Defining and Developing the Feedback-Providing and Mentoring Competencies of Clinical Preceptors

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Physician Assistant (PA) education is based on a model of didactic instruction followed by clinical experiences under the supervision of practicing health care providers, termed "clinical preceptors." These supervised clinical practice experiences provide real-world opportunities for students to practice the skills of patient care and are a key part of preparing students for their own clinical practice upon graduation. In addition to their supervisory roles, clinical preceptors are charged with the specific tasks of providing feedback and mentoring to students. Review of administrative data at the University of Pittsburgh PA Studies Program revealed suboptimal student evaluation scores regarding the performance of these competencies by their preceptors, and the program did not have mechanisms for selecting clinical preceptors based on their competencies in providing feedback and mentoring or for developing these competencies in current preceptors.

This project followed an improvement science approach, in which online learning modules regarding the competencies of providing feedback and mentoring were developed and presented to 46 current clinical preceptors. Using a pre-post model, knowledge and self-competence regarding these competencies were measured among the total population and by demographics, including age, gender, location, specialty of practice, and profession. The data were analyzed using descriptive and inferential statistics, where possible, and revealed that knowledge and self-competence scores improved overall and in almost every demographic group.

This study provides proof of concept for the use of online learning modules in the professional development of clinical preceptors of the University of Pittsburgh PA Studies Program, specifically in the competencies of providing feedback and mentoring. The findings will be disseminated through a manuscript to be submitted to a professional journal, and will serve as a basis for further efforts to improving the competencies of clinical preceptors at the program, across PA education, and in the education of other health care providers.

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Preface

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1.0 Introduction

1.1 Problem Area

Physician Assistant (PA) education is based on a model of didactic instruction followed by clinical experiences under the supervision of practicing health care providers, termed "clinical preceptors." These supervised clinical practice experiences (SCPEs) provide real-world opportunities for students to practice the skills of "comprehensive patient assessment and involvement in patient care decision making" (ARC-PA, 2018, p. 30) and are a key part of preparing students for their own clinical practice upon graduation. In addition to their supervisory roles, clinical preceptors are charged with the specific tasks of "providing feedback and mentoring to students" (ARC-PA, 2018, p. 23).

Though accreditation mandates these requirements for clinical preceptors, the overall lack of academic or professional literature in the field of PA education on defining the preceptor competencies of providing feedback and mentoring, and guides and examples of effective development in these competencies is nonexistent. Though it is common, practical knowledge that the 246 accredited PA programs must demonstrate compliance with the accreditation standard regarding the feedback and mentoring provided by clinical preceptors to students, programs are left to define these competencies on their own and to rely upon the literature of other health care professions for guidance.

Two complicating factors in the pursuit of excellence in providing feedback and mentoring is the existing shortage of clinical preceptors for PA students (Herrick & Pearl, 2015; Keahey, 2017; PA Education Association [PAEA], 2017a; PAEA, 2017b) and that clinical precepting is

most often a voluntary effort (PAEA, 2018). PA programs depend on clinical preceptors to serve as the faculty for this part of the curriculum, and being in such need has limited the ability of programs to select preceptors who have proven their competencies of providing feedback and mentoring limited or impossible. Additionally, PA programs must be judicious in requesting or requiring that clinical preceptors add training activities that would develop these competencies to their workloads at the risk of losing these important volunteers.

1.2 Problem of Practice

The accreditation standards of PA education mandate that programs demonstrate that their clinical preceptors provide feedback to and mentor the students in their charge (ARC-PA, 2018). Despite this common expectation among the 246 accredited programs, there is no supporting academic or professional literature in the field of PA education to guide the definition of these competencies or to guide the development of preceptors as they seek to attain or improve upon them. Further, review of administrative data regarding student feedback on clinical preceptors from the 2018 and 2019 calendar years reveals that only 75% of students reported receiving feedback and mentoring from their preceptors and that feedback and mentoring varied in quality with some preceptors providing minimal feedback only when required by the program via mid- and end-of-rotation evaluation forms. Specifically, and locally, my problem of practice is that the University of Pittsburgh PA Studies Program does not have mechanisms for selecting clinical preceptors based on their competencies in providing feedback and mentoring, or for developing these competencies in current preceptors.

In the context of our program and its geographically and professionally disparate base of clinical preceptors, of initial importance is to assess the feedback and mentoring practices of the clinical preceptors and what they need to perform these competencies. Though our program has maintained its accreditation, the lack of mechanisms for selecting clinical preceptors or developing their competencies increases the likelihood that such competencies are not being performed optimally by all preceptors for all students.

In my position as the chair of the Department of PA Studies that includes the PA Studies Program and a dedicated and adequate team of faculty and staff, I am in a unique position to investigate this problem of practice on behalf of the students, clinical preceptors, faculty, and administrative stakeholders who depend on our program to deliver high-quality clinical education. By defining, exploring, and developing the competencies of feedback delivery and mentoring to PA students, I aimed to deepen my understanding on the needs and methods for developing clinical preceptors to improve PA education. The approach used in this project involves the development and implementation of online professional development modules for the competencies of providing feedback and mentoring.

2.0 Review of Supporting Scholarship and Professional Knowledge

2.1 Introduction

Physician assistant (PA) education is based on a model of didactic instruction followed by clinical experiences under the supervision of practicing clinicians, termed "preceptors." This clinical education provides real-world opportunities for students to practice the skills of "comprehensive patient assessment and involvement in patient care decision making" (ARC-PA, 2018, p. 30) under the guidance of a seasoned practitioner (the preceptor). Thus, preceptors hold an important role in the education of physician assistants. Their placement, preparation, and interaction with the PA program is guided by accreditation standards. These standards require programs to document how the preceptors observe and oversee student performance during their SCPEs (ARC-PA, 2018), including that preceptors effectively provide feedback and mentoring to students (ARC-PA, 2018). Though accreditation mandates these requirement for preceptors, the academic and professional literature in the field of PA education to further define the competencies of the preceptor or to guide their development as instructional faculty capable of meeting the accreditation standards is scant. Programs are left to design these competencies on their own. For example, the University of Pittsburgh PA Studies Program, the site of my inquiry, does not have mechanisms for selecting or developing oversight and mentoring competencies in program preceptors.

The following review of scholarship and knowledge designed to provide an understanding of the history and present status of PA education and practice. In the first section, information pertaining to the development of the profession is provided with a brief overview of the origins of

PA education is provided. The second section presents information on the clinical education of physicians, nurses, and PAs to demonstrate the importance of clinical preceptors in training competent health care providers. The third section examines supervision as a pedagogical method in health care education for the development of the student self-efficacy as preceptors provide role modeling and feedback. Lastly, the concept of mentoring and its importance in the education of health care professionals is presented. I conclude with a summary of how these areas have informed my thinking and understanding of the role of preceptors in medical education and PA training more specifically.

2.2 Development and Main Models of PA Education

The education of PAs has evolved significantly since the inception of the profession. The first program designed specifically for PA education was developed at Duke University in Durham, North Carolina and graduated its first cohort in 1967 (Coombs & Pedersen, 2017). The Duke program followed the medical model, in which students began their education with classroom and laboratory instruction before transitioning to the clinical instruction that takes place in health care settings through bedside teaching and patient rounding (Cooke, Irby, & O'Brien, 2010; Hooker & Cawley, 2003; Shulman, 2005). The University of Pittsburgh PA Studies Program, which served as the site of inquiry for this investigation, follows the Duke model by completing all didactic coursework before a year of clinical education (University of Pittsburgh, 2018).

A second type of PA education, known as the Child Health Associate model, was developed by Henry Silver, MD, and Loretta Ford, RN, at the University of Colorado as a means

of training assistants to provide preventive and routine pediatric care under the supervision of a pediatrician (Hooker & Cawley, 2003). The third model of PA education was developed in 1969 when Richard Smith, MD, began the Medex program (a term derived from the words medical and extension meant to symbolize that PAs extend the care of physicians to more patients) to advance the training of military medical corpsmen (Hooker & Cawley, 2003). Though similar to the Duke model, Medex capitalized on the field experience and training of its students by decreasing the amount of didactic instruction and focusing most of this training in clinical preceptorships (Coombs & Pedersen, 2017).

The stature and rigor of PA education has progressed over the past five decades, from offering the first bachelor's degree in 1970 by Alderson Broaddus College (Piemme, Sadler, Carter, & Ballweg, 2013), to the standardization of the master's degree (Miller & Coplan, 2017), to the limited but growing number of doctoral programs operating today. Programs vary in length from 17 to 36 months, with most programs lasting either 24 or 27 months, with the final year in all programs including clinical preceptorships (Physician Assistant Education Association [PAEA], 2018). Additionally, since 1971, PAs have extended their training through residency programs in various medical specialties, though this is not required for certification or clinical practice (Asprey & Helms, 1999; Hooker, 2013; Polansky, 2007; Rosen, 1986). As of November 2018, over 90 of these postgraduate programs existed (The Association of Postgraduate PA Programs, 2018), lasting from 12 to 24 months beyond the initial training.

The peer-reviewed accreditation of PA training programs first occurred by the AMA in 1971 with the formation of the Joint Review Committee for Educational Programs for the Assistant to the Primary Care Physician (ARC-PA, 2018b; Coombs & Pedersen, 2017). The committee was later renamed the ARC-PA before ultimately becoming an independent agency in 2001. It remains

the only accreditor of PA programs in the nation (ARC-PA, 2018b). All PAs seeking to practice in the United States must graduate from a program accredited by the ARC-PA (National Commission on Certification of Physician Assistants [NCCPA], 2018b). Accreditation of programs is achieved and maintained by demonstrating compliance with the *Accreditation Standards for PA Education*, and this requires initial and regular site visits by the ARC-PA and a continuous process of data-driven self-study (ARC-PA, 2018).

2.3 Clinical Education of PAs and Other Health Care Professionals

The education of health care professionals has historically followed the apprenticeship model with formal didactic training becoming a common method only in the past two centuries (Fink, 2012). As noted by Shulman (2005), such bedside training and clinical rounding is considered a signature pedagogy of health care education, much like the Socratic question-and-answer sessions led by an instructor of law students, as it involves the surface structure of sharing information, the deep structure of applying known principles to the patient at hand, and the implicit structure of role-modeling and mentorship.

The work of Abraham Flexner (1910) in the early 1900s served as both the first survey of medical education and a vehicle for reformation through the regulation and standardization of curricula and educational practices. Commissioned by the Carnegie Foundation for the Advancement of Teaching to report on the state of medical education in the US and Canada, Flexner (1910) focused on several factors, including the history of medical education, the financial aspects, reconstruction (or a call for revised standards), comparison of the medical sects and state boards, the status of women and Black people, and the creation of a database of all American and

Canadian medical schools. To achieve this, Flexner visited 155 medical schools and examined "five principle areas at each school: entrance requirements, size and training of the faculty, size of endowment and tuition, quality of laboratories, and availability of a teaching hospital whose physicians and surgeons would serve as clinical teachers" (Beck, 2004, p. 2139).

The main outcome of the Flexner report were reforms that formalized medical education by moving it into the structure of the "science-based university education followed by internship" (Kenny, Mann, & MacLeod, 2003, p. 1203). This progression was supported by the description of clinical settings as laboratories that provide student the opportunity to gather and analyze information gathered from their patients, while also building relationships with the patients and their fellow clinicians (Flexner, 1910). According to Flexner (1910), the role of the clinical instructor in this laboratory is to review "everything, pointing out omissions, errors, [and] misinterpretation" (p. 97).

2.3.1 Clinical Education by Profession

As the signature pedagogy of health care education (Shulman, 2005), clinical instruction is pervasive in both practice and the accreditation standards for training programs. The following is an analysis of the current state of clinical education across the medical, nursing, and PA professions.

