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Athletic Training Student Core Competency Implementation During Patient Encounters

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Context: Health care research evidence suggests that early patient encounters (PEs), as well as the purposeful implementation of professional core competencies (CCs), for athletic training students (ATSs) may be beneficial to their ability to provide care. However, no investigators have related facets of the clinical education experience with CC implementation as a form of summative assessment of the clinical experience.

Objective: To determine the relationship between the frequency and length of PEs, as well as the student's role and clinical site during PEs, and the students' perceived CC implementation during these encounters.

Design: Cross-sectional study.

Setting: Professional athletic training program, National Collegiate Athletic Association Division I institution.

Patients or Other Participants: We purposefully recruited 1 athletic training program that used E*Value software; 40 participants (31 females, 9 males) enrolled in the professional phase (12 first year, 14 second year, 14 third year) participated.

Intervention(s): Participants viewed a 20-minute recorded CC educational module followed by educational handouts, which were also posted online for reference throughout the semester. The E*Value software was used to track PEs, including the type of encounter (ie, actual patient, practice encounter, didactic practice scenario), the type of site where the encounter occurred (university, high school), and the participant's role (observed, assisted, performed), as well as responses to an added block of questions indicating which, if any, of the CCs were implemented during the PE.

Main Outcome Measure(s): Variables per patient were PE length (minutes), participant role, site at which the encounter occurred, and whether any of the 6 CCs were implemented (*yes*/*no*). Variables per participant were average encounter length (minutes), encounter frequency, modal role, clinical site assignment, and the number of times each CC was implemented. Separate 1-way analyses of variance were used to examine the relationships between role or clinical site and implementation of total number of CCs. Multiple linear regressions were used to determine how the average length and frequency of PEs were related to the average and total number of implemented CCs. Binary logistic regression models indicated how the length of each encounter, role of the participant, and type of clinical site related to the implementation of each CC.

Results: The roles of participants during PEs were related to their ability to implement the total number of CCs ($F = 103.48$, $P < .001$). Those who observed were likely to implement fewer total CCs than those who assisted (M diff = –0.29, $P < .001$); those who assisted were likely to implement more total CCs than those who performed (M diff = 0.32, $P < .001$). Frequency of encounters was the only significant variable in the model examining all independent variables with CC implementation ($b_{4,32} = 3.34$, $t = 9.46$, $P < .001$).

Conclusions: The role of the student, namely assisting during PEs, and the volume of PEs should be considered priorities for students to promote greater CC implementation.

Key Words: clinical education, student role, preceptors

Key Points

- Athletic training students who assisted their preceptor during a patient encounter were more likely to implement core competencies during the encounter.
- Students who experienced a higher frequency of patient encounters during their clinical experience implemented more core competencies.

Clinical education for athletic training students (ATSs) has evolved from the paradigmatic guidelines of medical education. This clinical education has evolved internally from an apprenticeship model to that of a competency-based instruction model.[1] A common theme in the clinical education of medicine, nursing, and ATSs is learning through direct patient contact.[2–4] Early patient contact was found to be beneficial and valuable in helping to promote active roles, bringing theory taught in the classroom into clinical practice, and building students' confidence.[2–4] Although this preliminary research was valuable, additional information is needed to explore details related to the quality and quantity of patient encounters (PEs) for students and how these affect the students' abilities to function autonomously as competent future practitioners.

Real-time PEs enhance students' confidence levels in their practice.[5] The 5th edition of "Athletic Training Education Competencies"[6] further supports this type of learning by explicitly stating that Clinical Integration

Proficiencies are intended to be used in real-time situations to allow for growth in clinical decision making. The setting in or site at which the clinical placement occurs may also affect the student's ability to participate in active learning[2] and opportunities for real-time proficiency evaluation.[5] The Commission on Accreditation of Athletic Training Education (CAATE) "Standards for Accreditation of Professional Athletic Training Programs" require that clinical education take place through experiences that include equipment considerations, patients of different sexes, nonsport patient populations, individual and team sports, and a variety of nonorthopaedic conditions.[7] However, the quality of the students' interactions with the patients and the number of interactions are not addressed by the current Standards, thus leaving a void in the examination of clinical outcomes linked to the assignment strategy currently being used.

In 2001, the Institute of Medicine (IOM) published a report titled *Crossing the Quality Chasm: A New Health System for the 21st Century* [8] that called for an overhaul of the current health care system that should result in improved patient outcomes. To effect this change in the health care system, the IOM outlined concepts that should be adopted by all health care practitioners.[8] The Pew Health Professions Commission, established in the spring of 1989 and administered by the University of California at San Francisco Center for the Health Professions, was charged with assisting health professionals, workforce policy makers, and educational institutions in responding to the challenges of the changing health care system.[9] After the IOM report was released, the Pew Health Professions Commission narrowed the recommendations to 5 competencies that all health care providers should strive to attain.[10] These 5 competencies were patient-centered care (PCC), interprofessional education and collaborative practice (IPE), evidence-based practice (EBP), quality improvement (QI), and health care informatics (HI). The Accreditation Council for Graduate Medical Education released new accreditation standards in 2006 that identified 6 core areas of competency in which all trained physicians needed to be able to demonstrate proficient implementation. These competencies consisted of the 5 competencies previously addressed and introduced the sixth competency of professionalism.[11] This additional competency has subsequently been incorporated into other health care provider educational standards.

