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Formal and Informal Continuing Education Activities and Athletic Training Professional Practice

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Context: Continuing education (CE) is intended to promote professional growth and, ultimately, to enhance professional practice.

Objective: To determine certified athletic trainers' participation in formal (ie, approved for CE credit) and informal (ie, not approved for CE credit) CE activities and the perceived effect these activities have on professional practice with regard to improving knowledge, clinical skills and abilities, attitudes toward patient care, and patient care itself.

Design: Cross-sectional study.

Setting: Athletic training practice settings.

Patients or Other Participants: Of a geographic, stratified random sample of 1000 athletic trainers, 427 (42.7%) completed the survey.

Main Outcome Measure(s): The Survey of Formal and Informal Athletic Training Continuing Education Activities was developed and administered electronically. The survey consisted of demographic characteristics and Likert-scale items regarding CE participation and perceived effect of CE on professional practice. Internal consistency of survey items was determined using the Cronbach α ($\alpha = 0.945$). Descriptive statistics were computed for all items. An analysis of variance and dependent *t* tests were calculated to determine differences among respondents' demographic characteristics and their participation in, and perceived effect of, CE activities. The α level was set at .05.

Results: Respondents completed more informal CE activities than formal CE activities. Participation in informal CE activities included reading athletic training journals (75.4%), whereas formal CE activities included attending a Board of Certification–approved workshop, seminar, or professional conference not conducted by the National Athletic Trainers' Association or affiliates or committees (75.6%). Informal CE activities were perceived to improve clinical skills or abilities and attitudes toward patient care. Formal CE activities were perceived to enhance knowledge.

Conclusions: More respondents completed informal CE activities than formal CE activities. Both formal and informal CE activities were perceived to enhance athletic training professional practice. Informal CE activities should be explored and considered for CE credit.

Key Words: athletic trainers, professional advancement, lifelong learning

Key Points

- Athletic trainers engaged in both formal and informal continuing education activities to improve their knowledge, clinical skills or abilities, attitudes toward patient care, and patient care itself.
- Athletic trainers participated in informal continuing education more often than in formal continuing education and preferred shorter-duration activities.
- Formal continuing education was perceived to improve knowledge more than informal continuing education did, although the latter was perceived to improve clinical skills or abilities and to improve attitudes toward patient care more than the former. Both types were believed to improve patient care.

Continuing education (CE) is commonly required in a variety of allied health and medical professions.[1–5] It typically consists of educational activities designed to maintain or develop (or both) the knowledge, skills, performance, and professional relationships needed to provide services for patients, the public, or the profession.[5] The priority of CE is to improve professional practice.[6] To ensure that certified athletic trainers (ATs) maintain professional competence after entry-level certification, the Board of Certification[7] (BOC) established formal CE requirements for ATs to engage in lifelong professional learning throughout their careers. These CE requirements (75 continuing education units every 3 years) are intended to promote competence, develop knowledge and skills, and enhance professional skills and judgment beyond the levels required for entry-level practice.[7] These formal activities are provided through a BOC-authorized provider[7] for CE credit and typically include short courses featuring lectures and small group activities. Content experts usually do most, if not all, of the lecturing and group facilitation, with little interaction among participants.[8,9]

Professional growth, however, can occur outside of formal learning activities and can be important for learning clinical techniques, applying innovations in the clinical setting, and expanding one's understanding of patient care.[10,11] More active learning is common in informal CE and accommodates many learning styles.[8] Informal CE also promotes learning and practicing skills within the context of patient care.[12,13] However, at this time, the BOC does not award CE credit for informal learning activities. Therefore, the purpose of our investigation was to examine

Table 1. Respondents per National Athletic Trainers' Association District

National Athletic Trainers' Association District	Sample Population No. (%)	Responding Athletic Trainers No. (%)
1	68 (6.8)	34 (8.0)
2	146 (14.45)	48 (11.2)
3	107 (10.7)	38 (8.9)
4	221 (22.1)	110 (25.8)
5	81 (8.06)	33 (7.7)
6	48 (4.8)	20 (4.7)
7	57 (5.67)	36 (8.4)
8	82 (8.16)	23 (5.4)
9	148 (14.8)	42 (9.8)
10	42 (4.23)	24 (5.6)
Unidentified	0 (0)	19 (4.5)
Total	1000	427 (42.7)

the participation of ATs in various formal and informal CE activities and to understand how these CE activities are perceived to affect clinical practice with regard to improving knowledge, clinical skills or abilities, attitudes toward patient care, and patient care itself. Our results will help to identify which CE activities, both formal and informal, seem to affect athletic training practice.

