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The development and introduction of entrustable professional activities at 2 community-based chiropractic student preceptorship sites in the United States

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ABSTRACT

Objective: Entrustable professional activities (EPAs) have seen widespread adoption in medical education and other health professions education. EPAs aim to provide a bridge between competency-based education and clinical practice by translating competencies into fundamental profession-specific tasks associated with clinical practice. Despite the extensive use of EPAs in health professions education, EPAs have yet to be introduced into chiropractic education. The purpose of this paper is to describe the development and introduction of EPAs as part of 2 community-based chiropractic student preceptorship education programs in the United States.

Methods: EPAs were developed and introduced at 2 community-based chiropractic preceptorship sites in 5 distinct steps: (1) differentiating EPAs from competencies, learning objectives, and knowledge, skills, and attitudes; (2) identifying EPAs; (3) mapping EPAs to competencies and necessary experience, knowledge, and skills; (4) designing EPA assessment strategies; and (5) implementing the use of EPAs.

Results: A total of 13 individual EPAs were developed and mapped to Council on Chiropractic Education meta-competency outcomes and underlying experience, knowledge, and skills. Three assessment tools were created to evaluate student entrustability for EPAs and enhance student self-assessment. The EPAs and assessment tools were integrated into chiropractic student preceptorships at each site.

Conclusion: This paper describes the development and introduction of EPAs at 2 community-based chiropractic preceptorship sites. Future research is needed to develop and standardize EPA use and assessment, and to evaluate outcomes associated with EPA use.

Key Indexing Terms: Chiropractic; Education; Curriculum Development; Health Occupations

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INTRODUCTION

The adoption of competency-based education in the health professions has increased over the past several decades, with the most notable growth seen in the 1990s.[1,2] Despite its rapid rise in implementation, competency-based education has been the subject of some criticism. A primary criticism of competency-based education has been the inability to wholistically assess learner competencies across multiple domains, especially in the workplace.[3–5] These limitations extend to the challenge of providing a full assessment of the integration of activities involved in caring for patients.[1,5–10]

Whitcomb[11] describes that competency entails the possession of the knowledge, skills, and attitudes that are needed for the practice of a health care professional. However, health care professionals must translate their knowledge, skills, and attitudes into a collection of complex behaviors that yields high-quality patient care.[11] This translation involves the integration and application of competencies across multiple domains.[1,6,8,10,12,13] Therefore, the nurturing of a learner's ability to translate their knowledge, skills, and attitudes into high-quality patient care requires the critical observation of a learner's performance in the various professional activities that are involved in providing high-quality patient care.[11]

The concept of entrustable professional activities (EPAs) was developed in response to the criticisms of competency-based education.[1,12,14] EPAs are intended to act as a bridge between competency-based education and clinical practice by

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translating competencies into clinical practice.[4,15] EPAs operationalize learner outcomes as fundamental profession-specific tasks that a learner can be entrusted to independently perform, requiring the integration of multiple competencies.[1,3,16] The use of EPAs offers faculty the ability to make competency-based conclusions on the level of supervision needed for a learner to carry out a profession-specific task.[4]

To our knowledge, EPAs have yet to be introduced into chiropractic education. The Council on Chiropractic Education in the United States (CCE-USA) stipulates the use of "best practices to assess and demonstrate each student's achievement of meta-competency outcomes."[17] However, we are unaware of any documentation that describes chiropractic education programs utilizing EPAs. It is our experience that in the United States, chiropractic education is primarily designed in a specific competency-based assessment approach, limited to the direct and isolated assessment of individual meta-competency outcomes outlined by CCE-USA accreditation criteria. These isolated meta-competency outcome assessments could inhibit the ability to provide a full assessment of a student's ability to perform fundamental profession-specific tasks associated with independent clinical practice.

The authors have multiple experiences training chiropractic students, including community-based clinical preceptorship programs through affiliated doctor of chiropractic degree programs (DCPs) in the United States. Community-based chiropractic student preceptorships (sometimes referred to as "clerkships") are common methods for chiropractic students to enhance their readiness toward independent clinical practice by diversifying their clinical experiences in settings outside of clinics operated by their respective DCP. As a requirement from students' respective DCP, supervising chiropractors who participate in these community-based student preceptorship programs must perform student assessments of CCE-USA defined meta-competency outcomes based on the DCP's prescription of assessment tools. Yet, we have perceived a gap between the prescribed student assessments and our ability to accurately gauge students' readiness for independent clinical practice.

