

# Athletic Training Services in Public Secondary Schools: A Benchmark Study

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**Context:** Authors of the most recent study of athletic training (AT) services have suggested that only 42% of secondary schools have access to athletic trainers. However, this study was limited by a small sample size and was conducted more than 10 years ago.

**Objective:** To determine current AT services in public secondary schools.

**Design:** Cross-sectional study.

**Setting:** Public secondary schools in the United States.

**Patients or Other Participants:** A total of 8509 (57%) of 14951 secondary schools from all 50 states and Washington, DC, responded to the survey.

**Main Outcome Measure(s):** Data on AT services were collected for individual states, National Athletic Trainers' Association districts, and the nation.

**Results:** Of the 8509 schools that responded, 70% (n = 5930) had AT services, including full-time (n = 3145, 37%), part-

time (n = 2619, 31%), and per diem (n = 199, 2%) AT services, and 27% (n = 2299) had AT services from a hospital or physical therapy clinic. A total of 4075 of 8509 schools (48%) provided coverage at all sports practices. Eighty-six percent (2394/2842/787595) of athletes had access to AT services.

**Conclusions:** Since the last national survey, access to AT services increased such that 70% of respondent public secondary schools provided athletic trainers at sports games or practices. Approximately one-third of all public secondary schools had full-time athletic trainers. This number must increase further to provide appropriate medical coverage at athletic practices and games for secondary school athletes.

**Key Words:** high school, medical services, coverage, athletic trainers

## Key Points

- Seventy percent of public secondary schools in the United States had access to athletic training (AT) services at games or practices, but only 37% had full-time AT services.
- Nearly half of the schools reported providing full AT services for practice each afternoon.
- Access to AT services must increase to ensure secondary school athletes are receiving appropriate medical coverage at sports practices and games.

Athletic training (AT) is a relatively young profession that is expanding at all levels of athletic competition. In 1994, only 35% of high schools had AT services.<sup>1</sup> In the most recent study of schools using AT services, the National Athletic Trainers' Association (NATA) reported that only 42% of high schools employed athletic trainers.<sup>2</sup> This low percentage is alarming, considering that multiple national organizations (eg, NATA, Korey Stringer Institute, American College of Sports Medicine, American Academy of Pediatrics, American Medical Association, American Medical Society for Sports Medicine) promote and encourage the hiring of at least 1 athletic trainer at all high schools.<sup>3–5</sup>

Secondary schools without AT services rely on sports coaches and administrators, such as athletic directors, to determine proper medical treatment when injuries and emergencies arise during a practice or competition. Unfortunately, most coaches do not have the proper medical education to treat injuries or recognize the common causes of life-threatening medical conditions, which puts the lives of athletes in jeopardy.<sup>6</sup> Moreover, if

coaches do recognize a medical emergency is present, they are not trained to treat life-threatening conditions, and it should not be their responsibility to do so.

The incidence of sudden cardiac death in secondary school athletes ranges from 1:50 000 to 1:80 000.<sup>7</sup> Boden et al<sup>8</sup> demonstrated that approximately 10 secondary school American football athletes died each year from 1990 to 2010 in games and practices. Of these deaths, 85% were related to head injuries, heart conditions, or exertional heat stroke. Similarly, from 1980 to 2009, 58 American football athletes died due to exertional heat stroke.<sup>9</sup> Athletic trainers implement prevention strategies, such as coaching education, preparticipation examinations, emergency action plans, and heat-acclimatization policies, and are trained in lifesaving skills to treat these conditions. Therefore, athletic trainers are appropriate medical staff to have on site during sports games and practices and can provide care within seconds or a couple minutes of the onset of symptoms.<sup>3</sup>

Catastrophic injuries and deaths in secondary school athletes could presumably be prevented by having a medical professional on site who is educated in the

prevention, recognition, and treatment of potentially deadly conditions, such as cardiac conditions, exertional sickling, exertional heat stroke, and head injuries, but this has not been studied. The presence of athletic trainers in secondary schools in the United States is unknown, as these data are difficult to gather on a national scale due to the large number of secondary schools. Therefore, the purpose of our study was to determine AT coverage in US public secondary schools.

