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The Level of Medical Services and Secondary School–Aged Athletes

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Context: Medical organizations have recommended that administrators, parents, and community leaders explore every opportunity to make interscholastic athletic programs safe for participation, including employing athletic trainers at practices and competitive events.

Objective: To determine the overall level of medical services provided for secondary school–aged athletes at high school athletic events in a rural southern state, to evaluate the employment of athletic trainers in the provision of medical services in secondary schools, and to compare athletic training medical services provided at athletic events among schools of various sizes.

Design: Cross-sectional study.

Setting: Questionnaires were sent to administrators at 199 secondary schools.

Patients or Other Participants: A total of 144 administrators, including interscholastic athletic directors and school principals, from 199 secondary schools participated (72% response rate).

Main Outcome Measure(s): Participants completed the Self-Appraisal Checklist for Health Supervision in Scholastic Athletic Programs from the American Academy of Pediatrics, which has been demonstrated to be valid and reliable. The Kruskal-Wallis and Mann-Whitney tests were used to measure differences in groups.

Results: We found differences in cumulative scores when measuring between institutional classifications ($P \leq .05$). Cumulative scores for the Event Coverage section of the instrument ranged from 80.5 to 109.6 out of a total possible score of 126. We also found differences in several factors identified in the Event Coverage section ($P \leq .05$).

Conclusions: The number of coaching staff certified in cardiopulmonary resuscitation or first aid was minimal. Most schools did not have a plan for providing minimal emergency equipment, ice, or water for visiting teams. We found that 88% (n = 7) of the 8 essential Event Coverage components that the American Academy of Pediatrics deems important were not addressed by schools represented in our study.

Key Words: adequate medical coverage, emergency action plans, health care supervision

Key Points

- In some public schools, a large number of the coaching staff were not certified in cardiopulmonary resuscitation and first aid.
- Most school administrators did not have a plan for offering minimal emergency equipment, ice, or water for visiting teams.
- School administrators were not ensuring that emergency action plans were established for all athletic events and that a health care provider trained in catastrophic injury management was present at all practices and games.

During the 2009–2010 academic year, more than 7.5 million high school athletes participated in interscholastic athletics.[1] Participation in interscholastic sports can increase the risk of sustaining musculoskeletal injuries.[2,3] Powell and Barber-Foss[4] reported that an estimated 6 million high school students from approximately 20000 schools are injured in local sports programs each year.[5] According to data compiled by the National Athletic Trainers' Association (NATA), an estimated 1.3 million US high school athletes are injured each year.[6,7] Football has the highest injury rate among interscholastic sports.[8]

Regarding medical coverage in high school sports, medical organizations have recommended that administrators, parents, and community leaders explore every opportunity to make interscholastic athletic programs safer for participation. Improvement in health care delivery to interscholastic athletes could include athletic site readiness or the presence of an athletic trainer (AT) at both practice and competitive events. The American Academy of Family Physicians "encourages high schools to have, whenever possible, a Board of Certifi [*sic*] Association (NATA)–certified or registered/licensed athletic trainer as an integral part of the high school athletic program."[9] (Note: The Board of Certification, not the National Athletic Trainers' Association, certifies athletic trainers.) Lyznicki et al[10] reported the placement of ATs in the interscholastic setting. Miller[11] noted that some schools react to catastrophic injury or illness by hiring an AT to reduce or prevent injuries in interscholastic athletes. No follow-up data have shown that this is a positive outcome. Therefore, the purpose of our study was to determine the overall level of medical services provided for

secondary school–aged athletes at high school athletic events in a rural southern state, to evaluate the employment of ATs in the provision of medical services in secondary schools, and to compare athletic training medical services provided at athletic events at schools of various sizes. We wanted to know whether differences exist in the degree of adequacy among the 4 major areas specified by the American Academy of Pediatrics (AAP) (organization, administration, and staffing; facilities and equipment; event coverage; and education) based on school size.

METHODS

Participants

The Arkansas Activities Association, governing interscholastic participation in that state, provided a list of both public and private schools. Only schools offering football were sampled. In terms of enrollment, the 5A schools were the largest, whereas the 2A schools were the smallest of the schools sponsoring high school football. The 1A schools did not sponsor high school football in their districts, so they were not included in the study. Administrators, including athletic directors and principals, from 144 (72%) secondary schools elected to participate. Five of the participating schools sponsoring high school football were private, and the rest were public institutions. Participants provided written informed consent, and the Institutional Review Board of the University of Arkansas approved this study.

