

Emergency Action Planning in Kansas High Schools

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ABSTRACT

Introduction. Current evidence showed a variable rate of emergency action plan (EAP) implementation and a low rate of compliance to EAP guidelines in United States secondary schools. Compliance to EAP recommendations in Kansas high schools is not known. The purpose of this study was to identify the emergency preparedness of high school athletics in the state of Kansas and identify prevailing characteristics of schools that correlate with decreased compliance of an EAP.

Methods. Athletic directors for high schools in the state of Kansas were asked to participate in a web-based questionnaire that was emailed to each athletic director. The questionnaire identified demographics of the study population, EAP implementation rates, compliance to national EAP guidelines, access to certified medical personnel, and training received by athletics personnel. Descriptive statistics were then compiled and reported.

Results. The response rate for the survey was 96% (341/355). A total of 94.1% (320/340) of schools have an EAP, 81.4% (276/339) of schools have an automated external defibrillator (AED) at all athletic venues, and 51.8% (176/340) of schools had an athletic trainer (AT) on staff. Urban schools were significantly more likely than rural schools to have an AT on staff (OR = 11.10, 95% CI = [6.42, 19.18], $p < 0.0001$), have an EAP (OR = 3.69, 95% CI = [1.05, 13.02], $p = 0.0303$), require additional training for coaches (OR = 2.69, 95% CI = [1.42, 5.08], $p = 0.0017$), and have an AED on-site for some events (OR = 2.18, 95% CI = [1.24, 3.81], $p = 0.0057$).

Conclusions. Most Kansas high schools have an EAP in place and have at least one AED. Emergency planning should be improved through venue specific EAPs, access to early defibrillation, and additional training. Rural and lower division schools had less AT staffing and consequently were impacted more significantly than urban and higher division schools by these factors. These factors should be taken into account in future improvement strategies.

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INTRODUCTION

In 2019, nearly 8 million adolescents participated in school-related sporting activities according to the 2018-19 High School Athletics Participation Survey conducted by the National Federation of State High School Associations.¹ From 2011 to 2014, the U.S. Centers for Disease Control and Prevention reported nearly 5.6 million injuries related to sport or recreation among persons aged 5-24.² Although the majority of injuries were not life threatening, there were a significant amount of catastrophic and fatal injuries.

During the 2017-2018 academic year, 99 catastrophic injuries occurred in U.S. high school and college athletics.³ Catastrophic injuries were defined as fatalities, permanent disability injuries, serious injuries (fractured neck or serious head injury) even though the athlete had a full recovery, temporary or transient paralysis, heat stroke due to exercise, sudden cardiac arrest or severe cardiac disruption, and they occurred in high school and college athletes. Of these, 85 events occurred during or due to sport-related activities, and 66 of 85 sport-related catastrophic injuries were at the high school level.

Implementing an EAP is an essential part of ensuring an efficient response to any catastrophic event in high school athletics.⁴ An EAP is a written guideline of emergency planning designed to help individuals respond to a catastrophic injury within sports. The National Athletic Trainers' Association (NATA) has published guidelines on emergency preparedness in organized athletics through their position statements.^{4,6} NATA's guidelines identify the components of emergency response preparation, which includes formation and implementation of an EAP, proper education and training for personnel, acquisition and maintenance of emergency equipment and supplies, and appropriate use of personnel.⁵ In addition, the Sideline Preparedness Collaboration (comprised of six major professional organizations: American Academy of Family Physicians, American Academy of Orthopaedic Surgeons, American College of Sports Medicine, American Medical Society for Sports Medicine, American Orthopaedic Society for Sports Medicine, American Osteopathic Academy of Sports Medicine), American Academy of Pediatrics, and American Heart Association all endorse the formation and implementation of emergency plans in schools.⁷⁻⁹

EAP adoption has been studied in many other states and cities, but, to our knowledge, no literature has studied EAP adoption in Kansas.¹⁰⁻²² The purpose of this study was to identify the emergency preparedness of high school athletics in the state of Kansas and identify prevailing characteristics of schools that correlate with decreased compliance of an EAP.

METHODS

A web-based questionnaire (see Appendix) was developed to perform a cross-sectional analysis of the emergency preparedness of Kansas high schools. The questionnaire included 16 questions focused on demographics of the study population, EAP adoption, compliance to national EAP guidelines, access to certified medical personnel, and training received by athletics personnel.