## METHODS

### Participants

We contacted all 14 951 public secondary schools in the United States, and 8509 responded to our survey, resulting in a 57% response rate. We included US public schools with interscholastic athletics programs that offered at least 1 grade of grades 9 through 12. This information and the telephone numbers and e-mail addresses used to contact schools were collected from state high school athletic associations and the US Department of Education. Alternative, charter, magnet, preparatory, technical, and vocational schools were not included. The University of Connecticut-Storrs Institutional Review Board deemed that this study did not qualify as human subject research and therefore did not require approval due to the public nature of the data collected.

### Procedures

We contacted the athletic director of each school by telephone and e-mail (when available) until he or she responded or up to 4 times, with at least 1 day separating contact attempts. If the school did not employ an athletic director, we contacted the principal. Participants were read a description of the study and a structured series of questions regarding medical coverage during athletic games and practices that specifically related to the employment of an athletic trainer. The extent of AT services (eg, full time, part time, per diem) was determined by the athletic director's knowledge of hours worked and official hiring status at the school. The AT services via a clinic included athletic trainers who worked at the school and contracted through an independent hospital, sports medicine, or physical therapy clinic and were determined to be either full time or part time by the athletic director. Data collection took place from September 2011 through December 2013.

The research questions were as follows:

1. How many total athletes are in your school?
2. How many students (grades 9 through 12) are in your school?
3. Do you have an athletic trainer?
  - a. If yes, how many do you employ?
  - b. If yes, do(es) the athletic trainer(s) work full time, part time, from a clinic full time or part time, or per diem?
  - c. If yes, do(es) the athletic trainer(s) teach a sports medicine, athletic training, or health class?
  - d. If yes, do(es) the athletic trainer(s) work all practices between approximately 2 and 6 PM every day?

### Statistical Analysis

We used descriptive statistics to analyze AT services by individual state, NATA district, and US data and reported

them as means and percentages. Logarithmic and linear trend lines also are reported. All statistical analyses were performed in SPSS statistical software (version 20.0; IBM Corp, Armonk, NY).

## RESULTS

A total of 8509 secondary schools responded, but some schools did not respond to all questions. Of the 8509 schools that responded, 70% ( $n = 5930$ ) reported having AT services, and 86% ( $2\,394\,284/2\,787\,595$ ) of all athletes had access to AT services. The AT services were full time in 37% ( $n = 3145$ ) of schools, part time in 31% ( $n = 2619$ ), and per diem in 2% ( $n = 199$ ); some schools employed multiple athletic trainers. Twenty-seven percent ( $n = 2299$ ) of the 8509 responding schools reported having AT services via a clinic. A total of 47% of schools ( $4075/8509$ ) had full practice coverage every afternoon. Nineteen percent ( $n = 965$ ) of the 5121 schools with AT services also hired the athletic trainer to teach a health or sports medicine class at the school. The AT services by state and NATA district are provided in Table 1.

More large than small secondary schools offered AT services (Figure 1). Schools with athletic trainers averaged 432 athletes, whereas schools without athletic trainers averaged 175 athletes (Table 2). School size and the extent of AT services in all secondary schools are presented in Table 3 and Figure 1. School size and the extent of AT services in schools with AT services are presented in Table 4 and Figure 2.

