An Evaluation Of Interprofessional Education: The Medical And Pharmacy Student Experience

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AN EVALUATION OF INTERPROFESSIONAL EDUCATION:
THE MEDICAL AND PHARMACY STUDENT EXPERIENCE

By

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AN EVALUATION OF INTERPROFESSIONAL EDUCATION: THE MEDICAL AND PHARMACY STUDENT EXPERIENCE

Abstract

Interprofessional education (IPE) in health professions continues to garner attention and is widely encouraged in the overall improvement of health care delivery in the U.S. The lack of communication and cross-profession collaboration contributes to errors and lower patient outcomes. As a result, medical education is undergoing transformation as new models are sought to deliver curricula that foster collaboration among health care disciplines. The purpose of this mixed methods program evaluation was to explore pharmacy and medical students’ perceptions of interprofessional learning after a six-week clinical rotation in a family medicine setting, as well as describe student perceptions of patient benefits resulting from collaboration. This program evaluation was conducted using a mixed methods approach with three instruments used in sequential order: ATHCT (Attitudes Toward Health Care Teams); SPICE (Student Perceptions of Physician/Pharmacist Interprofessional Clinical Education); and TSS (Team Skills Scale). Three items on the SPICE tool showed significant change in the roles and responsibilities domain and it showed that clinical practice experiences were the ideal places for pharmacy and medical students to interact. Results of all items on the TSS (Team Skills Scale) showed improvement, and 9 out 17 showed statistical significance. Qualitative findings showed that students learned about another health profession as a result of this shared clinical experience and that collaboration was often easy and natural. Students described how collaboration allowed
for optimization of patient care. Increased knowledge and observation of health care professional roles promoted the act of collaboration for pharmacy and medical students and allowed for more open and honest communication with other health care professionals for patient care concerns. Finally, medical students recognized pharmacy students as collaborative direct care providers.
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Doctor of Education
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How does one complete a terminal degree, hold a full-time job, raise a family, and still have time left over to live life? The answer, I’ve found, is from the love and support of family and friends. My parents were a constant source of encouragement while my kids cheered me on. My colleagues were supportive when I told them my aspirations of a doctoral degree. I feel much appreciation to many who gave a kind word when it was really needed. This journey has been part of my desire to be a life-long learner and won’t end when I’m awarded a doctoral degree. My inquiry and study of interprofessional learning will continue, but will take a new direction. As for diplomas and degrees, I’m going to take time to study and grow in my first love of music. I feel blessed with a talent that I wish to pursue with all the extra time I’ll find.

Special thanks to Drs. Parsons, Morrill, and Marsh who were a constant source of help during this research project. Very special thanks to my copreceptor Dr. Abrell, who teaches collaboration by example. A heart-felt thanks to the faculty at FMI where learning in coparticipation is always a pleasure.

“Now go, write it before them in a table, and note it in a book, that it may be for the time to come.”

A saying from the Hebrew prophet Isaiah
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CHAPTER ONE

INTRODUCTION

Interprofessional education (IPE) in health professions continues to garner attention and is widely encouraged in the overall improvement of health care delivery in the U.S. (IPEC, 2016). According to the Interprofessional Education Collaborative Expert Panel (2011), health care reform should have a “common goal of building a safer and better patient-centered and community/population oriented U.S. health care system” (p. 3). As a result, medical education is undergoing growth and transformation as new models are sought to deliver curricula that foster collaboration among health care disciplines. According to Maine (2011), “This work represents a down payment . . . for the future of exciting new models of practice and education, and the winners are our patients!” (p. 1). The impetus for change comes largely from external sources (Accreditation Council for Graduate Medical Education, 2011; Accreditation Council for Pharmacy Education, 2010) and pharmacy and medical programs have required accreditation standards for interprofessional collaboration effective in 2016 (Zorek & Raehl, 2013).

Pharmacists and physicians need team orientation and communication skills to work together to deliver safe health care to all patients, whether in hospital, clinic, or pharmacy settings. However, most universities do not offer such curricula. Opportunities are lacking in both didactic and clinical teaching as most formal education is still offered in silos (separate curricula that are not integrated) with just one profession learning without influence from or integration with the other. Evidence indicates that team-based care supports quality and safe health care outcomes (Institute of Medicine [IOM] 2003; IPEC, 2016; World Health Organization, 2010), yet there is a paucity of opportunities for students to learn team-based care during formal training. The current model of educating pharmacy and medical students does not
provide insight to students as to what their respective colleagues do, and how they might interact and problem solve with other medical professionals upon entering the work force.