The questionnaire was delivered by email to athletic directors for each high school in March, April, and May 2020. All recipients were contacted through the Kansas State High School Athletic Association (KSHSAA) in December 2020 asking all non-responders to complete

the questionnaire. Questionnaire distribution and data organization was done using REDCap® (Research Electronic Data Capture) software.

For statistical analysis, responses were stratified by high school division, or between rural and urban status. For the analysis of responses by division, Cochran-Armitage tests for trend were used to test for increasing or decreasing trends in the proportions of school district with respect to their division. For the analysis of responses stratified between rural and urban, a chi-square test was used to analyze dichotomous responses. Continuous responses were analyzed by t-tests. A p value of < 0.05 was considered statistically significant.

RESULTS

Of the 355 recipients, 341 (96%) returned the survey in some capacity. KSHSAA assigns schools to each division by the size of their student population in grades 9-12. The assignment is updated in September of each year. The largest 36 schools are classified as 6A, the next 36 are 5A, the next 36 are 4A, the next 64 are 3A, the next 64 are 2A, and the remaining schools are classified as 1A.²³ From this, it could be determined that 59% (196/341) of schools had a student population greater than or equal to 1,000 students, and 41% (136/341) had a student population less than 1,000 students. In 50.1% (170/339) of schools, athletic trainers (AT) were the primary medical providers during school athletic events (Figure 1), and 51.8% (340/355) of schools had an AT on staff. Figure 1 represents the proportion of schools in Kansas that were the primary medical provider for athletic events. The proportion of schools using each medical provider as their primary provider for athletic events is shown in Figure 1. AED access and EAP adoption rates are shown in Table 1.

Urban/Rural. Urban schools were significantly more likely than rural schools to have an AT on staff (OR = 11.10, 95% CI = [6.42, 19.18], $p < 0.0001$), have an EAP (OR = 3.69, 95% CI = [1.05, 13.02], $p = 0.0303$), require additional training for coaches (OR = 2.69, 95% CI = [1.42, 5.08], $p = 0.0017$), and have an AED on-site for some events (OR = 2.18, 95% CI = [1.24, 3.81], $p = 0.0057$; Table 2). Urban schools were significantly less likely than rural schools to have an ambulance at football games (OR = 0.119, 95% CI = [0.063, .227], $p < 0.0001$). Among schools that have an EAP, there was no significant difference between urban and rural schools with regards to having a site specific EAP (OR = 1.51, 95% CI = [0.812, 2.81], $p = 0.1914$) or reviewing the EAP with opponents prior to events (OR = 0.954, 95% CI = [0.602, 1.51], $p = 0.8422$). Among schools that did not have an ambulance at their football games, urban schools were significantly closer to an ambulance than rural schools (6.36 vs. 11.58 minutes; $\Delta = 5.21$, 95% CI = [0.641, 9.78], $p = 0.0284$). Among schools that had an AT on staff, urban schools had ATs that worked significantly more hours (28.60 vs. 9.43 hours; $\Delta = 19.17$, 95% CI = [15.51, 22.85], $p < 0.0001$).

Athletic Trainers. Schools that had an AT on staff were more likely to have an EAP (OR = 3.38, 95% CI = [1.89, 9.60], $p = 0.0161$), have an AED on site for some events (OR = 1.85, 95% CI = [1.05, 3.27], $p = 0.0326$), require additional training for coaches (OR = 3.55, CI = [1.75, 7.24], $p = 0.0003$), and, if they had an EAP, have site-specific EAPs (OR = 2.23, CI = [1.23, 4.05], $p = 0.0076$; Table 3).

