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ORIGINAL RESEARCH

Effect of Procedure Type on Core Competency Implementation by Athletic Training Students

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Context: Core competencies (CCs) are now a required component of educational content in all types of Commission on Accreditation of Athletic Training Education-accredited athletic training programs. There is limited evidence demonstrating which procedures included during patient encounters (PEs) occurring in clinical education allow for implementation of CCs.

Objective: To determine the relationship between procedures performed by athletic training students during PEs on CC implementation.

Design: Panel design.

Setting: Undergraduate, 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 (Medhub) software; 40 participants (31 female, 9 male) enrolled in the professional phase (12 first year, 14 second year, 14 third year) participated.

Interventions: Participants viewed a 20 minute recorded CC education module followed by educational handouts, which were available online for reference throughout the semester. E*Value was used to track procedures (prevention, evaluation, manual therapy, rehabilitation, treatment, diagnostic, surgical, or other) performed during PEs and an added block of questions indicating which, if any, of the CCs were implemented during the PE.

Main Outcome Measure(s): Independent variables included procedures performed during PEs and whether any of the 6 CCs were implemented (yes/no). Binary logistic regression models determined how the type of procedure performed related to the implementation of each CC.

Results: Regression models were significant for 5 of the 6 CCs: patient-centered care (PCC; $\chi^2_7 = 62.949$, $P < .001$), interprofessional education and collaborative practice (IPECP; $\chi^2_6 = 41.172$, $P < .001$), health care informatics ($\chi^2_7 = 186.487$, $P < .001$), evidence-based practice (EBP) ($\chi^2_8 = 54.712$, $P < .001$), and quality improvement ($\chi^2_7 = 67.967$, $P < .001$). Participants including evaluation procedures during PE were 3.6 and 1.3 times more likely to implement PCC and IPECP, respectively. Participants including a diagnostic procedure were 4.2 and 2.9 times more likely to implement EBP and IPECP, respectively, and 0.2 times less likely to implement health care informatics. Participants incorporating a manual therapy procedure were 2.6, 1.7, and 2.1 times more likely to implement PCC, EBP, and quality improvement, respectively.

Conclusions: Athletic training program administrators should identify clinical sites that allow for PEs and procedural opportunities that align with priorities for greater CC implementation.

Key Words: Patient encounters, clinical education, evidence-based practice

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KEY POINTS

- The procedural opportunities available to athletic training students at assigned clinical sites impact the likelihood for core competency implementation.
- Increased educational emphasis need to be placed on the interconnectedness of the core competencies in clinical practice.
- Interprofessional education and collaborative practice, evidence-based practice, and the use of health care informatics are similarly more likely to be implemented by students when opportunities to perform diagnostic procedures are available at their clinical site.

INTRODUCTION

It has been more than 15 years since the Institute of Medicine outlined the core competencies (CCs), behaviors that should be performed by health care providers intended to improve patient outcomes, in an attempt to overhaul the existing health care system.[1] These 5 competencies include evidence-based practice (EBP), interprofessional education and collaborative practice (IPECP), health care informatics (HI), quality improvement (QI), and patient-centered care (PCC).[2] The Accreditation Council for Graduate Medical Education also released standards in 2006 that incorporated a sixth competency area of professionalism, which has since been incorporated into other health care provider preparation educational content as well as standards of practice.[3]

The CCs have been required educational content in Commission on Accreditation of Athletic Training Education (CAATE) accredited postprofessional athletic training degree and residency programs since 2014 and 2016, respectively.[4,5] The 2020 standards for CAATE accredited professional athletic training programs similarly require the inclusion of the CCs within the curricular content of programs taught at the postbaccalaureate degree level.[6] These standards indicate that competence and subsequent compliance with the standards should be assessed on sufficient interaction with actual patients and can be supplemented by simulation opportunities.[6]

Past research has identified that the role of the student, such as observing, assisting, or performing patient encounters (PEs), relative to the role of the preceptor may impact CC implementation.[7] It has been noted that students who assist their preceptor during PEs are more likely to implement CCs.[7] Additionally, students who have a higher volume of PEs during clinical education have increased opportunities to implement CCs.[7] As the CCs have not been a required component of the professional educational preparation of athletic trainers in the past, there is still scarce evidence demonstrating which characteristics of clinical education allow for the implementation of the CCs when students are interacting with actual patients. Therefore, the purpose of this study was to explore CC implementation by athletic training students relative to procedures included during PEs occurring within clinical education.