2.3.1.1 Medical Education.

Cooke, Irby, and O'Brien (2010) describe the current state of medical education, including the clinical experiences that occur during the third and fourth years of this four-year training. Specifically, Cooke et al. (2010) note that the third year is "a legacy of the Flexnerian reforms" (p.

82) and is “dedicated to patient care and investigation of clinical problems presented by…patients” (p. 82). This full-time clinical learning is “typically organized into a series of specialty-specific block rotations ranging from four to twelve weeks” (Cooke et al., 2010, p. 82) and occurs in both inpatient and outpatient settings.

Though the accreditation standards for allopathic and osteopathic schools do not dictate the specialties and settings of the clinical experiences, they generally include the core clerkships of internal medicine, family medicine, surgery, pediatrics, obstetrics and gynecology, and psychiatrics (American Osteopathic Association [AOA], 2017; Association of American Medical Colleges [AAMC] & AMA, 2018; Cooke et al., 2010). Both types of medical education also allow elective training in other medical specialties (AOA, 2017; AAMC & AMA, 2018). Though the accreditation standards for both types of medical education require that clinical preceptors be qualified and trained to supervise students, only the standards for allopathic schools require the provision of resources to develop teaching and assessment skills (AOA, 2017; AAMC & AMA, 2018). Interestingly, the focus of clinical medical education is on the successful achievement of outcomes instead of specific durations or other patient experience quotas.

2.3.1.2 Nursing Education.

Benner, Sutphen, Leonard, and Day (2010) described the current state of nursing programs that prepare registered nurses (RNs), noting that clinical instruction begins “as soon as students formally enter a nursing program, whether directly as part of community college or a diploma program, or after two years of general education in a baccalaureate program” (p. 41). This deviates from the Flexnerian model by mixing the didactic and clinical instruction throughout the training. Students enter clinical settings to experience actual patient care under the co-instruction of a preceptor nurse (who is charged with caring for the patients and providing supervision to the

students) and a nursing faculty member (who reinforces the application of prior classroom concepts to these experiences) (Benner et al., 2010). Though not the standard method, preceptorships (one-on-one matchings with a clinician instead of having multiple instructors) have been implemented successfully for undergraduate RN students (Mantzorou, 2004). The clinical education may occur in either the inpatient or outpatient setting. The education of advanced practice nurses (nurse practitioners, nurse anesthetists, nurse midwives, and clinical nurse specialists) generally follows the Flexnerian model of didactic preparation before supervised clinical practicum coursework (Clark, Kent, & Riesner, 2018; Foster & Flanders, 2014; Malina & Izlar, 2014; Marzalik, Feltham, Jefferson, & Pekin, 2018).

Regarding accreditation standards, the Commission on Collegiate Nursing Education (CCNE) (2018) requires that the parent institution of any nursing program must ensure that preceptors are "academically and experientially qualified for their role" (p. 11) and that there are policies, procedures, and documentation regarding preceptor qualification and evaluation. While there is specific language on the support of professional development, the language refers to the requirement that "faculty have opportunities for ongoing development in teaching" (CCNE, 2018, p. 12). Much like medical education, there are no specified requirements on the duration of clinical education; instead, the focus is on the achievement of student outcomes (CCNE, 2018).

2.3.1.3 PA Education.

Early PA education capitalized on the previous health care experience of its students and focused on bedside training. Over the five decades of PA education, especially as it was standardized using accreditation standards, the Flexnerian model of didactic before clinical instruction has become ubiquitous, as all programs have distinct didactic and clinical phases (Hooker & Cawley, 2003; PAEA, 2018). The accreditation standards of the ARC-PA (2018)

require accredited programs to include SPCEs in their curricula, and to demonstrate that these experiences are sufficient for students to meet the intended outcomes and to be prepared for practice as a PA. Specifically, these experiences must occur in the inpatient, outpatient, emergency department, and operating room settings (ARC-PA, 2018). SCPEs occur with precepting clinicians (physicians, PAs, or other licensed providers) in the disciplines of family medicine, internal medicine, general surgery, emergency medicine, obstetrics and gynecology, pediatrics, and behavioral and mental health (ARC-PA, 2018). Like medical and nursing education, there is no specific duration or other logistical requirements. For context, the clinical curriculum of the University of Pittsburgh PA Studies Program is divided into nine, five-week SCPEs that occur with at least one preceptor at each site, so every student has at least nine preceptors over the course of the clinical year (University of Pittsburgh, 2018).

Regarding preceptors, the ARC-PA (2018) standards of accreditation indicate that they must be licensed clinicians who are oriented to the learning outcomes of the students. Additionally, preceptors are to provide "observation and supervision of student performance while on [SCPEs] and…feedback and mentoring to students" (ARC-PA, 2018, p. 23). No other criteria for the selection of preceptors exist, and the standards do not mandate any obligation for their training or professional development (ARC-PA, 2018). The preceptors of the University of Pittsburgh PA Studies Program, for example, are selected based on their availability and their meeting the technical qualifications of licensing and current practice. No selection criteria regarding their instructional ability before precepting exist and no training or professional development opportunities have been put forth by the program.

2.4 Supervision as Pedagogy in Health Care Education

Flexner and all of the health care education programs before and since his report indicated that the supervision provided by clinical education facilitates supervisee learning. Specifically, in PA education, the ARC-PA (2018) accreditation standards state that preceptors must supervise student performance while on SCPEs and provide feedback and mentoring to students. Though it is common, practical knowledge that the 246 accredited PA programs must demonstrate compliance with the accreditation standard regarding the feedback and mentoring provided by clinical preceptors to students, the literature is scant on how supervision is operationalized as a pedagogical method.

2.4.1 The Mediated Model of Supervisory Learning

Goodyear (2014) asserted "the supervisory relationship is necessary to enable supervisee learning" (p. 83), and that "the quality of that relationship will predict supervisees' perceptions of the extent to which their experience constitutes 'good supervision'" (pp. 83-84). Based on this perspective, Goodyear (2014) proposed a mediated model of supervisory learning based on the four learning mechanisms (role modeling, feedback, direct instruction, and critical reflection) that reasonably reflected the interventions identified by supervision scholars (McLeod, Steinert, Meagher, & McLeod, 2003; Milne, Aylott, Fitzpatrick, & Ellis, 2008). The model establishes the supervisor as a mediator of each of the four mechanisms to facilitate supervisee learning through direct and indirect methods, and it uses the supervisory relationship as the means of this mediation (Goodyear, 2014). The model reflects the influence of social identities, personalities, and other factors on the supervisor-supervisee relationship and accounts for their impact on supervisee

learning (Goodyear, 2014), with specific attention to culture, gender, race/ethnicity, supervisory alliance, supervisor's model, supervisor style, supervision modality, supervisor ethical behavior, level of supervisee development, supervisor/supervisee personalities, and supervisor credibility.

This section provides a review of role modeling and feedback mechanisms, and it is framed by my review of supervision literature and the literature of the education of health care professionals as well as the theory of self-efficacy posited by Bandura (1977). This approach focuses on the supervision in health care education and PA education in particular.

2.4.1.1 Role Modeling.

Merton (1957) first described the concept of role modeling in reference to individuals who demonstrate the behaviors associated with their given role. Supervisors generally serve as role models for their supervisees, and this is important to the professional development of novice professionals (McLeod et al., 2003). Goodyear (2014) explained that supervisees identify with and model the behaviors of those who are similar to them, as well as of those who they would like to be. This identification and the resulting internalization of attitudes and behaviors is reflected in the work of Bandura (1977), who explained that the vicarious experience of live modeling impacts the internal assessment of self-efficacy by the observer.

Irby (1986) noted "role-modeling is a powerful technique and one especially well-suited to the apprenticeship system of medical education" (p. 38). Modeling involves articulating one's mental processes for consideration (and, ultimately, incorporation), exemplifying clinical competence, and demonstrating other professional characteristics (Irby, 1986). In health care education, the importance and developmental effects of role modeling have been described in the medical (Irby, 1986; Kenny, Mann, & MacLeod, 2003; Wright, Kern, Kolodner, Howard, & Brancati, 1998) and nursing (Moked & Drach-Zavahy, 2015; Shaikh, 2017) literature. Role

modeling is absent from the standards for medical (both allopathic and osteopathic) and nursing education (AAMC & AMA, 2018; AOA, 2017; CCNE, 2018).

In PA education, some literature can be found about role modeling. Forister, Jones, and Liang (2011) studied the personal statements written by applicants to PA programs, finding that the mention of a PA role model was statistically significant as a predictor of matriculation. The PAEA (2011) published the *Preceptor Orientation Handbook* for use by member programs in preparing clinical preceptors. It specifies that "preceptors will serve as role models for the student" (PAEA, 2011, p. 2), but this resource lacks a definition of the role model term and other directions for operationalizing this expectation. Finally, Hooker and Cawley (2003) noted that a preceptor (specifically a physician) serves as a role model for a PA student, since "the cardinal learning experiences of medicine – exploring, examining, and cutting into the human body;…accepting the limitations of medical science; and being confronted with death – will be experiences the physician will guide the PA through to professional self-actualization" (p. 88). At the University of Pittsburgh PA Studies Program, preceptors are informed of the associated ARC-PA (2018) accreditation standard regarding serving as a role model, but no additional definition of the term or guidance on how to perform this function exist.

2.4.1.2 Feedback.

The concept of feedback was adapted from the field of electrical engineering for use in social psychology by Kurt Lewin to refer to the adjustment of a process based on its results or effects (Yalom, 1995). In the context of this model of supervisory learning, Goodyear (2014) stated "feedback is indispensable to supervisee learning" (p. 87). As such, the performance feedback provided by a supervisor influences the supervisee to reduce the discrepancy between what they know and are able to do and the goal for what they should know and do (Goodyear,

2014). In the context of self-efficacy, performance feedback informs the experiences of the individual and their sense of efficacy expectations and mastery of an action or behavior (Bandura, 1977).

Ende (1983) framed the importance of feedback in the development of expertise, as "without feedback, mistakes go uncorrected, good performance is not reinforced, and clinical competence is achieved empirically or not at all" (p. 778). Methods for providing and the effects of feedback have been studied in the context of health care education. In medical education, reviews on feedback and its impact on performance identified the influences on providing feedback, from its timing and volume to reflective feedback conversations that develop learner self-assessment skills (Cantillon, 2008; Ramani & Krackov, 2012). Fluit, Bolhuis, Grol, Laan, & Wensing (2010) performed a systematic review and identified that instruments available for assessing clinical teaching were commonly assessed for internal consistency and reliability.

The role of feedback has also been assessed from multiple perspectives in nursing education literature. Clynes and Raftery (2008) outlined "the nature and importance of feedback in the clinical learning environment (p. 405) to assist with improving preceptor feedback processes. Calleja, Harvey, Fox, and Carmichael (2016) developed and studied resources and a process for assisting students with reflecting on the feedback they receive. Finally, Plakht, Shiyovich, Nusbaum, and Raizer (2013) recognized the importance of consistently providing high-quality feedback and evaluated the impact of feedback on clinical performance, self-assessment and other outcomes. The authors indicated that "high-quality positive feedback is associated with higher grades, higher contribution of the clinical practice to the student and over-self-evaluation whereas high-quality negative feedback is related to an accurate self-evaluation of the students' performance" (Plakht et al., 2013, p. 1264).

As with role modeling, the importance of feedback is established in the professional literature but not in the academic literature of PA education. The *Preceptor Orientation Handbook* states that preceptors are responsible for providing "ongoing and timely feedback regarding clinical performance, knowledge base, and critical thinking skills" (PAEA, 2011, p. 3). The handbook also states that daily feedback will improve student performance, though there are no citations to support this statement (PAEA, 2011). Finally, the handbook directs preceptors to academic and professional resources for preceptors as references for the development of their feedback skills (PAEA, 2011). This handbook is distributed to all clinical preceptors of the University of Pittsburgh PA Studies Program and students are surveyed at the end of each SCPE on the competencies and quality of their preceptors, but there is no direct instruction on, practice of, or formative assessment of feedback skills.

