Journal of Athletic Training 2021;56(11):1224–1231
doi: 10.4085/1062-6050-0494.20

www.natajournals.org

Athletic Administrators' Reporting of Emergency Preparedness Regarding Policies and Procedures in Iowa Secondary Schools

Richelle M. Williams, PhD, ATC*; Hayley J. Root, PhD, MPH, ATC†; Tamara C. Valovich McLeod, PhD, ATC‡

*Department of Athletic Training, Drake University, Des Moines, IA; †Department of Physical Therapy and Athletic Training, Northern Arizona University, Phoenix; ‡Athletic Training Programs and School of Osteopathic Medicine in Arizona, A.T. Still University, Mesa

Context: Secondary schools that offer school-sponsored athletic events should follow best-practice guidelines to provide policies that promote student health and safety.

Objective: To assess emergency preparedness from the perspective of athletic administrators (AAs) in Iowa secondary schools.

Design: Cross-sectional study.

Setting: Online survey.

Patients or Other Participants: Ninety-eight AAs from Iowa completed the survey (age = 45.33 ± 10.22 years, years as an AA = 9.37 ± 8.14, years in current role = 7.72 ± 7.09).

Main Outcome Measures(s): The 6-section survey contained with questions about access to athletic trainers (ATs), emergency action plans (EAPs), cardiopulmonary resuscitation (CPR), automated external defibrillators (AEDs), concussions, heat illness, and other general policies. Descriptive statistics (percentages and frequencies) were reported. Relative risk was calculated to compare schools with and those without access to ATs ($P < .05$).

Results: Most respondents (76.5%, n = 75/98) reported their school had access to a licensed AT. The majority had a written EAP (83.3%, n = 70/84), but fewer than half (39.2%, n = 31/79) reviewed it annually and fewer than 10% (n = 6/85) reported practicing it each year. All respondents (100%, N = 78/78) stated they had an AED on campus. All respondents (N = 77/77) indicated that they were familiar with the Iowa High School Athletic Association's (IHSAA's) concussion policy and had a concussion guideline in place. Many respondents (95.9%, n = 71/74) described being familiar with the IHSAA's heat illness policy, but more than half (62.1%, n = 41/66) noted they did not have a heat illness policy in place at their school.

Conclusions: Most respondents indicated their school had access to ATs, followed the state-mandated concussion guidelines, and had an AED. Although participants reported having written EAPs in place, levels of annual EAP review and practice were low. These results suggest that schools would benefit from educational opportunities to improve safety policies.

Key Words: athletic trainer, emergency action plans, policies, concussion, heat illness

Key Points

- Surveying athletic administrators on school policies and procedures provided insight into how access to an athletic trainer influenced policy implementation.
- Although most schools reported having an emergency action plan (EAP) in place, few schools had venue-specific EAPs, and even fewer practiced the EAP annually.
- Athletic administrators indicated high familiarity with and development of school and school board concussion policies.
- Most schools described familiarity with exertional heat illness, but few respondents cited best-practice policies specifically related to wet-bulb globe temperature monitors, rectal thermometry, or cold-water immersion cooling techniques.

Emergency action plans (EAPs) are written documents that describe stepwise approaches for handling emergency conditions.[1] These plans contain venue-specific procedures for responding to medical emergencies, including directions to venues; appropriate personnel to contact; and condition-specific protocols, such as cardiac arrest, concussion, and exertional heat illness (EHI), to streamline the emergency response and reduce the potential for errors.[2] Although the National Athletic Trainers' Association recommended that schools have EAPs in place for every venue where athletic events occur,[1] recent studies[3–5] suggested that gaps may exist in EAP development and implementation within schools and athletic associations. Researchers[3–7] who examined state-specific secondary school emergency readiness found gaps in preparedness and the implementation of policies and procedures, such as a failure to adopt policies in athletic programs. In terms of facilitators of implementation, Oregon schools with access to an athletic trainer (AT) were more likely to report implementing best-practice

recommendations than those without access to ATs.[4] Similarly, Valovich McLeod et al[3] found that schools with access to ATs were more likely to be prepared for emergencies, highlighting the value of ATs in the secondary school setting and the role ATs play in facilitating EAP best practices.

Although ATs are often the people who initiate EAPs, only 67%[8,9] of secondary schools in the US have access to an AT, and only 34%[8] to 53%[9] of ATs are employed in a full-time capacity. In the absence of an AT, athletic administrators (AAs), such as athletic directors, co-athletic directors, and coaches, are often responsible for developing and initiating EAPs when an emergency occurs. Some of the barriers to EAP implementation by AAs were financial strain and lack of education,[10] which highlights the importance of providing cost-effective educational materials to develop policies. However, before determining how to improve policy implementation, we must understand current practices among stakeholders.