METHODS

Design

We used a panel design that tracked a cohort of students over the course of 1 academic semester. A panel design is used to sample a group of participants, measuring a variable or multiple variables of interest at more than 1 point in time from this panel.[8]

Participants

E*Value (Medhub, Minneapolis, MN), a software program that provides tracking and recordkeeping capabilities for health care education programs, provided the researchers with a list of participating athletic training programs. Purposeful sampling was employed to recruit an institution willing to require students to track the number and type of PEs, the procedures performed during the encounter, and the level of supervision provided by preceptors during those encounters. The program that volunteered to participate was housed at a Carnegie Classification RU/VH (very high research activity) institution that was also a National Collegiate Athletic Association Division I university. The participating program was a professional level, CAATE-accredited, undergraduate athletic training program that included 3 cohorts of students. The program director, after signing the informed consent, provided the primary researcher with student cohort lists for admitted students, the existing list of patient care procedures being used by the program, as well as each student's assigned clinical education sites for the duration of the study. All enrolled students ($N = 43$) were recruited to participate, and ultimately only those who signed the informed consent form ($n = 40$; 31 females, 9 males; 12 first-year students, 14 second-year students, 14 third-year students) were included in the study. The mean age of participants was 20.65 ± 1.41 years.

The primary researcher supplied a 20 minute recorded educational PowerPoint (version 15.0; Microsoft Corporation, Redmond, WA) program that included a review of the definition of each of the CCs (see Table 1 for definitions provided)[1,2,4,5] and gave examples of behaviors that would constitute implementation of each. Participants viewed this recording during a mandatory meeting prior to their first clinical experience of the semester, with the goal that all participants would minimally have the same baseline exposure to the CCs before data collection. The recorded PowerPoint was also provided to the program and was posted within their online learning platform for the students to access throughout the semester if needed. Approval for this study was obtained from the College Human Subjects Research Committee at the university, as well as the participating institution's institutional review board.

Table 1. Core Competency Definitions

Competency	Definition
Evidence-based practice	Integration of best research evidence with clinical expertise and patient values to make decisions about the care of patients. Participate in learning and research activities when possible to improve your clinical knowledge base.
Health care informatics	Clinicians use information technology to manage clinical data and access the most recent evidence pertaining to optimum patient care. Use of information derived from online or internal databases for clinical decision support. Guide patients to accurate and reliable online health-related information. Use technology to communicate effectively to enhance the level of care a patient receives.
Interprofessional education and collaborative practice	Learning about, with, and from other health care providers. In practice, the ability to interact with other health professionals in a manner that optimizes the quality of care provided to individual patients. Cooperate, collaborate, communicate, and integrate care in teams to ensure that care is continuous and reliable. Use health care teams to reduce health care costs and decrease the likelihood of medical errors.
Patient-centered care	Efforts to inform, educate, and communicate with patients in a compassionate manner. Serve as an advocate for the patient's best interests and recognize conflicts of interest.
Professionalism	Relates to personal qualities of honesty, reliability, accountability, patience, modesty, and self-control. It 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 performance of duties, a commitment to continuing education, contributions to the body of knowledge in the discipline, appropriate dress, and maintenance of a healthy lifestyle. In athletic training, it includes adherence to National Athletic Trainers' Association Code of Ethics and the Board of Certification Standards of Practice.
Quality improvement	Identifying errors and/or hazards in care. Continually understand and measure quality of care in terms of structure, process, and outcomes in relation to the patient's and community needs. Design and test interventions to change processes and systems of care.

Instrumentation

The Web-based computer program E*Value (Medhub, Minneapolis, MN) was used to track PEs, the students' roles in PEs, procedures performed, and the associated implementation of the 6 CCs for each PE. Procedure options for the students were derived from the program's existing list of available procedures (76 options logged). A team of 3 athletic trainers (J.M.C. and 2 practicing clinicians) used a general inductive approach[9] to categorize the provided list of procedures into 8 categories after completion of data collection. Examples from the original list are provided for each category; however, the participating program did not authorize the release of the entire list of procedures. Prevention (eg, prophylactic taping, pre-activity stretching), evaluation (eg, examination: initial on-field, examination: follow up), treatment (eg, wound care: abrasion, cryo/thermotherapies), manual therapy (eg, myofascial technique, instrument-assisted soft-tissue mobilization), rehabilitation (eg, resistance exercises, range of motion exercise), diagnostic procedure (eg, fluoroscopy, nerve conduction assessment), surgical (eg, arthroscopy, intra-articular fracture), and other (eg, casting). Participants could identify multiple procedures for each PE, and therefore, researchers were able to extrapolate how many of each procedure group occurred during each PE. Additionally, for each PE, the participant identified whether he/she was able to implement each CC during the encounter via *yes*/*no* radio-button responses.

