated by the individual interviews.[14] The information collected in the short survey was predominately background information focused on aspects of sudden death that matched the current NATA position statements that directly relate to sudden death in sport. Using 2 data collection methods allowed for data triangulation.[14] The study received institutional review board approval before data collection.

Participant Recruitment and Data

Predetermined participant selection criteria[14] included being an AT faculty member employed in a Commission on Accreditation of Athletic Training Education (CAATE)–accredited program who taught content regarding preventing sudden death in sport. To help facilitate participant recruitment, an e-mail explaining the study and steps for data collection was sent to 75 program directors (PDs). The use of PDs as gatekeepers was necessary,[14,15] as currently there are no databases in existence from which to access individual instructors within CAATE-accredited programs. The programs selected represented a random distribution by region and size of the institution. The PDs both read and forwarded the e-mail to any prospective participants at their institution. Those who were interested in participating contacted the investigators directly to initiate data collection procedures. In total, 2 rounds of e-mail solicitations reached potential participants at 150 different CAATE-accredited programs.

The recruitment process yielded 12 participants (8 male and 4 female) from a variety of institution types, including private, public, and baccalaureate-, masters-, and doctorate-granting colleges and universities. These individuals had been board certified for 15 $\pm$ 9 years, had worked as faculty members for 13 $\pm$ 8 years, and had 11 $\pm$ 10 years of clinical experience (Table 1). Data analysis revealed redundancy and saturation with these participants.

Data Collection

Participants began the data collection process by completing a background questionnaire through SurveyMonkey. This questionnaire collected general demographic data and used Likert-scaled questions to rate participants' perceptions about how and to what depth sudden death in sport was taught[11,12] in their curriculum and the general sequencing of the topic in their program (Appendix 1). Next, participants completed a semistructured telephone interview that used researcher-developed, open-ended questions (Appendix 2). This format

Table 1. Participant Demographic Data

Name[a]	Gender	District	Time BOC Certified, y	Faculty Position	Time Faculty Member, y	Time at Current Institution, y	Time in Clinical Setting, y	Currently Practices Clinically	Clinical Setting
Kristina	Female	1	29	Associate professor	28	26	29	Yes	Football/ miscellaneous
Tim	Male	1	10	Assistant professor	5	2	5	Yes	Men's lacrosse
Earl	Male	1	14	Professor	10	10	1	Yes	Per diem
Damon	Male	1	28	PD/associate clinical professor	26	24	29	Yes	Women's gymnastics
Marge	Female	2	16	PD	15	16	2	Yes	Women's gymnastics
Peter	Male	2	24	PD and associate professor	13	6	13	No	None
Debra	Female	3	5	Doctoral teaching and research assistant	2	4	4	Yes	Emergency coverage/ miscellaneous
Kevin	Male	4	7	Senior instructor	4	6	7	Yes	Per Diem
Barry	Male	4	23	Associate professor	17	16	6	No	None
Diego	Male	6	17	Clinical instructor	13	13	15	Yes	Football
Paige	Female	9	12	PD	6	3	6	Yes	Miscellaneous
John	Male	9	0	Clinical education coordinator	20	8	14	No	None

Abbreviations: BOC, Board of Certification; PD, program director.
[a] Participants' names are pseudonyms.

was selected because of the flexibility afforded to explore the topic in depth and ascertain each program's individual characteristics.[14] Interviews were conducted at the participant's convenience during the spring semester of the academic year, and lasted approximately 30 to 45 minutes. All telephone interviews were transcribed verbatim, with participants given pseudonyms.

The interview guide was developed by the same 5-member research team who developed the survey instrument, and included 2 AT educators, 2 graduate assistant athletic trainers, and 1 qualitative researcher. The members used the existing literature on sudden death in sport,[11,12] educational methods,[14] and the research agenda to develop the open-ended questions. Two experts with backgrounds in sudden death, AT, and emergency medical care who were not involved in the data collection procedures reviewed both the survey questionnaire and the interview guide before data collection. Their feedback was used to update the data collection tools, and included several formatting items, removal and addition of questions, and rewording for clarity. A pilot study was conducted, after the initial review by the experts, with a small cohort of AT educators ($n = 2$), and generated further minor revisions to both the background questionnaire and interview guide. The data generated in the pilot was not included in the final analysis.