To our knowledge, no authors have investigated the emergency preparedness of Iowa secondary school athletic programs. As of spring 2020, Iowa had 453 high schools: 402 public and 51 private schools. In 2017, a state-level assessment of health and safety policies was performed, and Iowa ranked 49 out of 50 states (and the District of Columbia), which indicated a possible lack of evidence-based practice evaluation and treatment for patients with catastrophic injuries[11] and a lack of access to ATs. Recent researchers noted that access to ATs was related to improved emergency preparedness,[3,4] but unfortunately, not every school had access to an AT's health services.[9] It is important to determine how schools with and those without an AT are pursuing emergency preparedness and following best-practice guidelines. Although ATs and AAs are typically the individuals most involved in creation and implementation of preparedness policies and procedures, the AA likely has sole responsibility for this process when a school lacks access to an AT. Therefore, the purpose of our study was to assess emergency preparedness from the perspective of AAs in Iowa secondary schools. We hypothesized that Iowa secondary schools would have appropriate athletic emergency preparedness, but schools with access to an AT would have higher levels of emergency preparedness than schools without an AT.

METHODS

Participants

The study survey was sent to 535 AAs with email addresses that were publicly available through the Iowa High School Athletic Association (IHSAA) athletic directors' member directory as of November 2019. For each school, we sent emails to personnel listed as AA, athletic director, or co-athletic director. When a school had an AA and an athletic director or codirector listed, both individuals were emailed. Before data collection, the Drake University Institutional Review Board deemed the current study exempt. The first question of the survey asked for participant consent, and participants could continue the survey after providing consent.

Instrumentation. A 76-item survey assessed emergency preparedness and sports safety policies in Iowa secondary schools from an AA perspective. Our survey was modified from a previous survey investigating emergency preparedness in Arizona secondary schools from an athletic director's perspective that was created, assessed, modified, and approved by the Arizona Interscholastic Association's Sports Medicine Advisory Committee.[3] Modifications were made to reflect Iowa-specific language, such as changes in terminology related to Iowa-specific high school associations and recommendations for concussion education training. All authors approved these minor modifications related to Iowa-specific language in the survey; the delivery and objectives of the survey remained the same.

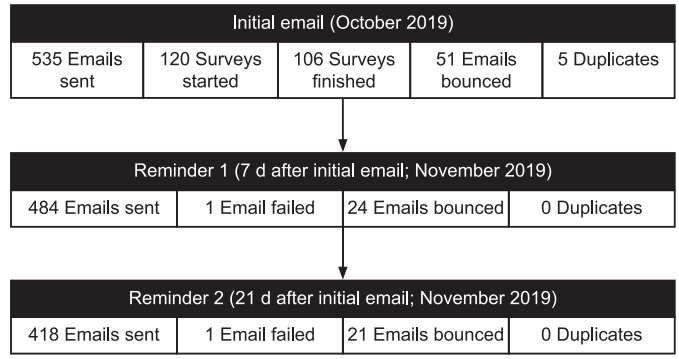

Figure 1. Flow chart of email responses.

The survey included binary (*yes* or *no*), multiple choice, and multipart items about current emergency preparedness in secondary schools. Specifically, questions addressed the following areas: (1) access to ATs, (2) EAPs, (3) access to emergency medical services (EMS) and emergency equipment, (4) automated external defibrillator (AED) access, (5) cardiopulmonary resuscitation (CPR) or first aid training, (6) concussion, (7) heat illness, and (8) other general policies. Results of the current study will focus on items 1 through 7. Participants were also asked demographic questions related to their experience as AAs. The Qualtrics survey platform was used.

Procedures

An initial email was sent to identified AAs requesting voluntary participation in the study. The email included an anonymous link to the survey and indicated an estimated completion time of 15 to 20 minutes. Survey data were collected over 5 weeks, and 2 reminders were emailed to potential participants 7 and 21 days after the initial email. Details about the survey distribution are presented in Figure 1.

Data Analysis

We used SPSS (version 26.0; IBM Corp) for data analysis. Descriptive statistics (percentage and frequency) were provided for each survey item. Demographic characteristics were summarized using mean ± SD or frequency and percentage. Survey logic is a built-in branching tool that allows for follow-up questions if a respondent answers a question in a particular manner. Because survey logic was used, variations existed in the number of responses per question, and the denominators are reported accordingly. Relative risks (RRs) and 95% CIs were calculated to test variables with and without AT access. A $P < .05$ was considered statistically significant.

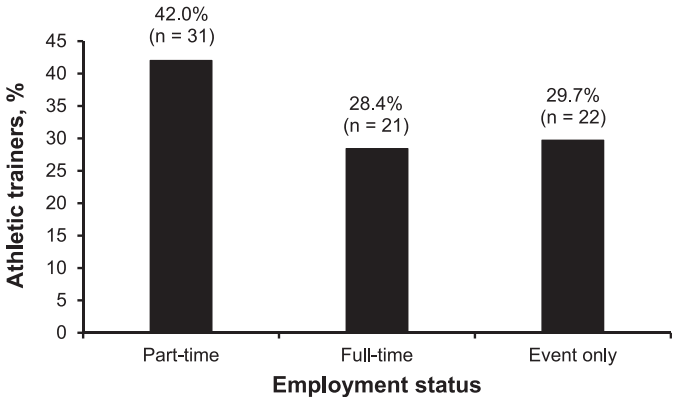

Figure 2. Employment status of athletic trainers (ATs) for those with access to an AT.