Data Collection Procedures

Patient encounters were documented through the fall semester, and participants were encouraged to log encounters every day as they occurred. Further, students were instructed to record all PEs, including those that they may have primarily observed, as opposed to being the primary provider of care. 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. Deidentified monthly participant records (E*Value titled reports: diagnosis download report and procedure download report) were downloaded 7 days into the following month by the program director and e-mailed to the primary researcher (J.M.C.) securely. For example, August encounter data would be downloaded on September 7. Therefore, PEs that occurred during the respective month, but that were documented after the 7th day of the following month were not evaluated in this study. The primary researcher de-identified the data and coded text responses (ie, yes/no) into numeric data entries. Procedures were categorized into the aforementioned categories upon completion of data collection.

Data Analysis

Participant responses were uploaded into PASW Statistics (version 24.0; SPSS Inc, Chicago, IL). The dependent variable was whether each of the 6 CCs were implemented (yes/no). Descriptive data were tabulated for CC implementation, as well as for the independent variables (procedure type). These descriptive data are outlined in Tables 2 and 3, respectively. Binary logistic regression models were used to determine how the procedure type impacted the participant's implementation of the CCs. Level of significance for analysis was set a priori at $\alpha < .05$.

RESULTS

There were a total of 2744 PEs reported for the academic semester and a total of 6195 procedures ($M = 2.3 \pm 1.4$

Table 2. Descriptive Data for Core Competency Implementation

Dependent Variable[a]	Variables	No. (%)	Mean ± SD
Implementation of the patient-centered care competency	No	251 (9.1)	0.91 ± 0.29
	Yes	2493 (90.9)	
Implementation of the interprofessional collaboration competency	No	1986 (72.4)	0.28 ± 0.45
	Yes	758 (27.6)	
Implementation of the evidence-based practice competency	No	1099 (40.1)	0.6 ± 0.49
	Yes	1645 (59.9)	
Implementation of the quality improvement competency	No	553 (20.2)	0.8 ± 0.4
	Yes	2191 (79.8)	
Implementation of the informatics competency	No	1470 (53.6)	0.46 ± 0.5
	Yes	1274 (46.4)	
Implementation of the professionalism competency	No	29 (1.1)	0.99 ± 0.1
	Yes	2715 (98.9)	

[a] Per patient encounter, no = 0 and yes = 1.

procedures per encounter). Participants incorporated treatment procedures most frequently of all procedure types, including them in 64.2% of encounters. Participants were least likely to report including prevention, surgical, and other procedures occurring in 0.5, 0.3, and 0.7% of encounters, respectively. Regarding CCs, participants were most likely to report that they implemented PCC (91% of encounters) and professionalism (99% of encounters), and were least likely to report implementation of HI (46.4% of encounters) and IPECP (27.6% of encounters).

Patient-Centered Care

The logistic regression model was statistically significant, $\chi^2_7 = 62.949$, $P < .001$. The model explained 10.7% (Nagelkerke R^2) of the variance in implementing PCC and correctly classified 90.9% of cases. Participants that included an evaluation procedure during the PE were 3.6 times more likely to implement PCC; those who included a manual therapy procedure were 2.6 times more likely to implement PCC; those who included a rehabilitation procedure were 1.9 times more likely to implement PCC; and those who included a treatment procedure were 1.5 times more likely to implement PCC. Incorporating diagnostic, surgical, or other procedures into the PE did not influence the likelihood of implementing PCC.