Data Analysis and Trustworthiness

Data were analyzed using the inductive approach as described by Thomas.[16] Using the research agenda and questions themselves, this systematic approach included several steps, including (1) an initial evaluation of the transcripts to gain a holistic understanding of the data, (2) labeling specific incidents to represent their meaning, and (3) categorizing similar labels into a conceptual model. Frequencies, means, and standard deviations were all calculated for items on the background questionnaire, including both the Likert-scaled questions and the basic demographic information.

Research procedures credibility and data trustworthiness were established using 3 strategies: (1) methodological triangulation,[14] (2) participant verification,[14] and (3) multiple-analyst triangulation.[14,17] Using information from both in-depth phone interviews and the survey questionnaire helped triangulate the results,[14,17] and participant verification was secured by allowing the subjects to review and edit their transcripts before analysis to ensure accuracy. Three researchers, including 1 graduate student and 2 experienced qualitative researchers, autonomously analyzed the data. All 3 coders were in agreement in the final presentation of the data.

RESULTS

Four major themes emerged from the data to describe the educational experiences provided to ATSs regarding sudden death: (1) current trends, (2) regional bias, (3) clinician experience, and (4) instructional methods. The first 3 themes were an illustration of what sudden death conditions were covered in the curriculum, as well as the depth to which each of the concepts was covered. The final theme was a reflection of methods used to deliver the information determined by the first 3 themes. Overall, participants reported that their programs spent an average of 5% of their total curriculum time covering material related to sudden death in sport, with only 2 participants indicating spending more time than that, at 10% and 20% of educational time, respectively. Additionally, on a Likert scale of 0 to 10 (0 = *not prepared* to 10 = *extremely prepared*), the participants indicated that their ATSs were

moderately prepared to handle an emergency situation involving a sudden death in sport condition (6 ± 2).

Current trends were classified as those topics related to sudden death considered to be "hot" in the media, literature, or both. Although the information presented to the ATS was driven by all NATA position statements, considerable attention was spent on cardiac, cervical spine, and head injuries, whereas limited time was focused on heat illnesses, asthma, or anaphylaxis. A *regional bias* appeared to influence an educator's likelihood of spending time on a certain topic, such as greater emphasis on heat-related conditions in hotter regions of the country. *Clinician experiences* illustrated the impact the AT instructor's previous professional experiences had on materials covered within a course, such as being involved with management of a cardiac episode. *Instructional methods* was the only theme characterized by 2 lower-order themes, which included *simulated learning experiences* and the *clinical educational experience*.

Current Trends

The dominant theme, *current trends*, was expressed by the AT educators' selections of materials related to sudden death, which were driven by current NATA position statements, information discussed within the media particularly related to case studies or policy changes, or a combination of both factors. Several AT educators discussed the recent NFL policy changes regarding concussion evaluation and management protocols as important issues to discuss with their ATSs. Tim said,

> *I mean me personally [for my class] I teach the head, neck, and spine. We spend a lot of time on concussions. I'm not going to lie, simply because there's so much out there right now [media and literature] and it's really a hot topic right now.*

Other AT educators developed course materials, as well as structured their curricula around the current NATA position statements dealing with sudden death, such as those on cervical spine, concussion, and exertional heat illnesses. Kevin reported,

> *One thing that I've done in the past several years in the classroom, and this is my core athletic training courses [only ATS]. I incorporate the NATA position statements and position stands. I have quizzes over those particular materials.*

Athletic training educators know that the hot topics of concussions, cervical spine injuries, and cardiac conditions are pressing issues currently being addressed by state legislatures, and that prevention and treatment methods are under constant scrutiny and change. Damon states,

> *I am very aware of all the different concussion legislation in our country regarding the occurrence of head injuries and the prevention of sudden death; so it is really kind of a combination of different things [that influence me], but I would say those [conditions] are the predominant areas right now and are important for discussion.*