Statement of the Problem

According to the Robert Wood Johnson Foundation (2011), medical education is delivered in silos [isolation, non-collaborative] and the lack of communication and cross-profession collaboration contributes to errors and poor patient outcomes. Hughes (2008) reports that medical errors, especially those caused by a failure to communicate, are a pervasive problem in today’s health care organizations. Medical errors have become a focus for health care consumers, legislators, and health care professionals since the publication in 1999 of the Institute of Medicine’s (IOM) report To Err Is Human. This report highlighted the alarming number of medical errors that occur annually in the United States, placing the number of resulting deaths annually close to 98,000. The Institute of Medicine (IOM) 2015 update indicates that the problem has not been addressed and that figure remains stagnated at approximately 98,000. According to several sources, the root of the problem is not individual errors but rather systemic problems finding common cause in communication failures among health care professionals (Carpenter, 2007; IOM, 1999; IOM, 2015).

It is believed that interprofessional education, with its emphasis on improved communication and team orientation, might lead to greater collaboration in actual practice, but the impact of interprofessional education or best practice to deliver curriculum is not yet understood. According to IOM (2015), the central goal of IPE is to produce a health workforce prepared to collaborate and drive positive outcomes from communication among the team with the patient. Alignment of education and clinical practice is still in its infancy stages, and has not yet yielded an abundance of opportunity despite recommendations from experts (IPEC, 2011;
IPEC, 2016; IOM, 2015). Graduates need experience and practice in which cross-profession teamwork and communication are modeled to understand the relationship among personnel and to gain respect and knowledge of one or more health professions simultaneously.

This study reflects the current work and practice for teaching pharmacy and medical students from an interprofessional approach, specifically teaching both learner groups together in a family practice setting with actual patient encounters. A private university faculty in Maine with diverse graduate medical programs collaborated with a family medicine clinic in Augusta, Maine. Together, they teach fourth year pharmacy and third year medical students in a shared clinical setting. Interprofessional preceptors aligned academic programming with collaborative practice to meet the needs of students, patients, populations, and the community health system. A faculty pharmacist and physician collaborated to provide an interprofessional clinical teaching experience for both pharmacy and medical students together. In this setting, medical care was provided to the patients of the faculty physician, and the pharmacist consulted on medication prescription during or after the patient encounter. Both pharmacy and medical students were present during the patient care encounters observing and participating in assessment and care of the patients.

**Purpose of the Study**

The purpose of this mixed methods program evaluation was to explore pharmacy and medical students’ perceptions of interprofessional learning after a six-week clinical rotation in a family medicine setting. The study was retrospective, analyzing data collected from June 2013 through June 2016. A secondary intention of this study was to explore students’ perceptions of other medical professionals’ contributions to their own learning about team orientation and
communication and to evaluate how interprofessional learning contributes to collaboration, respect for the roles of other health care professionals, and possible benefits to patients.

**Research Questions**

The following questions guided this research study:

1. How do the medical and pharmacy students describe learning about other professions?
2. What experiences or activities contributed to interprofessional learning and collaboration?
3. How do medical and pharmacy students perceive that collaboration among health care providers benefits patients?

**Conceptual Framework**

The concepts that guided this study surround the clinical instruction by faculty for students in actual patient encounters in family medicine. Clinical education is required for third year medical students and fourth year pharmacy students, and the integration of teaching pharmacy and medical students simultaneously guided the approach for this study. Additionally, patients are an integral part of the team while learning the roles and responsibilities of various providers of care who communicate directly with them. Importantly, students engage with faculty and patients while learning required skills and competencies as faculty model professional behaviors while mentoring both pharmacy and medical students as team members. Lastly, students have an opportunity to reflect upon the roles and responsibilities of their own and another profession working in collaboration on behalf of the patient. Often this is a first experience for pharmacy and medical students to work together in a shared clinical experience.
The use of open-ended questions in a post-survey instrument allowed students to freely express reflectively what the learning experience was like.