Upon completion of the preceptorship, students were to soon graduate and prospectively be licensed to independently practice. In response to our uncertainties in assessing the clinical readiness of chiropractic students, we identified the need to develop and introduce EPAs at each of our preceptorship sites. We felt that this would implement additional assessment tools aligned with DCP curricular goals to move students further on the pathway toward unsupervised clinical practice. In addition, we surmised that implementing EPAs into our preceptorship sites could enhance our ability to provide formative feedback to students and allow for more effective student self-assessment. Therefore, the purpose of this paper is to describe the development and introduction of EPAs as part of 2 US community-based chiropractic student preceptorship sites.

METHODS

Description of Chiropractic Student Preceptorship Sites

One preceptorship site was located in an academic medical setting within a hospital-based health care system. The other preceptorship was located within a Veterans Affairs (VA) hospital setting. Chiropractic students eligible to participate in preceptorships at these sites must be enrolled in either of their last 2 academic terms in a CCE-USA accredited DCP located in the United States. Students typically complete the preceptorship during 1 academic term (up to 16 weeks); though, at times, students may complete the preceptorship during 2 academic terms (up to 32 weeks).

The supervising chiropractor within the academic medical setting possessed a doctor of chiropractic (DC) degree and greater than 11 years of clinical experience. The supervising chiropractor at the VA hospital setting possessed a DC degree and a doctor of physical therapy degree and 23 years of clinical experience. Each supervising chiropractor had several years of experience in the clinical training of students in medicine, occupational therapy, physical therapy, and chiropractic. Three other members of our authorship team, who were not acting supervisors at these described preceptorship sites, collaborated with the supervising chiropractors by contributing to EPA development. One of these contributing members completed a DC degree and a master's of science degree, and had more than 11 years of clinical experience, which included prior clinical training of chiropractic students as a supervising chiropractic preceptor. Another member of the authorship team completed a DC degree and a doctorate of philosophy degree and had greater than 41 years of clinical experience. In addition, this member of the authorship team had 14 years of experience as an educator within a university department of physical therapy setting. Lastly, another member of the authorship team completed a DC degree, a master's of science degree, a master's of education degree, and an education doctorate degree. This person had 45 years of experience in chiropractic education and curricular development associated with DCPs.

Introduction and Development of EPAs

In the context of our preceptorship programs, we developed EPAs to aid in the assessment of students, in addition to ongoing use of DCP prescribed assessments for CCE-USA defined meta-competency outcomes. We developed and introduced EPAs for the 2 different chiropractic student preceptorship sites in a stepwise manner, which is similar to the development of EPAs in other health professions education programs.[15]

Step 1. Differentiating EPAs from Competencies, Learning Objectives, and Knowledge, Skills, and Attitudes

To produce a set of EPAs we first identified and delineated the difference between competencies, learning objectives, and knowledge, skills, and attitudes from EPAs. We subsequently explored and identified the various knowledge, skills, and attitudes necessary for a chiropractor to demonstrate competencies within various domains. In addition, when constructing these sets of knowledge, skills, and attitudes, we recognized that chiropractic students participating at our preceptorship sites are still in training and would need certain levels of clinical experiences (eg, hours involved in direct patient care during the preceptorship rotation) to nurture the expansion of their knowledge, skills, and attitudes. This process was completed through an informal and nonsystematic review of the literature and group consensus.

Step 2. Identifying EPAs

We identified a set of fundamental profession-specific tasks—labeled as EPAs—of a chiropractor operating within a clinical practice setting. We aimed for the EPAs to involve broad-based responsibilities and require the integration of multiple competency domains.[4] To aid in identifying authentic EPAs we used the following 2 criteria: (1) the EPA must be an activity that can be entrusted to be independently performed; and (2) the EPA requires competence with integration of knowledge, skills, and attitudes.[15]