METHODS

Respondents

The target population consisted of a geographic, stratified random sample of 1000 ATs across the 10 districts of the National Athletic Trainers' Association (NATA). Respondents had to be currently practicing and certified before January 1, 2006. The sample population included ATs from a variety of clinical practice settings (eg, college/university, high school, corporate/industrial). The number of participants selected per NATA district was based on the overall percentage of ATs from each district. For example, District 4 includes approximately 22.1% (n = 6979) of the total population of ATs nationwide; therefore, 221 ATs from District 4 were randomly selected from the BOC credential holders' database. This process was followed for all 10 NATA districts, yielding the sample population of 1000 ATs (Table 1).

Procedures

Institutional review board approval was obtained before the study began. To improve the response rate,[14] a ''notice of selection'' was distributed via e-mail to all participants in the sample. It introduced the upcoming investigation and encouraged their future involvement. Approximately 4 days later, all those in the sample were e-mailed again and invited to participate in the investigation. This invitation included the need for and purpose of the investigation, a confidentiality statement, contact information for the principal investigator, instructions for the completion of an online survey, and the electronic link to the survey. Informed consent was implied upon completion and submission of the survey.

Identifiers were used to track submitted surveys. We followed up with e-mails to nonrespondents for an additional 3 weeks and then sent hard copies of the survey through postal mail to all remaining nonrespondents.

Instrumentation

We developed the Formal and Informal Athletic Training Continuing Education Activities (FIATCEA) survey for this investigation. The FIATCEA survey consisted of 21 athletic training CE activities completed over the last 2 years, including 9 formal CE activities (eg, attending the NATA Annual Meeting & Clinical Symposia, publishing an article) and 12 informal CE activities (eg, mentoring a colleague, reading professional journals). Each of these items was scored on a 5-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*) to rate the extent to which each CE activity was perceived to affect professional practice by improving knowledge, improving clinical skills and abilities, improving attitudes toward patient care, and improving patient care itself. *Not applicable* (N/A) was chosen when the respondent did not engage in that particular CE activity. In addition, 8 items asked about demographic characteristics of the respondent (eg, NATA district, practice setting, years of experience as an AT). Respondents were invited to comment for an open-ended question regarding additional formal and informal CE activities that they felt affected their professional practice.

Face validity and content validity were established by 5 athletic training educators who were considered content experts in athletic training CE; 4 were members of the BOC Task Force for Continuing Professional Education and 1 was an educational researcher. Survey questions were assessed for content and clarity, and items were clarified or additional items were added as needed. Reliability was measured using the Cronbach α to determine internal consistency of survey items. The α coefficient was 0.945.

Data Analysis

Descriptive statistics were computed on all survey items. We used analysis of variance (ANOVA) and dependent *t* tests to analyze differences between select demographic characteristics of the ATs (eg, sex, practice setting, years of experience as an AT) and their participation in formal and informal CE activities. A repeated-measures ANOVA was calculated to determine differences among the perceived effects of each formal and informal CE activity. The α level was set at .05 for all analyses. A Bonferroni correction was used to reduce the chance of type I error, resulting in an α level of $P \leq .002$. In addition, the Bonferroni test was used for pairwise comparisons. Data analysis was performed using SPSS (version 13.0; SPSS Inc, Chicago, IL).

Although this was not a qualitative study, we had a sufficient number of comments to warrant qualitative analysis of the following survey question: ''List any additional formal (ie, approved for CE credit) or informal (ie, not approved for CE credit) athletic training CE activity that you completed which you feel impacted your clinical practice.''

Qualitative data were analyzed using interpretative coding.[15] This process involved categorizing individual comments into concepts. We then organized the concept categories into themes with pattern analysis[15] and assigned labels to capture their meaning. Three analysts evaluated the data to ensure trustworthiness and accurate interpretation.

Table 2. Participant Demographics

Demographic Variable	n (%)
Sex	
Male	209 (48.9)
Female	215 (50.4)
Athletic training practice setting	
College/university	130 (33.9)
High school	97 (25.3)
Professional sports	14 (3.6)
Sports medicine clinic	57 (14.8)
Orthopaedic physician's office	23 (6.0)
General practice physician's office	2 (0.5)
Hospital	24 (6.3)
Health/fitness facility	9 (3.0)
Corporate/industrial	13 (3.4)
Other	15 (3.9)
Years practicing as certified athletic trainer	
2–5	112 (26.7)
6–10	143 (34.0)
11–15	74 (17.6)
16–20	36 (8.6)
>20	55 (13.1)
Years in current practice setting	
1–5	243 (59.3)
6–10	89 (21.7)
11–15	31 (7.6)
16–20	14 (3.4)
>20	33 (8.0)

RESULTS

A total of 427 (42.7%) ATs participated in the study, representing all 10 NATA districts and a variety of athletic training practice settings. Most respondents represented the college/university (n = 130, 33.9%) and high school settings (n = 97, 25.3%). (Not all respondents answered all questions.) Total years of experience ranged from 2 to 5 years (n = 112, 26.7%) to more than 20 years (n = 55, 13.1%), and years of experience in the current employment setting ranged from 1 to 5 years (n = 243, 59.3%) to more than 20 years (n = 33, 8.0%). Respondent demographics are presented in Table 2.