Teaching in the context of actual practice emphasizes the importance of socializing students into the spirit of collaboration during the development of their professional identity, and early socialization is believed to foster mutual respect among disciplines and to diminish stereotypes (Hall, 2005; Horder, 2004; Oandasan & Reeves, 2005). Goldman, Meuser, Rogers, Lawrie, & Reeves (2010) describe the transition from traditional practice to collaborative care as one of rethinking traditional roles and understanding how teams might integrate collaborative care in clinical practice. Bosch & Mansell (2015) further characterize collaboration in health care by comparison to competitive team sports where shared leadership and communication are the hallmarks of advocating for patient-centered care. The faculty become the coaches (while still providing care) and students learn collaboration as the team focuses on the patient (central to the encounter). Figure 1 provides a depiction of teaching students in a practice setting.

The conceptual framework provides a working model for actual learning in clinical practice where students are given opportunities to learn team skills and communication in the

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**Figure 1: The context and concepts of teaching students while providing care**

- **Students**
  - Attitudes and perceptions learning about, with and from another profession
  - Written reflections about the roles and responsibilities of the other profession
  - Patient encounter with preceptor (faculty)

- **Patients**
  - Patient empowerment
  - Patient as a member of the health care team
  - Educating the patient on the roles and responsibilities of the team

- **Faculty**
  - Teaching required skills and competencies for each learner type
  - Modeling professional behaviors
  - Training for precepting another learner type
  - Aligning curriculum with practice
context of patient care. It is known that team skills build safer environments for patient care including reduced errors and improved outcomes (IPEC, 2011; IOM, 2015) and are needed in the overall health care reform and improvement.

Topical interest is a key element to a conceptual framework (Creswell, 2014) and this study continues a lifelong journey of improving educational approaches to pharmacy and medical education. The genesis of this project came through an interest in finding ways to improve health care outcomes through interprofessional education of pharmacy and medical students. The researcher has been a practicing pharmacist and administrator in health care for 30 years and has a keen interest in the improvement of both the clinical and educational aspects of this study.

Assumptions, Limitations, and Scope

As with any sort of program evaluation, it is important to set parameters and acknowledge general assumptions about not only the data, but the site and instrumentation. It is assumed that interprofessional education, now a required domain for pharmacy and medical students taught in clinical settings, will be an effective strategy to prepare students to interact with other health care professions more freely (IPEC, 2016). As health care focuses on improved patient experiences, this clinical interface provided practical opportunities for students to engage with each other and patients simultaneously. It is also assumed that students will learn communication skills that are beneficial to their patients in the context of learning about, with, and from another health professions student and from the faculty who precept them. Pharmacy and medical students who selected this clinical experience understood that it provided interprofessional learning opportunities about another health profession.
The researcher is also a preceptor/teacher for both medical and pharmacy students and it is assumed that facilitated patient care activities provide adequate interprofessional learning opportunities. The clinical teaching site discloses interprofessional learning to students prior to the start of the experience and students have several seminars early in their curricular experience specifically around interprofessional learning. These seminars are designed to introduce concepts of team orientation and the benefits of improving communication. It is further assumed that students will build upon their communication skills in the context of learning with other health professions. Finally, it is assumed that participants honestly answered all questions on survey instruments administered pre- and post-clinical experience.

Limitations

Limitations are inherent to any study, and their inclusion further helps set parameters for not only understanding the findings and results but why data may or may not be generalizable (Creswell, 2009). This study is limited in that only students who selected this learning experience are included in the study results. The learning experience is often referred to as a clinical rotation lasting for six weeks, and the limited duration may not be long enough to facilitate adequate interprofessional learning and assess the effects. The sample size is small and only twelve pharmacy and eight medical students complete a clinical rotation at the learning site in an academic year. This clinical rotation, usually called “ambulatory care” in pharmacy education, and “family medicine” in medical education, does not usually include both types of learners in other institutions and accreditation does not specify how both learner types gain experience. In this regard, generalizability may not extend to populations at large or other pharmacy and medical cohorts (Creswell, 2014; Yin, 2009). Lastly, a sample size of 60 and a study based at
one site present additional limitations where a larger sample across multiple sites may show more generalizable results (Creswell, 2009).