Given the limited timeframe in which a chiropractic student participates in a community-based preceptorship, we aimed to limit our set of EPAs to no more than 15 activities.[4] We used the Association of American Medical Colleges (AAMC) 13 core EPAs for entering postgraduate residency training to guide the formulation of our EPAs.[18] We then modified the EPAs, when appropriate, to reflect the tasks and expectations of a chiropractor functioning in clinical practice. Lastly, we either adopted the title of the EPA from the AAMC guide[18] or, when appropriate, we assigned a new title to each EPA. We formulated each EPA title with an intent to contain enough detail to succinctly describe the scope of the EPA, guide curricular expectations, facilitate student self-assessment, and enable formative feedback on student readiness to independently perform professional activities.[4,15]

Step 3. Mapping EPAs to Competency Outcomes and Necessary Experience, Knowledge, and Skills

As EPAs are the translation of competencies to clinical practice, each EPA was linked to CCE-USA meta-competency outcomes.[17] We also mapped each EPA with the determined experiences, knowledge, and skills necessary to demonstrate competence.

Step 4. Designing EPA Assessment Strategies

When designing EPA assessment methods, it is critical to include tools that measure entrustment. In addition, it is important to allow for the assessment of the student's integration of knowledge, skills, and attitudes into the performance of a professional activity or task.[15] We aimed to design an assessment approach that allowed for the communication of explicit formative feedback for the chiropractic student, but also facilitated student self-assessment.

We first created a global student self-assessment tool. This 36-item tool aims to gauge the student's general competencies and perceived confidence in performing aspects of authentic professional activities. Items were formulated by the authorship team.

We then created tools to assess entrustment of the student's performance of each EPA. Consistent with guidance from the AAMC's toolkit for core EPAs for undergraduate medical education, we used the modified Ottawa scale[19] and the modified Chen[1] scale as a framework for building our EPA assessment tools.[18] For each EPA we created 2 separate assessment tools. One assessment tool was designed for student self-assessment, while the other was designed for the supervising chiropractor to assess the student.

Lastly, strategies were created for the timing of administration of assessments. We perceived this to be critical due to the nature of the supervising chiropractors' positions who were full time clinicians without protected time allowances for student assessment. Timing of assessments were created based on anticipated feasibility to allow for the supervising chiropractor at each site to have focused time windows to assess student achievement of EPAs.

Step 5. Implementing the Use of EPAs

Specific actions were required to translate the development of EPAs into use. First, an approval of EPA use from the supervising chiropractor for the chiropractic student preceptorship at each respective site was required.

EPAs were then disseminated to the chiropractic students at both sites prior to their preceptorships. This was completed to orient the students to our developed fundamental profession-specific tasks of a chiropractor in a clinical setting and to provide clear expectations of the learning outcomes during the preceptorship program.

Lastly, management planning was necessary for the administration of EPAs. The site located at the academic medical center sought coordination with departmental educational personnel. This site coordinated with an intra-departmental educational programming coordinator who similarly coordinates the administration of assessments for postgraduate medical learners (eg, medical residents and fellows). EPA assessment tools were uploaded to an institutional assessment platform. An EPA assessment schedule was created for the duration of the chiropractic student preceptorship, which included the timing of assessments and the designated evaluators. The educational programming coordinator monitored the assessment schedule and emailed the individuals with a link to the EPA assessments at each designated date. The institutional assessment platform captured the completed assessments and archived responses so that the supervising chiropractor and student could access them to facilitate ongoing assessment. In addition, the supervising chiropractor scheduled weekly face-to-face meetings with the student to review the assessments and provide guidance and selective criticism.

The other preceptorship site located in the VA hospital setting required oversight of scheduling of evaluation and assessments by the supervising chiropractor. Once evaluations were completed, the supervising chiropractor would archive the assessment. Face-to-face meetings were scheduled to review the assessments with the student and to provide guidance and selective criticism for the student to engage in self-reflection to continue to improve in clinical training.