## DISCUSSION

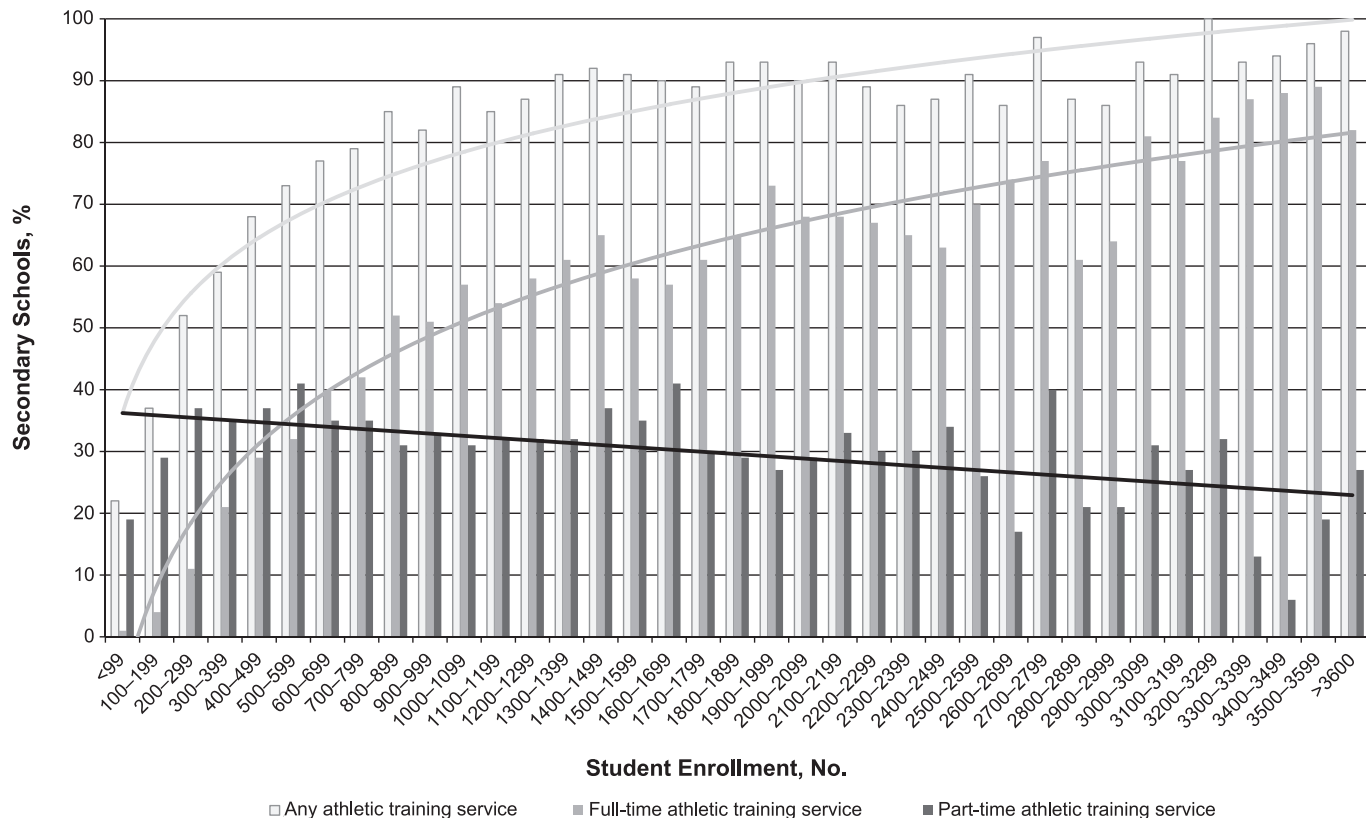
In this benchmark study, we determined the current state of AT services in public secondary schools throughout the United States. A total of 30% of respondent public secondary schools did not have AT services, leaving many athletes without appropriate medical coverage during sports games and practices. The remaining 70% had access to athletic trainers; however, most schools (63%) did not provide full-time AT services, and only 31% had part-time AT coverage. Athletic trainers worked more often at games and competitions than at practices, placing athletes at a substantial risk of injury during a large portion of sport participation. During practices, athletes may perform novel activities or exercise longer than during games, leaving them without appropriate medical coverage on a regular basis.