Participation in Formal and Informal CE Activities

As for formal CE activities, most respondents (n = 323, 75.6%) reported participation in a BOC-approved workshop, seminar, or professional conference not conducted by the NATA or its related affiliates/committees (Table 3). Many respondents also reported attending the NATA Annual Meeting & Clinical Symposia (n = 199, 46.6%) and completing a BOC home study course (n = 177, 41.5%). Only 6.6% (n = 28) of the respondents reported having published an article for athletic training CE.

Respondents were asked for comments regarding additional formal athletic training CE activities that affected their clinical practice. These reported activities were divided into 2 concept categories: *local/job-specific presentations* and *reading quizzes* (see the Figure for representative comments). The first category, *local/job-specific presentations*, describes many different types of formal CE presentations offered to ATs at the local level, often specific to job-related learning needs. The second category, *reading quizzes*, included quizzes submitted for CE credit that were derived from articles in professional journals or related materials.

Table 3. Formal Athletic Training Continuing Education Activities Completed

Formal Continuing Education Activity	n (%)
Attended a Board of Certification–approved workshop, seminar, or professional conference not conducted by the National Athletic Trainers' Association or its related affiliates or committees	323 (75.6)
Attended the National Athletic Trainers' Association Annual Meeting & Clinical Symposia	199 (46.6)
Completed a Board of Certification home study course	177 (40.3)
Attended the state athletic training meeting or clinical symposium	154 (36.0)
Completed a nonathletic training–related academic course	138 (32.3)
Attended the regional athletic training meeting/clinical or clinical symposium	129 (30.2)
Completed an athletic training–related academic course	106 (24.8)
Spoke or presented at workshop, seminar, or conference	81 (18.9)
Published an article	28 (7.7)

With respect to participation in informal CE activities, reading professional journals was most frequently reported (Table 4). The majority of respondents (n = 322, 75.4%) regularly read the *Journal of Athletic Training*, the *Athletic Training Education Journal*, or both. In addition, 294 respondents (68.8%) regularly read other refereed journals (eg, *Medicine and Science in Sports and Exercise*). A total of 11.9% (n = 51) of responding ATs held an office in a local, state, regional, or national athletic training organization. A dependent-samples t test revealed that the respondents completed more informal CE activities than formal CE activities ($t_3 = -114.182$, $P < .01$).

Respondents commented on additional informal athletic training CE activities they felt had affected their clinical practice. These reported activities were divided into 2 categories: *journal clubs* and *networking opportunities* (see the Figure for representative comments). Each category represents a group of responses that are a component of the larger themes of formal and informal CE activities. *Journal clubs* described activities in which respondents engaged in dialogue or discussion regarding articles in professional journals, whereas *networking opportunities* described activities that emphasized interactions with peers and colleagues.

Perceived Effect of Formal CE Activities

All formal CE activities were perceived to positively affect athletic training professional practice (Table 5). A 1-way ANOVA revealed no differences between respondent demographic characteristics and the perceived effect of formal CE activities on professional practice with respect to improving knowledge, clinical skills or abilities, attitudes toward patient care, or patient care itself.

Effect of Formal CE Activities on Improving Knowledge. Publishing an article in a refereed or nonrefereed journal (4.70 ± 0.529) and completing an athletic training–related course (4.54 ± 0.664) were perceived as having the greatest effect on improving knowledge. Nearly all respondents (96.9%, n = 32) either agreed or strongly agreed that publishing an article increased their knowledge, whereas