RESULTS

Differentiating EPAs from Competencies, Learning Objectives, and Knowledge, Skills, and Attitudes

The operationalization of competencies, learning objectives, and knowledge, skills, and attitudes were adopted from Ten Cate and Schumacher,[20] and are described in Table 1. Competencies were defined as attributes of an individual.[20] The CCE-USA accreditation standards for DCPs contain 8 meta-competency domains, with 31 associated meta-competency outcomes and are recognized as indicators of student competency. The 8 domains of competency are as follows: (1) assessment and diagnosis; (2) management plan; (3) health promotion and disease prevention; (4) communication and record keeping; (5)

Table 1 - Differentiation Between Competencies, Learning Objectives, Knowledge, Skills, and Attitudes, and Entrustable Professional Activities (EPAs)

Concept	Description	Example
Competencies	Attributes of an individual[20]	US Council on Chiropractic Education (CCE-USA) meta-competency domains and associated meta-competency outcomes
Learning objectives	Small and specific actions that can aid in reaching competencies	Proper communication between the student and patient[15]
Knowledge, skills, and attitudes	Underlying characteristics that support an individual's competencies	An attitude of compassion and respect for all patients and their families
EPAs	Descriptors of work that can be delegated to an individual and requires entrustment[4,15]	Gather a history and perform a physical examination

professional ethics and jurisprudence; (6) information and technology; (7) spinal manipulation; and (8) interprofessional education.[17] The 31 meta-competency outcomes within these 8 domains were adopted and operationalized as descriptors of a competent chiropractor (Table 2).[4]

We considered knowledge and skills to be the underlying characteristics that supported an individual's competence within these 31-meta-competency outcomes across the 8 meta-competency domains.[15]

We defined learning objectives as small and specific actions that aid in reaching competencies. Thus, we considered learning objectives to be a set of criteria which could be measured—based on various student evaluations to gauge competence—to indicate one's level of reaching competence in the various CCE-USA meta-competency domains. We operationalized EPAs as descriptors of work ("fundamental profession-specific tasks of a chiropractor") and a method of translating competencies into clinical practice.[4] For example, EPAs were considered an undertaking that could be delegated to someone, which requires entrustment.[15]

Identifying EPAs

We adopted 12 of the AAMC's 13 core EPAs for entering postgraduate residency training[18] with modification to a chiropractic scope of practice. We did not adopt the AAMC's EPA #8: Give or receive a patient handover to transition care responsibly.[18] With chiropractic education students are eligible for licensure upon graduation; thus, we developed an EPA focused on formulating a plan of care and managing a patient through an episode of care. The 13 EPAs we identified for each of the 2 community-based chiropractic student preceptorship sites are as follows:

EPA 1. Gather a history and perform a physical examination

EPA 2. Formulate and prioritize a differential diagnosis

EPA 3. Recognize a patient requiring urgent or emergent medical care and initiate timely referral/transfer of care

EPA 4. Recommend and interpret common diagnostic/screening tests

EPA 5. Formulate a plan of care and manage patient through episode of care

EPA 6. Engage in shared decision making and obtain informed consent for tests or treatment

EPA 7. Perform general procedures within the chiropractic scope

EPA 8. Enter diagnostic orders and referrals

EPA 9. Document clinical encounters in a patient record

EPA 10. Collaborate as a member of an interprofessional team

EPA 11. Provide an oral presentation of a clinical encounter

EPA 12. Form clinical questions and retrieve evidence to advance patient care

EPA 13. Contribute to a culture of safety/improvement

Mapping EPAs to Competency Domains and Necessary Experience, Knowledge, and Skills

The 13 identified EPAs mapped to CCE-USA meta-competency domains, and associated meta-competency outcomes, are shown in Table 3. An example of an EPA that is mapped with the CCE-USA meta-competency domains, and a description of the necessary experience, knowledge, and skills associated with the performance of that EPA is shown in Table 4.

Designing EPA Assessment Strategies

The 36-item global student self-assessment tool is shown in the Supplementary File. Examples of items included were "I am confident in my ability to gather a comprehensive history associated with a patient presenting with a spine related complaint" and "I am confident in my ability to perform a full physical examination with a patient presenting with a spine related complaint". Responses are recorded on a 4-point Likert-type scale, ranging from strongly agree to strongly disagree. In addition to the 4-point Likert-type scale, each response allows for a "comment" section for the student to expand on their response. The global student self-assessment tool is intended to provide a "baseline" assessment of the student at the time of beginning the preceptorship. The tool is then to be administered to the student at the end of the preceptorship.