Athletic training educators noted that the increased media coverage reinforced pertinent topics related to sudden death, and that the media can strongly influence their ATSs, as many watch professional sporting events and will critically evaluate how potential injuries or conditions are managed. Diego shared a question he fielded in his class:

> *Case and point there was a case last year [reported in the media] with an NFL football athlete [cervical spine injury]. They removed his helmet and put towels underneath his head. They didn't remove the shoulder pads, they log rolled him, and took him off on a stretcher. My students wanted to know: "Why did they do that? Why did we see an NFL athlete go off the field [with no helmet and shoulder pads still on]?"*

Awareness of current case studies, as depicted by real life, media, or the literature, was an important factor for this group of AT educators' decisions regarding course development and presentation of materials to the ATS.

Regional Bias

Regional bias, the second theme, illustrated the influence of the AT program's (ATP's) location within the United States. Participants reported spending an average 4% of their entire curriculum time on EHS, with 2 participants located in hotter climates each reporting 10%. The educators felt that certain conditions, such as heat illnesses, are more prevalent in the South/Midwest, and because of that, they made sure to cover those topics more in depth. Conversely, others were quick to afford less time on conditions that were unlikely to occur in their geographical region. Paige, who is located in the southern region of the United States, said,

> *I definitely think the regional part of our current location dealing with hyperthermia, the high prevalence of sickle cell trait–positive athletes and the interactions [treating heat illnesses], plays a significant role. As far as where they go afterwards I don't really think that matters as much as we focus on things that they are dealing with currently.... The primary influence is where we are now [in the heat].*

Debra explained how her program location influences her decisions by saying,

> *I try to make things relatable to their clinical setting. Especially being in the South and exposed to the heat. I just try to make things applicable for all my students because we are more likely to see a heat injury over something else.*

Similar to Debra's comments, Paige went on to share,

> *We definitely talk about sickle cell; we talk about hyperthermia. We talk about cardiac a lot because we've either had instances previously in clinical sites or just being in the South we see situations with sickle cell and hyperthermia. I definitely think our location of our school influences the conditions we deal with, such with hyperthermia, and the high prevalence of sickle cell trait athletes.*

From a different perspective, Damon, who is from a northern state, shared how his students probably don't have the same breadth of knowledge regarding heat-related illnesses as ATSs from the South:

Table 2. Use of NATA Position Statements in ATP Curriculums[a]

NATA Position Statement	Incorporated into Curriculum[b]	Not Incorporated into Curriculum[b]
Emergency planning	10	2
Asthma	7	5
AED	3	9
Commotio cordis	3	9
SCA in HS and colleges	5	7
Diabetes	5	7
Heat illness	11	1
Cold injuries	6	6
Sickle cell	9	3
concussion	10	2
Fluid replacement	11	1
Lightning	8	4
MRSA	6	6
Cervical spine injury	11	1

Abbreviations: AED, automated external defibrillator; ATP, athletic training program; HS, high school; MRSA, methicillin-resistant *Staphylococcus aureus*; NATA, National Athletic Trainers' Association; SCA, sudden cardiac arrest.

[a] Total number of participants was 12.

[b] Reflects use in course(s) related to sudden death in sport.

> *I think the graduates of our [AT] programs and most of the programs in New England, just don't share the same understanding of heat illness things, hyponatremia as a student graduating from the University of Alabama or a student graduating from Louisiana State.*

Our results suggest that the participants perceived specific conditions as regional, rather than as a result of genetic predisposition, training, or other environmental factors, and that they assigned the most course and curriculum time to teach those that were most prevalent in their area. Barry states, "I think we [as educators] have done a good job in our program really examining heat-related issues and concussion types of stuff related to sudden death. We really need to prepare our students for what they're going to face the most [in the clinical setting]."