The accreditation standards for PA education indicate that programs must document that preceptors are providing feedback to students, but there are no citations to support this expectation nor direction on the content or frequency of what is considered feedback (ARC-PA, 2018). This is similar to the accreditation standards of allopathic medical (AAMC & AMA, 2018) education programs, which identify the requirement of formal, formative feedback during educational experiences in a timely manner and consistently throughout the experiences, especially in the case of clinical education. The AAMC and AMA (2018) provide guidance on the purpose of feedback as "intended to modify the student's thinking or behavior in order to improve his or her subsequent learning and performance in the medical curriculum" (p. 24). Feedback is not specifically addressed in the accreditation standards for osteopathic medical (AOA, 2017) or nursing (CCNE, 2018) education programs.

2.5 Mentoring in Health Care Education

Mentoring is an important part of health care education and precepting. Garmel (2004) defined mentoring as "an intentional process of interaction between two individuals that includes nurturing to promote growth and development of the protégé (mentee)" (p. 1351). This is similar to the concept of supervision as pedagogy presented by Goodyear (2004), and it is rooted in the vicarious experience (through modeling) and verbal persuasion (through suggestion and exhortation) aspects of the development of self-efficacy (Bandura, 1977). This section presents mentoring in the context of medical, nursing, and PA education.

Mentoring is considered an important part of medical education and, consequently, a wealth of academic scholarship on the topic can be found. Sambunjak, Straus, and Marušić (2006) performed a systematic review of 42 articles to describe the prevalence of inquiry into mentorship, especially the factors associated with successful mentoring and the impact of mentoring on career satisfaction and productivity. Sambunjak et al. (2006) identified two studies that supported the claim that "the perceived importance of mentorship was related to career satisfaction" (p. 1108); additionally, three studies "found that mentors were seen as an important career-enhancing factor for medical students" (p. 1108).

A later review by Sambunjak, Straus, and Marušić (2009) found nine studies that focused on the characteristics of mentorship in academic medicine. The authors identified that mentoring can be formally assigned (much like the SCPEs designated for a PA student), but the outcomes can prove to be successful (though this depends on the qualities of the individuals involved), less effective, or even negative (if mentees feel forced into the relationship) (Sambunjak et al., 2009). Regarding successful assigned mentorship, the referenced study by Koopman and Thiedke (2005) is a qualitative inquiry of 13 medical school chairs regarding the mentoring of junior faculty, and

the authors do not further describe the qualities of the involved individuals that made assigned mentoring relationships successful. Regarding described mentor characteristics, the authors identified a variety of qualities that are inherent (e.g., altruistic, honest, patient), to be teachable (e.g., active listener, accessible), or professional (e.g., senior in field, experienced, knowledgeable) (Sambunjak et al., 2009).

The qualities and outcomes of mentoring have also been studied in nursing education. Jokelainen, Turunen, Tossavainen, Jamookeah, and Coco (2011) performed a systematic review of two decades of nursing research articles that included 23 articles with two emergent themes. First, the mentor has a role in creating a supportive learning environment, with subthemes including planning learning in advance, assuring support, familiarizing the student with the environment, and cooperating with stakeholders before, during, and after the training experience (Jokelainen et al., 2011). The authors also identified the role of the mentor in strengthening the professionalism of their mentees, especially through fostering the development of professional identity and enhancing professional competence (Jokelainen et al., 2011). Huybrecht, Loeckx, Quaeyhaegens, De Tobel, and Mistiaen (2011) analyzed the survey and semi-structured interview responses of 112 nursing mentors with attention to the tasks, drawbacks, and benefits of precepting. Key findings include the common responses that it is important for mentors to be able and have adequate time to give feedback, as well as the qualities of being trustworthy and capable of solving problems (Huybrecht et al., 2011).

Mentoring has not been investigated or presented in the academic literature of PA education. However, the practice of mentoring is included in one ARC-PA (2018) accreditation standard regarding clinical preceptors. Specifically, the standard states programs are required to document that “preceptors are providing…mentoring to students” (p. 23); the University of

Pittsburgh PA Studies Program does not have a mechanism for directing or assessing if or how preceptors are serving as mentors.

The ARC-PA standard is similar to that of the CCNE (2017) for nursing education regarding preceptors (also termed mentors in their document), as they must be academically and experientially qualified for their role. The medical, nursing, and PA education accreditors do not specify the definition of mentoring or the technicalities of the qualifications for mentors (AAMC & AMA, 2018; ACPE, 2015; ARC-PA, 2018; CCNE, 2017).

2.6 Synthesis

This review of scholarly and professional literature reinforces the key role of clinical preceptors in the education of PA students. The students' development into future health care providers depends on high-quality clinical education experiences that provide opportunities to apply their knowledge, skills, and attitudes to real patients. Equally as important is that the students receive guidance on their performance in order to reinforce and/or improve their practice. The education of physicians and nurses have demonstrated the importance of such experiences in their curricula and have analyzed data to identify models and guidance for the providing of feedback and mentoring. Especially in light of the accreditation requirements for PA programs to demonstrate that preceptors perform these functions, the lack of literature in the field of PA education leaves the field susceptible to missed opportunities to select and develop preceptors who are capable of performing this vital aspect of clinical education in a competent and successful manner.

3.0 Methods

3.1 Inquiry Questions

This study was guided by three inquiry questions:

1. How does participation in a series of online professional development modules improve participants' understanding of evidence-based methods for providing feedback and mentoring to clinical students?
2. How does self-competence in providing feedback and mentoring change among the baseline, immediate, and follow-up assessments of participants?
3. How do the baseline knowledge and self-competence of clinical preceptors before and after the online professional development modules differ among preceptors of various genders, ages, primary practice locations, professions, and specialties?

3.2 Inquiry Design

This project followed an improvement science approach. Improvement science has evolved over the past 80 years into a common method for the practical application of statistical data analysis in quality control and improvement efforts (Shewart, 1939; Deming, 1950; Deming, 1993; Langley et al., 2009). The science of improvement calls upon individuals seeking to analyze their systems and organizations to follow an iterative model based on an understanding of the goal of the change, effective measurement, and rational and informed

theorizing on incremental change efforts (Langley et al., 2009). Based on this foundation, the model also includes one or more PDSA cycles as "the framework for an efficient trial-and-learning methodology" (Langley et al., 2009, pp. 24-25). In this context, "planning" is the gathering of data and the design of a change effort, "doing" is the execution of the effort and data collection following a planned measurement scheme, "studying" is the analysis of the data and the subsequent drawing of conclusions, and "acting" is the integration, scaling, rejection, or adjustment of the change effort for future practice and the consideration of entering another "planning" phase.

Improvement science and its associated PDSA cycles have been used successfully in the education and practice of health care professionals. One notable example is the improvement effort described by Pronovost et al. (2006) that used a safety program and other interventions to generate a large and sustained reduction of infections across 108 intensive care units. Additionally, White et al. (2012) presented an improvement effort regarding compliance with proper hand hygiene, noting an increase from less than 68% to over 95% by physicians at a hospital. The improvement science approach is appropriate for this project because there is a recognized problem in my program, that clinical preceptors are not providing feedback and mentoring at an acceptable level, and my program does not ensure that they have those competences (either by screening for them when selecting preceptors or by developing those competencies after they have agreed to precept).

The theory of improvement guiding this project was that online professional development modules develop preceptors' competencies in providing feedback and mentoring, leading to improved student perceptions and quality of clinical education. The overall aim of my inquiry and improvement effort is that by January 2022, over 90% of the

clinical preceptors of the University of Pittsburgh PA Studies Program will be rated as "agree" or "strongly agree" on the student clinical rotation evaluation questions related to the competencies of providing feedback and mentoring. To achieve this aim, I followed the improvement theory that the practice of clinical preceptors in the areas of providing feedback and mentoring will benefit from professional development provided through online professional development modules. The driver diagram that illustrates the theory of improvement and aim is presented in Appendix A.

This improvement science design investigated how, in my position as the chair of the Department of PA Studies that includes the PA Studies Program, I can develop an effective, measurable change that results in an improvement in the self-competence and knowledge of clinical preceptors (Langley et al., 2009). This project included a change intervention that professionally educates the participants on effective practices of feedback providing and mentoring in order to improve their knowledge and self-competence; importantly, it collected data to identify if and to what extent a change in any of these areas occurred (Langley et al., 2009). This project also examined the relationship among demographic variables and pre-module assessments of self-competence and knowledge, as well as changes that occurred after completing the online professional development modules.

This project involves background data collection and an initial PDSA cycle represented by the development and implementation of online professional development modules on providing feedback and mentoring by clinical preceptors. Analysis of all project data, especially those related to the outcomes of the modules on preceptor competence and knowledge of evidence-based practices for providing feedback and mentoring, will be used in

future decision-making regarding revisions to and the ongoing use of the modules for developing these competencies (Langley et al., 2009).

3.2.1.1 Competence.

An important component in developing the online professional development modules, tests, and surveys for this project (and in any professional education or development activity) is the construct known as competence. The construct of competence is most simply defined as "an organism's capacity to interact effectively with its environment" (White, 1959, p. 297). Axley (2008) presented an analysis of the concept of competency that identified the practical definitions and applications of the term, as it can refer to abilities, actions, behaviors, or expectations; however, there was a common theme of demonstrating effectiveness and the prudent consideration of outcomes. The construct is central to competence motivation theory advanced by Harter (1978), which organizes the reasons why an individual would interact with and attempt to master their environment, and self-determination theory (Deci & Ryan, 1985), which identifies the need for competence as an innate driver of individuals to grow and integrate into their environment and presents a continuum of amotivation, extrinsic, and intrinsic motivation with considerations of controlled versus autonomous motivation. Of significant importance in this project is the idea that clinical preceptors have baseline levels of competence in providing feedback and mentoring, and that improving these capacities positively impacts the perceptions and outcomes of PA students.

3.2.1.2 Competence and Continuing Professional Development.

Self-determination theory (Deci & Ryan, 1985) and the development and maintenance of competence are key aspects of continuing professional development, which is defined as the "continuing process, outside formal undergraduate and postgraduate training, …to maintain and

improve standards of … practice through the development of knowledge, skills, attitudes, and behavior" (The Royal College of Obstetricians and Gynecologists, 2010, p. 1). This process is primarily self-directed (Tjin A Tsoi, de Boer, Croiset, Koster, & Kusurkar, 2016) and therefore relies upon the motivations of the individual professional (Deci & Ryan, 1985). Tjin A Tsoi et al. (2016) identified that both the controlled, extrinsic motivation of licensure requirements and the autonomous, intrinsic motivation to practice effectively and safely drive the professional development activities of pharmacists. Several, studies have identified the benefits of continuing medical education and other professional development activities on the practice and competence of health care providers (Ahmed et al., 2013; Davis & Galbraith, 2009). Finally, and directly related to this project, several studies have demonstrated that online modules are an effective delivery method for such continuing professional development (Hugenholtz, de Croon, Smits, van Dijk, & Nieuwenhuijsen, 2008; Khatony, Nayery, Ahmadi, Haghani, & Vehvilainen-Julkunen, 2009).

3.3 Inquiry Methods

Using an improvement science inquiry design, I investigated how, as the chair of the department that houses a PA Studies Program, I can develop an effective, measurable change that results in an improvement in the perception of self-competence and knowledge of clinical preceptors This project included a change intervention that professionally educates the participants on effective practices for providing feedback and mentoring students in order to improve their knowledge, perceptions of their self-competence, and competencies in these areas; importantly, the project collected data to identify if and to what extent a change in any

of these areas occurs (Langley et al., 2009). The project also examined the relationship among demographic variables and pre-module assessments of self-competence and knowledge, as well as changes that occur after completing the module. This project represented the background data collection and the PDSA cycle that supports progress towards the overall aim, and it will inform future iterations of the improvement process for my program and, potentially, for other PA programs (Langley et al., 2009).