For the student self-assessment tool, the student is asked to respond to the question, "How confident are you in your ability to carry out this activity? [insert EPA]". Responses are

Table 2 - Description of US Council on Chiropractic Education (CCE) Meta-Competency Domains and Associated 31 Meta-Competency Outcomes[17]

Meta-Competency Domain	Meta-Competency Outcome
Meta-competency 1. Assessment and diagnosis	1. Develop a list of differential diagnosis/es and corresponding exams from a case-appropriate health history and review of external health records. 2. Identify significant findings that may indicate the need for follow-up through additional examination, application of diagnostic and/or confirmatory tests and tools, and any consultations. 3. Generate a problem list with diagnosis/es
Meta-competency 2. Management plan	1. Develop an evidence-informed management plan appropriate to the diagnosis, including obstacles to improvement, measurable health care goals, prognoses and target endpoint of care in consideration of bio-psychosocial factors, natural history and alternatives to care. 2. Refer for emergency care and/or collaborative care as appropriate. 3. Present a management plan that includes obtaining informed consent. 4. Deliver appropriate chiropractic adjustments/manipulations, and/or other forms of passive care as identified in the management plan. 5. Implement appropriate active care as identified in the management plan. 6. Make recommendations for changes in lifestyle behaviors, activities of daily living and/or dietary and nutritional habits as appropriate. 7. Implement changes to the management plan as new clinical information becomes available. 8. Identify maximum improvement and document the endpoint of care or determine rationales for continuing care.
Meta-competency 3. Health promotion and disease prevention	1. Manage health risks and public health issues, including reporting, as required. 2. Recommend or provide resources (educational, community-based, etc) and instruction regarding public health issues. 3. Address appropriate hygiene practices in the clinical environment. 4. Communicate health improvement strategies with other health professionals.
Meta-competency 4. Communication and record keeping	1. Document health risks and management options considering the patient's health care needs and goals. 2. Consider the patient's ethnicity, cultural beliefs, and socio-economic status when communicating. 3. Generate accurate, concise, appropriate and legible patient records, narrative reports and correspondence. 4. Safeguard and keep confidential the patient's protected health and financial information. 5. Generate patient records that are in compliance with state and federal laws and regulations and applicable/accepted industry standards.
Meta-competency 5. Professional ethics and jurisprudence	1. Maintain appropriate physical, communication (verbal and nonverbal) and emotional boundaries with patients. 2. Maintain professional conduct with patients, peers, staff, and faculty. 3. Comply with the ethical and legal dimensions of clinical practice.
Meta-competency 6. Information and technology literacy	1. Use relevant scientific literature and other evidence to inform patient care.
Meta-competency 7. Chiropractic adjustment/ manipulation	1. Identify subluxations/segmental dysfunction of the spine and/or other articulations. 2. Analyze and interpret findings indicating the need for chiropractic adjustment/manipulation. 3. Identify indications, contraindications, and risk factors for the chiropractic adjustment/manipulation; and, explain the anticipated benefits, potential complications and effects to patients. 4. Apply chiropractic adjustment/manipulation to patients while ensuring patient safety. 5. Identify the effects following the chiropractic adjustment/manipulation.
Meta-competency 8. Interprofessional education	1. Explain their own roles and responsibilities and those of other care providers and how the team works together to provide care. 2. Use appropriate team building and collaborative strategies with other members of the health care team to support a team approach to patient centered care.

Table 3 - Entrustable Professional Activities (EPAs) Matched with US Council on Chiropractic Education (CCE-USA) Meta-Competency Domains and Associated Meta-Competency Outcomes[17]

	Assessment and Diagnosis (MC1)	Management Plan (MC2)	Health Promotion and Disease Prevention (MC3)	Communication and Record Keeping (MC4)	Professional Ethics and Jurisprudence (MC5)	Information and Technology Literacy (MC6)	Spinal Manipulation (MC7)	Interprofessional Education (MC8)
EPA 1. Gather a history and perform a physical examination	MC1.1			MC4.2	MC5.1 MC5.2 MC5.3			
EPA 2. Formulate and prioritize a differential diagnosis	MC1.1 MC1.3							
EPA 3. Recognize a patient requiring urgent or emergent medical care and initiate timely referral/transfer of care	MC1.2	MC2.2		MC4.2				
EPA 4. Recommend and interpret common diagnostic/ screening tests	MC1.2	MC2.1		MC4.2	MC5.1 MC5.2 MC5.3			
EPA 5. Formulate a plan of care and manage patient through episode of care	MC1.2	MC2.1 MC2.7 MC2.8	MC3.1 MC3.2	MC4.2	MC5.1 MC5.2 MC5.3			
EPA 6. Engage in shared decision making and obtain informed consent for tests or treatment	MC1.2	MC2.3		MC4.2	MC5.1 MC5.2 MC5.3		MC7.3	
EPA 7. Perform general procedures within the chiropractic scope		MC2.4 MC2.5 MC2.6			MC5.1 MC5.2 MC5.3		MC7.1 MC7.2 MC7.4 MC7.5	
EPA 8. Enter diagnostic orders and referrals	MC1.2	MC2.2						
EPA 9. Document clinical encounters in a patient record		MC2.8		MC4.1 MC4.2 MC4.3 MC4.5	MC5.1 MC5.2 MC5.3			