From an analysis of NATA-membership data, Lyznicki et al<sup>1</sup> reported that during the 1993–1994 school year, only 35% of public schools in the United States used AT services. In 2005, membership data revealed that 42% of schools used AT services, an increase in the presence of athletic trainers in secondary schools (R. Lowe, oral communication, April 2014).<sup>2</sup> These surveys did not differentiate the extent of coverage (eg, full time, part time, clinic, per diem), and the methods and small sample sizes from these surveys limited our knowledge of AT services nationwide by possibly not reflecting true AT coverage. To our knowledge, we are the first to survey all public secondary schools in the United States instead of a subset of the population, and we observed a dramatic increase (an additional 28% nationwide) in secondary school athletic trainers since 2005, a great step forward for health care in secondary school athletes. However, we did

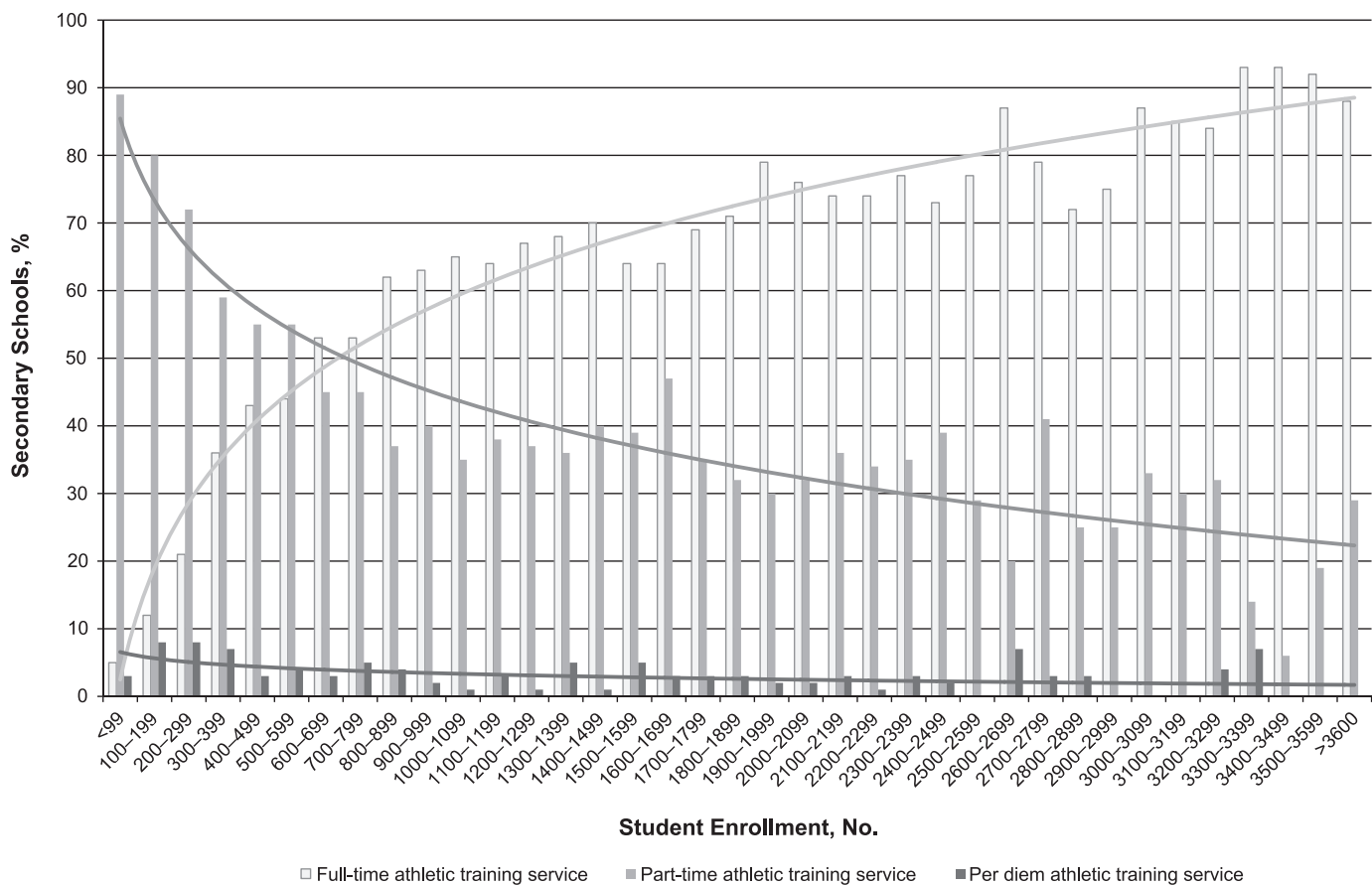
**Table 1. Athletic Training Services in US Secondary Schools, 2011–2013<sup>a</sup>**