Evaluating overall health care competency is important to assessing ATSs' preparedness to practice autonomously. The core competencies (CCs) are currently required to be integrated into CAATE-accredited postprofessional athletic training degree curriculums and athletic training residency programs.[12,13] Although they have not yet been fully integrated into the CAATE-accredited 2012 professional program standards, CAATE has proposed drafts for the next version that will require the CCs to be included in the curriculum and the clinical experiences of professional ATSs.[14] Other health care professions have documented[15,16] their attempts to incorporate the IOM recommendations into their didactic curriculum, but the topic has been discussed only minimally in the athletic training education literature.[17] The manner in which the CCs can be incorporated into clinical education has also been examined in health care fields such as medical education[18] and nursing.[19] Researchers[18] in an exploratory qualitative study examined medical residency programs to learn if and how CCs were addressed during supervision within the residency experience. They determined that the CCs were included superficially and in an unconscious manner, without purposeful direction or intention. Additionally, evidence[19] from nursing programs whose clinical education components were based on quantity of time versus those directed by the achievement of clinical competencies further supported these findings. Clinical hour requirements cannot predict comprehensive exposure to all the CCs necessary for entry into professional practice.[19] Both studies demonstrated the need for purposeful and comprehensive inclusion of CCs in the clinical education component of health care professions.

Studies in other health care fields suggested that the purposeful implementation of CCs during PEs would be beneficial. However, no researchers have related facets of the clinical education experience with CCs as a means for conducting a summative assessment of the clinical experience. Therefore, the purpose of our study was to determine the extent to which a relationship existed between CC implementation and the frequency and length of PEs and the student's role and clinical site placement during PEs.

METHODS

Design

We used a panel design that tracked a cohort of students over the course of 1 academic semester.

Participants

The software program E*Value (Advanced Informatics, Minneapolis, MN) provides tracking and record-keeping capabilities for health care education programs. A list of current athletic training programs that used the E*Value software was provided by the software company, and we pursued purposeful sampling to recruit an institution willing to participate. Professional athletic training programs with the software were contacted to determine the extent of their use of the program, specifically the aspects related to tracking PEs. Once a program that met the minimal requirements for E*Value use agreed to participate, recruitment was stopped. The selected program was within a National Collegiate Athletic Association Division I institution with a Carnegie Classification RU/VH (very high research activity). The participating program was currently using E*Value and was minimally requiring students to record the number of PEs, the type of PE, and the level of supervision of those encounters by their preceptors. The program director provided the primary researcher with the student list by year in the program, as well as each student's assigned clinical site for the semester. The participating program conducted a 3-year professional phase as part of its overall curriculum. All students ($N = 43$) enrolled in the professional phase of the program were asked to participate. Informed consent forms were signed by the participating program's program director and the students who agreed to participate ($n = 40$; 31 females, 9 males). Participants constituted 3 cohorts: 12 first-year students, 14 second-year students, 14 third-year students. The mean age of students was 20.65 ± 1.41 years.

The primary researcher supplied a 20-minute recorded educational program to the program director that participants viewed during a mandatory meeting before their first clinical experience of the semester. The recorded material included a review of each of the CCs and gave examples of behaviors that would constitute the implementation of each. The program director oversaw the delivery of the educational materials. The program director had notified the researchers that planned assignments throughout the semester would reinforce understanding of the CCs; however, the goal of this session was to ensure that all participants had the same baseline awareness of the components of each of the 6 CC areas before data collection. The materials were also posted in an online format to which the participants had access throughout the semester for reference as needed to review elements of each of the CC areas as they catalogued their ongoing PEs. Separate from this study, the program also required students to complete 6 reflective assignments over the course of the semester, 1 per CC, in which they discussed specific experiences in which they implemented that CC. Approval for this study was obtained from the Human Subjects Research Committee in the Darden College of Education at Old Dominion University (#201403008), as well as the participating institution's institutional review board (#E8858).

Instrumentation

The Internet-based computer program E*Value was used to track PEs and the associated implementation of the 6 CCs for each PE. The athletic training program required students to enter an agreed-upon minimal amount of information for each PE. This information indicated that a PE occurred, what type of encounter occurred (ie, actual PE, practice encounter with peer or preceptor, didactic practice scenario), the length of time spent with the patient, the site at which the PE occurred (ie, college/university, high school, clinic, health services, physician's office), and the student's level of autonomy for this encounter (observed, assisted, or performed, but participants also could select *other* or any combination of these roles). For this study, the participants who input any combination of roles for any encounters were all placed in the *other* category. Participants who selected any clinical site for a PE that was not either a college/university or high school were assigned to the *other* group (n = 11 encounters). An additional block of questions was created within the PE reporting page to determine CC implementation. For each PE, the participant documented whether he or she was able to implement the CC during the encounter via *yes*/*no* radio-button responses.