Table 3 - Continued.

	Assessment and Diagnosis (MC1)	Management Plan (MC2)	Health Promotion and Disease Prevention (MC3)	Communication and Record Keeping (MC4)	Professional Ethics and Jurisprudence (MC5)	Information and Technology Literacy (MC6)	Spinal Manipulation (MC7)	Interprofessional Education (MC8)
EPA 10. Collaborate as a member of an interprofessional team		MC2.2	MC3.4		MC5.2 MC5.3			MC8.1 MC8.2
EPA 11. Provide an oral presentation of a clinical encounter	MC1.1 MC1.2 MC1.3	MC2.1		MC4.2	MC5.2			
EPA 12. Form clinical questions and retrieve evidence to advance patient care						MC6.1		
EPA 13. Contribute to a culture of safety/improvement			MC3.3	MC4.4	MC5.1 MC5.2 MC5.3		MC7.4	

recorded on a 5-point Likert-type scale ranging from "I am in need of complete guidance and/or am unprepared" to "I am able to function with complete independence, including in complex situations". In addition to the 5-point Likert-type scale, responses allow for 3 areas of comments to expand on their response: (1) areas of strength, (2) areas of improvement, and (3) comments of notable aspects that are not described in comment areas 1 or 2. An example of the student EPA self-assessment tool is provided in the Supplementary File.

For the assessment tool created for the supervising chiropractor to assess the student, the supervising chiropractor is asked to respond to the question, "How much do you trust the student to carry out this activity? [insert EPA]". Similarly, responses are recorded in a 5-point Likert-type scale ranging from "The student requires complete guidance and/or is unprepared" to "The student can be trusted to function with complete independence, including in complex situations". In addition to the 5-point Likert-type scale, responses allow for 3 areas of comments to expand on their response: (1) areas of strength, (2) areas of improvement, and (3) comments of notable aspects that are not described in comment areas 1 or 2. An example of the supervising chiropractor EPA assessment tool is provided in the Supplementary File.

We organized the assessment strategy for the 13 EPAs into 3 "blocks" to focus learning and assessment of the entire set of EPAs in a gradual manner. EPAs 1–4 were assigned to block 1. EPAs 5–10 were assigned to block 2. EPAs 11–13 were assigned to block 3. Each block of EPAs was designated an anticipated timeframe in which weekly EPA concentration and assessment would occur. For example, concentration and assessment of the EPAs assigned to block 1 would be anticipated to occur in the first 6 weeks of the preceptorship; concentration on EPAs assigned to block 2 would be anticipated to occur in weeks 7–13; and EPAs assigned to block 3 would be anticipated to occur in weeks 14–16. Because the DCPs in which students are enrolled have various time allowances for preceptorship rotations, the time that each student rotated through our 2 preceptorship sites was inconsistent. Therefore, the timelines allocated to each block of EPAs is variable and considered an anticipated outline for our sites. Table 5 outlines the planned EPA assessment sequence.

Implementing the Use of EPAs

No obstacles were encountered in the approval process. For each respective preceptorship site, the supervising chiropractor was involved with the processes necessary to develop the EPAs and EPA assessments. Thus, the supervising chiropractors were engaged stakeholders and advocates for the implementation of EPAs at their sites. No obstacles were experienced in the dissemination of EPAs to students. Students confirmed receipt of EPAs and expressed understanding of the expectations of EPAs and assessments during their respective preceptorships. Lastly, no obstacles were experienced in the administration of EPA assessments or in the EPA assessment feedback process.