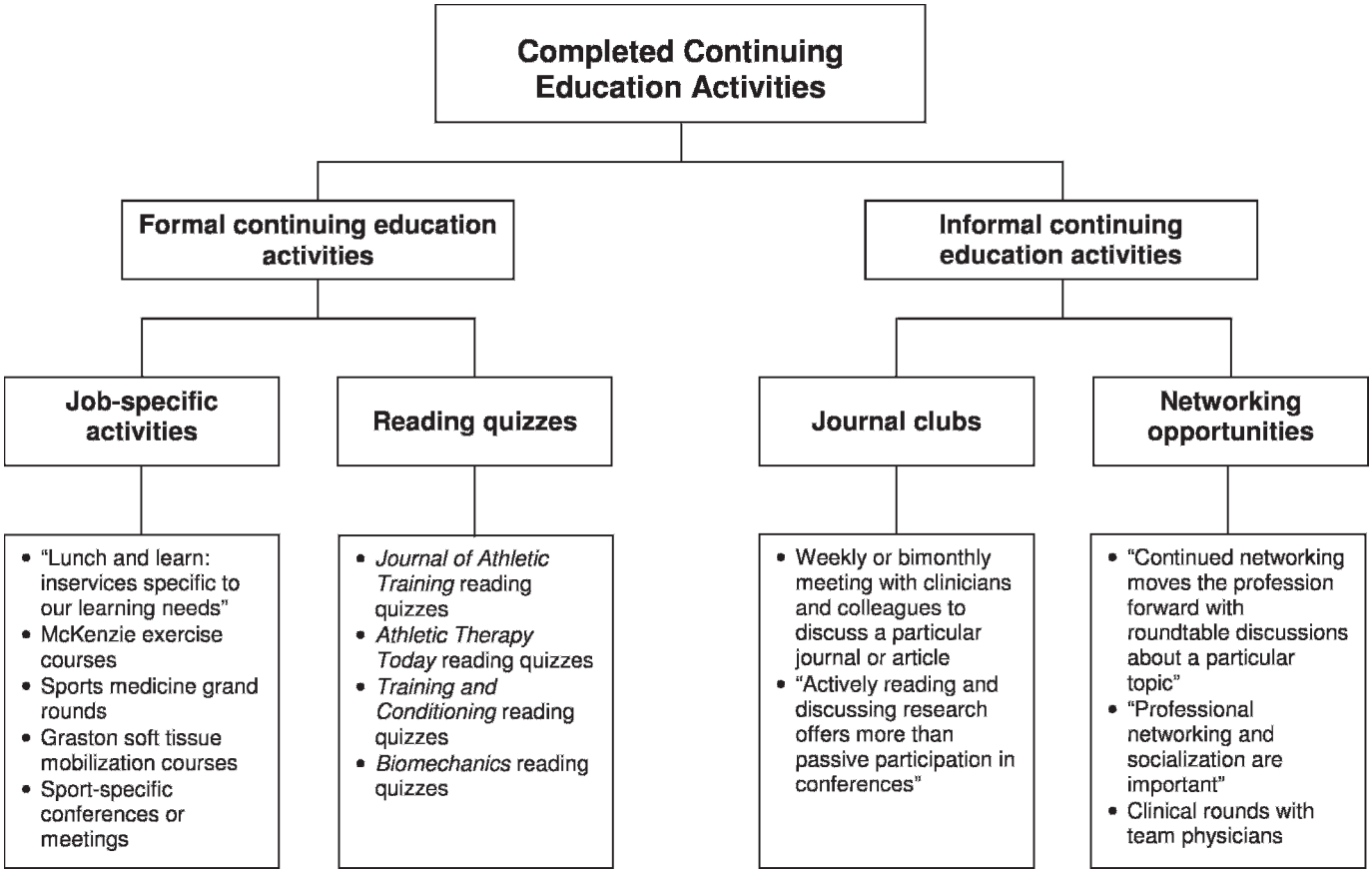

Figure. Conceptual framework of qualitative data: completed formal and informal continuing education activities perceived to affect athletic training practice.

95.3% (n = 101) agreed or strongly agreed that an athletic training–related course increased their knowledge. A repeated-measures ANOVA ($F_{1,8}$ = 76.555, $P < .001$) revealed differences between the perceived effects of formal CE activities with regard to improving knowledge. Bonferroni pairwise comparisons determined that publishing an article ($P = .022$) and completing an athletic training course ($P = .038$) were perceived to improve knowledge more than all other formal CE activities. Attending a state athletic training meeting or clinical symposium ($P = .009$) was perceived to improve knowledge less than all other formal CE activities. In addition, formal CE activities were perceived to improve knowledge more than informal CE activities ($t_{414} = 2.559$, $P = .011$).

Table 4. Informal Athletic Training Continuing Education Activities Completed

Informal Continuing Education Activity	n (%)
Read athletic training journals	322 (75.4)
Read other refereed professional journals	294 (68.8)
Read athletic training–related textbooks	247 (57.8)
Supervised athletic training student(s)	208 (48.7)
Received job-specific continuing education from employer	204 (47.7)
Taught athletic training–related course	177 (41.4)
Mentored an athletic training colleague	165 (38.6)
Obtained specialty certification	151 (35.3)
Mentored by an athletic training colleague	126 (29.5)
Conducted scholarly research	88 (20.6)
Reviewed manuscripts	57 (13.3)
Held a local-, state-, regional-, or national-level office	51 (11.9)