Data-Collection Procedures

Patient encounters were documented throughout the fall semester. The program director monitored student encounter data input daily and reminded participants to input data if they were not doing so in a timely fashion. Monthly participant records were downloaded 7 days into the following month by the institution's program director and forwarded to the primary investigator. Therefore, PEs that occurred during the month but were documented by the participant after the seventh day of the following month were not evaluated in this study. The primary investigator de-identified the data and coded text responses (ie, *yes*/*no*) into numeric data entries.

Data Analysis

Participant responses were uploaded into SPSS (version 21.0; IBM Corp, Armonk, NY). Due to the manner in which encounters were reported, data were analyzed in 2 ways. One method grouped the data per PE, and the other method grouped data per participant. When we analyzed the data by PEs, variables were the PE length (minutes), the role of the participant in the encounter, the site at which the encounter occurred, and whether each of the 6 CCs was implemented (*yes*/*no*). When we analyzed the data by participant, variables were the average encounter length (minutes), the encounter frequency, the number of times each CC was implemented, and the total number of CCs implemented per participant, as well as the modal role and clinical site of the participant during the encounter.

Descriptive data were tabulated for CC implementation (total, PCC, IPE, EBP, QI, HI, and professionalism), as well as for the independent variables (PE frequency, PE length, role of the participant, and clinical site of the encounter). These descriptive data are outlined in Tables 1 and 2.

Separate 1-way between-participants analyses of variance were calculated to determine if the role (observed, assisted, performed, or other) or clinical site (university/college, high school, or other) was related to the implementation of total number of CCs. All post hoc analyses for significant main effects were completed using a conservative Bonferroni α adjustment.

We conducted multiple linear regressions to determine how the average length of PEs by participants and the frequency of PEs per participant related to the average and total number of implemented CCs. Binary logistic regression models were used to determine how the length of each encounter related to the implementation of each CC, as well as how the role of the participant per encounter and type of clinical site at which the encounter occurred affected the participant's ability to implement the CCs. Because the assisted role had the highest likelihood of CC implementation (4.46 $\pm$ 1.08) compared with observed (4.17 $\pm$ 1.10), performed (4.14 $\pm$ 1.43), or other (3.13 $\pm$ 1.61), we determined that *assisted* would be the comparison role for the binary logistic regression (omit category) when examining CC implementation for each individual competency based on the role of the participant. As the university/college setting is typically identified as the traditional setting in which the ATSs complete clinical requirements, it was selected as the comparison setting for the binary logistic regressions (omit category) when examining the implementation of each of the individual CC categories based on the clinical site assignment of the participant.

Finally, a multiple linear regression was performed to determine how all independent variables by participant (frequency of PEs, average length of PE, modal role of participant, and clinical site) were related to the total number of CC implementations for the semester. The level of significance for all analyses was set a priori at $\alpha < .05$.

RESULTS

The CCs were implemented over a total of 2744 PEs, with an average of 4 CCs implemented per encounter (4.04 $\pm$ 1.37). Participants were most likely to report that they implemented the CCs of PCC (91% of encounters) and professionalism (99% of encounters). Participants were

Table 1. Descriptive Data for Core Competency Implementation

Dependent Variable	Description	Variables[a]	Number	Percentage	Mean ± SD
Sum of core competency implementation	Per a patient encounter (range = 0–6)	Total	2744	100	4.04 ± 1.37
		0	9	0.3	
		1	228	8.3	
		2	51	1.9	
		3	554	20.2	
		4	771	28.1	
		5	788	28.7	
		6	343	12.5	
Ability to implement the patient-centered care competency		No	251	9.1	
	Per a patient encounter	Yes	2493	90.9	0.91 ± 0.29
Ability to implement the interprofessional collaboration competency		No	1986	72.4	
	Per a patient encounter	Yes	758	27.6	0.28 ± 0.45
Ability to implement the evidence-based practice competency		No	1099	40.1	
	Per a patient encounter	Yes	1645	59.9	0.6 ± 0.49
Ability to implement the quality improvement competency		No	553	20.2	
		Yes	2191	79.8	0.8 ± 0.4
Ability to implement the informatics competency		No	1470	53.6	
	Per a patient encounter	Yes	1274	46.4	0.46 ± 0.5
Ability to implement the professionalism competency		No	29	1.1	
	Per a patient encounter	Yes	2715	98.9	0.99 ± 0.1

[a] *No* = 0, *yes* = 1.

least likely to report implementation of HI (46.4% of encounters) and IPE (27.6% of encounters). See Table 1 for descriptive statistics on the implementation of the CCs.