Clinician Experience

Athletic training educators drew from their own personal clinical experiences to facilitate ATS learning. These experiences greatly influenced course development, materials covered, and time spent on topics pertaining to sudden death. A few of the AT educators had prior experience managing a case of sudden death. This gave them perspective, respect for the seriousness of the condition, and a realistic understanding of the condition's management. All but 3 of the participants were active clinically at the time of the study, which also helped facilitate their professional experiences and perceptions related to sudden death. One educator, Kristina, who served in a dual role, shared one of her personal experiences of sudden death: "It sticks in your head forever, so you are going to prepare your [future] athletic trainers for that experience, comparable to the one you had." The educators realized how profound an authentic experience could be, and therefore tried to integrate them into their pedagogy to promote ATS learning. They also realized that it was likely that one of their own ATSs would face a similar situation in the future. Paige said,

> *The fact [as an undergraduate student] I experienced one of my athletes going into cardiac arrest in the middle of football [practice]. I want everyone to have an understanding of their role and [appreciate] the importance of prior preparation. That is why we practice emergency action plans and all the related items.*

Athletic training educators believed that sharing their personal experiences could improve ATS comprehension of both the seriousness of sudden death and the importance of skill development and personally connect the student and educator. John explained,

> *I spend a fair amount of time on concussions because I like concussions. That has always been one of my particular interests [clinically]. It is [story telling] one of the ways you can get students to actually pay attention. So yes, I think past experience does in fact matter and I think it for sure influences people [and their teaching practices].*

Although there are different reasons that affect the depth to which certain subjects relating to sudden death in sport are taught in undergraduate programs across the country, AT educators agreed that they try to touch upon all causes.

Instructional Methods

When asked to discuss their use/selection of instructional methods regarding sudden death in sport, the 2 most popular methods cited by educators were real-time learning and clinical education experiences based on exposure to authentic educational experiences that fostered critical thinking. The content the participants used, on the other hand, came primarily from the NATA position statements (Table 2).

Simulated Learning Experiences. The AT educators in this study agreed that ATSs need real-life or real-time exposure to transfer their cognitive knowledge and develop competence, yet they were acutely aware that opportunities were limited. The AT educators also discussed the importance of practicing critical thinking and skill application, which they reported facilitating in the classroom and laboratory setting with the use of case studies, scenarios, and simulations. Paige believed,

> *I would say the real case scenarios make the most impact. I think that with any of those emergency situations, because there is very limited real-world exposure [the reality] of having something like that [actually] happen. I think that most students will feel somewhat inadequate or [uncomfortable] until they are placed in that situation even though it is contrived.*

Tim supported Paige's statement,

> *I [try to] scare them a little bit. I'll be honest. I definitely try to bring forward scenarios [of sudden death], but not just hey this is a scenario [I arbitrarily made up]. I really try to provide real-life cases, real-life stories, real-life scenarios that myself and other staff members have been in [to help them gain an understanding].*

Another AT educator, Marge, believed the best laboratory tool would be one that allows for an ATS to emulate actual patient care:

> *I would love to have a simulation mannequin, that's one thing that's missing. I would like to have the simulated mannequin that moans and groans and its tongue swells and he can go into cardiac arrest and you can actually put on an AED [automated external defibrillator] and practice [treating a sudden death scenario].*

Athletic training educators realized that it is nearly impossible for an ATS to see an actual case of sudden death in sport. However, they agreed that some degree of realism is necessary to appreciate the necessary knowledge and skills. The best alternative, therefore, was to use simulations and case studies facilitated by discourse between the instructor and ATS.

Clinical Education. The educators in this study discussed the importance of using the ATS's clinical rotations as a means to promote real-time learning. John discussed the value of seeing skills used in the field to help ATSs transform cognitive knowledge into practical application, and shared, "I think they [the ATS] can't really be prepared until they get some real-life experience. They're not going to be efficient at CPR [cardiopulmonary resuscitation] until they actually have to do it." The educators understood that a case of sudden death or other emergency care situation would be rare, but plausible practice was necessary to promote ATS learning. Kevin discussed using his program's clinical education experiences as his only real chance to provide exposure to real patient care. He said, "[What I would consider] the only real-life situations would be those [that] occur at their clinical site, which would be more of the high school setting, college setting." Peter agreed with Kevin, in that his program also used the traditional clinical education site as a means for student learning, but rarely used other means to expose students to cases of sudden death. He shared,