Effect of Formal CE Activities on Improving Clinical Skills and Abilities. Completing an athletic training–related course (4.29 ± 0.878) and attending a symposium or workshop not conducted by the NATA or its related affiliates and committees (4.28 ± 0.712) were perceived to most improve clinical skills and abilities. It was noted that 82.1% of respondents (n = 87) either agreed or strongly agreed that completing an athletic training–related course resulted in improving their clinical skills or abilities, whereas 87.9% (n = 284) either agreed or strongly agreed that attending a BOC-approved workshop, seminar, or professional conference not conducted by the NATA or its related affiliates/committees resulted in improving their clinical skills or abilities. A repeated-measures ANOVA revealed differences between the perceived effects of formal CE activities with regard to improving clinical skills and abilities ($F_{1,8}$ = 72.920, $P < .001$). Bonferroni pairwise comparisons revealed that completing an athletic training course ($P = .001$) and attending a workshop, seminar, or professional conference ($P = .043$) were perceived to improve clinical skills or abilities more than all other formal CE activities. Attending a state athletic training meeting or clinical symposium ($P = .007$) was perceived to improve clinical skills and abilities less than all other formal CE activities.

Effect of Formal CE Activities on Improving Attitudes Toward Patient Care. Completing an athletic training–related course (4.10 ± 0.894) and publishing an article (3.97 ± 0.928) were perceived as having the greatest effect on improving attitudes toward patient care. A total of

Table 5. Perceived Effect of Formal Athletic Training Continuing Education on Professional Practice (Mean ± SD)[a]

Formal Continuing Education Activity	Knowledge	Clinical Skills or Abilities	Attitudes	Patient Care
Published an article	4.70 ± 0.529	4.16 ± 0.954	3.97 ± 0.928	4.03 ± 0.928
Completed an athletic training–related academic course	4.54 ± 0.664	4.29 ± 0.878	4.10 ± 0.894	4.29 ± 0.829
Attended a Board of Certification–approved professional conference not conducted by the National Athletic Trainers' Association or its related affiliates or committees	4.44 ± 0.594	4.28 ± 0.712	3.79 ± 0.927	4.16 ± 0.761
Completed a nonathletic training–related academic course	4.41 ± 0.816	3.69 ± 1.139	3.71 ± 1.112	3.75 ± 1.127
Spoke or presented at a workshop, seminar, or conference	4.30 ± 0.928	3.99 ± 1.000	3.72 ± 1.085	3.90 ± 1.008
Completed a Board of Certification–approved home study course	4.28 ± 0.645	3.92 ± 0.894	3.54 ± 0.947	3.88 ± 0.824
Attended a regional athletic training meeting or clinical symposium	4.11 ± 0.640	3.70 ± 0.876	3.35 ± 0.982	3.68 ± 0.992
Attended the National Athletic Trainers' Association Annual Meeting & Clinical Symposia	4.20 ± 0.715	3.81 ± 0.871	3.47 ± 0.979	3.84 ± 0.889
Attended the state athletic training meeting or clinical symposium	4.00 ± 0.808	3.59 ± 0.887	3.25 ± 0.903	3.62 ± 0.902

[a] 1 = *Strongly disagree*; 5 = *strongly agree*.

74.3% of respondents (n = 78) either agreed or strongly agreed that completing an athletic training–related course improved their attitude toward patient care; 70.0% (n = 21) either agreed or strongly agreed that publishing an article improved their attitude toward patient care. A repeated-measures ANOVA revealed differences between the perceived effects of formal CE activities with regard to improving attitudes toward patient care ($F_{1,8} = 82.410$, $P < .001$). Bonferroni pairwise comparisons demonstrated that completing an athletic training course ($P = .041$) and attending a workshop, seminar, or professional conference ($P = .043$) were perceived to improve attitudes toward patient care more than all other formal CE activities. Attending a state athletic training meeting or clinical symposium ($P = .031$) was perceived to improve attitudes toward patient care less than all other formal CE activities, except for attending a regional athletic training meeting or symposium.

Effect of Formal CE Activities on Improving Patient Care. Completing an athletic training–related course (4.29 ± 0.829) and attending a BOC-approved workshop, seminar, or professional conference not conducted by the NATA or its related affiliates or committees (4.16 ± 0.761) were perceived as having the greatest effect on improving patient care. Most respondents (n = 88, 83.0%) either agreed or strongly agreed that completing an athletic training–related course improved patient care, whereas 83.3% (n = 269) either agreed or strongly agreed that attending a BOC-approved workshop, seminar, or professional conference not conducted by the NATA or its related affiliates or committees resulted in an improvement in patient care. A repeated-measures ANOVA revealed differences between the perceived effects of formal CE activities with regard to improving patient care ($F_{1,8} = 57.991$, $P < .001$). Bonferroni pairwise comparisons showed that completing an athletic training course ($P = .002$) and attending a workshop, seminar, or professional conference ($P = .030$) were perceived to improve patient care more than all other formal CE activities. Attending a state athletic training meeting or clinical symposium ($P = .038$) was perceived to improve patient care less than all other formal CE activities.