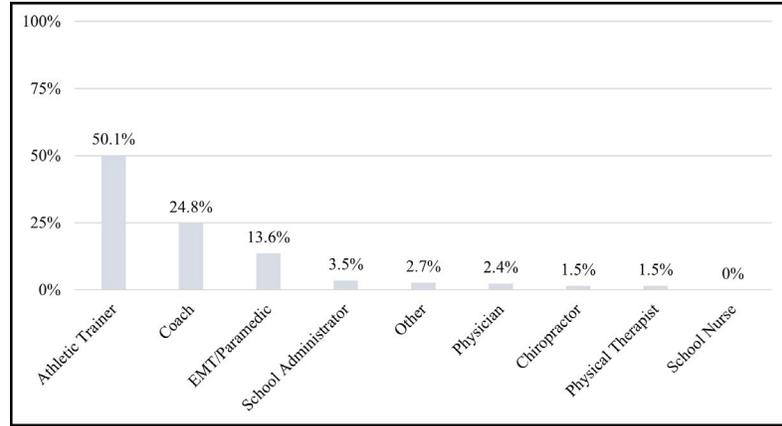


Figure 1. Providers of medical care during high school athletic events (n = 339).

Table 1. Automated external defibrillator (AED) access and emergency action plan (EAP) adoption.

AED access within 4 minutes	
AED available for all athletic venues	276 (81.4%)
AED available for some venues	63 (18.6%)
AED not available	0 (0%)
Presence of EAP	
EAP adopted	320 (94.1%)
No EAP	20 (5.9%)
EAP is venue specific	
Yes	259 (82.5%)
No	55 (17.5%)
EAP is reviewed with the opposing team before an event	
Yes	201 (59.5%)
No	137 (40.5%)
Open to assistance in creating or improving EAP	
Yes	228 (67.7%)
No	109 (32.3%)

Division. For having an AT on staff, a higher division was associated with a higher proportion of schools with an AT on staff ($p < 0.0001$). Lower divisions were associated significantly with higher proportions of having an ambulance at football games ($p < 0.0001$). Additionally, higher divisions were associated significantly with greater proportions of having an EAP ($p = 0.0005$), requiring additional training for coaches ($p = 0.0049$), and having an AED on-site for some events ($p = 0.0229$). Among schools that had an EAP, there was no significant trend in the proportions of having a site-specific EAP ($p = 0.1142$) or reviewing the EAP with opponents prior to an event ($p = 0.6429$).

Table 2. Urban/rural results and differences.

	Urban (n = 136)	Rural (n = 196)	Urban-Rural	
			Odds Ratio (95% CI)	p Value
Athletic Trainer on staff	112 (82%)	59 (30%)	11.10 (6.42 - 19.18)	< 0.0001
Having EAP	133 (98%)	179 (91%)	3.69 (1.05 - 13.02)	0.0303
Require additional training for coaches	29 (21%)	18 (9%)	2.69 (1.42 - 5.08)	0.0017
AED on site for some events	35 (26%)	27 (14%)	2.18 (1.24 - 3.81)	0.0057
Ambulance at football games	82 (60%)	178 (91%)	0.119 (0.063 - 0.227)	< 0.0001
Site-specific EAP	111 (82%)	142 (72%)	1.51 (0.812 - 2.81)	0.1914
Review EAP with opponents before event	78 (57%)	113 (58%)	0.954 (0.602 - 1.51)	0.8422
Athletic Trainer hours	28.60 hours	9.43 hours	$\Delta = 19.17$ 95% CI = (15.51 - 22.85)	< 0.0001
Ambulance distance	6.36 minutes	11.58 minutes	$\Delta = 5.21$ 95% CI = (0.641 - 9.78)	0.0284

Note: EAP = emergency action plan; AED = automated external defibrillator.

Table 3. Athletic trainer (AT) services results and differences.

	AT on staff (n = 176)	No AT on staff (n = 164)	AT-No AT	
			Odds Ratio (95% CI)	p Value
Having EAP	171 (97%)	148 (90%)	3.38 (1.89-9.60)	0.0161
Having site-specific EAP	147 (84%)	113 (69%)	2.23 (1.23-4.05)	0.0076
Having AED for some events	39 (22%)	24 (15%)	1.85 (1.05-3.27)	0.0326
Require additional training for coaches	37 (21%)	11 (7%)	3.55 (1.75-7.24)	0.0003

Note: EAP = emergency action plan; AED = automated external defibrillator.