> *No we don't [require extra real-time learning situations]. They get rotated just like they have for years through different genders, through different sports, high school, and college, and so forth. I don't think there is a way you can do that [simulate real time learning] beyond the standard practicum experience in the clinical settings.*

With the exception of 1 participant, the educators felt that the perfect recreation of or guaranteed exposure to a real-life situation of sudden death was not feasible, as they rarely occur. Damon summed up all participants' thoughts when said, "I think it is very difficult to put that type of a thing [real-life sudden death] in place." One participant felt that the ability to ride along with emergency medical services professionals was the best chance for students to learn through an authentic experience via observation. She said,

> *They have to learn how to take the cognitive [knowledge] and figure out a game plan. Having the practical skills are an absolutely must, as you must practice what you will do in real-time setting. I'm trying very hard to get my program to make this one of their [clinical] rotations or experiences whereby they will actually ride on an ambulance. They will be able to see the real deal. That's the best teacher.*

DISCUSSION

The purpose of this study was to gain insight into how AT educators prepared students to manage cases of sudden death in sport once they entered the work force. Mazerolle and colleagues[6,9,10] demonstrated that, despite being knowledgeable on how to properly recognize and treat EHS, ATs don't always transfer this knowledge to their clinical practice because they lack comfort implementing the recommended assessment and treatment devices because of insufficient hands-on educational training.[9,10] We were also interested in learning what content was taught and the methods used to deliver it, as previous literature revealed a reliance on lecture-based techniques, which often fail to provide chances for hands-on training.[9,10,18] Prince et al[19] reported that the most stressful time for medical students is the transition from academic studies to clinical practicum experiences, because they must apply the knowledge they have learned; this thought can be transferred to ATSs and highlight their need for guided, authentic learning experiences.

Our data suggest that there are 3 major themes that affect which sudden death topics are covered and how much time is spent on each: current trends, regional bias, and the clinician's personal experience. The results contribute to the existing literature regarding instructional methods and sudden death, and suggest that an instructor relies on previous experience and knowledge to help guide course development.[9] A fourth theme emerged, instructional methods, which illustrated how AT educators selected an instructional style to deliver information to their students. As in Mazerolle et al,[6] AT educators felt their students would properly recognize and treat a case of EHS on a test or practice exam, but, without real-life, hands-on experience, were unsure if they would be able to correctly manage the situation in the real world. All participants involved agreed that real-life learning scenarios would be most advantageous; unfortunately, none of the participants provided real-life sudden death scenarios for ATSs to practice while engaged in learning in their programs.

Current Trends

The NATA requires ATP educators to teach students specific competencies to prepare them to be successful entry-level ATs.[1] In addition to the content outlined in the educational competencies, AT educators also used situations from the Internet, the news media, and nationally televised athletic events in which ATs were called onto the field to care for an athlete as platforms to discuss sudden death with their students. Using real-life situations can have a powerful effect on ATSs, and create teachable moments for students to reflect on and critique the final outcome. Athletic training student learning is driven by application to real-life learning opportunities.[2,3] Moreover, with an interest in or a love of sports as a natural attractor for a career in AT, our results illustrate that our educators are aware of their ATSs' knowledge of trending topics in the sports world and make curriculum decisions with this in mind.

With policy changes on medical treatment in professional sports, new literature continually being published, legislative changes, and lawsuits filed against athletic departments when an athlete dies all serving as headlines in today's media, the AT educators in our study felt compelled to spend more time

on cardiac conditions, concussions, spinal injuries, and heat illnesses. Today's AT educators are challenged with addressing not only the educational competencies, but also those sudden death topics that appear to be more prevalent or frequent. During the summer of 2011, the hot topic with extensive media buzz was the collective bargaining agreement that led the National Football League to changes rules related to the duration of time off, number of full-contact practices, and number of full-padded practices to improve the athletes' safety.[20] Because of both the high-profile nature of the changes related to concussion management and the likelihood that their students would manage many concussions during their careers, our educators felt the need to spend more time covering this material. In addition to the probability of occurrence in clinical practice, changes in legislation regarding AED availability and media coverage of exertional heat illness deaths also prompted the participants to increase coverage of cardiac conditions and EHS.