Patient Encounter Length by Participant

The average length of time participants spent in a PE was 19.29 minutes (±23 standard deviations). As the average length of the PE increased, the total number of CCs implemented by the participant decreased ($b_{2,34}$ = –0.64, r^2 = 0.61, $P < .001$). The average length of the PE was not related to the average number of CCs implemented per participant (F = 1.79, P = .190). As the average length of the PE increased, implementation of 4 of the 6 CCs by the participant decreased: PCC ($b_{2,34}$ = –0.63, r^2 = 0.54, P = .043), EBP ($b_{2,34}$ = –0.38, r^2 = 0.36, $P < .001$), QI ($b_{2,34}$ = –0.53, r^2 = 0.49, P = .002), and professionalism ($b_{2,34}$ = –0.79, r^2 = 0.77, $P < .001$). The average length of the PE did not affect the implementation of IPE (P = .514) or HI (P = .129).

Frequency of Patient Encounters by Participant

Participants encountered a range of 2 to 240 patients each. As the total number of PEs by each participant increased (74.2 ± 59.2), the total number of CCs implemented by the participant also increased ($b_{1,35}$ = 0.85, r^2 = 0.79, $P < .001$). As the total number of PEs by each participant increased, the average number of CCs implemented per participant also increased ($b_{1,35}$ = 4.85, r^2 = 0.16, P = .016), as did the implementation of 5 of the 6 individual CCs: PCC ($b_{1,35}$ = 0.81, r^2 = 0.66, $P < .001$), EBP ($b_{1,35}$ = 0.55, r^2 = 0.31, $P < .001$), QI ($b_{1,35}$ = 0.77, r^2 = 0.59, $P < .001$), HI ($b_{1,35}$ = 0.48, r^2 = 0.23, P = .003), and professionalism ($b_{1,35}$ = 1.0, r^2 = 0.99, $P < .001$). The number of PEs did not affect the implementation of IPE (P = .734).

Table 2. Descriptive Data for Role and Site per Patient Encounter

Variable	No. (%)
Student role	
Observed	865 (3.15)
Assisted	601 (21.9)
Performed	781 (28.5)
Other	474 (17.3)
Clinical site assignment	
University	1927 (70.2)
High school	806 (29.4)
Clinic/other	11 (0.4)

Participant Role per Encounter

The role of the participant during PEs was related to the ability to implement the total number of CCs (F = 103.48, $P < .001$). Pairwise comparisons further indicated that those who observed PEs were likely to implement fewer total CCs than those who assisted (M diff = –0.29, $P < .001$) but were likely to implement more CCs than those who selected the role of *other* (M diff = 0.44, $P < .001$). Additionally, those who assisted during the PE were likely to implement more total CCs than those who solely performed the PE (M diff = 0.32, $P < .001$) or those who selected the role of *other* (M diff = 0.29, $P < .001$).

When inputting the data from each individual PE, participants selected the role that they fulfilled during the encounter and then selected a dichotomous (*yes*/*no*) radio-button option to indicate whether or not the participant believed he or she had implemented that competency during the PE for each of the CC categories. When examining the participant role's relationship with competency implementation, the role of *assisted* was used as the comparison, or omitted, variable. Odds ratios for the participant roles are also detailed in Table 3.

For PCC (Nagelkerke R^2 = 0.17), those who observed PEs (β = –1.21, Wald $\chi^2[1]$ = 9.36, P = .002) were less likely (B = 0.30) to implement the competency during PEs than those who assisted. The participants who performed PEs (β = –2.21, Wald $\chi^2[1]$ = 35.00, $P < .001$) were even less likely (B = 0.11) to implement PCC, and those who

Table 3. Odds Ratios for Student Role Compared With the Assisting Role

Core Competency	Observed			Performed			Other		
	Odds Ratio (B)	P Value	Likelihood	Odds Ratio (B)	P Value	Likelihood	Odds Ratio (B)	P Value	Likelihood
Patient-centered care	0.30	.002	3.33	0.11	.000	9.09	0.04	<.001	25
Interprofessional education and collaborative practice	1.04	.739		1.17	.179		0.46	.001	2.17
Evidence-based practice	1.32	.014	0.75	0.93	.511		0.17	<.001	5.88
Quality improvement	1.07	.662		0.35	.000	2.86	0.34	<.001	2.94
Use of health care informatics	0.31	.000	3.23	0.89	.309		0.26	<.001	3.85
Professionalism	0.27	.041	3.7	0.41	.188		1.14	.886	

selected *other* ($\beta = -3.31$, Wald $\chi^2[1] = 79.47$, $P = .000$) as the role were the least likely ($B = 0.04$) to implement PCC as compared to those who assisted.

For IPE (Nagelkerke $R^2 = 0.03$), those who observed PEs ($\beta = 0.04$, Wald $\chi^2[1] = 0.11$, $P = .739$) or performed PEs ($\beta = 0.16$, Wald $\chi^2[1] = 1.81$, $P = .179$) did not differ from those who assisted PEs in the likelihood of implementing the competency. Those that selected *other* ($\beta = -0.78$, Wald $\chi^2[1] = 25.30$, $P < .001$) as the role were less likely ($B = 0.46$) to implement IPE as compared to those who assisted.