National Athletic Trainers' Association District	State	Response Rate, % (No.)	Schools With Athletic Training Services, %						
			Overall	Full Time	Part Time	Per Diem	Hospital or Clinic	Athletic Trainer Teaching Health Class	Practice Coverage Every Day
1	Connecticut	69 (96)	96	33	50	8	11	2	73
	Maine	54 (56)	70	25	45	2	16	7	48
	Massachusetts	60 (144)	78	44	30	10	15	11	73
	New Hampshire	68 (56)	70	34	30	4	34	13	61
	Rhode Island	55 (24)	75	17	46	13	17	4	29
	Vermont	48 (27)	44	33	11	0	0	11	37
	Average	61 (403)	77	35	36	7	16	8	63
2	Delaware	100 (27)	96	44	56	0	44	26	93
	New Jersey	100 (311)	95	91	10	2	4	6	55
	New York	49 (341)	67	27	36	3	27	7	48
	Pennsylvania	89 (423)	96	72	30	2	58	5	87
	Average	73 (1102)	87	63	27	2	33	7	66
3	District of Columbia	100 (7)	100	86	14	0	0	0	14
	Maryland	61 (105)	61	21	41	1	24	4	32
	North Carolina	53 (193)	76	50	22	2	19	28	64
	South Carolina	54 (101)	81	54	29	0	27	32	77
	Virginia	74 (230)	87	70	19	1	23	0	36
	West Virginia	41 (46)	85	46	37	2	7	13	67
	Average	59 (682)	79	53	26	1	21	14	52
	4	Illinois	55 (320)	79	32	39	2	31	8
Indiana		62 (222)	90	55	36	5	43	10	66
Michigan		51 (228)	68	31	34	4	43	7	55
Minnesota		54 (219)	73	17	53	1	28	2	29
Ohio		60 (422)	92	45	53	2	65	12	71
Wisconsin		66 (285)	88	36	48	2	65	4	46
Average		58 (1696)	83	37	45	2	48	8	55
5		Iowa	54 (122)	73	16	49	2	43	5
	Kansas	56 (183)	63	19	43	0	27	8	30
	Missouri	51 (252)	51	20	29	2	24	6	26
	Nebraska	61 (166)	71	13	59	3	40	8	28
	North Dakota	48 (75)	44	7	36	1	27	7	16
	Oklahoma	98 (445)	26	9	13	3	10	2	13
	South Dakota	63 (105)	43	12	25	1	12	8	23
	Average	64 (1348)	48	14	31	2	22	5	22
6	Arkansas	55 (103)	34	16	15	3	18	5	24
	Texas	48 (618)	78	62	14	6	11	34	62
	Average	49 (721)	72	56	14	5	12	30	57
7	Arizona	43 (89)	65	43	19	1	6	33	64
	Colorado	46 (131)	56	24	34	0	15	11	47
	New Mexico	36 (48)	48	40	10	0	0	29	46
	Utah	44 (53)	58	30	30	0	23	34	57
	Wyoming	68 (45)	51	24	24	0	18	16	33
	Average	45 (366)	57	32	26	1	12	23	51
8	California	44 (428)	56	26	25	3	5	16	42
	Hawaii	59 (24)	100	100	0	0	0	0	100
	Nevada	35 (30)	53	17	27	0	17	7	43
	Average	44 (482)	58	29	24	2	6	14	45
9	Alabama	32 (113)	78	35	38	4	53	5	43
	Florida	52 (225)	82	49	27	1	8	23	72
	Georgia	31 (115)	73	45	27	4	34	8	59
	Kentucky	52 (129)	68	43	21	1	31	8	57
	Louisiana	99 (287)	62	20	42	1	46	10	23
	Mississippi	31 (75)	81	29	45	3	40	7	43
	Tennessee	38 (112)	75	41	31	2	45	9	59
	Average	48 (1056)	73	36	33	2	35	11	49
10	Alaska	56 (84)	4	0	4	0	4	1	0
	Idaho	61 (82)	38	17	26	0	7	22	28
	Montana	51 (88)	40	9	31	1	13	8	18
	Oregon	54 (119)	49	14	30	2	24	6	34
	Washington	84 (280)	61	21	25	1	12	14	35
	Average	65 (653)	46	15	24	1	12	11	27
Average		57 (8509)	70	37	31	2	27	11	48