Perceived Effect of Informal CE Activities

Informal CE activities were perceived to improve athletic training professional practice (Table 6). A 1-way ANOVA revealed no differences between respondent demographic characteristics and the perceived effect of informal CE activities on professional practice with regard to improving knowledge, clinical skills or abilities, attitudes toward patient care, or patient care.

Effect of Informal CE Activities on Improving Knowledge. Being mentored by an athletic training colleague (4.56 ± 0.573) and obtaining a specialty certification (4.54 ± 0.650) were perceived to have the greatest effect on improving knowledge. The majority of respondents (n = 119, 94.4%) either agreed or strongly agreed that being mentored improved their knowledge; 94.1% (n = 138) either agreed or strongly agreed that obtaining a specialty certification improved their knowledge. A repeated-measures ANOVA revealed differences between the perceived effects of informal CE activities with regard to improving knowledge ($F_{1,11} = 60.904$, $P < .001$). Bonferroni pairwise comparisons revealed that being mentored by a colleague ($P = .010$) or obtaining a specialty certification ($P = .034$) was perceived to improve knowledge more than all other informal CE activities. Holding an office in a local, state, regional, or national athletic training organization ($P = .036$) was perceived to improve knowledge less than all other informal CE activities.

Effect of Informal CE Activities on Improving Clinical Skills or Abilities. Being mentored by an athletic training colleague (4.51 ± 0.590) and obtaining a specialty certification (4.47 ± 0.691) were perceived as having the greatest effect on improving clinical skills or abilities. It was noted that 95.2% of respondents (n = 119) either agreed or strongly agreed that being mentored improved their clinical skills or abilities, whereas 91.4% (n = 138) either agreed or strongly agreed that obtaining a specialty certification improved their clinical skills or abilities. A repeated-measures ANOVA revealed differences between the perceived effects of informal CE activities with regard to improving clinical skills or abilities ($F_{1,11} = 153.215$, $P < .001$). Bonferroni pairwise comparisons demonstrated that being mentored by a colleague ($P = .028$) and obtaining a specialty certification ($P = .038$) were perceived to improve clinical skills or abilities more than all other informal CE activities. Holding an office in a local, state, regional, or national athletic training organization ($P = .043$) was perceived to improve knowledge less than all other informal CE activities. In addition, a dependent-samples t test revealed that informal CE activities were perceived to improve clinical skills or abilities more than formal CE activities ($t_{409} = -2.754$, $P = .006$).

Table 6. Perceived Effect of Informal Athletic Training Continuing Education on Professional Practice (Mean ± SD)[a]

Informal Continuing Education Activity	Knowledge	Clinical Skills or Abilities	Attitudes	Patient Care
Mentored by an athletic training colleague	4.56 ± 0.573	4.51 ± 0.590	4.33 ± 0.808	4.46 ± 0.643
Obtained specialty certification	4.54 ± 0.650	4.47 ± 0.691	4.17 ± 0.916	4.38 ± 0.743
Conducted scholarly research	4.52 ± 0.606	3.97 ± 1.030	3.73 ± 1.078	3.98 ± 0.963
Taught athletic training–related course	4.39 ± 0.708	4.28 ± 0.785	3.89 ± 0.977	4.13 ± 0.833
Received job-specific continuing education from employer	4.28 ± 0.776	4.18 ± 0.809	3.88 ± 0.980	4.14 ± 0.827
Reviewed manuscripts	4.26 ± 0.624	3.86 ± 0.962	3.55 ± 0.989	3.67 ± 0.991
Supervised athletic training student(s)	4.19 ± 0.781	4.16 ± 0.835	3.76 ± 0.952	3.98 ± 0.895
Read other referred professional journals	4.19 ± 0.627	3.94 ± 0.726	3.65 ± 0.840	3.91 ± 0.759
Read athletic training–related textbooks	4.14 ± 0.721	4.04 ± 0.720	3.60 ± 0.875	3.91 ± 0.777
Mentored an athletic training colleague	4.13 ± 0.712	4.05 ± 0.818	3.80 ± 0.939	4.02 ± 0.812
Read athletic training journals	4.13 ± 0.638	3.81 ± 0.784	3.51 ± 0.902	3.77 ± 0.805
Held a local-, state-, regional-, or national-level office	4.08 ± 0.886	3.29 ± 1.099	3.50 ± 1.052	3.29 ± 1.021

[a] 1 = *Strongly disagree*; 5 = *strongly agree*.