RESULTS

Response Rate

The study email with the survey link was sent to the addresses of 535 AAs: 51 emails bounced back or were invalid, and 5 were duplicates. Of the remaining emails, 120 respondents accessed the survey, 106 respondents started the survey (88.3% access rate, n = 106/120), and 98 completed the survey (20.5% completion rate, n = 98/479; Figure 1). The mean age of respondents was 45.33 ± 10.22 years. Mean years of experience as an AA was 9.37 ± 8.14 years, and mean years of experience in their current role was 7.72 ± 7.09 years. Most respondents were athletic directors (72.4%, n = 71/98), followed by AAs (11.2%, n = 11/98), school administrators (8.2%, n = 9/98), and those serving in multiple roles (7.1%, n = 7/98).

Access to ATs

Of the 98 respondents, 75 (76.5%) reported their school had access to a licensed AT. The AT was primarily employed by an outside clinic or hospital (71.6%, n = 53/74), but some ATs were directly employed by the school or district (23.0%, n = 17/74). Employment status was defined as *full-time employment* (>20 hours/week), *part-time employment* (<20 hours/week), or events only (Figure 2).

Of those without access to ATs, most indicated they did not have access to other medical providers for practices (73.9%, n = 17/23) or games (40.9%, n = 9/22). Of those who did have access to other medical providers for practices and games, EMS (33.3%, n = 3/9), physicians, (22.2%, n = 2/9), and physical therapists (22.2%, n = 2/9) were the common providers, and football games (83.3%, n = 5/9) were cited as the most covered events more than 50% of the time. Table 1 further describes AT access and policies.

Emergency Action Plans, EMS Access, and Emergency Equipment

Most participants (83.3%, n = 70/84) described having a written EAP for managing serious, potentially life-threatening sport-related injuries, or both. Respondents with access to an AT more frequently stated they had a written EAP for managing these situations ($P = .047$, RR = 2.56, 95% CI = 1.015, 6.483). More than half of respondents (55.6%, n = 45/81) recounted having a written EAP for each school venue where teams practiced and competed. Fewer than half noted that the EAP was distributed and reviewed annually by athletics staff members (39.2%, n = 31/79), but those with access to an AT were more likely to have an annual review ($P = 0.03$, RR = 1.54, 95% CI = 1.13, 2.10). Most participants (92.9%, n = 79/85) reported not practicing the EAP at each venue annually with critical personnel, and no difference occurred between those with and those without access to ATs ($P = .13$, RR = 1.11, 95% CI = 1.02, 1.20). Of the 6 respondents who said they practiced the EAP at each venue, coaches (100%, n = 6/6), school administrators (83.3%, n = 5/6), ATs (66.7%, n = 4/6), and EMS (50.0%, n = 3/6) were the critical personnel practicing the EAP. More than half of respondents (57.4%, n = 35/61) observed that their EAP included recommendations for appropriate documentation after a catastrophic injury; however, no difference was found between those with and those without access to an AT ($P = .22$, RR = 1.50, 95% CI = 0.83, 2.72).

Most participants (97.3%, n = 71/73) commented that local EMS were familiar with the venue and protocols for efficient response and that the closest EMS location was less than 5 miles (8 km) from the school (88.8%, n = 71/80). No difference was present between participants with and those without access to an AT and EMS familiarity with the venue ($P = .37$, RR = 3.29, 95% CI = 0.22, 49.91). The distances from the respondents' schools to the nearest hospital and the estimated arrival time are shown in Table 2, and the specific emergency equipment available at the respondents' schools is shown in Table 3.

Access to AED, CPR, and First Aid Training

All respondents (100%, N = 78/78) reported having access to an AED at school, and most said 2 to 3 AED units were available (55.7%, n = 34/61). Almost two-thirds (64.9%, n = 50/77) indicated that for 100% of athletic practices and competitions, an AED was available within 3 to 5 minutes of the venue. Most commonly, the school nurse was responsible for regularly checking the AED batteries and placement pads (65.0%, n = 52/80), but many participants did not know how often the AED battery and placement pads were checked (38.0%, n = 30/79). Of those who did know, 21.5% (n = 17/79) stated the AED was checked yearly; 15.2% (n = 12/79), every few months; and 13.9% (n = 11/79), monthly. Most respondents (57%, n = 45/79) noted that documentation of AED maintenance was required and the documentation was typically housed in the school nurse's office (65.1%, n = 28/43).

The majority of respondents (78.2%, n = 61/78) indicated that all coaches at the school were required to be CPR certified and AED trained; however, 5.1% (n = 4/78) specified that only head coaches were required to have this certification and training, and 12.8% (n = 10/78) reported that coaches were not required to have this training. No difference occurred between coach requirements among those with or without access to ATs ($P = .16$).