Instrumentation

To determine the overall level of medical services provided at high schools in Arkansas, we used the Self-Appraisal Checklist for Health Supervision in Scholastic Athletic Programs,[12] which was created by the AAP Committee on Sports Medicine and has been used in various capacities. Floyd[13] used the instrument, supporting its validity. Although the instrument is considered to be both reliable and valid, statistical analysis for reliability has not been conducted. Given the widespread use by both the AAP and other researchers, we considered the instrument to be reliable and valid.

The instrument contained 47 questions and statements that were grouped into 4 topic areas identified by the AAP: (1) organization, administration, and staffing; (2) facilities and equipment; (3) event coverage; and (4) education. The statements were scored on a 4-point Likert scale, ranging from 0 (*never*) to 3 (*always*). A score of 3 indicated *compliance* with the statement; less than 3, *noncompliance*. Each of the responses reflected the administrator's view of the institution's participation in activities related to delivery of medical services at official athletic contests. In addition, the Health Care Supervision School Profile sheet (4 questions), which we created, was attached to acquire demographic data about schools, personnel, enrollment, and athletic classification (school size).

Procedures

Athletic administrators and directors at 199 secondary schools offering high school football were sent a cover letter, informed consent form, instrument, and postage-paid return envelope and were instructed to complete the instrument. Each envelope was coded for corresponding school district and for data collection purposes. Anonymity of returned questionnaires was maintained, and only group mean data were used. A follow-up mailing was conducted after 2 weeks, instructing those who had not returned their instruments to complete and return them.

Data Analysis

The data were analyzed to evaluate differences in how the 4 categories of schools (2A, 3A, 4A, 5A) scored each of the 8 items in the Event Coverage section of the instrument. Reported results represent cumulative scores only from the Event Coverage section of the questionnaire. Each of the 8 items in the Event Coverage section was analyzed separately using nonparametric tests. These items were scored on an ordinal scale (3 indicating *always;* 2, *sometimes;* 1, *seldom;* and 0, *never*), so use of parametric statistics was inappropriate.[14–16] When reviewing the distribution of responses on each item, we determined that the data did not meet the underlying assumptions of parametric statistics, such as normality, skewness, and kurtosis. Therefore, no scale reduction techniques could be used to extract the underlying constructs, and each item had to be analyzed individually. Although nonparametric statistics might not be as powerful as parametric statistics, they are more robust in making assumptions of normality for the underlying data. We used the Kruskal-Wallis test, which is the independent-samples test that corresponds with the parametric analysis of variance, and the Mann-Whitney test to identify groups that were different at the α level of .05, which was set a priori.

RESULTS

Participation in this study was remarkably high, with a total response rate of 72% (144 of 199). Responses to the instrument included 94% (n=30) of 5A schools, 91% (n=29) of 4A schools, 65% (n=42) of 3A schools, and 61% (n=43) of 2A schools. Table 1 summarizes the nonparametric descriptive analyses, mode, median (50th percentile), and 25th and 75th percentiles for all 8 Event Coverage items by school level. These descriptive analyses demonstrate the necessity of conducting nonparametric analyses on the data. The Kruskal-Wallis test indicated that in 7 of 8 Event Coverage items, group differences existed between at least 2 of the 4 groups of schools. Furthermore, using the Mann-Whitney test for identifying groups that are different at the α level for each of the possible 6 pairs of comparisons across all 7 items revealed that 26 of the 42 paired comparisons (7 items times 6 comparisons per item) were different. When considering the level of care provided to high school football players, our data revealed that 88% (n=7) of the 8 essential Event Coverage components that the AAP deems important were not met by schools represented in our study.[13]

We found differences between secondary schools in having effective communication systems available for emergencies, having an emergency vehicle available for use, having playing areas surveyed before events for hazards, having emergency first-aid supplies available during competitions, monitoring environmental conditions appropriately, and supplying enough drinking water and ice for athlete use ($P \leq .05$ for all). Having this many areas of noncompliance demonstrated a lack of preparation for emergencies and other medical needs. Class 4A schools demonstrated the lowest overall rating in provision of medical services to athletes (80.5), whereas 5A schools demonstrated the highest rating (109.6). Table 2 summarizes the number of between-groups differences.