**Significance**

Collaborative interprofessional practice is regarded as a means to ensuring favorable patient outcomes and experiences (The IHI Triple Aim, 2017) and overall health care system improvement. Strategies supporting collaborative care approaches and evaluation of interprofessional education and its timing in health professions learning are currently under investigation to understand their significance in transformative efforts (The Affordable Care Act, 2015). Interprofessional learning is well established in health professions in the United Kingdom and Canada, but adoption by U.S. universities has been comparatively more recent (Freeth & Reeves, 2004; IPEC, 2011). This study will contribute to the findings as medical and pharmacy students share experiential learning in the context of actual patient encounters in family medicine. The evaluation of this program may contribute to the approaches pharmacy and medical educators utilize to deliver clinical teaching by providing insight to student perceptions about learning from other health care professionals, what activities contributed to interprofessional learning, and potential benefits to patients perceived by students.

The domains of interprofessional education and collaboration are readily identifiable in the accreditation standard for pharmacy and medical education as well as other allied health professions (Accreditation Council for Graduate Medical Education, 2011; Accreditation Council for Occupational Therapy Education, 2010; Accreditation Council for Pharmacy Education, 2011; American Association of Colleges of Nursing, 2008, 2011). Furthermore, the domains do conform to the spirit of collaborative learning with the long-term goal of improved outcomes for patients and transformation in health care.
Definition of Terms

The following terms are used throughout this dissertation:

**Interprofessional learning:** Two or more health disciplines who “learn with, from, and about each other to improve collaboration and the quality of care” (CAIPE, 2002).

**Interprofessional competencies:** “the complex integration of knowledge, skills, attitudes, values, and judgments that allow a health provider to apply these components into all collaborative situations. Competencies should guide growth and development throughout one’s life and enable one to effectively perform the activities required in a given occupation or function and in various contexts” (Canadian Interprofessional Health Care Collaborative [CIHC], 2010, p. 7).

**Collaboration or interprofessional collaborative practice** (in health care teams): “an interprofessional process of communication and decision making that enables the separate and shared knowledge and skills of health care providers to synergistically influence the client/patient care provided” (Way et al., 2001, as cited in CIHC, 2007, p. 7).

**CAIPE:** Centre for the Advancement of Interprofessional Education

**CIHC:** Canadian Interprofessional Health Collaborative

**IOM:** Institute of Medicine

**IPEC:** Interprofessional Education Collaborative

**WHO:** World Health Organization
Conclusion

Chapter one provided an introduction to the concept and reality of interprofessional education and collaboration in health care; the problem of medical errors and lack of team orientation; the conceptual framework of teaching students while providing medical care to patients; assumptions and limitations; and definition of terms. The need for improvement in health care outcomes is paramount and transformative efforts must occur on many levels. The implementation of interprofessional education, which may lead to greater collaboration in practice, is one suggested strategy, but additional benefits including producing team orientation and enhanced communication are other areas of quality improvement to consider in health care reform. Chapter two provides a detailed examination of the literature along with historical contexts that now drive the need for transformational changes in health professions education. The urgency to change aspects of health care delivery and the need to improve outcomes in a cost effective manner will always be considerations. Chapter three describes the methodology for this mixed methods study, which will review pre- and post-data samples of attitudinal surveys administered to students at the start and completion of a six week clinical rotation. Examination of the responses to open-ended questions will identify themes that emerge as pharmacy and medical students describe their experiences learning about, with, and from each other. Chapter four will provide analysis of the quantitative and qualitative data describing the changes students perceive about learning in practice with mentors and other health profession learners. Chapter five will conclude the study, reviewing the findings and discussing their significance for suggested future areas of research that may contribute to knowledge of interprofessional education in health professions.
CHAPTER TWO
LITERATURE REVIEW

A survey of the medical literature over more than two decades indicates that health care in the United States is not getting safer. IOM reports (1999; 2015) reveal no significant safety improvements and continue to conclude that medical errors due to a lack of communication and team orientation are the root cause for most mistakes. Though accreditation standards across health professions education have newly required interprofessional education that emphasizes communication and team orientation, they are still new, having originated in 2011 (IPEC, 2016). Best practices are still under review in an effort to fully understand how to transform curricular and experiential models, as well as to understand and utilize evaluation and programmatic assessment. Current efforts still focus on implementation (IPEC, 2016) yet the need for evaluation grows to understand its impact on health care delivery.