Concussion

All respondents (100%, N = 77/77) observed that they were familiar with the IHSAA concussion policy and had a concussion guideline in place. Most (87.3%, n = 55/63)

Table 1. Athletic Administrators' Responses to Specific Policies Compared With Athletic Trainer Access: A Relative Risk Analysis
Continued on Next Column

Policy	Access to Athletic Trainer, No. (%)		*P* Value
	Yes	No	
Written EAP			
Yes	57/70 (81.4)	13/14 (92.9)	.047[a]
No	8/70 (11.4)	6/14 (42.9)	
Designated medical expert			
Yes	30/51 (58.8)	2/16 (12.5)	.001[a]
No	21/51 (41.8)	14/16 (87.5)	
Steroids			
Yes	9/44 (64.3)	0/16 (0)	.050
No	35/44 (79.5)	16/16 (100)	
Education and new staff orientation about state high school policies			
Yes	32/51 (62.7)	3/16 (18.8)	.002[a]
No	19/51 (37.3)	13/16 (81.3)	
EAP for each venue			
Yes	37/62 (59.7)	8/19 (42.1)	.177
No	25/62 (40.3)	11/19 (57.9)	
Cardiopulmonary resuscitation-certified coaches			
Yes	49/59 (83.1)	12/19 (63.2)	.155
No	7/59 (11.9)	3/19 (15.8)	
Head coach only	2/59 (3.4)	2/19 (10.5)	
Unsure	1/59 (1.7)	2/19 (10.5)	
School board concussion policy			
Yes	42/48 (87.5)	13/15 (86.7)	.933
No	6/48 (12.5)	2/15 (13.3)	
Concussion baseline testing			
Yes	45/54 (83.3)	13/17 (76.5)	.523
No	9/54 (16.7)	4/17 (5.9)	
Familiarity with state heat illness policy			
Yes	54/55 (98.1)	17/19 (89.5)	.097
No	1/55 (1.8)	2/19 (10.5)	
Additional heat illness policies			
Yes	19/48 (39.6)	6/18 (33.3)	.641
No	29/48 (60.4)	12/18 (66.7)	
Environmental measures before activity			
Yes	42/54 (77.8)	10/16 (62.5)	.219
No	12/54 (22.2)	6/16 (37.5)	
Written heat illness policy			
Yes	15/42 (35.7)	3/13 (23.1)	.396
No	27/42 (64.3)	10/13 (76.9)	
Access to cold-water immersion			
Yes	30/52 (57.7)	6/18 (33.3)	.075
No	22/52 (42.3)	12/18 (66.7)	
Written policy on rectal temperature			
Yes	3/37 (8.1)	0/13 (0)	.290
No	34/37 (91.9)	13/13 (100)	
Lightning policy			
Yes	20/50 (40)	4/17 (23.5)	.221
No	30/50 (60)	13/17 (76.5)	
Dietary supplements			
Yes	5/43 (11.6)	0/16 (0)	.154
No	38/43 (88.4)	16/16 (100)	
Disordered eating policy			
Yes	7/43 (16.3)	0/16 (0)	.086
No	36/43 (83.7)	16/16 (100)	
Ultimate decision			
Yes	33/42 (78.6)	9/10 (90)	.570
No	9/42 (21.4)	3/10 (30)	
Automated external defibrillators on campus			
Yes	59/78 (75.6)	19/78 (24.4)	NA
No	0	0	
Familiarity with Iowa concussion policy			
Yes	58/77 (75.3)	19/77 (24.7)	NA
No	0	0	
Concussion guidelines in place			
Yes	58/77 (75.3)	19/77 (24.7)	NA
No	0	0	

Abbreviations: EAP, emergency action plan; NA, not applicable.
[a] Indicates significance ($P < .05$).

remarked that they had a school board-approved concussion policy. Further, all participants described that their school or district concussion policy had removal-from-play (100%, n = 74/74), graded stepwise return-to-play (100%, n = 73/73), and return-to-classroom (100%, n = 71/71) guidelines. The majority stated that their school or district concussion policy included concussion treatment options (92.8%, n = 65/70) and helmet-fitting guidelines (86.8%, n = 59/68).

Respondents explained that their school had a preseason education routine in place with verification of participation for students (82.0%, n = 60/73), parents (66.2%, n = 45/68), coaches (94.6%, n = 70/74), and staff or administrators (71.9%, n = 46/64). "Heads-up" training materials from the National Federation of State High School Associations and Centers for Disease Control and Prevention were the most common pathways for preseason education.

Heat Illness

Although most participants (95.9%, n = 71/74) reported being familiar with IHSAA's heat illness policy, more than half (62.1%, n = 41/66) said no heat-related policy was in place at their school. Most respondents (74.3%, n = 52/70) commented that their schools took environmental measurements before practices and games to inform activity modifications, and we found no difference between those with and without access to an AT and taking environmental measurements ($P = .22$, RR = 1.69, 95% CI = 0.75, 3.77). Coaches (62.0%, n = 44/71) were commonly responsible for monitoring environmental conditions, and the athletic director (93.0%, n = 66/71) usually had the authority to modify or cancel school events because of environmental conditions (Figure 3).