3.4 Inquiry Setting

I am the chair of the department that houses the University of Pittsburgh PA Studies Program in Pittsburgh, Pennsylvania. During the clinical phase (or second year) of our curriculum, each of our 60 students completes nine, five-week SCPEs across a variety of medical specialties and settings, from family medicine offices to the operating theaters of general surgery. To accomplish this, we maintain a base of 93 clinical preceptors who host up to 18 students per academic year at their places of practice without compensation. Geographically, clinical preceptors are located mostly in Western Pennsylvania and the surrounding states, though we have preceptors in Hawaii and Alaska. Importantly, our program is affected by the preceptor shortage and there is a perpetual scramble to recruit additional preceptors to meet our needs; as a result, we are not in a position to select preceptors who have the best-developed abilities of providing feedback and mentoring to students.

The Director of Clinical Education of our program is primarily responsible for the curricular design, implementation, quality assurance, administration, and coordination of the clinical phase. For the eight years preceding this project, there was no other faculty support and

minimal administrative assistance in performing these tasks and they did not have the time or infrastructure to focus on clearly defining or improving the competencies of providing feedback and mentoring by clinical preceptors. Clearly, the large number and wide geographic distribution of our clinical preceptors, along with an understaffed and limited system for supporting and developing them, had constrained our program to this problem.

Fortunately, our program was in a position to explore the problem of defining and developing in clinical preceptors the competencies of providing feedback and mentoring to students. We have since added a faculty member and a dedicated administrative assistant to the clinical education team. I have also made it a personal mission to dedicate time, attention, and support to the clinical education aspect of our program, the human capital necessary for better understanding and solving this problem is in place. Additionally, the University of Pittsburgh has a strong infrastructure for gathering information about this problem via its Peter M. Winter Institute for Simulation, Education, and Research (WISER), which has expertise in and systems for the design, implementation, and measurement of professional development and other trainings that can be used to further explore this problem and trial an intervention using an improvement science approach.

3.5 Population

A total population sampling approach included the 93 clinical preceptors of the University of Pittsburgh PA Studies Program, due to the relatively small size of the population and their shared characteristics of being health care providers who serve the program as clinical preceptors. Though a demographic profile of this group had not been performed prior to the study, it was

known that they include PAs, physicians, and nurse practitioners. Geographically, preceptors were known to be mostly located in Pennsylvania, however, they may practice anywhere in the United States. The data from this project was collected between November 2019 and April 2020. Participants were recruited via email to respond to the tests/surveys and to complete the online professional development modules about the importance of providing feedback and mentoring, as well as formal, evidence-based methods for how to effectively perform these competencies. Completion was incentivized, as those who completed the modules and all assessments were awarded Continuing Medical Education credit through the UPMC Center for Continuing Education in the Health Sciences. Response and completion rates were reported, as well as the demographic data of the participants.

3.6 Data Collection

This project followed a pre-post model by implementing surveys that gathered information on demographics, self-competence, and user satisfaction with online professional development modules, as well as knowledge tests regarding the constructs of providing feedback and mentoring. Specifically, the construct of feedback is defined as "information communicated to the learner that is intended to modify the learner's thinking or behavior for the purpose of improving learning" (Shute, 2008). Similarly, mentoring is defined as the process by which "a more-experienced member of an organization maintains a relationship with a less-experienced, often new member to the organization and provides information, support, and guidance so as to enhance the less-experienced member's chances of success in the organization and beyond" (Campbell & Campbell, 1997). The test/survey schedule was as follows: The pretest/survey was administered immediately

before beginning the modules, the immediate posttest/survey after completing the final module, and the delayed posttest/survey approximately two months after the modules were completed.

Items related to demographics included asking the participants with which gender they most identify, their age, in which of the United States their primary practice setting is located, their profession, and their main specialty of practice. See Appendix B for the items.

An item was included on the pre-module survey that assessed participant opinions on the impact of the common barriers to providing feedback to graduate medical students (Anderson, 2012), as these barriers are expected to be the same for PA students. These barriers included the amount of observation of the student needed in order to base preceptor input, concerns for the emotion and reaction of the student, time constraints, and a personal concern for the ability of the preceptor to provide meaningful feedback and mentoring in an effective manner. Though not included in the inquiry questions, this information will inform the theory of improvement and future PDSA iterations.

The items regarding self-competence were developed by using assessments of confidence levels (presented in Appendices C, D, and E) by adapting the Confidence in Learning Mathematics Scale that is part of the Fennema-Sherman Mathematics Attitudes Scales (Fennema & Sherman, 1976). Shortened versions of the Fennema-Sherman Mathematics Attitudes Scales have been used in multiple studies of attitudes regarding confidence levels in learning and applying mathematics (Ren, Green, & Smith, 2016; Sachs & Leung, 2007). The aim of adapting the Confidence in Learning Mathematics Scale was to capture the attitudes of clinical preceptors regarding learning and applying the constructs of providing feedback and mentoring.

The items regarding the self-perception of competencies (presented in Appendices C, D, and E) were adapted from the Perceived Competence Scale first developed by Williams and

Deci (1996) and adapted in various studies to assess participants' experiences of feeling able to successfully perform tasks (Williams et al., 2009; Williams, McGregor, Zeldman, Freedman, & Deci, 2004). The aim of adapting the Perceived Competence Scale was to capture clinical preceptors' experiences in feeling able to successfully provide feedback to and mentor of PA students. Also included were items related to user satisfaction with the learning module (adapted from Allen & Nimon, 2007), a knowledge test regarding the constructs of providing feedback and mentoring, and several open-ended questions that ask for general feedback about the learning module and suggestions on other topics that should be considered for professional development of clinical preceptors (see Appendices C, D, and E for the instruments).

All survey and test items were assessed for content validity, or "how well the items of a scale represent the full domain or range of content a scale is intended/should be measuring" (Nevo, 1985) through administration of the Content Validity Index (Lynn, 1986; Waltz & Bausell, 1981). This process involved the recruitment of six experts (fellow PA educators) as raters who reviewed items and focused on content "relevance" and "clarity" of each item and the full scale. According to Lynn (1986), five of six (83%) raters scoring items high on such a scale would establish content validity beyond the 0.05 level of significance, and "items that do not achieve the required minimum agreement of the experts should be eliminated or further revised" (p. 384). Finally, the content validity of each instrument was assessed by determining the proportion of total items judged content valid. The survey and test instruments were similarly reviewed by a group of six practicing clinicians who no longer serve as clinical preceptors. All input from this process was reviewed and no changes to the items were made before administration to the study population.

3.7 Data Analysis

The investigator used statistical software for data analysis to answer the inquiry questions. For Inquiry Question 1, mean overall scores on the knowledge questions from all three observation points (pre-module, immediate post-module, and delayed post-module) are presented in tabular form, along with the mean scores and standard deviations for the individual knowledge questions. Paired t-testing was used to compare scores at each of the three observation points according to the following sets: pre-module and immediate post-module scores, pre-module and delayed post-module scores, and immediate post-module and delayed post-module scores.

For Inquiry Question 2, responses to the five items on self-competence regarding feedback were converted to the following scale: “not at all” was rated “0,” “slightly” was rated “5,” “somewhat” was rated “10,” “mostly” was rated “15,” and “completely” was rated “20.” This generated a “feedback self-competence scale score” for each participant; as such, the maximum score on the scale was 100. The same approach was used for the five items on self-competence regarding mentoring to generate a “mentoring self-competence scale score” of up to 100 for each participant.

The mean scores for each scale from all three observation points (pre-module, immediate post-module, and delayed post-module) were presented in tabular form, along with the mean scores and standard deviations for the individual questions. One-way ANOVA testing was used to compare sets of scores from the three observation points. These sets included pre-survey and immediate post-survey scores, pre-survey and delayed post-survey scores, and immediate post-survey and delayed post-survey scores.

For Inquiry Question 3, the investigator sought to determine whether relationships exist between the knowledge and self-competence scores at each point in time and the demographics of gender, age, primary practice location, profession, and specialty of practice. Descriptive statistics (means and standard deviations) were used to present the demographic data. Where necessary, groupings among the demographic responses were performed to facilitate analysis. For example, responses to the item on age were combined into the following groups: 24-29 years, 30-39 years, 40-49 years, and 50+ years of age.

3.8 Institutional Review Board

This study was approved on November 19, 2019, by the WISER Research Committee under their comprehensive protocol for exempt studies granted by the Institutional Review Board of the University of Pittsburgh. Documentation of approval is included as Appendix G.

4.0 Findings

4.1 Participants

The population for this study was the clinical preceptors of the University of Pittsburgh Physician Assistant Studies Program, and a total population sample was recruited. The investigator began recruiting efforts in January 2020 and the data were collected between January 2020, and April 2020. The investigator emailed all 93 clinical preceptors and invited them to participate in the online professional development modules and to answer all survey and test instruments. Of the 93 clinical preceptors, 46 (for a response rate of 46.2%) fully completed the pretest and pre-survey instruments; 34 (36.6%) fully completed the modules and all pre- and posttest instruments; and 28 (30%) fully completed the modules and all pre- and post-survey instruments. Demographic information of the analytic sample is shown in Table 1.

Table 1 Description of Analytic Sample

	n	%
Total	46	100%
Gender		
Female	35	76.1%
Male	11	23.9%
Age (in years)		
20-29	8	7.4%
30-39	25	54.3%
40-49	5	10.9%
50+	8	17.4%
Primary Profession		
Nurse Practitioner	4	8.7%
Physician (Not a Surgeon)	8	17.4%
Physician Assistant	32	69.6%
Surgeon	1	2.2%
Unknown	1	2.2%
Specialty of Practice		
Behavioral Health/Psychiatry	2	4.3%
Emergency Medicine	3	6.5%
Family Medicine	8	17.4%
General Internal Medicine	4	8.7%
General Pediatrics	6	13%
General Surgery	5	10.9%
Hospital Medicine	7	15.2%
Obstetrics and Gynecology	7	15.2%
Unknown	4	8.7%
Primary Practice Location		
Pennsylvania	36	78.3%
Other State	7	15.2%
Unknown	3	6.5%

4.2 Findings Related to Inquiry Question 1

Regarding Inquiry Question 1, participant performance on the knowledge questions related to evidence-based methods for providing feedback and mentoring to clinical students on the pretest and immediate posttest were assessed using descriptive statistics and paired t-testing, and the data and analysis findings are presented in Tables 2 and 3. Data from three of the 46 participants was removed from the set due to null data for one or both tests.

Table 2 Knowledge Question Scores for Participants on Pre- and Immediate Posttests

	n	Mean Score	Median Score	Standard Deviation
Pretest	43	0.713	0.667	0.210
Immediate Posttest	43	0.942	1.000	0.088

Table 3 Pre- and Immediate Posttest Analysis

Mean Change	T-Test	P value
0.229	6.687	0.000

As indicated in Tables 2 and 3 there is a statistically significant difference (p = 0.000) between the mean scores on the Pretest and Immediate Posttest performances by these participants and the T-score of 6.687 indicates a strong difference between the mean scores of the two groups.

Knowledge retention by the participants between the pretests and delayed posttests were assessed using descriptive statistics and paired t-testing. Thirty-four participants completed all items in both instruments, and their demographic data are presented in Table 4. Item response distributions are presented in Appendix F.