For EBP (Nagelkerke $R^2 = 0.15$), those who observed PEs ($\beta = 0.28$, Wald $\chi^2[1] = 6.05$, $P = .014$) were more likely ($B = 1.32$) to implement the competency than those who assisted. The participants who selected *other* as the role ($\beta = -1.79$, Wald $\chi^2[1] = 172.05$, $P < .001$) were less likely ($B = 0.17$) to implement EBP than those who assisted. Those who performed the PE ($\beta = -0.07$, Wald $\chi^2[1] = 0.43$, $P = .511$) did not differ from those who assisted in implementing the EBP competency.

For QI (Nagelkerke $R^2 = 0.07$), those who observed PEs ($\beta = 0.07$, Wald $\chi^2[1] = 0.191$, $P = .662$) did not differ in the likelihood of implementing the competency compared with those who assisted. The participants who performed the PE ($\beta = -1.06$, Wald $\chi^2[1] = 54.16$, $P < .001$) and those who selected *other* ($\beta = -1.07$, Wald $\chi^2[1] = 46.73$, $P < .001$) were less likely ($B = 0.35$ and $B = 0.34$, respectively) to implement QI than those who assisted.

For HI (Nagelkerke $R^2 = 0.11$), those who performed PEs ($\beta = -0.11$, Wald $\chi^2[1] = 1.03$, $P = .309$) did not differ from those who assisted. The participants who observed PEs ($\beta = -1.17$, Wald $\chi^2[1] = 114.53$, $P < .001$) and those who selected *other* ($\beta = -1.35$, Wald $\chi^2[1] = 107.13$, $P < .001$) were less likely ($B = 0.31$ and $B = 0.26$, respectively) to implement HI than those who assisted.

For professionalism (Nagelkerke $R^2 = 0.03$), those who performed PEs ($\beta = -0.88$, Wald $\chi^2[1] = 1.74$, $P = .188$) or selected the role of *other* during PEs ($\beta = 0.13$, Wald $\chi^2[1] = 0.02$, $P = .886$) did not differ from those who assisted in implementing the competency. Those who observed PEs ($\beta = -1.30$, Wald $\chi^2[1] = 4.18$, $P = .041$) were less likely ($B = 0.27$) to implement professionalism as compared with those who assisted.

Table 4. Odds Ratios for the Clinical Site of the Encounter as Compared With the University/College Site

Core Competency	High School		
	Odds Ratio (B)	P Value	Likelihood
Patient-centered care	6.37	<.001	0.16
Interprofessional education and collaborative practice	0.51	<.001	1.96
Evidence-based practice	1.19	.042	0.84
Quality improvement	1.18	.132	
Use of health care informatics	0.51	<.001	1.96
Professionalism	2.02	.157	

Clinical Site per Encounter

The clinical site of the PE was categorized into 2 groups: university/college (1927 encounters) and high school (806 encounters). The 11 encounters that occurred in other locations (ie, student health clinics or physicians' offices) were not included in this analysis. Clinical site was related to the sum of the CCs implemented per encounter ($F = 4.413$, $P = .036$).

The university/college setting was the comparison basis for the binary logistic regressions when we examined the implementation of each individual CC category based on the clinical site of the PE. The odds ratios for the clinical site are detailed in Table 4.

For PCC (Nagelkerke $R^2 = 0.07$), those whose encounters occurred at a high school ($\beta = 1.85$, Wald $\chi^2[1] = 52.81$, $P < .001$) were more likely ($B = 6.37$) to implement the competency than those at a university/college site. For IPE (Nagelkerke $R^2 = 0.03$), those whose PEs occurred at a high school ($\beta = -0.68$, Wald $\chi^2[1] = 44.12$, $P < .001$) were less likely ($B = 0.51$) to implement the competency than those at a university/college site. For EBP (Nagelkerke $R^2 = 0.002$), those whose PEs occurred at high schools ($\beta = 0.18$, Wald $\chi^2[1] = 4.14$, $P = .042$) were more likely ($B = 1.19$) to implement the competency than those at university/college sites. For QI (Nagelkerke $R^2 = 0.001$), the likelihood of implementation at a high school ($\beta = 0.16$, Wald $\chi^2[1] = 2.27$, $P = .132$) did not differ from that at a university/college site. For HI (Nagelkerke $R^2 = 0.031$), PEs that occurred at a high school ($\beta = -0.68$, Wald $\chi^2[1] = 61.73$, $P < .001$) were less likely ($B = 0.51$) to involve implementing the competency as compared with those at a university/college site. For professionalism (Nagelkerke $R^2 = 0.008$), implementation during PEs that occurred at high schools ($\beta = 0.70$, Wald $\chi^2[1] = 2.00$, $P = .157$) did not differ from that at a university/college site.