Over half of individuals (53.7%, n = 36/67) noted having educational components for athletes, parents, and coaches

Table 2. Distance to the Nearest Hospital and Hospital Drive Time

Variable	No. (%)
Hospital distance from school (mi)	
<5	39 (48.8)
6–15	18 (22.5)
15–20	12 (15.0)
20–30	10 (12.5)
>30	1 (1.3)
Drive time to nearest hospital (min)	
<1	2 (2.5)
1–5	30 (37.5)
6–10	11 (13.8)
11–15	14 (17.5)
16–20	12 (15.0)
20–40	10 (12.5)
>40	1 (1.3)

Table 3. Equipment Availability, Environmental Measures Taken, and Reported Core Temperature Methods

Item	No. (%)
Equipment	
Automated external defibrillator	78 (21.61)
Airway rescue devices	19 (5.26)
Air temperature device	33 (9.14)
Cold tub immersions	31 (8.59)
Core temperature device	13 (3.60)
Emergency blood kits	58 (16.07)
Epi-pen (Viatris Inc)	51 (14.13)
Measure and document vitals	36 (9.97)
Spine boards	28 (7.76)
Tarp for immersions	10 (2.77)
Wet-bulb globe thermometer	4 (1.11)
	No. (%) of Respondents
Environmental measures	
Heat index	51 (34.0)
Temperature	49 (32.7)
Lightning check	48 (32.0)
Wet-bulb globe temperature	1 (0.67)
Other	1 (0.67)
Core temperature method	
Oral	39 (65)
Axillary	7 (11.7)
Temporal artery	7 (11.7)
Tympanic	3 (5)
Rectal	2 (3.3)
Other	11 (18.3)

on heat-related topics, but most (67.3%, n = 37/55) lacked a written treatment plan for managing heat illness. No difference was present among those with or without access to an AT regarding having written treatment plans for managing heat illness ($P = .40$, RR = 1.20, 95% CI = 0.82, 1.74). Most respondents (51.4%, n = 36/70) had access to cold-water immersion (CWI) equipment at their school; a CWI tub (91.7%, n = 33/36) was the most common type of equipment, followed by a tarp for the tarp-assisted cooling with oscillation (TACO) method[12] (2.8%, n = 1/36). No difference was demonstrated between those with and those without access to an AT with respect to CWI availability ($P = .08$, RR = 1.58, 95% CI = 1.00, 2.49). The most frequent methods used to measure core temperature are listed in Table 3. Most participants said they either did not have a written policy on rectal thermometry (64.4%, n = 47/73) or did not know whether their school had such a policy (31.5%, n = 23/73); however, no difference was found between those with and those without access to an AT regarding a written rectal thermometry policy ($P = .29$, RR = 1.09, 95% CI = 0.99, 1.20).

DISCUSSION

The purpose of our study was to assess emergency preparedness from the perspective of AAs in Iowa secondary schools, primarily focusing on access to ATs, EAPs, access to EMS and emergency equipment, AED access, CPR and first aid certifications, concussion, and heat illness policies. Although 100% of participants reported that their school had access to an AED and that they were familiar with the IHSAA concussion policy, there is room for improvement, particularly in relation to appropriate access to ATs and heat illness policies.

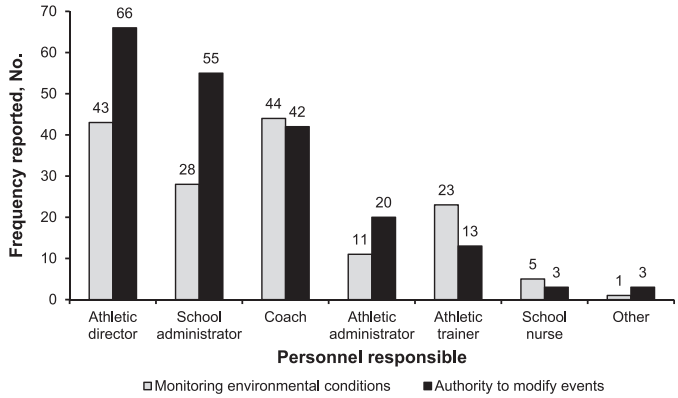

Figure 3. Personnel responsible for monitoring environmental conditions and modifying events.

Access to ATs

In the United States, ATs provided medical coverage to roughly 66% of secondary schools,[9] but only 53% were employed full time; the other 47% were employed in a part-time or per diem capacity.[9] This leaves millions of student-athletes without appropriate and consistent access to medical care. We determined that 76% of schools in Iowa employed licensed ATs but mostly in part-time roles. These results are consistent with a 2019 report[9] on access to ATs in the US that showed 79% of secondary schools with athletic activities in Iowa had access to an AT, but only 24% employed full-time ATs. The lack of full-time ATs suggests a need to increase the level and consistency of AT access to ensure appropriate medical care for student-athletes. However, because our study included only a small sample of Iowa secondary schools, our data may underestimate the true number of ATs in the state. We also demonstrated that having access to an AT was associated with an increased likelihood of having a written EAP and annual education about state policies. This highlights the important role ATs can play in the adoption of appropriate medical policies and implementation of health and wellness educational strategies.