<sup>a</sup> All values were rounded. The average response rates for each district represent the total schools in the district that responded divided by all schools in the district that were contacted.



**Figure 1. Extent of athletic training (AT) coverage in all US secondary schools by student enrollment, 2011–2013. Logarithmic lines of best fit indicate trends for “Any AT service” and “Full-time AT service.” A linear line of best fit indicates trend for “Part-time AT service.”**



**Figure 2. Extent of athletic training (AT) coverage in US secondary schools with AT services by student enrollment, 2011–2013. Logarithmic lines of best fit indicate trends for all types of services.**

**Table 2. Athletic Training Services by Number of Athletes in US Secondary Schools, 2011–2013<sup>a</sup>**

National Athletic Trainers' Association District	State	Overall Average No. of Students	Average No. of Athletes			
			Overall	Schools With Athletic Training Services	Schools Without Athletic Training Services	Per Full-Time Athletic Trainer
1	Connecticut	1108	542	556	230	688
	Maine	530	274	348	103	453
	Massachusetts	1022	496	540	295	576
	New Hampshire	720	304	383	123	382
	Rhode Island	942	361	354	381	416
	Vermont	453	214	305	141	346
	Average	885	421	482	196	544
2	Delaware	1101	416	413	500	387
	New Jersey	1215	563	570	167	574
	New York	972	400	476	244	574
	Pennsylvania	1028	436	445	200	484
	Average	1046	447	479	239	522
3	District of Columbia	854	216	216	NA	224
	Maryland	1377	510	542	459	490
	North Carolina	1160	350	379	256	382
	South Carolina	1085	406	451	191	469
	Virginia	1286	471	509	214	537
	West Virginia	759	268	287	166	202
	Average	1198	417	449	293	457
4	Illinois	1041	450	536	119	716
	Indiana	900	318	336	149	399
	Michigan	823	354	437	174	527
	Minnesota	729	355	428	161	659
	Ohio	813	339	353	176	432
	Wisconsin	627	293	320	99	475
	Average	823	354	396	148	504
5	Iowa	531	261	304	144	533
	Kansas	499	213	280	100	483
	Missouri	605	228	346	105	526
	Nebraska	348	156	185	85	391
	North Dakota	230	119	198	55	500
	Oklahoma	517	203	344	113	496
	South Dakota	280	128	212	66	369
	Average	469	197	278	98	484
	Average	653	243	432	146	491
6	Texas	1195	425	501	158	572
	Average	1117	399	496	154	569
7	Arizona	1231	405	544	150	586
	Colorado	736	351	554	88	631
	New Mexico	803	290	485	126	444
	Utah	1020	364	512	156	536
	Wyoming	452	200	279	117	449
	Average	867	340	507	120	556
8	California	1686	564	686	409	767
	Hawaii	1171	533	533	NA	533
	Nevada	1100	338	506	147	575
	Average	1625	548	662	391	720
9	Alabama	617	237	264	145	333
	Florida	1652	496	532	333	565
	Georgia	1308	415	457	302	478
	Kentucky	847	283	327	185	344
	Louisiana	705	247	312	123	387
	Mississippi	688	261	289	136	294
	Tennessee	909	255	282	174	300
	Average	1037	337	380	208	424
10	Alaska	175	80	450	66	NA
	Idaho	590	232	398	131	512
	Montana	241	110	174	67	395
	Oregon	742	316	504	137	607
	Washington	860	364	517	177	550
	Average	618	261	451	122	541
Average		919	358	432	175	515