DISCUSSION

This paper describes the development and introduction of EPAs at 2 community-based chiropractic student preceptorship

Table 4 - Example of an Entrustable Professional Activity (EPA) Matched with domains of US Council on Chiropractic Education Meta-Competencies and Required Experience, Knowledge, and Skills

Title of EPA	EPA 8. Enter Diagnostic Orders and Referrals
Domains of competencies	Assessment and diagnosis, management plan
Experience, Knowledge, and Skills Required	Spend at least 75% time spent in clinical environment. initially in observational role (typically 1–2 weeks). Demonstrate ability to effectively communicate in a common language with other spine and health care providers. Demonstrate this in patient charting, written notes to providers and verbal clinical interaction. Understand indications and contraindications for spine diagnostic studies—EMG/NCV, x-rays, MRI, CT, bone scan. Understand and interpret findings in the context of the patient's clinical presentation. Be able to recognize the need for emergent care or refer to the appropriate provider for collaborative care or for the more appropriate service. Provide evidence for the utilization for diagnostic testing/imaging and be concordant to practice guidelines. Demonstrate acceptance of constructive criticism and apply concepts learned in the constructive criticism process. Demonstrate knowledge of quality and effectiveness (clinical and cost) in spine care with application of this knowledge in clinical settings.

sites. To our knowledge, this is the first evidence of the use of EPAs in chiropractic education. Given that this is the first known iteration of EPAs in chiropractic education, we believe that the use of EPAs at our preceptorship sites can likely be further refined and improved with ongoing programmatic quality improvement processes and profession-wide dialogue. We further surmise that EPAs can be developed and implemented in DCPs and postgraduate chiropractic training programs. It is our anticipation that this paper will aid in advancing a dialogue in chiropractic education around competency-based education and assessment.

Medical education can be defined as 2 phases. The first phase of medical education is the undergraduate phase, which is typical medical school or pre-residency training. The second phase of medical education is the postgraduate phase where upon completion of medical school the student advances to residency/fellowship training. EPAs were initially developed in 2005 for postgraduate medical education.[21,22] Since its inception, EPAs have seen widespread international implementation with high levels of acceptance in the postgraduate medical education setting.[23–25] Medical education is now experiencing a movement toward the implementation of EPAs within undergraduate medical education.[25,26] Furthermore, other health professions such as dietetics, pharmacy and physician assistant studies are increasingly introducing EPAs as part of their education programs.[23]

It is our expectation that the introduction of EPAs in chiropractic education will yield similar benefits that have been realized with other health professions education. We perceived a gap between chiropractic student assessment expectations and assessment of actual performance of fundamental profession-specific tasks of prospective entry-level graduates. This gap prompted us to develop and introduce EPAs into our preceptorship sites. Similarly, a 2021 scoping review of EPAs in entry-level health professions found that a main reason for education programs introducing EPAs was to reduce this gap and describe competency-based outcomes through the viewpoint of a practicing health care professional.[23] In addition, EPAs have been shown to enhance student-focused learning and reduce discrepancies between actual and expected performance across multiple stakeholders, including students, instructors, and assessors.[23]

There are, however, expected barriers to more widespread development and introduction of EPAs in chiropractic education. Unlike the medical education model, postgraduate chiropractic education in the form of residency or fellowship training is optional. Chiropractic education is primarily designed to incorporate undergraduate and postgraduate trainings into 1 DCP experience. This demands the question of how to apply EPAs appropriately and sequentially into chiropractic student learning and assessment. As other studies have reported, EPA assessment (which is based on entrustment) may inherently limit assessment of a student's skillset.[23,27] Furthermore, without a mandatory postgraduate education model in chiropractic, it may be challenging to identify how broad or how specific EPAs within the current DCP education model should be for a prospective practicing chiropractor.[23]

Limitations

At the time of writing of this paper, though no chiropractic students had completed the entirety of a preceptorship with the inclusion of EPAs at either of the 2 community-based preceptorship sites, each site had a student actively participating in a preceptorship that included the implementation of EPAs. Thus, we do not describe outcomes of student learning associated with EPA use in this paper.