Emergency Action Plans, EMS Access, and Emergency Equipment

Best-practice recommendations include having a written document that is specific to each athletic venue and is developed, coordinated, and practiced annually with critical personnel.[13] Eighty-three percent of respondents described having a written EAP at their school, which was slightly lower than the 95% of schools with a written EAP in a previous study.[3] Only 55% of our participants stated they had venue-specific EAPs, only 40% indicated reviewing the EAP, and only 7% practiced the EAP annually with critical personnel. The proportion of participants who acknowledged practicing the EAP annually was much lower than the 32% in previous work.[3] In another AA-specific survey, 75% related the adoption of an EAP in their secondary school, and those with access to an AT were more likely to do so.[14] When schools lack a venue-specific EAP or do not practice their EAP with relevant personnel, the school's liability increases because implementation errors and decreased quality of clinical care are more likely to occur. In addition, we identified that those who cited having

access to an AT were more likely to have a written EAP in place, further suggesting that ATs are necessary to improve sports safety and implement policies and procedures. It is unclear why Iowa secondary schools were not practicing and reviewing EAPs annually. However, providing educational opportunities and templates for schools to follow may improve future EAP development and implementation in Iowa.

Access to CPR, AED, and First Aid Training

High schools with AEDs were more likely to have comprehensive EAPs in place.[6] All of our respondents reported they had an AED at their school, and the number of units ranged from 2 to 11. Toresdahl et al[15] determined that 82.6% of schools had at least 1 AED; the average was 2.8 AEDs per school. Valovich McLeod et al[3] found that 93% of schools had access to an AED. Given that sudden cardiac arrest is the leading cause of death in youth athletes, AEDs must be readily available at all sporting events. In addition, AEDs have been shown to significantly increase survival rates the more quickly they are applied, as survival rates decline markedly for every minute of no action.[16] Therefore, having multiple AEDs available within 3 minutes of any potential athletic event is critical.[17,18] Fortunately, our results suggested that respondents had access to at least 1 AED at their school for a potential emergency. As of 2016, Iowa required all health clubs, sports clubs, and gyms to have an AED onsite,[19] but the IHSAA does not require sponsored athletic events to have an AED onsite or accessible to each venue.[11] So even though our participants indicated having an AED at their secondary school, it was not required by the IHSAA,[11] and personnel at other schools who did not respond to our survey may not have AED(s) available. The presence of AEDs is a major component of providing appropriate medical care to student-athletes, but having trained personnel to use the AED or administer CPR is also vital. In this study, 78.1% of respondents observed that all coaches at their schools were required to be CPR certified and AED trained, but 5% commented that only head coaches were required to be trained. Further, 12.8% conveyed that coaches were not required to be CPR certified or AED trained at all. These findings were lower than in a similar study[3] in which 86% of coaches were CPR certified and AED trained. Importantly, all paid and volunteer coaches for secondary school sports in Iowa are required to maintain CPR certification.[20] Thus, respondents who stated that only head coaches were certified and trained or that no coaches were CPR certified and AED trained were not following the requirements of the Iowa Board of Education for coaching at the secondary school level.

Concussion

All respondents cited familiarity with IHSAA's concussion policy and had concussion guidelines in place at their school. These results were consistent with those of a previous investigation[3] of state emergency preparedness and concussion policies. Even though our participants were familiar with concussion policies and had concussion guidelines, 87% also depicted having a school board policy in place, which was higher than the 71% shown earlier.[3] Having a school board policy in place ensures a uniform approach to concussion management among schools. It can prevent "doctor shopping" by athletes and parents and provides the school with a liability safeguard because best practices are outlined for each school. A school-level policy is also important for supplementing state laws and policies and tailoring procedures to the specific personnel and resources of the school.

The Iowa concussion law states that a concussion must be diagnosed by a licensed health care provider (physician, physician assistant, chiropractor, advanced practice nurse practitioner, nurse, physical therapist, or AT).[21] Furthermore, each school district must provide the parent or guardian (of students in grades 7–12) with concussion information that must be signed and returned before the student-athlete can participate in sport.[21] The concussion law also includes recommendations for immediate removal from play and no return to participation without written clearance from a licensed provider.[21] Graded stepwise return-to-play guidelines and required education for officials, coaches, and school personnel are included as well.[21] Respondents to our study confirmed that these rules and regulations were followed with 100% participation. These findings and the state law collectively suggest that state high school associations are prioritizing concussion education and the use of practice guidelines. The presence of concussion policies acknowledged by respondents was much higher than other areas of emergency preparedness, which may be due to the Iowa concussion law and a lack of similar mandated requirements for other athletic policies and procedures.

Heat Illness

Exertional heat illnesses are a range of conditions that include heat cramps, heat exhaustion, heat stroke, and exertional hyponatremia, among others.[22] Most of our respondents reported being familiar with the IHSAA heat illness policy, which contains requirements for heat acclimatization but no mandates regarding the use of wet-bulb globe temperature (WBGT) or environmental monitoring.[11] Recent evidence[23] showed that athletes were safer in states with mandated heat guidelines, suggesting an area for future development to ensure safe sport participation.

An EHI policy should include prevention through environmental monitoring, diagnostic measurement strategies, and treatment considerations. Most respondents said that their schools took environmental measurements before practices or games to inform activity modifications. Although the National Athletic Trainers' Association[22] and American College of Sports Medicine[24] recommended monitoring via WBGT, Iowa does not require this,[11] and only 1 participant noted measuring WBGT. The most common measures obtained were temperature and heat index.