Frequency, Length, Role, Site, and CC Implementation per Participant

The model of all independent variables (frequency of PE, average length of PE, modal role of participant, and clinical site type) was related to the total implementation of CCs ($F = 22.94$, $P < .001$, $r^2 = 0.74$). However, frequency of PEs

Table 5. Effects of Frequency, Length, Role, and Site on Total Core Competency Implementation per Student

Variable	Coefficients[a] Unstandardized B	Unstandardized Standard Error	Standardized β	*t* Value	*P* Value
(Constant)	59.898	54.450		1.100	.280
Average time spent per encounter	1.010	1.711	.054	.590	.559
Modal role of student	−21.320	19.780	−.101	−1.078	.289
Clinical site (modal) where student saw majority of patient encounters	2.005	45.411	.004	.044	.965
Frequency of patient encounters	3.341	.353	.881	9.458	<.001

[a] Dependent variable: total competency implementation.

was the only significant variable in this model ($b_{4,32}$ = 3.341, $t = 9.458$, $P < .001$). Consequently, when examined in a singular model, frequency of PEs was the only variable that was related to total CC implementation (see Table 5 for full regression statistical output).

DISCUSSION

Patient Encounter Length

An inverse relationship was identified between the length of time a participant spent with a patient and the total number of CCs implemented. The average PE per participant was just under 20 minutes, and the average number of CCs that were reported as implemented was 4. This inverse relationship existed by individual competencies as well. As the average length of time spent with patients increased, participants reported a decreased number of times that they were able to implement PCC, EBP, QI, and professionalism. This finding supports the existing evidence[18–22] that suggested students benefitted from purposeful, high-quality, clinical education experiences as opposed to accumulating a quantity of hours or time at clinical education sites.

This finding should also be evaluated in the context of the potential total CCs that can actually be implemented. Only 6 CCs can be implemented in a single patient interaction. Hypothetically, using a 1-hour time frame, if student A spends 60 minutes with a patient, each CC can be implemented only once. Conversely, if student B spends an average of 20 minutes per patient, and therefore has 3 PEs in the provided time frame, the student can implement each CC 3 times, for a total of 18 possible implementations. This consideration is supported by the determined lack of relationship between the average length of PEs and the average number of CCs implemented by participants. Participants who had shorter PEs averaged the same number of CCs as those with longer PEs but for the semester overall had more implementations of the CCs. If ATSs are fulfilling an hours quota in clinical education, those who have a higher frequency of patient interaction likely spend proportionally less time with patients and therefore have a higher rate of CC implementation. This highlights the potential need for students to track patient encounter frequency versus hours completed in clinical education if CC exposure is an associated goal of clinical education.

Patient Encounter Frequency

The relationship noted between the frequency of PEs and the total number of CCs implemented was the opposite of that for PE length. As the average number of PEs increased, so did the total number of CCs that could be implemented. This finding was mirrored in the examination of the average number of CCs implemented. Students in nursing and physician assistant education programs reported that having more opportunities to practice skills ultimately correlated with improved competency.[15,16] When examined in 1 model with all of the independent variables included in our study, PE frequency was the single significant variable that related to total CC implementation, explaining 74% of the variance. Therefore, if ATSs are fulfilling an hours quota in clinical education, those who have a higher frequency of PEs have a higher rate of CC implementation. Thus, the aims of clinical education should be directed at obtaining an increased number of PEs for students in order to provide them the greatest opportunity for CC implementation rather than a set number of hours.

Participant Role

The role of the participant was related to the total number of CCs implemented. Those who assisted with PEs were more likely to implement more of the CCs than those who performed the encounter, observed the encounter, or fulfilled a combination of these roles (other). It has been reported[20–24] that interactions with preceptors during clinical education experiences affect the student's learning from and satisfaction with the experiences. It is possible that this highlights the overall importance of the preceptor's role in clinical education and the attainment of proficiency in the CCs during PEs. The accreditation standards require that during clinical education, the preceptor must be physically present and able to intervene on behalf of the student and the patient.[7] Another health care profession[18] has identified that in order for students to learn about the CCs during clinical rotations, the preceptor must purposefully introduce and reinforce the competencies during patient interactions. If a student is observing PEs, he or she is likely watching the preceptor perform the components of the encounter and could have both limited interaction with the patient and the patient's other health care providers and limited input in the clinical decision-making process, all of which would contribute to some of the CC implementation. Conversely, if the student is performing the encounter independently, he or she may not be consciously attempting to reinforce the CCs during the encounter without a preceptor purposefully encouraging him or her to do so. Through assuming the role of assisting during a PE, it appears that the interaction between preceptor and student allowed for the greatest implementation of the total number of CCs.