Interprofessional Education and Collaborative Practice

The logistic regression model was statistically significant, $\chi^2_6 = 41.172$, $P < .001$. The model explained 6.6% (Nagelkerke R^2) of the variance in implementing IPECP and correctly classified 73.4% of cases. Participants who incorporated a diagnostic procedure were 2.9 times more likely to implement IPECP. Those who included an evaluation, rehabilitation, or treatment procedure during the PE were 1.3, 1.2, and 1.1. times more likely, respectively, to implement IPECP. Incorporation of prevention, manual therapy, surgical, or other procedures did not influence the likelihood of implementing IPECP.

Evidence-Based Practice

The logistic regression model was statistically significant, $\chi^2_8 = 54.712$, $P < .001$. The model explained 9.9% (Nagelkerke R^2) of the variance in implementing EBP and correctly classified 58.6% of cases. Participants who included diagnostic procedures were 4.2 times more likely to implement EBP during the PE. Incorporating manual therapy, rehabilitation, or treatment procedures during the PE resulted in the participant being 1.7, 1.5, or 1.3 times more likely, respectively, to implement EBP. Inclusion of prevention, surgical, or other procedures did not influence the likelihood of implementing EBP.

Quality Improvement

The logistic regression model was statistically significant, $\chi^2_7 = 67.967$, $P < .001$. The model explained 8.2% (Nagelkerke R^2) of the variance in implementing QI and correctly classified 79.8% of cases. Participants who included manual therapy procedures were 2.1 times more likely to implement QI, and

Table 3. Descriptive Data for Procedure Categories[a]

Procedures Category	No. of Encounters Incorporating Procedures	Percentage of Overall Encounters Incorporating Procedures	Range of Procedures Incorporated into Each Encounter
Prevention	15	0.50	0–2
Evaluation	441	16.10	0–6
Treatment	1761	64.20	0–16
Manual therapy	746	27.80	0–7
Rehabilitation	901	32.80	0–8
Diagnostic	47	1.70	0–3
Surgical	7	0.30	0–1
Other	20	0.70	0–1

[a] Number of participants reporting encounters = 40.

those who included rehabilitation procedures were 1.6 times more likely to implement QI. Incorporation of prevention, evaluation, treatment, diagnostic, surgical, or other procedures did not influence the likelihood of implementing QI.

Health Care Informatics

The logistic regression model was statistically significant, $\chi^2_7 = 186.487$, $P < .001$. The model explained 5.2% (Nagelkerke R^2) of the variance in implementing HI and correctly classified 63.2% of cases. In cases when procedures that were categorized as other were included, participants were 4.0 times as likely to implement HI. When manual therapy or treatment procedures were included in PEs, participants were 1.5 and 1.3 times more likely, respectively, to implement HI. Participants that included diagnostic procedures were 0.2 times less likely to implement HI. Prevention, evaluation, rehabilitation, and surgical procedures did not influence the likelihood of implementing HI.

Professionalism

The logistic regression model for the implementation of professionalism was not statistically significant, $\chi^2_7 = 6.171$, $P = .520$.

DISCUSSION

Patient-Centered Care

Defined as the provision of care during which the practitioner serves as an advocate for the patient's best interest, PCC incorporates patient education and compassionate communication to achieve the desired outcome that meets the patient's goals.[1–3] It has been established that PCC is the most likely CC to be implemented by practitioners in a variety of health care fields and is more likely to be implemented during PEs in which the student is assisting their preceptor.[7,10] Our findings suggest that PCC is more likely to be implemented during PEs that include an evaluation, rehabilitation, or manual therapy procedure. It is likely that this occurred because all of these procedures would typically include thorough communication with the patient, and patient communication is a critical component of PCC.

Our study also found that inclusion of diagnostic, surgical, or other procedures did not increase the likelihood of students identifying that they implemented PCC. It is possible that this occurred because those types of procedures within the PE, or even the PE itself, may have been performed by another provider with the student observing or assisting. Athletic training students may not be perceiving interprofessional collaboration as a component of PCC during the provision of patient care despite coordination of care being delineated as 1 of the 8 dimensions of PCC and a contributing factor of better patient outcomes.[11,12] If the students indeed do not perceive interprofessional collaboration as a component of PCC during the provision of patient care, this identifies a need for programs to emphasize the overlapping components of each of the CCs and their influence on each other, specifically the overlapping components of PCC and IPECP.