Because EHI includes a range of heat-related conditions, it is important to use accurate tools for differential diagnosis. Most respondents commented that their policy advised taking oral temperatures to measure core temperature. This finding is concerning because oral temperature is not an accurate measure of deep body temperature.[25] Less than 3% specified using rectal thermometry, and most did not know or were unsure if a written policy on use of rectal thermometry existed. Our survey question did not ask who

measured core body temperature for a suspected EHI, yet an AT is a qualified health care provider who can take core temperature; however, we identified no difference between those with and without access to an AT in the use of rectal thermometry. Although this was a survey of AAs, these results were consistent with previous research[26] in which fewer than 20% of ATs evaluated core temperature using rectal thermometers. Because more than half of our respondents lacked a written policy on rectal temperature measurement and more than one quarter did not know whether their school had a policy, increased education is needed on the importance and appropriate use of rectal thermometry to encourage its adoption.

For treatment of an EHI, CWI is most appropriate for rapid cooling, but using the TACO method is better than no treatment at all.[12] Most respondents reported they had access to CWI equipment at their school, roughly half used an immersion tub for CWI, and 1 respondent described access to a tarp for the TACO method. Similar to the rectal thermometry results, although our study participants were AAs, these findings are consistent with previous reports in AT populations, in which roughly half of ATs used CWI for rapid cooling[26] and just over half had an immersion tub filled with ice water before the start of high school football practices.[27] Overall, the respondents appeared to be familiar with the Iowa heat policies, and many had access to CWI equipment. However, there is room for improvement by increasing WBGT use, ensuring ATs have the authority to make activity modifications because of weather, and applying rectal thermometry in conjunction with rapid cooling strategies.

Limitations

The current study was not without limitations. We intentionally contacted AAs in Iowa to evaluate the presence of various health-related athletic policies in secondary schools; therefore, our data cannot be generalized to practice patterns and emergency preparedness in other states. Additionally, the survey was anonymous, and thus, we were unable to determine if multiple administrators from the same school responded and thereby skewed the findings if a school was represented more than once. Further, our study had a low response rate, so it is difficult to generalize findings to the entire state. Because the survey asked AAs about school policies, our results may also be limited if the respondents were not directly involved with the policies and procedures at their schools. Another limitation is that we did not collect secondary school demographic data, which affected our ability to assess resource availability based on school size and location. However, most participants stated they were within 5 miles (8 km) of the nearest hospital. These findings suggested that the location of respondents was likely not a more rural area, which was an initial concern in surveying Iowa. Future researchers should analyze school demographics and locations to assess the socioeconomic aspects of policies and procedures and develop tools that schools can use to create and implement emergency policies and procedures.

Our results of the current study indicated that most AAs who completed our survey had access to an AT and that access was positively associated with having a written EAP and designated concussion expert, emphasizing the value of ATs to school and health care teams. Although respondents acknowledged having a written EAP in place, schools need to improve their review and practice of the EAP annually with critical personnel at each venue. Also, although many schools had access to an AT, most ATs were employed in a part-time capacity, and despite the heat policies in place at many schools, best-practice standards were frequently not followed. Both findings highlighted future areas for improvement. Therefore, ATs should continually review the policies and procedures at their schools with AAs. It is important for all athletics staff to know and understand the policies and procedures for sports safety in the event an emergency occurs. Because current data suggest that most secondary schools with access to an AT have only part-time access, AAs should be well informed and involved in policy development and implementation.

REFERENCES

1. Andersen J, Courson RW, Kleiner DM, McLoda TA. National Athletic Trainers' Association position statement: emergency planning in athletics. *J Athl Train*. 2002;37(1):99–104.
2. Casa DJ, Almquist J, Anderson SA, et al. The inter-association task force for preventing sudden death in secondary school athletics programs: best-practices recommendations. *J Athl Train*. 2013;48(4):546–553. doi:10.4085/1062-6050-48.4.12
3. McLeod TCV, Cardenas JF. Emergency preparedness of secondary school athletic programs in Arizona. *J Athl Train*. 2019;54(2):133–141. doi:10.4085/1062-6050-35-18
4. Johnson ST, Norcross MF, Bovbjerg VE, Hoffman MA, Chang E, Koester MC. Sports-related emergency preparedness in Oregon high schools. *Sports Health*. 2017;9(2):181–184. doi:10.1177/1941738116686782
5. Schneider K, Meeteer W, Nolan JA, Campbell HD. Health care in high school athletics in West Virginia. *Rural Remote Health*. 2017;17(1):3879. doi:10.22605/rrh3879
6. Wasilko SM, Lisle DK. Automated external defibrillators and emergency planning for sudden cardiac arrest in Vermont high schools: a rural state's perspective. *Sports Health*. 2013;5(6):548–552. doi:10.1177/1941738113484250
7. Scarneo SE, DiStefano LJ, Stearns RL, Register-Mihalik JK, Denegar CR, Casa DJ. Emergency action planning in secondary school athletics: a comprehensive evaluation of current adoption of best practice standards. *J Athl Train*. 2019;54(1):99–105. doi:10.4085/1062-6050-82-18
8. Pike AM, Pryor RR, Vandermark LW, Mazerolle SM, Casa DJ. Athletic trainer services in public and private secondary schools. *J Athl Train*. 2017;52(1):5–11. doi:10.4085/1062-6050-51.11.15
9. Huggins RA, Coleman KA, Attanasio SM, et al. Athletic trainer services in the secondary school setting: the athletic training locations and services project. *J Athl Train*. 2019;54(11):1129–1139. doi:10.4085/1062-6050-12-19
10. Scarneo-Miller SE, DiStefano LJ, Singe SM, Register-Mihalik JK, Stearns RL, Casa DJ. Emergency action plans in secondary schools: barriers, facilitators, and social determinants affecting implementation. *J Athl Train*. 2020;55(1):80–87. doi:10.4085/1062-6050-484-18
11. Adams WM, Scarneo SE, Casa DJ. State-level implementation of health and safety policies to prevent sudden death and catastrophic injuries within secondary school athletics. *Orthop J Sports Med*. 2017;5(9):2325967117727262. doi:10.1177/2325967117727262
12. Luhring KE, Butts CL, Smith CR, et al. Cooling effectiveness of a modified cold-water immersion method after exercise-induced hyperthermia. *J Athl Train*. 2016;51(11):946–951. doi:10.4085/1062-6050-51.12.07