Effect of Informal CE Activities on Improving Attitudes Toward Patient Care. Being mentored by an athletic training colleague (4.33 ± 0.808) and obtaining a specialty certification (4.17 ± 0.916) were perceived to have the greatest effect on improving attitudes toward patient care. It was noted that 87.3% of respondents (n = 110) either agreed or strongly agreed that being mentored improved their attitude toward patient care; 74.8% (n = 113) either agreed or strongly agreed that obtaining a specialty certification improved their attitude toward patient care. A repeated-measures ANOVA revealed differences between the perceived effects of informal CE activities with regard to improving attitudes toward patient care ($F_{1,11}$ = 81.019, $P < .001$). Bonferroni pairwise comparisons showed that being mentored by a colleague ($P = .029$) and obtaining a specialty certification ($P = .042$) were perceived to improve attitudes toward patient care more than all other informal CE activities. Holding an office in a local, state, regional, or national athletic training organization ($P = .044$) was perceived to improve attitudes toward patient care less than all other informal CE activities, other than reading athletic training journals. In addition, a dependent-samples t test revealed that informal CE activities ($t_{407} = -3.630$, $P < .001$) were perceived to improve attitudes toward patient care more than formal CE activities.

Effect of Informal CE Activities on Improving Patient Care. Being mentored by an athletic training colleague (4.46 ± 0.643) and obtaining a specialty certification (4.38 ± 0.743) were perceived to have the greatest effect on improving patient care. It was noted that 92.1% of respondents (n = 116) either agreed or strongly agreed that being mentored improved patient care, whereas 84.8% (n = 128) either agreed or strongly agreed that obtaining a specialty certification improved patient care. A repeated-measures ANOVA identified differences between the perceived effect of informal CE activities with regard to improving patient care ($F_{1,11}$ = 114.223, $P < .001$). Bonferroni pairwise comparisons revealed that being mentored by a colleague ($P = .031$) and obtaining a specialty certification ($P = .037$) were perceived to improve patient care more than all other informal CE activities. Holding an office in a local, state, regional, or national athletic training organization ($P = .036$) was perceived to improve patient care less than all other informal CE activities.

DISCUSSION

Continuing education seeks to help health care professionals stay abreast of advances in patient care and to encourage practitioners to discontinue less effective practices.[16] Continuing education is underpinned by the belief that gains in knowledge lead to improved practice, which ultimately improves patient outcomes.[10,17,18] Both formal and informal CE activities are considered beneficial in improving knowledge in a variety of health care fields.[1–5,8,9] Our study revealed that ATs completed more informal CE activities than formal CE activities. These results indicate that ATs find informal CE activities pragmatic and beneficial, even though they do not earn formal CE credit. Other researchers[5,10,17,18] have also demonstrated that health care professionals value participating in informal CE activities to improve their knowledge, clinical skills, attitudes, and patient outcomes.

Participation in Formal CE Activities

Shorter CE courses in medicine and nursing, rather than attending conferences, have been identified[5,8,9,19,20] as a commonly completed CE activity. Our research also indicates that shorter CE activities were completed more often by ATs. This finding indicates that ATs would like to complete CE activities in a single day versus attending the NATA Annual Meeting & Clinical Symposia to maintain their credential.

The popularity of home study courses was high, as nearly half of the ATs reported completing such a course during the last 2 years. Online and other interactive multimedia CE activities are growing in popularity in other health care fields as well.[21–28] The flexibility of online CE activities is ideal for ATs, who can complete them according to their specific learning needs whenever, wherever, and however they choose.

Effective CE should be specific to the learning needs of the participant.[29] Participants need to be engaged and active throughout the learning process as they work with CE providers to improve their professional practice.[12] The ATs in this study commented on the importance of active participation in need-based CE. Many of them completed job-specific CE activities (eg, in-service luncheons, grand rounds) organized by their employers to meet specific learning needs. These CE activities not only encourage employers to develop specific learning activities for their

employees but also provide them with opportunities to directly observe how the CE information is being implemented in clinical practice.[30] In addition, job-specific CE activities demonstrate the value and importance that employers place on CE for improving professional practice.