To facilitate increased implementation of PCC, athletic training students should be placed in clinical education experiences that allow for PE opportunities that include evaluation, rehabilitation, treatment, and manual therapy as a part of the plan of care for patients at that site. Program administrators should continue to emphasize the importance of preceptor-guided practice and encourage students to assist preceptors in PEs to increase the likelihood of PCC implementation.[7] Increased educational emphasis should be placed on the connection between the coordination of care with other health care providers as a component of PCC to help students better understand the totality of this particular CC.

Interprofessional Education and Collaborative Practice

Interprofessional education and collaborative practice is the practice of learning about, with, and from other health care providers and practices to enable the provision of optimal care to patients.[1–3] In previous findings, IPECP has been shown to be the least likely CC to be implemented by athletic training students, however, is more likely to occur at university/college athletic training practice settings than at high school practice settings.[7] This likelihood has been attributed to the more frequent presence of physicians or physician assistants within the care delivery model of university/college athletic training practice settings.[7] As noted earlier in this discussion, lack of collaborative care has been previously identified as the largest barrier to implementing PCC.[13] There have been many identified benefits of the inclusion of IPECP within health care education, including a greater understanding of the roles of all health care providers and an increased understanding of language and skills necessary for patient care.[13] Patients also benefit from the inclusion of IPECP as it carries over to the provision of PCC.[11,12,14]

Participants who included a diagnostic procedure within the PE were almost 3 times more likely to identify implementing IPECP within our study. This is likely because the inclusion of diagnostic imaging studies, such as magnetic resonance imaging, bone scan, or radiograph included interactions with other health care providers during the process of referral of the patient for diagnostic imaging. There was a minimal increase in the likelihood to implement IPECP when evaluation, treatment, or rehabilitation procedures were included.

Students in professional athletic training programs under the 2020 CAATE standards will be required to have multiple opportunities to implement IPECP within their educational experiences,[6] and diagnostic procedures were incorporated into just 1.5% of PEs that naturally occurred for students in this athletic training program. Furthermore, the inclusion of IPECP only occurred in 25% of all PEs. Research has demonstrated that, while clinicians value the importance of interprofessional collaboration, they are not implementing this competency within their clinical practice.[15] This highlights the need for program administrators to consider how to purposefully incorporate IPECP within the clinical education opportunities that students have, as they may not naturally occur in high enough frequency for the student to fully reap the benefits of the inclusion of this CC, nor for the program to demonstrate compliance with this requirement. Students may also not understand, as demonstrated by our findings, that IPECP is an important component of PCC as well.

Evidence-Based Practice

Defined as the integration of the best research evidence with clinical expertise and patient values,[1–3] EBP has been reported to be one of the CCs that is the most difficult to transition from the classroom to the clinical setting in health care education.[16–20] Past research has demonstrated that the role of the student and the site at which the PE occurred may have little to no influence on the implementation of EBP by students.[7]

Similar to the IPECP competency, diagnostic procedures played an important role in the inclusion of EBP during PEs. Considering that the inclusion of diagnostic procedures increased the likelihood of implementing EBP by 4 times, but that diagnostic procedures were incorporated into only 1.5% of PEs, there appears to be a significant need to supplement student clinical education experiences to provide more opportunities to incorporate EBP, including the possibility of students assisting with the performance or facilitation of diagnostic imaging. It is also possible that PEs that required diagnostic imaging were more complex in nature and resulted in the student asking questions of experts and/or seeking out additional information about the condition, thus increasing the implementation of EBP. The inclusion of manual therapy, rehabilitation, or treatment procedures also resulted in a slight increase in the likelihood to implement EBP, which was similar to the findings of the IPECP competency. Considering the similarities in the implementation of EBP and IPECP, it is plausible to assume that the inclusion of EBP and IPECP are linked in terms of some of the PE opportunities that students experience. This would be supported by the definition of EBP, which includes the integration of clinical expertise, which exists during interactions with all types of health care providers. Thought should be given to the possibility that increased EBP or IPECP competency implementation may influence each other, so consideration of opportunities that promote implementation of both competencies should be given.

Many barriers to the use of EBP in clinical practice have been identified,[16–21] so it may need to be a priority of preceptors to implement EBP within their practice before students will be able to do the same, and program administrators may need to emphasize EBP within their preceptor development as well. Evidence suggests that, while clinicians (preceptors) retain the knowledge connected with EBP-associated continuing education, their confidence in the implementation of the material decreases over time.[21] If preceptors are hesitant to implement EBP within their own clinical practice, students will be less likely to be exposed to and subsequently implement EBP during PEs experienced in clinical education experiences. Preceptor development should incorporate strategies to encourage preceptors to consciously include EBP within the PEs occurring at their clinical site and even more so to verbalize the clinical decision-making process that incorporates EBP to the students that they supervise.