13. Casa DJ, Guskiewicz KM, Anderson SA, et al. National Athletic Trainers' Association position statement: preventing sudden death in sports. *J Athl Train*. 2012;47(1):96–112. doi:10.4085/1062-6050-47.1.96
14. Scarneo-Miller SE, DiStefano LJ, Register-Mihalik JK, Stearns RL, Denegar CR, Casa DJ. Athletic administrators report of emergency action plan adoption in secondary school athletics: the influence of athletic training services. *J Appl Sport Manage*. 2019;11(3):1–10. doi:10.18666/jasm-2019-v11-i3-9240
15. Toresdahl BG, Harmon KG, Drezner JA. High school automated external defibrillator programs as markers of emergency preparedness for sudden cardiac arrest. *J Athl Train*. 2013;48(2):242–247. doi:10.4085/1062-6050-48.1.20
16. Larsen MP, Eisenberg MS, Cummins RO, Hallstrom AP. Predicting survival from out-of-hospital cardiac arrest: a graphic model. *Annals Emerg Med*. 1993;22(11):1652–1658. doi:10.1016/S0196-0644(05)81302-2
17. Aschieri D, Penela D, Pelizzoni V, et al. Outcomes after sudden cardiac arrest in sports centres with and without on-site external defibrillators. *Heart*. 2018;104(16):1344–1349. doi:10.1136/heartjnl-2017-312441
18. Drezner JA, Courson RW, Roberts WO, et al. Inter-association task force recommendations on emergency preparedness and management of sudden cardiac arrest in high school and college athletic programs: a consensus statement. *Heart Rhythm*. 2007;4(4):549–565. doi:10.1016/j.hrthm.2007.02.019
19. State laws on cardiac arrest and defibrillators. National Conference of State Legislators. https://www.ncsl.org/research/health/laws-on-cardiac-arrest-and-defibrillators-aeds.aspx#School_athletics. Published 2020. Accessed August 4, 2020.
20. Coaching. Iowa Board of Educational Examiners. https://boee.iowa.gov/coaching. Accessed August 4, 2020.
21. Concussion and brain injury policies. The Iowa Legislature. https://www.legis.iowa.gov/docs/code/280.13C.pdf. 2020. Accessed September 21, 2020.
22. Casa DJ, DeMartini JK, Bergeron MF, et al. National Athletic Trainers' Association position statement: exertional heat illnesses. *J Athl Train*. 2015;50(9):986–1000. doi:10.4085/1062-6050-50.9.07
23. Kerr ZY, Register-Mihalik JK, Pryor RR, et al. The association between mandated preseason heat acclimatization guidelines and exertional heat illness during preseason high school American football practices. *Environ Health Perspect*. 2019;127(4):47003. doi:10.1289/EHP4163
24. American College of Sports Medicine, Armstrong LE, Casa DJ, et al. American College of Sports Medicine position stand. Exertional heat illness during training and competition. *Med Sci Sport Exerc*. 2007;39(3):556–572. doi:10.1249/MSS.0b013e31802fa199
25. Mazerolle SM, Ganio MS, Casa DJ, Vingren J, Klau J. Is oral temperature an accurate measurement of deep body temperature? A systematic review. *J Athl Train*. 2011;46(5):566–573. doi:10.4085/1062-6050-46.5.566
26. Mazerolle SM, Scruggs IC, Casa DJ, et al. Current knowledge, attitudes, and practices of certified athletic trainers regarding recognition and treatment of exertional heat stroke. *J Athl Train*. 2010;45(2):170–180. doi:10.4085/1062-6050-45.2.170
27. Kerr ZY, Scarneo-Miller SE, Yeargin SW, et al. Exertional heatstroke preparedness in high school football by region and state mandate presence. *J Athl Train*. 2019;54(9):921–928. doi:10.4085/1062-6050-581-18

Address correspondence to Richelle M. Williams, PhD, ATC, Department of Athletic Training, Drake University, 2507 University Avenue, Fitch Hall 124, Des Moines, IA 50311. Address email to Richelle.williams@drake.edu.