Regional Bias

Our data suggest that the geographical location of the ATS's undergraduate institution influenced how much curricular time was spent on certain sudden death conditions. This was particularly evident with participants from the South and Midwest regions of the United States, where the likelihood of managing heat-related conditions was increased, devoting more time to ensure student competence. The Korey Stringer Institute[21] reported on their Registry of Sudden Death in Sport that out of 13 cases of heat illness related sudden death in 2011, only 3 occurred in the north. Although the educators from northern regions educated their ATSs about heat illnesses, because of the perceived reduced likelihood of occurrence, they dedicated less time to covering the material. This is further supported by our data that showed that the majority of participants dedicated 4% of their curriculum to EHS, whereas the 2 from hotter regions devoted 10% of their curriculum. Regardless of region, students must be trained to manage all potential causes of sudden death, because it is unlikely that they will all continue to work in a single environment for their entire career.

Clinical Experience

Like the findings of Mazerolle and colleagues,[9] our data indicate that AT educators' personal clinical experience can affect their selection of instructional methods and concepts to be covered within their curriculums. Athletic training students value the opportunity to relate to and receive authentic experiences in order to learn and retain the information presented. For example, dental school instructors often use personal stories or clinical cases to stimulate discussions and provoke critical analysis of the case presented.[22] This approach also helps ATSs process the information being taught and see how it's relevant and transferable to their clinical practice, often giving insight that cannot be found in a textbook.[22]

Athletic training educators who have managed a sudden death in sport have the unique ability to drive home a scenario's authenticity; and although previous experience alone does not imply clinical effectiveness, it does give them firsthand knowledge from which to draw realistic details. In short, instructors who use their own experiences to create educational scenarios make learning more meaningful, increase their students' motivation to learn and integrate AT content knowledge,[5] and possibly influence them to volunteer at local community events where these conditions are more likely to occur. In this study, participants who had treated a sudden death in the past were comfortable relaying presentation, treatment, outcome, and debriefing information to their ATSs. Shared clinical experiences also give students a better understanding of how potentially deadly conditions can occur, and, if they are managed properly, how an AT can save an athlete's life. Regardless of pedagogical strategy used, realistic scenarios and real-life experiences are critical for students to develop competence and confidence and implement the best clinical practices.[23,24]

Instructional Methods

Educators use a variety of instructional methods to target students' different learning styles;[2,3] however, it appears the best method to prepare students to manage a case of sudden death in sport is to provide the most authentic educational experiences possible. The use of authentic, integrated tasks, in which knowledge and its application are learned together, has been proposed as a way to make the student-to-practitioner transition less problematic.[19] In fact, a recent study identified that the a lack of authentic learning experienced was a complaint of students as it related to their lack of comfort with making psychosocial intervention decisions. Two popular methods include providing students with instructor-driven simulated learning scenarios in a classroom or lab and relying on the students' clinical education experiences to provide actual cases. Previous studies have shown that, even though ATSs are provided with appropriate knowledge to recognize and treat EHS, they are apprehensive to practice the most appropriate methods when necessary.[6,7,9,10,18] The aim of providing students with the most realistic experiences is to develop their clinical thinking skills and prepare them to translate cognitive knowledge into psychomotor skills.[24]

Real-Time Instructor-Driven Learning. Our participants reported that real-time scenarios would best prepare students to manage sudden death. Unfortunately, these types of scenarios rarely occur in clinical rotations and are difficult to recreate accurately in a classroom or lab. Therefore, educators are forced to create mock scenarios or simulations to force students to think critically and practice skills, and hope they are as authentic and realistic as possible. Because adult students prefer that educators use scenarios and case studies[5] to show how classroom material is applicable to their clinical rotations,[25] the use of simulations or scenarios to evaluate student learning and skill proficiency has become popular among ATPs.[26,27] Armstrong et al[26] go on to show students are better able to recall and use information if they learn and experience real-time situations.