Table 4 Description of the Participants who Completed All Pre-, Immediate Post-, and Delayed Posttests

	n	%
Total	34	100%
Gender		
Female	28	82.4%
Male	6	17.6%
Age (in years)		
20-29	6	17.6%
30-39	21	61.8%
40-49	4	11.8%
50+	3	8.8%
Primary Profession		
Nurse Practitioner	3	8.8%
Physician (Not a Surgeon)	4	11.8%
Physician Assistant	26	76.5%
Surgeon	0	0%
Unknown	1	3%
Specialty of Practice		
Behavioral Health/Psychiatry	1	3%
Emergency Medicine	3	8.8%
Family Medicine	5	14.7%
General Internal Medicine	3	8.8%
General Pediatrics	5	14.7%
General Surgery	4	11.8%
Hospital Medicine	6	17.6%
Obstetrics and Gynecology	3	8.8%
Unknown	4	11.8%
Primary Practice Location		
Pennsylvania	30	88.2%
Other State	3	8.8%
Unknown	1	3%

Data and the associated analysis regarding the data and analysis findings are presented in Tables 5 and 6.

Table 5 Knowledge Question Scores for Participants on Pre- and Delayed Posttests

	n	Mean Score	Median Score	Standard Deviation
Pretest	34	0.716	0.667	0.219
Delayed Postest	34	0.882	1.000	0.151

Table 6 Pre- and Delayed Posttest Analysis

Mean Change	T-Test	P value
0.167	4.254	0.000

There was a statistically significant difference ($p = 0.000$) between the mean scores on the pretest and delayed posttest performances by these participants and the T-score of 4.254 indicates a strong difference between the mean scores of the two groups.

Assessment of the retention of knowledge over the two-month period by participants between the immediate posttest and delayed posttest was assessed using descriptive statistics and paired t-testing, and the data and analysis findings are presented in Tables 7 and 8.

Table 7 Knowledge Question Scores for Participants on Immediate and Delayed Posttests

	n	Mean Score	Median Score	Standard Deviation
Immediate Posttest	34	0.951	1.000	0.087
Delayed Posttest	34	0.882	1.000	0.151

Table 8 Immediate and Delayed Posttest Analysis

Mean Change	T-Test	P value
-0.069	-2.802	0.008

There was statistically significant difference (p = 0.008) between the means of the immediate and delayed posttest performances by these participants, and the T-score of -2.802 indicates a strong difference between the mean scores of the two groups. This analysis indicates that there was a decrease in knowledge retention two months after completing the online professional development modules.

4.3 Findings Related to Inquiry Question 2

Inquiry Question 2 explored how self-competence in providing feedback and mentoring ding feedback and mentoring changed among the baseline, immediate, and follow-up assessments of participants. Participant self-competence in providing feedback and mentoring were assessed using scale scores based on the responses to the corresponding questions from the pre-, immediate post-, and delayed post-surveys.

4.3.1 Feedback Self-Competence

Twenty-eight participants completed all items on feedback self-competence on the pre-, immediate post-, and delayed post-surveys and their demographics are presented in Table 9. Item response distributions are presented in Appendix F.

Table 9 Description of the Participants who Completed All Feedback Self-Competence Items

	n	%
Total	28	100%
Gender		
Female	24	85.7%
Male	4	14.3%
Age (in years)		
20-29	4	14.3%
30-39	20	71.4%
40-49	2	7.1%
50+	2	7.1%
Primary Profession		
Nurse Practitioner	2	7.1%
Physician (Not a Surgeon)	2	7.1%
Physician Assistant	23	82.1%
Surgeon	0	0%
Unknown	1	3.6%
Specialty of Practice		
Behavioral Health/Psychiatry	1	3.6%
Emergency Medicine	2	7.1%
Family Medicine	3	10.7%
General Internal Medicine	3	10.7%
General Pediatrics	4	14.3%
General Surgery	4	14.3%
Hospital Medicine	6	21.4%
Obstetrics and Gynecology	1	3.6%
Unknown	4	14.3%
Primary Practice Location		
Pennsylvania	26	92.9%
Other State	1	3.6%
Unknown	1	3.6%

Descriptive statistics on the feedback self-competence items and scale scores are presented in Tables 10 and 11. For reference, item responses and their numerical conversions were as follows: “not at all” was rated “0,” “slightly” was rated “5,” “somewhat” was rated “10,” “mostly” was rated “15,” and “completely” was rated “20.”

Table 10 Feedback Self-Competence Items and Total Mean Scores (n = 28)

	Mean Pre-Survey Scale Score	Immediate Post-Survey Scale Score	Delayed Post-Survey Scale Score
I am capable of providing feedback to PA students.	16.96	17.86	18.39
I am confident in my ability to provide feedback to PA students.	16.07	16.61	18.21
Providing feedback to PA students is not difficult for me.	15	15.54	16.61
I have a strong understanding of the concepts of providing quality feedback to PA students.	13.57	17.68	18.04
I provide effective feedback to PA students.	13.75	15.89	16.79
	Mean: 75.36 Range: 55-100 STD: 12.09	Mean: 83.57 Range: 60-100 STD: 12.76	Mean: 84.46 Range: 65-100 STD: 12.12

Table 11 Feedback Self-Competence Scale Scores from Pre-, Immediate Post-, and Delayed Post-Surveys

	n	Mean Scale Score	Standard Deviation
Pre-	28	75.36	12.09
Immediate Post	28	83.57	12.76
Delayed Post	28	84.46	12.12

One Way Repeated Measures of Analysis of Variance among the treatment groups revealed differences among the mean values that are statistically greater than pure random chance. This demonstrated a statistically significant difference (p <0.001). In order to isolate the group or groups that differ from the others, a multiple comparison procedure revealed differences in the pre- vs. immediate post-survey (p <0.001) and the pre- vs. delayed post-survey (p <0.001) groups (the differences in the means are approximately 8.2 and 9.1, respectively), but there was no difference between the immediate post- and delayed post-survey groups (the difference between those two means is approximately 0.9, and p = 0.704)

4.3.2 Mentoring Self-Competence

Twenty-nine participants completed all items on feedback self-competence on the pre-, immediate post-, and delayed post-surveys and their demographics are presented in Table 12. Item response distributions are presented in Appendix F.

Table 12 Description of the Participants who Completed All Mentoring Self-Competence Items

	n	%
Total	29	100%
Gender		
Female	25	86.2%
Male	4	13.8%
Age (in years)		
20-29	4	13.8%
30-39	21	72.4%
40-49	2	6.9%
50+	2	6.9%
Primary Profession		
Nurse Practitioner	3	10.3%
Physician (Not a Surgeon)	3	10.3%
Physician Assistant	22	75.9%
Surgeon	0	0%
Unknown	1	3.4%
Specialty of Practice		
Behavioral Health/Psychiatry	1	3.4%
Emergency Medicine	2	6.9%
Family Medicine	4	13.8%
General Internal Medicine	3	10.3%
General Pediatrics	4	13.8%
General Surgery	4	13.8%
Hospital Medicine	5	17.2%
Obstetrics and Gynecology	3	10.3%
Unknown	3	10.3%
Primary Practice Location		
Pennsylvania	26	89.7%
Other State	2	6.9%
Unknown	1	3.4%

Descriptive statistics on the feedback self-competence items and scale scores are presented in Tables 4.13 and 4.14. For reference, item responses and their numerical conversions were as follows: “not at all” was rated “0,” “slightly” was rated “5,” “somewhat” was rated “10,” “mostly” was rated “15,” and “completely” was rated “20.”

Table 13 Mentoring Self-Competence Items and Total Mean Scores (n = 29)

	Pre-Survey Scale Score	Immediate Post-Survey Scale Score	Delayed Post-Survey Scale Score
I am capable of mentoring PA students.	17.07	17.59	17.76
I am confident in my ability to mentor PA students.	16.21	17.41	17.24
Mentoring PA students is not difficult for me.	13.97	15.86	15.86
I have a strong understanding of the concepts of mentoring PA students.	13.97	17.59	17.24
I effectively mentor PA students.	14.66	16.38	16.72
	Mean: 75.86 Range: 35-100 STD: 17.17	Mean: 84.31 Range: 60-100 STD: 12.07	Mean: 82.24 Range: 55-100 STD: 12.83

Table 14 Mentoring Self-Competence Scale Scores from Pre-, Immediate Post-, and Delayed Post-Surveys

	n	Mean Scale Score	Standard Deviation
Pre-	29	75.86	17.48
Immediate Post	29	84.31	13.01
Delayed Post	29	82.24	20.42

One Way Repeated Measures of Analysis of Variance among the treatment groups revealed differences among the mean values that are statistically greater than pure random chance. This demonstrated a statistically significant difference (p <0.001). In order to isolate the group or groups that differ from the others, a multiple comparison procedure revealed differences in the pre- vs. immediate post-survey (p <0.003) and the pre- vs. delayed post-survey (p <0.022) groups (the differences in the means are ~6.4 and 8.5, respectively), but there was no difference between the immediate post- and delayed post-survey groups (the difference between those two means is approximately 2.1, and p = 0.447).

4.4 Findings Related to Inquiry Question 3

To explore how the knowledge and self-competence of clinical preceptors before and after the online professional development modules differ among preceptors of different genders, ages, primary practice locations, profession, and specialty, descriptive statistics were performed on the various groupings of participants and these data are presented. The results indicated that almost all demographic groups had a sustained increase in knowledge and feedback and mentoring self-competence scores. These data are presented in the following sections.

4.4.1 Knowledge

Descriptive statistics were used to analyze the data collected on the pretest, immediate posttest, and delayed posttest scores for the 34 participants who completed all knowledge questions. These data are presented in Tables 15 and 16.

Table 15 Mean Knowledge Question Scores by Gender, Location, and Age

		n	Pretest Score	Immediate Posttest Score	Delayed Posttest Score
Gender	Female	28	0.708	0.958	0.881
	Male	6	0.75	0.917	0.889
Location	Alaska	1	0.833	0.833	1
	Maryland	1	0.5	1	1
	Pennsylvania	30	0.722	0.95	0.883
	Ohio	1	0.667	1	0.667
Age	20-29	6	0.778	0.972	0.889
(in years)	30-39	21	0.714	0.929	0.881
	40-49	4	0.708	1	0.792
	50+	3	0.611	1	1

Table 16 Mean Knowledge Question Scores by Profession and Specialty

		n	Pretest Score	Immediate Posttest Score	Delayed Posttest Score
Profession	Nurse Practitioner	3	0.722	0.889	0.889
	Physician	4	0.75	1	0.917
	Physician Assistant	26	0.699	0.949	0.872
Specialty	Behavioral Medicine/ Psychiatry	1	0.833	1	1
	Emergency Medicine	3	0.722	0.944	0.833
	Family Medicine	5	0.667	0.967	0.9
	General Internal Medicine	3	0.667	1	0.944
	General Pediatrics	5	0.833	1	0.9
	General Surgery	4	0.75	0.958	0.917
	Hospital Medicine	6	0.667	0.944	0.833
	Obstetrics & Gynecology	3	0.611	0.944	1

These data revealed that almost every group saw an increase in the mean score between pretest and immediate posttest, with sustained mean scores based on comparison of the immediate and delayed posttests. In the breakdown by professions, the physician group had a much higher scale score at all three measurement points. A useful means for differentiating among the

professions, as well as within the other demographic categories, might be a qualitative analysis with representative samples of each group. Inferential statistical analysis was not performed due to the low number of participants in most groups.

4.4.2 Feedback Self-Competence

Descriptive statistics were used to analyze the data collected on the pre-survey, immediate post-survey, and delayed post-survey scores for the participants who completed all feedback self-competence scale items. The number of participants per demographic category varies, as some participants who provided data for the scale items did not indicate all of their demographics; for each category, as many participants as possible are presented in order to maximize analytical power. These data are presented in Tables 17 and 18.