Abbreviation: NA, not applicable.

<sup>a</sup> All values were rounded. The average for each district represents the total schools in the district that responded divided by all schools in the district that were contacted.

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**Table 3. Extent of Athletic Training Coverage of All US Secondary Schools Based on Student Enrollment, 2011–2013**

Range of Student Enrollment	No. of Schools	Schools With Athletic Training Services, %				
		Any Service	Full Time	Part Time	Per Diem	Clinic
1–99	550	22	1	19	1	12
100–199	713	37	4	29	3	20
200–299	664	52	11	37	4	30
300–399	564	59	21	35	4	27
400–499	523	68	29	37	2	37
500–599	441	73	32	41	3	37
600–699	385	77	40	35	2	33
700–799	337	79	42	35	4	30
800–899	338	85	52	31	3	35
900–999	257	82	51	33	2	33
1000–1099	230	89	57	31	1	36
1100–1199	284	85	54	32	3	32
1200–1299	297	87	58	32	1	32
1300–1399	218	91	61	32	4	32
1400–1499	191	92	65	37	1	32
1500–1599	210	91	58	35	4	37
1600–1699	176	90	57	41	2	28
1700–1799	174	89	61	30	3	33
1800–1899	187	93	65	29	3	24
1900–1999	110	93	73	27	2	15
2000–2099	167	90	68	29	2	26
2100–2199	94	93	68	33	3	27
2200–2299	105	89	67	30	1	25
2300–2399	71	86	65	30	3	18
2400–2499	68	87	63	34	1	22
2500–2599	53	91	70	26	0	19
2600–2699	35	86	74	17	6	26
2700–2799	30	97	77	40	3	30
2800–2899	38	87	61	21	3	16
2900–2999	14	86	64	21	0	29
3000–3099	42	93	81	31	0	14
3100–3199	22	91	77	27	0	23
3200–3299	25	100	84	32	4	16
3300–3399	15	93	87	13	7	7
3400–3499	16	94	88	6	0	19
3500–3599	27	96	89	19	0	15
>3600	45	98	82	27	0	29
Average	167 <sup>a</sup>	70	37	31	2	27

<sup>a</sup> The average number of schools per state was 293, but an average of 167 schools per state responded to the survey.

not determine if the athletic trainers had appropriate certifications or licensure to meet the individual state athletic training standards.

In intercollegiate athletics, health care units (HCUs) were developed to quantify an athlete-to-athletic trainer ratio that would permit appropriate medical coverage.<sup>10</sup> Whereas similar research has not been performed at the secondary school level, the same concept can be applied, and the following example has been adjusted using secondary school injury-rate data.<sup>11</sup> One full-time certified athletic trainer reasonably can be responsible for approximately 12 adjusted HCUs, which are based on injury rate, treatment time per injury, and athlete-exposures for each sports team.<sup>10</sup> For example, a typical secondary school that has junior varsity and varsity teams for football and boys' and girls' soccer in the fall, boys' and girls' basketball and wrestling in the winter, and baseball and softball in the spring is equivalent to 34.1 HCUs and approximately 500 athletes (similar to the average number of athletes in public