Problem-based learning may also allow for realistic scenarios in the classroom. Introduced in the 1960s, problem-based learning was developed to improve medical education by transitioning from a subject- and lecture-based curriculum to interdisciplinary studies guided by real-life problems.[28,29] This pedagogical strategy can potentially help students learn to use clinical data to reason their way to a diagnosis and minimize the shock of professional socialization when entering the work force.[19]

Table 3. Recommendations to Maximize Clinical Education Experiences

Condition	Recommendation
Exertional heat stroke	[CT]: Attend a local road race or large-scale event such as a marathon to observe implementation of techniques such as rectal temperature and cold-water immersion. When students return from experience use classroom time to discuss experience. [SL]: Using an anatomical replica, have students practice taking rectal temperature assessments. Set up cold-water tubs and have students immerse classmates to experience teamwork and steps necessary to complete immersion of patient.
Cardiac conditions	[CT]: Include required ride-along time with a local EMT/paramedic company for learning through observation of implementation of lifesaving techniques. [SL]: Use of mock scenario in which student must implement basic lifesaving techniques of CPR/AED on patient. To replicate real-time learning and conditions, have other students in class role play as spectators, coaches, and players.
Cervical spine	[CT]: Require all students to engage in spine boarding experience during equipment-intensive experience, regardless if real-time learning or practice with clinical instructor. Student can be charged with EAP review with coaching staff. [SL]: Before the start of each academic year, have students implement spine boarding skills. Include review of EAPs and different situations for spine boarding [ice, water, etc.].

Abbreviations: AED, automated external defibrillator; CPR, cardiopulmonary resuscitation; CT, clinical learning (real-time learning); EAP, emergency action plan; EMT, emergency medical technician; SL, simulated (or contrived) learning opportunities.

Clinical Education. Because of the challenges in simulating actual cases of sudden death in sport, AT educators often rely heavily on their students' clinical education practicums. Athletic training students value multiple opportunities for application of knowledge and skills in a variety of authentic experiences, which is often provided in clinical rotation experiences.[5] Clinical education allows direct mentoring, which encourages students to fully appreciate their role and gain a more realistic understanding of clinical integration. Two pitfalls associated with relying on clinical education as the sole means for students to learn about sudden death in sport are the unlikelihood of occurrence and the instructor's potential lack of training, expertise, or familiarity with a skill or technique.[6,7,9,10,18,30] Sudden death in sport is rare; therefore, an ATS may never have the opportunity to fully develop this proficiency during clinical rotations. Moreover, as in the case of EHS, many ATs do not use the NATA recommended guidelines, yet they are supervising and instructing students clinically. Although clinical education experiences are fundamental to competence development, alone they may not provide each student the consistency necessary for full skill mastery. In addition to traditional clinical rotations, students can increase their exposure to potentially deadly sudden illnesses and injuries by riding along with emergency medical technician/paramedic professionals, volunteering at road race mass-medical tents and cross-country meets, or observing at a local emergency room.

Limitations/Future Research

Our study did have a few limitations, the first of which was the small sample size. Because some programs used multiple courses and educators to teach material related to sudden death, our participants might have spoken from limited experience not reflective of their entire program. Although having a small sample is common in qualitative studies, it does limit the ability to transfer these result to all ATPs. The second limitation was that not all districts were represented in the participant pool, possibly concealing regional bias. And lastly, 8 out of 12 participants had 10 or more years of experience as a faculty member. A younger sample set might have used different instructional methods that would have changed the emergent themes. Therefore, future research should further explore these themes with a larger, truly representative participant pool and question instructors from other medical professions about the value they place on currents trends and regional influence. How ATSs evaluate media reports in comparison with information their educators convey and their individual knowledge acquisition over their academic career should also be explored.

Conclusion

It is evident that media influence, regional bias, and an AT educator's personal clinical experience affect how much academic time is devoted to certain topics of sudden death. Athletic training educators are challenged to provide the most authentic, real-time learning scenarios for cases of sudden death, even though these are almost impossible to recreate. Although clinical education provides the most realistic medium for real-time learning, programs may also need to use class or laboratory time to give students more skill practice. We present several suggestions for instruction and implementation in Table 3.