Deficiencies in the Evidence

The current literature focuses on small pilot studies with planned activities through various universities as well as small studies in medical practices and health systems (CAIPE, 2012; IPEC, 2016). Mature programs in the U.K. and Canada provide promising results (CAIPE, 2012) for their respective health care systems, but it will take time to validate methods of delivery as well as evaluate the outcomes in the United States. There is significant literature contribution from the United Kingdom and Canada (CIHC, 2010; IPEC, 2016; Pardue, 2015) yet relatively little scholarship in the United States regarding the implementation, timing, and assessment of interprofessional education, especially in the clinical experiences of pharmacy and medical students (IPEC, 2011; IPEC, 2016).
Contextual differences between the Canadian and United Kingdom experiences should be viewed with caution in the United States since there is not a unified national health care service. The United States’ health care system does not require interprofessional collaboration, whereas the U.K. and Canada have well established and supported collaborative protocols (CAIPE, 2012). Interprofessional education and collaboration are encouraged in the overall improvement of health care delivery and outcomes from the United Kingdom and Canada may be viewed as potential models (IPEC, 2011).

This literature review will explore historical considerations that led to the need for interprofessional education as well as the progress for implementing curricular changes for a new model of educational delivery in graduate medical programs. Key concepts of communication among different types of learners, attitudes, and perceptions are also explored. Evaluation of various models of practice highlight common themes as implementation varies by setting and the needs of health care systems vary by region. Lastly, the impact of coordinated and person-centered care are explored and the possible change in paradigm this represents in the delivery of health care.

**Historical Background**

The concept of IPE is not new, nor just limited to the United States. It is a global phenomenon and first received attention when the World Health Organization (WHO) published *Learning to Work Together for Health* (WHO, 1988). This publication gave health professions the directive to understand the roles of others, the need for collaboration, and the collective efforts of the team on behalf of patients.
International IPE

The United Kingdom provided initial leadership in groundbreaking efforts to promote IPE with its Centre for the Advancement of Interprofessional Education (Barnsteiner et al., 2007; CAIPE, 2012). According to Pardue (2015), The Centre maintains relationships with both the European Higher Education Academy and European Interprofessional Education Network and has helped encourage collaborative efforts throughout the United Kingdom and is also a partner for the international IPE research publication *The Journal of Interprofessional Care* (CAIPE, 2012). Notably, The National Health Service (U.K) began early support of IPE efforts across practice disciplines through cooperation with the Centre (Reeves & Freeth, 2002). The United Kingdom initiated interprofessional learning in health professions in 1991, and Canada followed in 1992 (CAIPE, 2012).

The Canadian Health Ministry adopted IPE as an official strategy to improve health systems by 2003 (CAIPE, 2012). This is reflective of the Canadian Health Ministry’s effort to ensure access to quality health care (Canadian Interprofessional Health Collaborative [CIHC], 2012). Health Canada generated and funded numerous health profession universities across the country to look at the aims, processes, and outcomes of IPE (CIHC, 2012). The results of this collaborative produced a competency framework for all health professions to meaningfully engage in interprofessional practice. Specifically these competencies include interprofessional communication, patient-centered care, role clarification, team functioning, collaborative leadership, and interprofessional conflict resolution (CIHC, 2010).

Interprofessional Education in the United States

Medical educators and practitioners in medical disciplines have learned specific content in a silo perspective and historically, each discipline covered required clinical concepts unique to
that profession. The deficiency exists that health profession students do not learn early on what other professions might complement their skill sets. According to Gilligan, Outram, & Levitt-Jones (2014), university leaders struggle with recognizing silos even though medical programs are co-located and a glaring lack of learning about other professions becomes evident when graduates work in clinical teams and do not have interpersonal communication skills due to a lack of understanding the roles of others.

The Robert Wood Johnson Foundation (2011) reports that medical education is delivered in silos and the lack of communication between them and not working in teams contribute to errors and lower outcomes after they enter the field. Hughes (2008) reports that medical errors, especially those caused by a failure to communicate, are a pervasive problem in today’s health care organizations. A survey of 2,382 nurses conducted by the Cunningham Group found that “58% of the nurses said that at some point they felt ‘either unsafe to speak up or they were unable to get others to listen’” (Leander, 2011, p. 1). The Institute of Medicine (IOM) (2015) reports medical errors, lack of communication, and undervaluing the contribution of other health care professions has stagnated U.S. health care system improvements.