Participation in Informal CE Activities

Our results clearly demonstrate that ATs participated in informal CE activities more often than in formal CE activities. As is the case in other health care professions,[3,17,31–33] ATs found these informal CE activities important for improving professional practice; reading professional journals and textbooks were the most frequently completed informal CE activities. Nearly half of the ATs reported that they supervise athletic training students and teach an athletic training–related course. Both of these informal CE activities require the AT to engage in student-teacher relationships in which the AT is responsible for providing feedback to students regarding their classroom or clinical performance.[34] These interactions are important, because they provide opportunities for the AT to discuss concepts related to professional practice with students, supplementing and reinforcing the AT's knowledge.[17]

Informal CE activities seem to center on a problem within the context of professional practice,[8] whereas CE activities are derived from problems that arise in patient care. Many of these informal CE activities occur spontaneously and involve interaction and collaboration with colleagues (eg, supervising AT students, job-specific CE). Consistent with the findings of other researchers,[8,9,17,35] comments from our respondents regarding participation in informal CE activities emphasized the importance of social interaction and collaboration during patient care.

Perceived Effect of Formal and Informal CE Activities

The ATs perceived that both formal and informal CE activities positively affected their athletic training practices (ie, all formal and informal CE activities had a mean score greater than 3.0 on the 5-point Likert scale). This result supports the notion that informal CE is important for improving the professional practice of ATs, warranting further investigation of these informal CE activities.

Effect of Formal and Informal CE Activities on Improving Knowledge. Formal CE activities were perceived to improve knowledge more than did informal CE activities. Similarly, a researcher[1] in occupational therapy found that formal CE activities improved knowledge more than did informal CE activities. Many formal CE activities consist of short courses featuring lectures,[8,9] with participants having little interaction with one another. Because of the content-centered nature of formal CE activities, it is not surprising that these CE activities were perceived to improve knowledge more than did informal CE activities.

Effect of Formal and Informal CE Activities on Improving Clinical Skills or Abilities. Informal CE activities were perceived to improve clinical skills or abilities more than did formal CE activities. These informal CE activities are important for applying innovations to the clinical setting and expanding one's understanding of patient care,[10] because they typically occur within the context of patient care. The nature of informal CE lends well to improving clinical skills or abilities to a greater extent than does formal CE, as informal CE is driven by the problems that arise in the context of patient care. These informal activities in the clinical setting allow practitioners to fluidly learn new clinical skills, practice them on patients, and receive feedback from other practitioners regarding their performance. Similarly, among occupational therapists, informal CE activities were perceived to have a greater effect on improving clinical skills or abilities than did formal CE activities.[1]

Effect of Formal and Informal CE Activities on Improving Attitudes Toward Patient Care. Informal CE activities were perceived by ATs to improve attitudes toward patient care more than did formal CE activities. The learner-centered nature of these informal activities (eg, being mentored by a colleague, obtaining a specialty certification) allowed AT practitioners to engage in activities that related directly to interests or problems regarding their patient care. Similarly, among occupational therapists,[1] informal CE activities, such as being mentored by a colleague and spontaneous or unplanned on-the-job training, were perceived to improve attitudes toward patient care more than did formal CE activities. The particular effectiveness of informal CE activities may be that they occur with mentors, during teachable moments, when the practitioner has a need to learn.[1]

Effect of Formal and Informal CE Activities on Improving Patient Care. The primary goal of the knowledge, skills, and attitudes learned through CE participation is to enhance patient care.[5] To date, however, most CE researchers have not assessed practitioners' perceptions regarding improvements in patient care.[36] The ATs in this investigation reported that both formal and informal CE activities improved patient care and that neither type was perceived to improve patient care more than the other. This indicates that both types of CE activities are relevant for ATs. In occupational therapy, however, formal CE activities were perceived to improve patient care more than did informal CE activities.[1] Similar to ATs, nurses perceived that informal CE activities improved their patient care more than did formal CE activities.[3] More research is needed to clarify the specific benefits of formal and informal CE activities.

Conclusions and Implications

We are the first to examine ATs' participation in formal and informal CE activities and the perceived effects of these CE activities on professional practice. Athletic trainers reported that they engage in both formal and informal CE activities to improve their knowledge, clinical skills or abilities, attitudes toward patient care, and patient care itself. Participation in informal CE was reported more frequently, even though CE credit is not awarded for such participation. Formal and informal CE activities that were shorter in duration were completed more frequently, indicating that CE providers should offer ample opportunities for time-efficient CE. The perceived effects of formal and informal CE activities on professional practice were extremely positive. Formal CE was perceived to improve knowledge more than did informal CE, whereas informal CE was perceived to improve both clinical skills or abilities and attitudes toward patient care more than did formal

CE. Both formal and informal CE activities were perceived to improve patient care. Given the frequent participation in informal CE and the perception that these activities improve clinical skills or abilities and improve attitudes toward patient care, this type of CE should be examined as a means of earning CE credit. In addition, further research is needed to determine how ATs select CE activities (eg, to address specific problems encountered in patient care, to simply fulfill the CE credit quota). A better understanding of CE participation trends through the professional career (eg, entry level versus seasoned practitioner) and of how these CE activities are perceived to have affected professional practice is also warranted.

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