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Appendix 1. Background Questionnaire

Name: _____

Gender: Male ____ Female ____

How long have you been BOC certified? _____

What is your position on the faculty? (Program director, professor, etc.) _____

How long have you been a faculty member? _____

How many years have you been at your current institution? _____

How many years have you worked primarily in a clinical setting? _____

Highest level of education:
___ Bachelor's Degree ___Master's Degree ___Doctorate (PhD or EdD)
___Other (please specify)_____

Do you hold any other specialty certifications or credentials? (eg, EMT, PT, CSCS, PES, etc) If so, please list and indicate the year you attained this certification/credential.
_____
_____

Do you still practice clinically as an athletic trainer? Yes___ No___
If so, please indicate with what sport, setting, and frequency. (eg, Boston marathon, per diem high school coverage)
_____
_____

What courses do you teach and what level are the students in each of those courses?
_____
_____
_____

How many credit hours (estimate if necessary) are spent in your curriculum on sudden death and emergency procedures? What year in school are the students when they take these classes?
_____
_____
_____

Do you think the class time that you allot for instruction regarding sudden death and emergency procedures is adequate? **Yes___ No___**
If not, what changes would you like to see happen?
_____
_____
_____

How confident do you believe your students feel with emergency procedures related to preventing sudden death in sport?
Not confident 0 1 2 3 4 5 6 7 8 9 Very confident

Appendix 1. Continued.

Please indicate the percentage of total time spent covering the prevention, assessment, and treatment of each of the following conditions:
Anaphylaxis _____
Asthma _____
Cardiac _____
Diabetes _____
Exertional heat stroke _____
Exertional sickling _____
Head injuries _____
Hyponatremia _____
Hypothermia _____
Lightning _____
MRSA _____
Spinal cord injuries _____
Trauma _____
Other _____
Do you teach your students about emergency action plans and preparing for emergencies?
Yes ____ No ____
**** If Yes, please respond to the following questions below.***

Do you utilize the NATA's Position Statement on Emergency Planning in Athletics?
Yes___ No___

How important do you feel this document is as a tool to help you teach?
Not Important 0 1 2 3 4 5 6 7 8 9 Very Important

What other documents/ resources/ tools do you use? _____
_____
_____

What types of hands on/ laboratory/ scenarios do you use? _____
_____
_____

*[Question as listed was repeated for all conditions as listed above]

Appendix 2. Faculty Interview Guide

1. Can you discuss how you were assigned/chosen to teach course materials related to sudden death in sport?
   a. Probe: What methods, if any, do you use to stay current regarding preventing sudden death in sport?
   b. Probe: How often do you review NATA Position Statements

2. Can you discuss in what year of schooling and in what courses students learn information regarding preventing sudden death in sport?
   a. Probe: What classes are specifically used to deliver the information? How often during the students curriculum is the material reviewed?

3. Do you spend more time on certain concepts/conditions compared to others? If yes, which ones and why?
   a. Probe: Can you give an estimate of time spent covering the material (ie, third)?

4. What types of instructional methods have you found to be most successful in delivering content related to sudden death in sport?
   a. Probe: What influences your decision regarding these instructional methods?

5. What types of real-time learning opportunities do you provide your students regarding preventing sudden death in sport?

6. Is there anything you would change about the current set-up or structure of the curriculum/courses regarding sudden death? (in an ideal world)
   a. Probe: What strengths does your program have regarding teaching sudden death in sport? What weaknesses do they have regarding teaching sudden death in sport?

7. What are the key points you try to instill in your athletic training students about the following:
   a. Concussions
   b. Cardiac issues
   c. EHS
   d. Hyponatremia
   e. Exertional sickling
   f. Lightning
   g. Spinal cord injuries
   h. Other issues

8. What percentage of your students do you feel are prepared to handle any emergency situation as well as prevent liability regarding sudden death in sport upon graduation from your program?