DISCUSSION

Rural and lower division schools are less likely to have EAP implementation, AED access, and additional athletics staff training, which are three vital components of emergency preparedness in athletics. Schools with an AT on staff were more likely to have site-specific EAPs, access to AEDs, and require additional training for coaches. Both access to an AT and access to an AED have shown a positive correlation with other markers of emergency preparedness.^{10,13,15,21} Poor access to ATs in rural Kansas schools likely plays a role in other aspects of emergency preparation. This is important because it emphasizes the fact that many schools rely on athletic directors and other staff to implement health and safety policies without the help of an AT. Additional training may

allow schools with and without an AT on staff to more efficiently implement the standard of care as outlined by the NATA's recommended health and safety guidelines.

All schools reported having access to at least one AED on campus, but only 81.4% (276/339) have an AED available within four minutes of all athletic venues. It is well known that early defibrillation and early activation of an emergency response are crucial for cardiac arrest survival, thus improving AED access in Kansas schools should be of utmost importance.⁶ Pike et al.²⁴ identified education and cost as barriers to health and safety policy implementation for state high school athletic associations. This was relevant for rural and lower division schools who were less likely to have an AT on staff, as shown by our survey results. Rural schools could have limited funding and AT availability compared to urban areas, further compounding the difficulty in successful implementation of state health and safety policies. In addition, more than 25% of schools utilize coaches, school administrators, and other staff for medical coverage. These individuals would benefit from training beyond cardiopulmonary resuscitation and AED, like concussion management, heat illness, and emergency action planning. Trained healthcare providers are vitally important to high school athletics. The majority (67.7%) of Kansas schools were open to assistance in creating or improving their current EAP. This showed that future improvement strategies will be received positively and are likely to be successful.

Limitations. This study was limited by potential bias since only 96% (341/355) of responses were received and some of the schools may have been underrepresented because some responses may be duplicates if the same school submitted the survey more than once. Survey responses were received anonymously through REDCap[®], therefore we were unable to determine if there were any duplicate entries. Finally, a lack of AT staffing may be the result of lower funding, which could impact how many schools have EAPs.

CONCLUSIONS

The results of this study showed that the majority of Kansas high schools have an EAP in place and have at least one AED. While these are important factors, there is improvement to be made through venue specific EAPs, access to early defibrillation, and additional training. While having an AT on staff seemed to improve the emergency preparedness of schools, it can be challenging due to financial cost. Funding and other barriers to emergency preparedness in school-based athletics should be discussed with relevant stakeholders like athletic directors, state legislative officials, and ATs to determine a viable improvement strategy. Education regarding the importance of EAPs, AEDs, and ATs could be an important improvement strategy, especially in schools with low compliance to current recommendations. Rural and lower division schools were impacted more significantly than urban and higher division schools and this should be taken into account in future improvement strategies.

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Keywords: sports medicine, athletic injuries, youth sports, team sports

APPENDIX

Questionnaire

	Question	Available Responses
1	What division of high school do you participate in?	1A, 2A, 3A, 4A, 5A, 6A
2	Where are you located in the state of Kansas?	Northwest, Southwest, North Central, South Central, Northeast, Southeast
3	Would you consider your school rural? (fewer than 1,000 population)	Yes, No
4	Which of the following provide care for athletic injuries or illnesses during school athletic events?	Athletic trainer (ATC), Coach, School administrator, School nurse, Emergency medical technician or paramedic, Physician (MD or DO), Chiropractor (DC), Physical therapist (PT), Other, None of the above
5	Do you have an athletic trainer on staff?	Yes, No
6	If so how many hours per week?	Open numerical value
7	Do you have an ambulance at your football games?	Yes, No
8	If not how far away is the nearest ambulance (minutes)?	Open numerical value
9	Does your school require coaches to obtain CPR and AED training?	Yes, No
10	Does your school require coaches to undergo additional training on athlete healthcare beyond what is required by KSHSAA? Currently KSHSAA requires all coaches to be trained in CPR and AED use.	Yes, No
11	If your school requires additional training, please specify:	Open
12	Does your school have an automated external defibrillator (AED) that is available and can be used within 4 minutes of any athletic venue?	Yes, for all athletic venues; No; Yes, but only for some athletic venues
13	Does your school have an emergency action plan for medical emergencies during athletic events?	Yes, No
14	If your school does have an emergency action plan, is the emergency action plan specific to all athletic venues? (e.g. specific for football field, basketball court, weight room, etc.)	Yes, No
15	Do you review the EAP with the opposing team before an event?	Yes, No
16	Would you be open to assistance to help create or improve your EAP?	Yes, No