Quality Improvement

Quality improvement is the process of continually understanding and measuring the effectiveness of care in relation to patient needs.[1–3] It has been previously identified that the role of the student, by assisting their preceptor in PEs, influences the likelihood of implementing QI, but that QI was not impacted by the clinical site type at which the PE occurred.[7] In this study, only the inclusion of manual therapy or rehabilitation procedures increased the likelihood of implementing QI. It is possible that these procedure types require the greatest amount of reflection on the effectiveness of treatment prior to determining the next steps in the plan of care, and thus invoke QI more regularly.

In nursing education, the inclusion of assignments, such as personal reflections or patient observations, results in an increased understanding and inclusion of QI.[22] The inclusion of such assignments for athletic training students in clinical education experiences, especially pertaining to PEs that involve manual therapy or rehabilitation procedures, could improve upon the students' understanding of QI.

Health Care Informatics

Defined as the use of information technology to effectively manage clinical data and access relevant evidence pertaining to patient care,[1–3] HI was one of the CCs that was implemented least often in our study. Past research has identified that students were less likely to implement HI when observing their preceptor complete the PE and that HI implementation increased as the numbers of PEs increased.[7]

Our study found that implementation of HI was more likely to occur when students performed procedures classified as other, such as casting, or manual therapy or treatment procedures. It is possible that these types of procedures required either increased need for access to patient information, or that students were seeking additional evidence to support the use of the procedures they were intending to use. Manual therapy and treatment procedures also increased the likelihood of EBP implementation, which supports this hypothesis.

Consideration should be given to provide students increased access to clinical sites that incorporate electronic health record information into clinical decision making and encourage the promotion of both HI and EBP by preceptors overseeing students at clinical sites.

Professionalism

Professionalism is the ethical behavior, respectful demeanor, willingness to serve others, sensitivity to diverse patient populations and their concerns, a commitment to continuing education and the dissemination of evidence relevant to the profession, and a conscientious approach to professional duties.[1–3] Past research has shown that implementation of professionalism by athletic training students is more likely to occur during clinical education experiences that include increased volume of PEs and by students who assist their preceptors in PEs.[7] Our study found that professionalism was not influenced by the type of procedures performed by students, and as such, professionalism may relate more to the consistency of practice rather than specific procedure opportunities.

LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

These data were collected from 1 professional athletic training program and, while significant as a seminal contribution to the athletic training body of literature, may not be universally

applicable across all programs until evaluated on a larger scale. Data collection specifically relied on the participants' perceptions of CC implementation, which was not triangulated by patients or preceptors, and as such may limit the applicability of the findings. Lastly, the study examined procedure type's relationship with CC implementation in a binary fashion; the quality with which the competency was performed was not assessed.

Future research should examine the relationship of procedures performed and CC implementation across a larger population of participants to determine the applicability of the findings to all professional athletic training programs. Specifically, future research may examine graduate level professional athletic training programs and compare CC implementation during immersive and nonimmersive clinical experiences. Future studies could also examine the quality of CC implementation by considering the inclusion of specific behaviors related to the CCs as opposed to just the perception of implementation, as it may yield more accurate results of what aspects of each of the CCs are influenced by the procedures performed by students. Lastly, future studies should also consider incorporating preceptor validation of student performance of the CCs to better triangulate and confirm their implementation.

CONCLUSIONS

Our findings indicate that the implementation of CCs is related to the types of procedures students have the opportunity to include during PEs that occur in clinical education experiences.

There was overlap in the procedure types that influence implementation of IPECP, EBP, and HI, which suggests that increases in opportunities to one of these competencies could have carryover effects to the others. Increased educational emphasis to both students and preceptors on how IPECP and PCC may influence each other is also recommended. Purposeful inclusion and reflection of CC implementation may be necessary for programs to ensure students' understanding and inclusion of CCs are occurring in clinical education. Lastly, program administrators should incorporate information regarding purposeful CC use in clinical decision making into preceptor development to encourage preceptor use of the CCs that will influence student CC implementation.

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