In addition, there are limitations associated with the development of EPAs and EPA assessments described in this paper. First, to our knowledge there is no documentation of prior EPA development in chiropractic education. Though we utilized the AAMC's 13 core EPAs for undergraduate medical education[18] as a starting point, there is no current consensus or standard for EPAs in chiropractic education. This limits our

Table 5 - Entrustable Professional Activities (EPAs) Assessment Schedule

Evaluation Form	Purpose	Completed by	Frequency of Assessment
Global Self-Assessment	Global self-assessment for student	Student	First day of preceptorship Last day of preceptorship
Individual EPA Assessments (Student Self-Assessment Series)	Self-assessment for individual EPAs	Student	Every Friday throughout the duration of rotation EPAs #1–4 completed during Block 1 (~ weeks 1–6); also completed during Blocks 2 and 3 if necessary EPAs #5–10 completed during Block 2 (~ weeks 7–13); also completed during Block 3 if necessary EPAs #11–13 completed during Block 3 (~ weeks 14–16)
Individual EPA Assessments (Attending Series)	Assessment of the student for individual EPAs	Supervising chiropractor	Every Friday throughout the duration of rotation EPAs #1–4 completed during Block 1 (~ weeks 1–6); also completed during Blocks 2 and 3 if necessary EPAs #5–10 completed during Block 2 (~ weeks 7-–13); also completed during Block 3 if necessary EPAs #11–13 completed during Block 3 (~ weeks 14–16)

understanding of the appropriateness of the number and scope of EPAs that we developed. Second, though our EPA development was rooted in CCE-USA defined meta-competencies and we used the AAMC's schema associated with their 13 core EPAs for undergraduate medical education[18] as an anchor for our assessments, the assessment of individual competencies and their translation into professional activities are limited by a lack of standardized rubrics and assessments tools. Third, though we based our individual EPA assessment tools on the modified Chen[1] and modified Ottawa[19] scales, there has been no validity or reliability testing of the EPA assessment tools that we created. Fourth, we adopted a 4-point Likert scale format for the 36-item global student self-assessment from a similar self-assessment in a health professions program at 1 of the participating sites. Thus, the scale for the 36-item global student self-assessment is heterogeneous from our other developed EPA assessments. Further, the 36-item student self-assessment tool was created by the authors and did not undergo psychometric testing to evaluate its reliability or validity.

Lastly, we designed our EPA assessment in time scheduled blocks. We did this purposely to enhance the supervising chiropractors' ability to have focused time windows to assess student EPA achievement. However, this scheduled EPA assessment framework could skew assessments from earlier blocks of assessment compared to later assessment blocks. In addition, this fixed time-based assessment could be argued as antithetical to competency-based education which typically characterizes assessment through a lens of fixed outcomes within a varied time period.

Future Research

Given the lack of evidence of EPA use in chiropractic education there are numerous directions of research that are needed. First, large scale input and expertise, such as through use of Delphi methodology, on the identification of EPAs and rubrics for EPA assessments in chiropractic education at both the DCP and postgraduate levels can help to standardize EPA use. For example, our assessment tools rely primarily on subjective assessments of EPA achievement. Standardization of rubrics to assess EPA achievement, particularly outside of the community-based preceptorship setting in which multiple assessors are involved, is needed. In addition, formulation of homogeneity in EPA assessment tools along with testing for valid and reliable assessment tools is needed. Second, collecting data on the experiences of chiropractic students, educators, and assessors who use EPAs can enhance understanding of barriers and limitations to use. Further, studies are needed to understand if outlining and assessing fundamental profession-specific tasks of an entry-level chiropractor in chiropractic education can potentially aid in defining strengths or weaknesses in chiropractic curricula and enhance quality improvement processes.[23,28]

CONCLUSION

EPAs have seen widespread adoption in medical education with increasing adoption in entry-level health professions education, such as pharmacy, physician assistant studies, and dietetics. However, there is no evidence of EPA use in chiropractic education. This paper describes the development and introduction of EPAs at 2 community-based chiropractic student preceptorship sites. Future research is needed to develop consensus on EPA development and assessment, as well as investigation of barriers and facilitators to use across chiropractic education. The current chiropractic education model with optional postgraduate residency training poses a

potential challenge to identification of the specificity and scope of EPAs at the DCP level.

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