Table 17 Mean Feedback Self-Competence Scale Scores by Gender, Location, and Age

		n	Pre-Survey Scale Score	Immediate Post-Survey Scale Score	Delayed Post-Survey Scale Score
Gender	Female	24	74.167	83.75	84.167
	Male	4	82.5	82.5	86.25
Location	Pennsylvania	26	75.385	82.885	84.423
	Maryland	1	65	75	90
Age	20-29	4	81.25	88.75	85
(in years)	30-39	20	72.25	81	84.25
	40-49	2	87.5	87.5	85
	50+	2	82.5	95	85

Table 18 Mean Feedback Self-Competence Scale Scores by Profession and Specialty

		n	Pre-Survey Scale Score	Immediate Post-Survey Scale Score	Delayed Post-Survey Scale Score
Profession	Nurse Practitioner	2	67.5	82.5	80
	Physician	2	95	85	75
	Physician Assistant	23	74.348	83.043	85.217
Specialty	Behavioral Medicine/ Psychiatry	1	100	100	100
	Emergency Medicine	2	65	82.5	82.5
	Family Medicine	3	73.333	86.667	80
	General Internal Medicine	3	85	90	100
	General Pediatrics	4	58.75	71.25	75
	General Surgery	4	82.5	82.5	90
	Hospital Medicine	6	79.167	78.333	80
	Obstetrics & Gynecology	1	80	100	80

These data revealed that almost every group saw an increase in the mean between pretest and immediate feedback self-competence scale scores, with sustained means based on comparison of the immediate and delayed feedback self-competence scale scores. Inferential statistical analysis was not performed due to the low number of participants in most groups.

4.4.3 Mentoring Self-Competence

Descriptive statistics were used to analyze the data collected on the pre-survey, immediate post-survey, and delayed post-survey scores for the participants who completed all mentoring self-competence scale items. The number of participants per demographic category varies, as some participants who provided data for the scale items did not indicate all of their demographics; for each category, as many participants as possible are presented in order to maximize analytical power. These data are presented in Tables 19 and 20.

Table 19 Mean Mentoring Self-Competence Scale Scores by Gender, Location, and Age

		n	Pre-Survey Scale Score	Immediate Post-Survey Scale Score	Delayed Post-Survey Scale Score
Gender	Female	25	75	85.2	84.2
	Male	4	81.25	83.75	87.5
Location	Pennsylvania	26	74.038	83.462	83.269
	Maryland	1	75	90	100
	Ohio	1	100	100	100
Age	20-29	4	87.5	91.25	87.5
(in years)	30-39	21	70.238	80.952	81.095
	40-49	2	92.5	97.5	97.5
	50+	2	95	100	97.5

Table 20 Mean Mentoring Self-Competence Scale Scores by Profession and Specialty

		n	Pre-Survey Scale Score	Immediate Post-Survey Scale Score	Delayed Post-Survey Scale Score
Profession	NP	3	78.333	91.667	90
	Physician	3	95	91.667	91.667
	PA	22	73.636	83.409	83.409
Specialty	Behavioral Medicine/ Psychiatry	1	100	100	100
	Emergency Medicine	2	77.5	82.5	85
	Family Medicine	4	81.25	90	90
	General Internal Medicine	3	80	88.333	88.333
	General Pediatrics	4	70	85	86.25
	General Surgery	4	80	82.5	86.25
	Hospital Medicine	5	78	82	84
	Obstetrics & Gynecology	3	48.333	73.333	65

These data revealed that almost every group saw an increase in the mean between pretest and immediate feedback self-competence scale scores, with sustained means based on comparison of the immediate and delayed feedback self-competence scale scores. Inferential statistical analysis was not performed due to the low number of participants in most groups.

5.0 Discussion

5.1 Conclusion

This project provides proof of concept for the use of online learning modules in the professional development of clinical preceptors of the University of Pittsburgh PA Studies Program, specifically in the competencies of providing feedback and mentoring. The mean overall increases in knowledge of the participants who completed the pretest, modules, and immediate posttest and those who completed the pre- and immediate post-surveys regarding feedback and mentoring self-competence indicate the modules had a positive impact on all three of these areas. Results from this study were consistent with previous studies that suggested that online learning modules were effective for professional development (Hugenholtz et al., 2008; Khatony et al., 2009).

Statistical analysis of the data regarding the impact of the online professional development modules on the knowledge of clinical preceptors demonstrated statistically significant positive differences in the mean scores of all participants who completed the pretest and immediate posttest (n = 43) and the pretest and delayed posttest (n = 34). Similarly, analysis of the data regarding feedback and mentoring self-competence scale scores revealed statistically significant positive differences among the mean values (p <0.001). Results from these analyses indicated that the modules were positively impactful on the knowledge and competences of clinical preceptors.

Regarding differences in impact of the online professional development modules on clinical preceptors of various demographic groups, the data generally indicated overall increases in mean knowledge and feedback and mentoring self-competence scale scores of most groups.

Though most groups had a low number of participants, it should be noted that the groups with relatively larger samples (namely, females, those who practice in Pennsylvania, physician assistants, and those aged 30-39 years) demonstrated positive differences in their mean pretest and immediate posttest scores and their pre- and immediate post-surveys used to measure their feedback and mentoring self-competence scores.

5.2 Limitations

There were several limitations to this study. First, the sample size was small as there was a low response rate among the total population sample and there were few participants in many of the demographic groups, with data indicating only one participant in each of several categories. The small overall and demographic sample sizes limit the generalizability of the findings and indicate that the findings may not reflect those of the general population of preceptors. The small overall sample sizes also limit the interpretation of the t-test and One-Way ANOVA analysis, and analysis of differences among demographic groups was similarly limited. Another limitation arises from the total population sampling method, as recruiting all preceptors did not allow for a comparison group. Additionally, some participants did not complete all assessments and modules of the study, but the study design did not capture reasons why this occurred or why the participants who completed the study did so.

Another limitation arises from the quantitative nature of the study. It would be insightful if a small qualitative analysis of each representative demographic group could be interviewed about perceptions regarding self-competence in providing. It was of interest that the feedback self-competence scale scores for the physician group were significantly higher than other professions

on the pre-survey and decreased to the lowest level of any profession on the delayed post survey. As above, the small number of physician participants (n = 2) providing this data is a limitation and conducting an interview of a sample from each profession may have been insightful identifying the reason for their respective trends.

The pretest-posttest design has been found to have several limitations, including the timing by which participants must complete assessments (in this case, the immediate and delayed posttests must be completed on schedule) (Pratt, McGuigan, & Katzev, 2000). Similarly, the use of a pretest, especially one measuring self-competence, may mask changes if the participants overestimate themselves on the initial observation (Pratt et al., 2000). Furthermore, internal validity may be threatened as participants may respond to posttests from a changed frame of reference after completing the learning module due to a better understanding of the construct being measured (Howard et al., 1979).

Additionally, responses and response rates may have been positively or negatively affected by the incentivization with continuing education credits, as the 1.5 hours of credit may not have been enough to attract and retain some participants, while others may have had an acquiescence bias in their responses if they perceived that such high-end results would be favorable to the researcher that provided the incentive.

5.3 Implications for Future Inquiry

In considering future inquiry related to this subject and project, it is notable that the uneven distribution of participants across demographic groups may provide a comparison group for future analysis. For example, if this project were to be repeated with a group of 30 nurse practitioners,

the data between that group and the physician assistants who completed this study would be comparable and might better support inferential statistical analysis and the drawing of conclusions. Other considerations for future research include the potential of analyzing for a lag effect by repeating the same study and comparing the data of these groups of preceptors from different times. Additionally, a future study iteration could address the limitation related to participant attrition by including a process for identifying reasons why participants who did not complete the study had this outcome, since this occurred but was not investigated. Finally, analysis of the knowledge and self-competence items could be performed to refine them before use in future iterations of this project.

5.4 Implications for Practice

5.4.1 University of Pittsburgh PA Studies Program

In keeping with the principles of improvement science, the findings of this project will inform the planning phase of the next PDSA cycle that aligns with the aim of this inquiry and improvement effort: By January 2022, over 90% of the clinical preceptors of the University of Pittsburgh PA Studies Program will be rated as “agree” or “strongly agree” on the clinical rotation evaluation questions related to the competencies of providing feedback and mentoring. To continue the work towards this aim, I will pursue interventions in four areas, especially informed by the driver diagram presented in Appendix A. First, I will expand module completion by reengaging the total preceptor population so any preceptor who did not complete the modules and assessments has another opportunity to do so. Additionally, I will engage preceptors and their

practice administrators in order to optimize the student load for each preceptor, as some may be overloaded and unable to commit the attention and effort necessary to perform the competencies of feedback and mentoring at satisfactory levels. Similarly, I will work with the student population by instructing them on the competencies of feedback and mentoring from the preceptor and student perspectives before they begin their clinical education. I expect that this intervention will help to make them more receptive to feedback and mentoring, to develop their understanding of the efforts of their preceptors, and to set reasonable expectations of the role of their preceptors in their clinical education.

The third key area that will be engaged in continuing the work toward this aim is the administration of the program. Formally, the program has an assigned program director and a director of clinical education. To work toward the aim of having high student evaluation scores of the preceptors' feedback and mentoring performance, I will work with them to analyze the assessment method for gathering this information to ensure that it is a valid instrument. This work will likely include an assessment for content validity of an internally developed survey or the incorporation of a different, validated instrument. Additionally, I will engage these administrators to identify all of the resources available for supporting the development and performance of these competencies by clinical preceptors and will bundle them in an easily accessible location for ongoing preceptor use. Further, I will work with them to ensure that any new clinical preceptors will be offered and encouraged to complete the online learning modules from this study.

Finally, as the chair of the department that includes the PA Studies Program, I can use my administrative authority and educational experience to support the work toward this aim. One method is to incentivize the completion of the online learning modules and assessments, perhaps through financial incentives that pay preceptors for the time they allot to completing them or by

creating and bestowing an annual award that recognizes outstanding mentoring by a clinical preceptor. Other options that I could employ would be to continue to refine the existing online learning modules through item analysis, as well as to develop additional modules related to the competencies of providing feedback and mentoring that present other evidence-based methods to further develop our preceptors.

5.4.2 Across PA and Other Healthcare Education Programs

This improvement study can contribute to the generalizable knowledge and inform effective practices of a variety of health care professionals and educators; therefore, it will result in the following deliverable products. First, the findings of the study will be disseminated by submitting a proposal for a presentation at a professional conference and in a manuscript that will be submitted for publication in an academic or professional journal focused on the training and practice of PAs or health care providers in general. Similarly, I will reach out to organizations and institutions at various levels to offer the online learning modules for the professional development of their members who serve as clinical preceptors. Some options for this include directly connecting with leaders of PA training programs at other institutions, the administrators of current and future health care networks that serve as clinical sites and that employ our clinical preceptors since many of these networks are interested in such professional development, and in connecting with national and international PA education associations to add these modules to the resources they offer and suggest to their member individuals and programs.

Finally, the online learning modules were written inclusively and in a manner informed by the feedback and mentoring practices of other professions. Therefore, I will follow a similar plan of offering the modules for others to use by approaching the other graduate and professional

programs that train health care professionals that include clinical education by preceptors. I will start this by offering the modules to the programs in the Schools of the Health Sciences at the University of Pittsburgh. Fortunately, there is a mechanism for awarding continuing education credit for the modules by the Accreditation Council for Pharmacy Education and the American Nurses Credentialing Center's Commission on Accreditation, so this will be pursued as a means of incentivizing engagement from professionals in other health care disciplines.