Table 1. Nonparametric Descriptive Analyses, Mode, Median (50th Percentile), and 25th and 75th Percentiles for All 8 Items of the Event Coverage Section[a] of *A Self-Appraisal Checklist for Health Supervision in Scholastic Athletic Programs*[12] by School Classification (Size)

			Percentiles			Kruskal-Wallis Test Results								
Event Coverage Item	School Classification (n)	Mode	25	50[b]	75	Mean Rank	χ^2_3	*P* Value	Mann-Whitney Test Results[c]					
All coaches and sports medicine personnel are trained in CPR, emergency management of life-threatening injuries, and universal precaution techniques.	5A (30)	2	2	2	3	81.50	3.13	.37	ND	ND	ND	ND	ND	ND
	4A (29)	1	1	1	2.5	66.64			ND	ND	ND	ND	ND	ND
	3A (42)	1	1	1	3	67.15			ND	ND	ND	ND	ND	ND
	2A (43)	2	1	2	3	75.40			ND	ND	ND	ND	ND	ND
An effective communication system is available to permit immediate access to a medical emergency unit.	5A (30)	3	2	3	3	87.67	7.68	.05	1	2	3	ND	ND	ND
	4A (29)	1	1	2	3	60.21			1	ND	ND	ND	ND	ND
	3A (42)	2	2	2	3	72.10			ND	2	ND	ND	ND	ND
	2A (43)	3	2	2	3	70.60			ND	ND	3	ND	ND	ND
A suitable vehicle and designated driver are available for immediate transportation of the injured athlete to a designated medical resource that has already been alerted.	5A (30)	3	2	3	3	90.00	25.64	≤.001	1	2	ND	ND	ND	ND
	4A (29)	1	1	2	3	61.72			1	ND	ND	ND	5	ND
	3A (42)	1	1	1	3	52.86			ND	2	ND	ND	ND	6
	2A (43)	3	2	3	3	86.74			ND	ND	ND	ND	5	6
The playing area is surveyed before each event to identify and correct hazards.	5A (30)	3	3	3	3	90.37	32.03	≤.001	1	2	ND	ND	ND	ND
	4A (29)	3	1	2	3	55.47			1	ND	ND	ND	5	ND
	3A (42)	2	2	2	3	54.43			ND	2	ND	ND	ND	6
	2A (43)	3	3	3	3	89.17			ND	ND	ND	ND	5	6
Emergency first aid supplies and equipment are readily available to all competing teams.	5A (30)	3	3	3	3	87.90	26.58	≤.001	1	2	ND	ND	ND	ND
	4A (29)	3	3	1	3	57.03			1	ND	ND	ND	5	ND
	3A (42)	2	2	2	3	57.18			ND	2	ND	ND	ND	6
	2A (43)	3	3	3	3	87.15			ND	ND	ND	ND	5	6
Visiting teams have ready access to facilities for care of an injured athlete.	5A (30)	3	3	3	3	74.93	9.06	.03	1	ND	ND	ND	ND	ND
	4A (29)	3	2	3	3	57.09			1	ND	ND	4	5	ND
	3A (42)	3	3	3	3	78.76			ND	ND	ND	4	ND	ND
	2A (43)	3	3	3	3	75.08			ND	ND	ND	ND	5	ND
Environmental conditions are monitored by sling psychrometer or other means during hot or humid weather, and appropriate measures are taken to protect the athlete from heat-related illness.	5A (30)	3	1	3	3	83.67	30.95	≤.001	1	ND	ND	ND	ND	ND
	4A (29)	0	0	0	2	40.53			1	ND	ND	4	5	ND
	3A (42)	3	2	3	3	90.20			ND	ND	ND	4	ND	6
	2A (43)	3	0	2	3	68.98			ND	ND	ND	ND	5	6
An ample supply of drinking water and ice is available at all times.	5A (30)	3	2.8	3	3	77.00	23.45	≤.001	ND	2	3	ND	ND	ND
	4A (29)	3	2	3	3	63.90			ND	ND	ND	ND	5	ND
	3A (42)	2	2	2	3	56.63			ND	2	ND	ND	ND	6
	2A (43)	3	3	3	3	90.66			ND	ND	3	ND	5	6

Abbreviations: CPR, cardiopulmonary resuscitation; ND, no difference.