Patient-Centered Care

Patient-centered care is defined as the provision of care during which the practitioner informs, educates, and communicates with the patient in a compassionate manner while serving as an advocate for the patient's best interests.[8–11] Participants in this study were most likely to report incorporating PCC into their PEs. Similar to our findings, PCC has been reported[15] by students and faculty as the most likely CC to be implemented in patient care during nursing education programs. Implementation of the PCC competency was less likely to occur during longer PEs but occurred more often as the frequency of PEs increased. This finding highlights the possibility that the importance of attaining competency within clinical education may not solely reflect the number of skills actually performed by the student but more the purposeful, active educational process of learning from a preceptor or mentor during the encounter. For PCC, the role of participants assisting their preceptor allowed for an increased opportunity to provide PCC: 3.3 times more likely than for those who observed, 9.1 times more likely than for those who actually performed the encounter, and 25 times more likely than for those who identified their role as other. Based on these findings, the clinical education experiences that result in increased implementation of PCC are those that provide increased PE frequency, without lengthened PE times, and that allow for the student to assist with the PE. It is likely that PCC was the most frequently reported CC because students were self-assessing their performances and probably believed that they provided PCC in the majority of their encounters. Communication and education between the preceptor and student and between the practitioners and patient were likely increased in PEs in which the student was assisting the preceptor, thus resulting in the increased probability of implementing PCC.

This competency's implementation was influenced by the clinical site assignment, but in practice, this equated to the student in the high school setting being only 0.2 times more likely to implement the competency during a PE than students in the university/college setting. Therefore, until this relationship is evaluated on a larger scale, this finding may not have practical implications.

Interprofessional Education and Interprofessional Practice

The definition of *interprofessional education* is learning about, with, and from other health care providers, whereas the definition of *interprofessional practice* is the ability to interact with other health professionals in a manner that optimizes the quality of care provided to individual patients.[8–11] Implementation of the IPE CC was not related to the average length of time of PEs or the frequency of PEs. The descriptive statistics indicated that the participants were able to implement IPE in just over a quarter of PEs, and IPE was the least implemented CC in the study. In nursing education, only about half of students and faculty were able to integrate interdisciplinary care.[15] The authors of this same study also found that the lack of interprofessional collaboration was identified as the single largest barrier to providing PCC.[15] The lack of IPE implementation in our study indicates a need for athletic training program personnel to seek specific encounters and clinical sites that will allow students to interact clinically with other health care professionals. In our study, of the 2744 encounters, only 11 occurred outside the traditional academic athletic training settings. Per the documentation provided by the program director, none of the participants were specifically assigned to nonacademic sites for the entire semester of the data-collection time frame. It may be that this CC was the least likely to be incorporated due to the structure of most traditional, academic athletic training facilities, which often do not employ other types of health care providers. Interprofessional education is more easily achieved in clinical facilities operating within a medical model, which often employ a variety of providers. Therefore, these data indicate that if students are not intentionally assigned to clinical experiences designated to promote IPE, these interactions are unlikely to occur organically and regularly at an academic site.

Implementation of this competency was twice as likely in the university/college setting compared with the high school setting. This may be because postsecondary athletic programs are more likely to employ physicians who frequently treat patients on-site, giving ATSs the opportunity to interact with them more often.

Notably, minimal relationships occurred between the examined variables and the implementation of IPE. This CC is thought to be more easily coordinated at the graduate level of education and within departments that contain other allied health educational programs[25]; our participant sample was within an undergraduate program in a school of kinesiology, so this programmatic structure may have affected these results. Furthermore, experiences that were didactic in nature within the athletic training program that may have involved personnel from other health care professions were not included in these reported data. However, our findings do bring to light the need for programs to purposefully seek opportunities for students to participate in interprofessional care teams during clinical practice.

Evidence-Based Practice

Evidence-based practice is defined as integrating the best research evidence with clinical expertise and patient values to make decisions about the care of patients.[8–11] Translation of EBP from didactic to clinical education experiences can be challenging, as has been reported both in athletic training[26–30] and in nursing education.[15] In this study, the implementation of EBP was related to both the length and frequency of PEs. Participants who spent more time on average with patients reported a decreased number of times that they implemented EBP, whereas those who saw a higher patient volume were more likely to implement this CC. Our results also indicate that the role of the participant was related to the implementation of EBP. Those who observed PEs were statistically more likely to implement EBP than those who assisted during encounters, which meant that those who observed were 0.75 times more likely to implement EBP, so this may not be clinically relevant in practice until it is evaluated on a larger scale. No differences were seen in the likelihood of implementing EBP between those who assisted with and those who performed the PE. The influence of the student's role on the implementation of EBP during the PE may again highlight the importance of supervised, progressively autonomous clinical practice with a preceptor who engages the student during the PE. The odds of EBP implementation did not vary between PEs that occurred in the university/college setting versus the high school setting.

Overall, these findings indicate that EBP was most frequently implemented in academic settings when PEs were more frequent but not necessarily longer in length. The relationship with the role that the student plays in the interaction may need to be examined more in the future.

Quality Improvement

Quality improvement is defined as the process of continually understanding and measuring the quality of care in terms of structure, process, and outcomes in relation to the patient's and community's needs.[8–11] Quality improvement was also inversely related to the length of PEs and was positively related to the frequency of PEs, once again highlighting the need for students to have a higher volume of PEs during their clinical education experiences to allow for greater implementation of this competency. The participants who assisted with PEs were 2.9 times more likely to implement QI than both those who performed the PE and those who selected the role of other. This finding further emphasizes the importance of preceptor interaction during PEs, as students who are assisting their preceptors in providing care to patients are more likely to report their participation in the competency implementation process.