Appendix A Driver Diagram

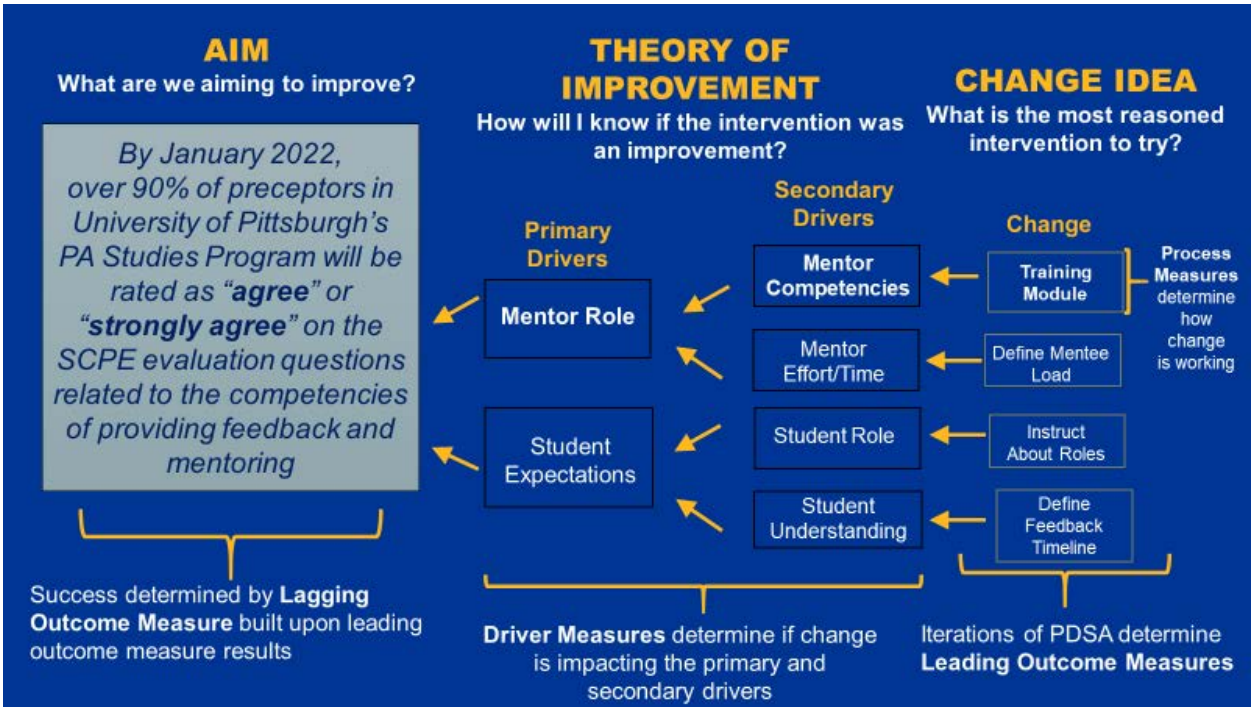

Figure 1 Driver Diagram Demonstrating the Theory of Improvement

Appendix B Demographic Survey

Instructions: Please indicate your response to the following questions:

1. With which gender do you most identify?
    a. Female
    b. Male
    c. Transgender Female
    d. Transgender Male
    e. Gender Variant/Non-Conforming
    f. Not Listed: _____
    g. Prefer Not to Answer

2. Please indicate your age: _____

3. In which of the United States is your primary practice setting? _____

4. Which of the following best indicates your profession?
    a. Nurse Practitioner
    b. Physician
    c. Physician Assistant
    d. Surgeon
    e. Other: _____

5. Please indicate your main specialty of practice:
    a. Behavioral Medicine/Psychiatry
    b. Emergency Medicine
    c. Family Medicine
    d. General Internal Medicine
    e. General Pediatrics
    f. General Surgery
    g. Hospital Medicine
    h. Obstetrics & Gynecology
    i. Other (Including Subspecialties): _____

Appendix C Pre-Module Test/Survey

Instructions: Please indicate how much each of the following commonly perceived barriers to providing feedback and mentoring impact your interactions with PA students:

Perceived Barriers to Feedback and Mentoring

1. Having enough observation of the student to base feedback and mentoring:
    a. Not at all, slightly, moderately, very much, extremely
2. Concern about the emotions of the learner
    a. Not at all, slightly, moderately, very much, extremely
3. Concern about reaction of the learner
    a. Not at all, slightly, moderately, very much, extremely
4. Time constraints
    a. Not at all, slightly, moderately, very much, extremely
5. Concern about your ability to effectively provide feedback and mentoring
    a. Not at all, slightly, moderately, very much, extremely

Instructions: Please indicate your level of agreement with the following statements:

Providing Feedback

1. I am capable of providing feedback to PA students.
    a. Not at all, slightly, somewhat, mostly, completely agree

2. I am confident in my ability to provide feedback to PA students.
    a. Not at all, slightly, somewhat, mostly, completely agree

3. Providing feedback to PA students is not difficult for me.
    a. Not at all, slightly, somewhat, mostly, completely agree

4. I have a strong understanding of the concepts of providing quality feedback to PA students.
    a. Not at all, slightly, somewhat, mostly, completely agree

5. I provide effective feedback to PA students.
    a. Not at all, slightly, somewhat, mostly, completely agree

Mentoring

1. I am capable of mentoring PA students.
    a. Not at all, slightly, somewhat, mostly, completely agree

2. I am confident in my ability to mentor PA students.
    a. Not at all, slightly, somewhat, mostly, completely agree

3. Mentoring PA students is not difficult for me.
    a. Not at all, slightly, somewhat, mostly, completely agree

4. I have a strong understanding of the concepts of mentoring PA students.
    b. Not at all, slightly, somewhat, mostly, completely agree

5. I effectively mentor PA students.
    a. Not at all, slightly, somewhat, mostly, completely agree

Instructions: Please answer the following questions to the best of your ability:

Knowledge of the Ask-Tell-Ask Strategy and Mentoring

1. An important part of the mentoring relationship is setting goals that will guide the partnership. Which of the following acronyms can be helpful in setting goals?
    a. SMART*
    b. TIPS
    c. GOALSET
    d. REAL

2. The best description for the role of a mentor is to:
    a. Create and maintain a supportive climate that promotes the conditions necessary for learning to take place*
    b. Ensure that students see as many patients as possible during the rotation
    c. Serve as a resource of medical knowledge that provides answers to all student questions (clinical or otherwise)
    d. Direct student learning by designing and implementing a series of situations and patient care experiences

3. Which of the following is an important part of the mentoring process?
    a. Preparing
    b. Negotiating
    c. Enabling Growth
    d. Coming to Closure
    e. All of the above*

4. After a patient encounter during a student's clinical rotation, you decide to employ the Ask-Tell-Ask Feedback Model to review the student's performance. The most appropriate initial step in this process is to:
    a. You ask the student for their self-assessment of their performance*
    b. You check the trainee's understanding by asking a question related to the patient case
    c. The student asks you for feedback about their performance
    d. The student asks you a question related to the patient case

5. According to the Ask-Tell-Ask model, encouraging a student to continue an effective behavior is known as which type of feedback?
    a. Reinforcing*
    b. Modifying
    c. Justifying
    d. Counseling

6. After employing the Ask-Tell-Ask Feedback Model during an encounter with a PA student, the last step is to:
    a. Provide focused teaching
    b. State your observations
    c. Discuss a plan for improvement with the learner*
    d. Ask for the trainee's self-assessment

Appendix D Immediate Post-Module Test/Survey

Instructions: Please indicate your level of agreement with the following statements:

Providing Feedback

1. I am capable of providing feedback to PA students.
    a. Not at all, slightly, somewhat, mostly, completely agree

2. I am confident in my ability to provide feedback to PA students.
    a. Not at all, slightly, somewhat, mostly, completely agree

3. Providing feedback to PA students is not difficult for me.
    a. Not at all, slightly, somewhat, mostly, completely agree

4. I have a strong understanding of the concepts of providing quality feedback to PA students.
    a. Not at all, slightly, somewhat, mostly, completely agree

5. I provide effective feedback to PA students.
    a. Not at all, slightly, somewhat, mostly, completely agree

Mentoring

1. I am capable of mentoring PA students.
    a. Not at all, slightly, somewhat, mostly, completely agree

2. I am confident in my ability to mentor PA students.
    a. Not at all, slightly, somewhat, mostly, completely agree

3. Mentoring PA students is not difficult for me.
    a. Not at all, slightly, somewhat, mostly, completely agree

4. I have a strong understanding of the concepts of mentoring PA students.
    a. Not at all, slightly, somewhat, mostly, completely agree

5. I effectively mentor PA students.
    a. Not at all, slightly, somewhat, mostly, completely agree

Instructions: Please answer the following questions to the best of your ability:

Knowledge of the Ask-Tell-Ask Strategy and Mentoring

1. An important part of the mentoring relationship is setting goals that will guide the partnership. Which of the following acronyms can be helpful in setting goals?
    a. SMART*
    b. TIPS
    c. GOALSET
    d. REAL

2. The best description for the role of a mentor is to:
    a. Create and maintain a supportive climate that promotes the conditions necessary for learning to take place*
    b. Ensure that students see as many patients as possible during the rotation
    c. Serve as a resource of medical knowledge that provides answers to all student questions (clinical or otherwise)
    d. Direct student learning by designing and implementing a series of situations and patient care experiences

3. Which of the following is an important part of the mentoring process?
    a. Preparing
    b. Negotiating
    c. Enabling Growth
    d. Coming to Closure
    e. All of the above*

4. After a patient encounter during a student's clinical rotation, you decide to employ the Ask-Tell-Ask Feedback Model to review the student's performance. The most appropriate initial step in this process is to:
    a. You ask the student for their self-assessment of their performance*
    b. You check the trainee's understanding by asking a question related to the patient case
    c. The student asks you for feedback about their performance
    d. The student asks you a question related to the patient case
5. According to the Ask-Tell-Ask model, encouraging a student to continue an effective behavior is known as which type of feedback?
    a. Reinforcing*
    b. Modifying
    c. Justifying
    d. Counseling

6. After employing the Ask-Tell-Ask Feedback Model during an encounter with a PA student, the last step is to:
    a. Provide focused teaching
    b. State your observations
    c. Discuss a plan for improvement with the trainee*
    d. Ask for the trainee's self-assessment

Assessment of the Modules

1. The learning modules covered the important topics of the content area.
    a. Not at all, slightly, somewhat, mostly, completely agree

2. The learning modules covered the topics in sufficient detail.
    a. Not at all, slightly, somewhat, mostly, completely agree

3. Please provide any feedback about the learning modules that you would like to share:
    a. Open-ended

4. What other topic(s) would you suggest for professional development opportunities for clinical preceptors?
    a. Open-ended

Appendix E Delayed Post-Module Test/Survey

Instructions: Please indicate your level of agreement with the following statements:

Providing Feedback

1. I am capable of providing feedback to PA students.
    a. Not at all, slightly, somewhat, mostly, completely agree

2. I am confident in my ability to provide feedback to PA students.
    a. Not at all, slightly, somewhat, mostly, completely agree

3. Providing feedback to PA students is not difficult for me.
    a. Not at all, slightly, somewhat, mostly, completely agree

4. I have a strong understanding of the concepts of providing quality feedback to PA students.
    a. Not at all, slightly, somewhat, mostly, completely agree

5. I provide effective feedback to PA students.
    a. Not at all, slightly, somewhat, mostly, completely agree

Mentoring

1. I am capable of mentoring PA students.
    a. Not at all, slightly, somewhat, mostly, completely agree

2. I am confident in my ability to mentor PA students.
    a. Not at all, slightly, somewhat, mostly, completely agree

3. Mentoring PA students is not difficult for me.
    a. Not at all, slightly, somewhat, mostly, completely agree

4. I have a strong understanding of the concepts of mentoring PA students.
    a. Not at all, slightly, somewhat, mostly, completely agree

5. I effectively mentor PA students.
    a. Not at all, slightly, somewhat, mostly, completely agree

Instructions: Please answer the following questions to the best of your ability:

Knowledge of the Ask-Tell-Ask Strategy and Mentoring

1. An important part of the mentoring relationship is setting goals that will guide the partnership. Which of the following acronyms can be helpful in setting goals?
    a. SMART*
    b. TIPS
    c. GOALSET
    d. REAL