**Table 4. Extent of Athletic Training Coverage of US Secondary Schools With Athletic Training Services Based on Student Enrollment, 2011–2013**

Range of Student Enrollment	Athletic Training Services, %			
	Full Time	Part Time	Per Diem	Clinic
1–99	5	89	3	57
100–199	12	80	8	55
200–299	21	72	8	57
300–399	36	59	7	45
400–499	43	55	3	55
500–599	44	55	4	50
600–699	53	45	3	43
700–799	53	45	5	38
800–899	62	37	4	41
900–999	63	40	2	41
1000–1099	65	35	1	41
1100–1199	64	38	3	38
1200–1299	67	37	1	37
1300–1399	68	36	5	37
1400–1499	70	40	1	35
1500–1599	64	39	5	41
1600–1699	64	47	3	32
1700–1799	69	35	3	37
1800–1899	71	32	3	26
1900–1999	79	30	2	17
2000–2099	76	32	2	29
2100–2199	74	36	3	29
2200–2299	74	34	1	28
2300–2399	77	35	3	22
2400–2499	73	39	2	25
2500–2599	77	29	0	21
2600–2699	87	20	7	30
2700–2799	79	41	3	31
2800–2899	72	25	3	19
2900–2999	75	25	0	33
3000–3099	87	33	0	15
3100–3199	85	30	0	25
3200–3299	84	32	4	16
3300–3399	93	14	7	13
3400–3499	93	6	0	20
3500–3599	92	19	0	15
>3600	88	29	0	31
Average	55	46	4	41

secondary schools [ $n = 535$ ]).<sup>11</sup> This is well beyond 12 HCUs per full-time athletic trainer and indicates the need for 3 full-time athletic trainers. Therefore, the employment of multiple full-time athletic trainers should be encouraged in secondary schools to enhance sport safety. Hawaii, for example, has successfully implemented multiple athletic trainers at secondary schools, with 19 of 24 schools having hired 2 full-time athletic trainers. This number increased from 1991, when only 8% of public and private schools in Hawaii had 1 athletic trainer at sports practices.<sup>12</sup>

One major limitation of our study involves the definitions of *AT services*. Full- and part-time AT services were determined by the athletic director based on game and practice coverage and on official employment status at the school. Athletic directors may have mistakenly considered an employee who teaches during the day and covers some practices and games to be a full-time athletic trainer. Not all athletic directors knew exact school enrollment or athlete numbers and, therefore, they approximated these values. Similarly, not all athletic directors understood who qualified as an *athletic trainer*, as some mentioned that

they themselves were the athletic trainers despite no education or training as such. We did not ask if the athletic trainer was certified, licensed, or registered, and this should be explored in a future study. Thus, in states that do not require certification to work as an athletic trainer (eg, California), the number of schools with appropriate, qualified AT services may be overestimated.

Researchers should investigate private and specialty (eg, vocational, technical, charter, alternative) school AT services. These types of secondary schools may offer differing levels of AT services due to differences in school enrollment and financial support. Understanding the barriers and reasons why school districts do not employ athletic trainers or only hire part-time athletic trainers can help identify how to increase AT coverage of sports games and practices.

## CONCLUSIONS

Whereas the percentage of schools with AT services in secondary schools has increased dramatically since 1994, at the time of this study, only 37% of schools had full-time AT services. The presence of AT services in US public secondary schools needs to increase, and school districts should continue to hire athletic trainers as appropriate medical providers for sports games and practices. It is promising that 70% of the public secondary schools in the United States recognize the importance of AT services and have some level of medical coverage. Although many of these schools need to enhance coverage to properly protect all athletes and some schools still need to begin offering AT services, the momentum is clearly focused on improving medical services for secondary school athletes. This is a trend that will have life-saving consequences.

## ACKNOWLEDGMENTS

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