Overall, an increase in QI implementation is likely to occur in clinical education experiences that allow for higher patient frequency, as well as when a preceptor engages the student to assist in the PE but not necessarily during experiences designated at specific site types. Quality improvement is intended to be cyclical and reflective in nature, allowing for consideration of the changes made and analysis of the outcomes. Measuring this competency in terms of individual PEs may limit the applicability of these findings.

Use of Health Care Informatics

Health care informatics is defined as the use of information technology to manage clinical data and access available evidence pertaining to optimal patient care.[8–11] Health care informatics implementation was not related to the length of PEs. As a competency that is technologically focused, HI may be performed outside of the physical presence of the patient, and therefore, participants did not report it as part of the PE. Health care informatics implementation was related to the number of PEs: participants who catalogued more PEs were more likely to implement this competency. The methodologic design of this study required HI to be part of the data-collection process, and this should be considered when examining the results; however, the collection process used what was essentially an electronic medical record software program, so as participants reported more encounters, they were in fact implementing this competency, thereby validating the findings. Participants who assisted and performed PEs did not differ in their implementation of HI, but those who observed PEs were 3.2 times less likely and those who selected the role of other were 3.8 times less likely to implement HI than those who assisted. Similar to the aforementioned competencies, this finding underlines the importance of preceptor engagement and having progressively autonomous supervised clinical education.

Professionalism

Professionalism is exhibited through ethical behavior, a respectful demeanor toward all persons, compassion, a willingness to serve others, sensitivity to the concerns of diverse patient populations, a conscientious approach to the performance of duties, a commitment to continuing education, and contributions to the body of knowledge in the discipline.[8–11] The implementation of professionalism was related to the length and frequency of PEs. Participants who had the opportunity to engage in patient care for a higher volume of patients were more likely to implement professionalism, but those who averaged a longer time with patients reported implementing professionalism less frequently. Participants who observed PEs were 3.7 times less likely to implement professionalism than those who assisted, once again accentuating the need for preceptor engagement in the patient's treatment to implement CCs. The clinical site at which the PE occurred did not relate to the implementation of professionalism, continuing to draw attention to the potential lack of importance of site type and the need for increased focus on patient volume and student engagement, regardless of the site.

LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

We studied 1 professional athletic training program, and although the findings were significant and potentially affect how program personnel examine and evaluate clinical education, the findings may not be universally applicable across all programs until evaluated on a larger scale. This study examined only CC implementation frequency and not the quality with which the CCs were implemented during the PE. Additionally, data collection relied on the consistent reporting of PEs by the participants and did not incorporate the preceptors' perceptions of CC implementation, which might have yielded different results.

Future researchers should examine these variables across a larger programmatic population, including postbaccalaureate-level professional programs, to determine their relevance to all athletic training programs. Additionally, our study was conducted over the course of a single semester; future investigators should consider a more longitudinal approach to evaluating PEs as ATSs progress through clinical education. In addition to tracking how PEs affect CC implementation, authors could also examine how PEs are related to students' perceptions of competence and change in competence over time in the realms of the CCs. Lastly, as preceptor assistance during PEs was identified as a factor in students' CC implementation, researchers should examine the student-to-preceptor ratio that best supports preceptor mentorship in the clinical education experience, the development and training of the preceptor that best facilitates incorporation of the CCs, and the preceptors' perceptions of CC implementation to better validate the accuracy of students' understanding of when the CCs are actually being incorporated into patient care.

CONCLUSIONS

Implementation of the majority of the CCs was related to the frequency of PEs. Participants who had the opportunity to interact with a higher patient volume were more likely to implement the CCs as a whole. Athletic training programs should be monitoring PE volume to ensure that students receive quality clinical education experiences rather than simply accumulate a specific number of hours. Clinical education sites should be evaluated based on patient volume to determine whether the experience is valuable if a goal of a clinical education experience is to allow students the opportunity to implement the CCs.

Implementation of some of the CCs was more likely when participants were assisting than observing or performing the PE. This finding underscores the importance of the interaction and guidance of a preceptor who engages the student during the CCs and the true need for supervised clinical education experiences. Athletic training program personnel should evaluate preceptors on a regular basis to determine how effectively the engagement process is being incorporated into PEs and to ensure that the preceptors are educating students on how to best implement the CCs while interacting with them. Preceptor training should incorporate instruction on how to facilitate PEs to allow greater opportunities for students to assist the preceptor throughout the time spent with the patient and to encourage CC implementation in students who are performing PEs autonomously.

With the exception of EBP, minimal to no relationships existed between the clinical site at which the PEs occurred and CC implementation, emphasizing the greater importance of what the student is doing at the clinical site relative to the PEs rather than the importance of the site at which the PE occurs. The role of the student during PEs and the volume of PEs should be considered the priorities for students to promote increased CC implementation rather than seeking specific types of clinical education sites.

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