Several important and historic Institute of Medicine (IOM) reports (1972, 1999, 2001, 2003) detail the lack of a team orientation in health professions and the resulting adverse outcomes such as medical errors and excess costs. Minimal federal funding has stifled the progression of interprofessional education and the phenomenon continues to be studied only sporadically. Notably, the Agency for Healthcare Research and Quality has developed retraining for current practitioners through TeamSTEPPS® in an effort to build existing workforce capacity in IPE team-based care (Baker et al., 2005). Though this might be a helpful resource it is far from any national reform efforts to improve the overall health care system.
In 2009, six professional organizations, including medicine and pharmacy, convened an expert panel to identify a common platform for IPE delivery resulting in four competency domains essential for progress (IPEC, 2011). The report of the expert panel in consultation with the global IPE community derived these four competencies along with suggested implementation and practice designs: teams and teamwork; interprofessional communication; roles and responsibilities; and values and ethics for interprofessional practice (IPEC, 2011). This consortium of six professional organizations comprised educators, administrators, and evaluators charged with the task of defining, promoting, and sustaining IPE activities in educational settings and actual practice models (IPEC, 2011).

**Theoretical Framework**

The current literature in this review is grounded in a pragmatic framework which is well suited for clinical practice where there is an environment of constant change. According to Barr (2013), many practitioners approached interprofessional education (IPE) singlemindedly in light of a single discipline, i.e., in silos. Research based in adult learning theories (Barr, 2013) asserts that interprofessional education should lead to interprofessional collaboration. Graduate medical professionals learn in practice, and current licensed medical personnel learn in context by coparticipation. Lave & Wenger (1991) as cited by Barr (2013), stated “learning in practice is coparticipation, calling on a shared repertoire of communal learning resources” (p. 6). Coparticipation is described extensively by IPEC (2011) as necessary toward learning collaboration in actual practice.

A framework that incorporates these concepts is the 3P Biggs (1993) model as cited by Pardue (2015, p. 11). The three “Ps” are: presage, process, and product. The presage phase takes into account prior knowledge and considers the environment where learning will occur. The
process stage is where the actual learning occurs and the instructional methods used to deliver the content. Lastly, the product is the actual outcome of the learning as assessed by knowledge or ability. Pardue (2015) further develops this framework with the addition of reflection as part of the learning cycle (p.11). This last step becomes important as learners reflect and value the role of others and the faculty reflects on teaching improvements.

Biggs 3P educational model (1993) conceptualizes what learners and teachers bring to the IPE setting (as cited by Freeth & Reeves, 2004). Presage factors account for what students and preceptors experienced prior to the formal clinical setting. Process factors according to Biggs 3P (1993) model account for the educational content, including the clinical interaction with patients, learning about other health professions, and the modeling of professional behaviors from preceptors (Freeth & Reeves, 2004). The product is the results of student outcomes such as professional behaviors and attitudes, clinical skills, discipline-specific competencies, and individually defined goals by preceptors and students (Freeth & Reeves, 2004). The product phase reveals the impact of the educational intervention and according to Freeth and Reeves (2004) reveals quantitatively or qualitatively how well material was learned or demonstrated through competency, as well as attitudinal and perception changes.

Pardue (2015) adds reflection to the Biggs (1993) model for the teacher to process the experience and provide a platform for growth, self-awareness, and improvement of teaching skills. Describing the culmination of teaching upon reflection, Pardue (2015) offers the following:

With IPE, the teaching team needs to exchange perspectives as to what aspects went well and what challenges arose. What did the evaluation of student learning reveal, and were there different outcomes among the various disciplines? Are there recommendations or
revisions for future experiences? Reflection on these questions provides ongoing quality improvement for IPE. (p. 14)

**Patient Care Considerations**

It is suggested that integration of the patient into the decision making process about personal health care as well as teaching the patient the role that each profession may provide is key toward a health care paradigm change (IOM, 2015). Oandasan et al. (2004) have long urged for patient centered health care and shared decision-making in the concept of partnership in health care, where the patient is a key member of the health care team. Patient engagement in health care decisions is encouraged in the overall improvement and delivery of care (IPEC, 2011).