[a]Indicates responses scored on a 4-point Likert scale, with 0 indicating *never;* 1, *seldom;* 2, *sometimes;* and 3, *always*.

[b]Indicates median.

[c]Indicates Mann-Whitney tests identified these groups as different ($P < .05$) from each other for the given pair or pairs of comparisons (1–6) for the corresponding Event Coverage item.

Table 2. Number of Between-Groups Differences[a] for the 8 Items of the Event Coverage Section of the *Self-Appraisal Checklist for Health Supervision in Scholastic Athletic Programs*[12]

	School Classification		
School Classification	5A	4A	3A
4A	6	—	—
3A	5	2	—
2A	2	6	5

[a] Indicates $P \leq .05$.

We found a difference in mean scores for the Event Coverage section of the questionnaire ($P < .001$). The scores for schools by classification ranged from 15.44 to 20.60. For provision of medical services at their events, the class 4A schools again demonstrated the lowest in the range of scores, and class 5A demonstrated the highest score.

Fifty-nine percent (n = 85) of the respondents did not have an emergency action plan (EAP) (Likert scale score = 0). The 2A schools reported the highest rate (26%, n = 11) and the 5A and 4A schools reported the lowest rate (each: 22%, n = 6) of schools within their classifications to have EAPs. When measuring mean responses to an item questioning whether all coaches and sports medicine personnel who attended athletic events were trained in cardiopulmonary resuscitation (CPR), we found no difference between school administrator responses when we compared them by classification (Table 1). However, we found that administrators' responses to this question averaged 1.8 on the 3-point scale. The score indicates that the average response was between the choices *seldom* and *sometimes*. Sixty percent (n = 18) of 5A, 45% (n = 13) of 4A, 50% (n = 21) of 3A, and only 14% (n = 6) of 2A school administrators replied *always* to relying on an AT to structure medical services for athletes at their institutions.

DISCUSSION

We found that some public school districts in our study did not have a large number of their coaching staff certified in CPR or first aid. This might be of concern because most schools do not have access to the services of an AT who is trained in CPR and first aid. This finding also draws into question interpretation of the response identifying ATs as being responsible for supervising medical service provision to athletes. At the time of the study, the Arkansas Activities Association did not have a rule requiring all coaches to be certified in CPR or first aid. Since the study was conducted, the 88th General Assembly of the State of Arkansas has enacted legislation (Act 1214 of the Regular Session, 2011) requiring emergency readiness for all athletic events in secondary schools. Schools also have not been required to provide EAPs to address catastrophic emergencies during high school athletic contests. Perhaps before this legislation, having people with such training in place for all events was not believed to be necessary. If that was the case, it certainly set a dangerous precedent when one considers the inherent risk associated with sports participation and the potential liability associated with not requiring emergency training for personnel overseeing these activities. The situation has been exacerbated by not requiring EAPs specific for sport activities.

Another important finding was the availability of emergency equipment for all competing teams and the availability of ice and water during games. Emergency items, such as vacuum splints, crutches, and CPR masks, should be made available and accessible for both the home and visiting teams. Our results indicated that most schools studied do not have a plan for offering minimal emergency equipment or simply providing ice and water for visiting teams.

Parents, educators, and citizens should be concerned about providing a safe environment for children. Certainly, standards should exist for the provision of care for interscholastic athletes. We demonstrated that schools offering high school football across one southern state did not demonstrate a high rating for overall medical provision for and supervision of their athletes during practice or games. School administrators who participated in this study did not ensure that EAPs were in place for all athletic events and did not ensure that a health care provider with current training in catastrophic injury management was present for all practices and games.

With the incidence of injury in interscholastic sports well substantiated, school districts and parents should look seriously at ensuring quality health care for athletes participating in their athletic programs. The liability for not ensuring a safe environment is one major reason for schools to review how they take care of their athletes and how they can best prepare for injury and emergency situations inherent in sports participation. Parents should take an active role in helping their school districts acquire resources for providing a safe environment in which their children can participate in sports. In addition, all state high school activities associations should require policies to be in place to ensure safety for school-aged children in the academic setting. Finally, legislative bodies should do more to ensure that athletic environments are safe for children.

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