2. The best description for the role of a mentor is to:
    a. Create and maintain a supportive climate that promotes the conditions necessary for learning to take place*
    b. Ensure that students see as many patients as possible during the rotation
    c. Serve as a resource of medical knowledge that provides answers to all student questions (clinical or otherwise)
    d. Direct student learning by designing and implementing a series of situations and patient care experiences

3. Which of the following is an important part of the mentoring process?
    a. Preparing
    b. Negotiating
    c. Enabling Growth
    d. Coming to Closure
    e. All of the above*

4. After a patient encounter during a student's clinical rotation, you decide to employ the Ask-Tell-Ask Feedback Model to review the student's performance. The most appropriate initial step in this process is to:
    a. You ask the student for their self-assessment of their performance*
    b. You check the trainee's understanding by asking a question related to the patient case
    c. The student asks you for feedback about their performance
    d. The student asks you a question related to the patient case

5. According to the Ask-Tell-Ask model, encouraging a student to continue an effective behavior is known as which type of feedback?
    a. Reinforcing*
    b. Modifying
    c. Justifying
    d. Counseling

6. After employing the Ask-Tell-Ask Feedback Model during an encounter with a PA student, the last step is to:
    a. Provide focused teaching
    b. State your observations
    c. Discuss a plan for improvement with the trainee*
    d. Ask for the trainee's self-assessment

Appendix F Items

Table 21 Knowledge of Feedback and Mentoring – Item Response Distribution

Item	Pretest (*n* = 43)	Immediate Posttest (*n* = 43)	Delayed Posttest (*n* = 34)
After a patient encounter during a student's clinical rotation, you decide to employ the Ask-Tell-Ask Feedback Model to review the students' performance. The most appropriate initial step in this process is to:			
You ask the student for their self-assessment of their performance*	58.1% 25	93% 40	82.4% 28
You check the trainee's understanding by asking a question related to the patient case	34.9% 15	2.3% 1	14.7% 5
The student asks you for feedback about their performance	2.3% 1	2.3% 1	0% 0
The student asks you a question related to the patient case	4.7% 2	2.3% 1	2.9% 1
According to the Ask-Tell-Ask model, encouraging a student to continue an effective behavior is known as which type of feedback?			
Reinforcing*	93% 40	100% 43	100 % 34
Modifying	4.7% 2	0% 0	0% 0
Justifying	2.3% 1	0% 0	0% 0
Counseling	0% 0	0% 0	0% 0

Table 21 (continued)

After employing the Ask-Tell-Ask Feedback Model during an encounter with a PA student, the last step is to:			
Provide focused teaching	7% 3	0% 0	2.9% 1
State your observations	2.3% 1	0% 0	0% 0
Discuss a plan for improvement with the learner*	55.8% 24	88.4% 39	76.5% 26
Ask for the trainee's self-assessment	34.9% 15	11.6% 5	20.6% 7
An important part of the mentoring relationship is setting goals that will guide the partnership. Which of the following acronyms can be helpful in setting goals?			
SMART*	58.1% 25	93% 40	91.2% 31
TIPS	23.3% 10	4.7% 2	2.9% 1
GOALSET	16.3% 7	2.3% 1	5.9% 2
REAL	2.3% 1	0% 0	0% 0
The best description for the role of a mentor is to:			
Create and maintain a supportive climate that promotes the conditions necessary for learning to take place*	76.7% 33	90.7% 39	97.1% 33
Ensure that students see as many patients as possible during the rotation	0% 0	0% 0	0% 0
Serve as a resource of medical knowledge that provides answers to all student questions (clinical or otherwise)	2.3% 1	2.3% 1	0% 0
Direct student learning by designing and implementing a series of situations and patient care experiences	20.9% 9	7% 3	2.9% 1

Table 21 (continued)

Which of the following is an important part of the mentoring process?			
Preparing	0% 0	0% 0	2.9% 1
Negotiating	0% 0	0% 0	0% 0
Enabling Growth	14% 6	0% 0	11.8% 4
Coming to Closure	0% 0	0% 0	0% 0
All of the Above*	86% 37	100% 43	85.3% 29

* *indicates a correct response.*

Table 22 Self-Competence Scales – Item Response Distribution from Pre-Surveys

Item	Not at all	Slightly Agree	Somewhat Agree	Mostly Agree	Completely Agree
Feedback (*n* = 28)					
I am capable of providing feedback to PA students.	0% 0	0% 0	0% 0	60.7% 17	39.3% 11
I am confident in my ability to provide feedback to PA students.	0% 0	0% 0	10.7% 3	57.1% 16	32.1% 9
Providing feedback to PA students is not difficult for me.	0% 0	0% 0	21.4% 6	57.1% 16	21.4% 6
I have a strong understanding of the concepts of providing quality feedback to PA students.	0% 0	0% 0	39.3% 11	50% 14	10.7% 3
I provide effective feedback to PA students	0% 0	0% 0	35.7% 10	53.6% 15	10.7% 3
Mentoring (*n* = 29)					
I am capable of mentoring PA students.	0% 0	3.4% 1	3.4% 1	41.4% 12	51.7% 15
I am confident in my ability to mentor PA students.	0% 0	0% 0	17.2% 5	41.4% 12	41.4% 12
Mentoring PA students is not difficult for me.	3.4% 1	41.4% 12	31% 9	24.1% 7	34.5% 10
I have a strong understanding of the concepts of mentoring PA students.	0% 0	3.4% 1	34.5% 10	41.4% 12	20.7% 6
I effectively mentor PA students.	0% 0	0% 0	27.6% 8	1.7% 15	20.7% 6

Table 23 Self-Competence Scales – Item Response Distribution from Immediate Post-Surveys

Item	Not at all	Slightly Agree	Somewhat Agree	Mostly Agree	Completely Agree
Feedback (*n* = 28)					
I am capable of providing feedback to PA students.	0% 0	0% 0	0% 0	42.9% 12	57.1% 16
I am confident in my ability to provide feedback to PA students.	0% 0	0% 0	10.7% 3	46.4% 13	42.9% 12
Providing feedback to PA students is not difficult for me.	0% 0	3.4% 1	10.7% 3	57.1% 16	28.6% 8
I have a strong understanding of the concepts of providing quality feedback to PA students.	0% 0	0% 0	0% 0	46.4% 13	53.6% 15
I provide effective feedback to PA students.	0% 0	3.4% 1	3.4% 1	64.3% 18	28.6% 8
Mentoring (*n* = 29)					
I am capable of mentoring PA students.	0% 0	0% 0	0% 0	48.3% 14	51.7% 15
I am confident in my ability to mentor PA students.	0% 0	0% 0	3.4% 1	44.8% 13	51.7% 15
Mentoring PA students is not difficult for me.	0% 0	0% 0	20.7% 6	41.4% 12	37.9% 11
I have a strong understanding of the concepts of mentoring PA students.	0% 0	0% 0	0% 0	48.3% 14	51.7% 15
I effectively mentor PA students.	0% 0	0% 0	6.9% 2	58.6% 17	34.5% 10

Table 24 Self-Competence Scales – Item Response Distribution from Delayed Post-Surveys

Item	Not at all	Slightly Agree	Somewhat Agree	Mostly Agree	Completely Agree
Feedback (*n* = 28)					
I am capable of providing feedback to PA students.	0% 0	0% 0	0% 0	46.4% 13	53.6% 15
I am confident in my ability to provide feedback to PA students.	0% 0	0% 0	0% 0	50% 14	50% 14
Providing feedback to PA students is not difficult for me.	0% 0	0% 0	21.4% 6	39.3% 11	39.3% 11
I have a strong understanding of the concepts of providing quality feedback to PA students.	0% 0	0% 0	0% 0	53.6% 15	46.4% 13
I provide effective feedback to PA students.	0% 0	0% 0	7.1% 2	64.3% 18	28.6% 8
Mentoring (*n* = 29)					
I am capable of mentoring PA students.	0% 0	0% 0	0% 0	44.8% 13	55.2% 16
I am confident in my ability to mentor PA students.	0% 0	0% 0	3.4% 1	48.3% 14	48.3% 14
Mentoring PA students is not difficult for me.	0% 0	3.4% 1	10.3% 3	51.7% 15	34.5% 10
I have a strong understanding of the concepts of mentoring PA students.	0% 0	0% 0	3.4% 1	48.3% 14	48.3% 14
I effectively mentor PA students.	0% 0	0% 0	6.9% 2	51.7% 15	41.4% 12

Appendix G Institutional Review Board Approval

Beck Jr, David C

From: John Lutz <lutzjw@gmail.com>
Sent: Tuesday, November 19, 2019 2:37 PM
To: Beck Jr, David C
Cc: O'Donnell, John Marc; Deborah Farkas; William McIvor; Lilly Emlet
Subject: Approval for WISER IRB for the FDBK MNTR STUD - ONLINE course.
Attachments: PRO18050538 - Approval Letter.pdf

Dear David,
Congratulations! The WISER Research Committee (WRC) has reviewed your proposal for the research study "Defining and Developing the Feedback-Providing and Mentoring Competencies of Clinical Preceptors" which is associated with the FDBK MNTR STUD - ONLINE course. We have approved it for use under our comprehensive IRB protocol # PRO18050538: "Knowledge, Attitude and Skill Attainment at WISER: Ongoing Analysis of WISER Course Goal Measures". I have attached a copy of our IRB approval letter for your records.

As part of the documentation for this project, please forward PDF copies of certificates of completion of CITI training for all investigators for "**Social and Behavioral Research - Basic/Refresher**" and "**Social and Behavioral Responsible Conduct of Research**". You can find directions for printing the certificates at WISER's Research web page.

We will assign a committee member to work with you and monitor your progress. As part of the agreement with the IRB and our accreditation with the Society for Simulation in Healthcare, we will need periodic updates on your project. Your assigned committee member will contact regarding the details.

Please let us know if the committee can be of further assistance.

Best of luck to you and your co-investigators in your research endeavors.

John Lutz
Director of Information Technology
Co-Director of Research
Winter Institute for Simulation, Education, and Research (WISER)
University of Pittsburgh
lutzjw@upmc.edu
www.wiser.pitt.edu
412-648-6073

WISER is Accredited by the Society for Simulation in Healthcare in Teaching, Assessment, Research, and Systems Integration
WISER is Endorsed by the American Society of Anesthesiologists

Figure 2 Study Approval from WISER Research Committee

From: irb@pitt.edu
To: Farkas, Deborah
Subject: PI Notification: IRB determination
Date: Tuesday, July 17, 2018 11:02:17 AM

University of Pittsburgh

Institutional Review Board

3500 Fifth Avenue
Pittsburgh, PA 15213
(412) 383-1480
(412) 383-1508 (fax)
http://www.irb.pitt.edu

Memorandum

To: Deborah Farkas

From: Sue Beers

Date: 7/17/2018

IRB#: PRO18050538

Subject: Knowledge, Attitude and Skill Attainment at WISER: Ongoing Analysis of WISER Course Goal Measures

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The above-referenced project has been reviewed by the Institutional Review Board. Based on the information provided, this project meets all the necessary criteria for an exemption, and is hereby designated as "exempt" under section

45 CFR 46.101(b)(1)

Please note the following information:

- Investigators should consult with the IRB whenever questions arise about whether planned changes to an exempt study might alter the exempt status. Use the "**Send Comments to IRB Staff**" link displayed on study workspace to request a review to ensure it continues to meet the exempt category.
- It is important to close your study when finished by using the " **Study Completed**" link displayed on the study workspace.
- Exempt studies will be archived after 3 years unless you choose to extend the study. If your study is archived, you can continue conducting research activities as the IRB has made the determination that your project met one of the required exempt categories. The only caveat is that no changes can be made to the application. If a change is needed, you will need to submit a NEW Exempt application.

Please be advised that your research study may be audited periodically by the University of Pittsburgh Research Conduct and Compliance Office.

Figure 3 Institutional Review Board Supporting Enduring WISER Research Committee Decisions

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