**Making the Patient Part of the Team**

Bosch & Mansell (2015) compare collaboration in health care to competitive team sports where shared leadership and communication are hallmarks of advocating for the patient. The concept of patient-centered care, including the family and community, supports the participation of the patient as an integral partner on the health care team in planning, implementing, and evaluating health care (CIHC, 2010; IPEC Expert Panel, 2011; WHO, 2010). Feeley & Gottlieb (2004) describe the model of collaborative practice based on values including the sharing of power between partners, the pursuit of goals that are the result of discussion and negotiation, and active participation and involvement of the partners in the process of working together. Oandasan et al. (2004) explains the relation between “patient centered health care” and “collaborative care”:

> Although available evidence to date is limited, it is mounting: collaborative practice does enhance patient outcomes. Patients are thus at the center of collaborative care since they
are the very reason behind the interdependency of the professionals. This explains the terminology of “Collaborative Practice—Patient-Centred Care Practice” . . . patients are simultaneously active members of the teams and recipients of the team care. (p. 20)

According to the Interprofessional Education Collaborative Expert Panel (2011), patients want care that: (a) addresses their concerns; (b) seeks an integrated understanding of their whole person; (c) finds common ground on diagnosis and management; (d) promotes wellness and prevention; (e) and deepens trust and experience with their health care provider(s).

**Shared Decision Making**

Shared decision making is proposed as a model for patients and providers (Schneider et al., 2006) as the middle ground between paternalism and informed choice. Treatment decisions are based on the provision of evidence in conjunction with stated patient preferences. According to Wensing, Wetzels, Hermsen & Baker (2007), older adults with multiple chronic conditions were more likely to feel enabled if they had been actively involved in primary care consultation. Shared decision making is based on the premise that a patient’s knowledge will help guide the health care encounter and reflects the attitude that providers should value as part of the relationship with the patient (Mead & Bower, 2000; Stewart, 2001). Patient empowerment is a viewpoint that health and illness affect the patient, and by gaining input from his or her contribution will lead to enhanced outcomes (May & Mead, 1999).

**Role Clarification**

To provide effective patient centered care, health professionals must have a clear understanding of their own skills, as well as knowledge of the scope of practices of those working in the patient care setting (CIHC, 2010; IPEC Expert Panel, 2011; WHO, 2010). Role clarification includes articulating strengths and limitations during the decision making process,
leading to safer and more effective care (IPEC Conference Proceedings, 2011). The concept of role clarification expands to role appreciation where the valuing of other professionals is gained as additional skill sets are brought to the patient care team. This further enhancement allows each team member to work at the full scope of their practice and provides a more equitable distribution of the workload (CIHC, 2010; IPEC Expert Panel, 2011). Role appreciation may be important for breaking down hierarchy, turf battles, and distrust in the skill sets of others (IPEC Expert Panel, 2011). Roberts & Perryman (2007) promoted role clarification and appreciation among disciplines as a method to promote a patient-safe culture—specifically, relationships that were “built on trust, respect, confidentiality, responsiveness, empathy, effective listening, and communication. . . .” (p. 156).

**Evaluation of IPE**

The literature reveals much discussion around the evaluation of IPE, and Kirkpatrick (1967) provides a widely accepted basis for evaluation (Cooper, Carlisle, Gibbs, & Watkins, 2001; Hammick, 2000; Hammick et al., 2007; Hutchinson, 1999; Mann et al., 2009; Oandasan & Reeves, 2005b; Zwarenstein et al., 1999), classifying IPE outcomes into these categories: reaction, learning, behavior, and results. Figure 2 below provides a visual depiction of the categories in the hierarchy of learning. Thus, this framework is widely adopted and accepted in various training and educational facilities across the United States and Canada (Freeth & Reeves, 2004).

**Hierarchy of Educational Evaluation in IPE**

The foundational level as proposed by Kirkpatrick (1967) examines the evaluation of the learner and the relevance of content to the learner. Here motivation and interest are assessed along with the desire to continue in learning, which are integral steps in progression. Level two
examines the extent to which learners change attitudes and perceptions as well as gain skills during the learning process. Level three focuses on behaviors and how learners transfer those to actual practice settings, evaluated by observation and testing. By this stage, assessment focuses on the extent the learner performs with expected behaviors in the actual practice setting. Level four explicates how changes are measured at the organization or system level. Though more difficult to assess, this is believed to deliver the most value and have greatest impact (Kirkpatrick, 1998).

Figure 2. Kirkpatrick’s Hierarchy of Learning. Evaluation of reaction (satisfaction or happiness).

Freeth et al. (2002) proposed the use of a modified version of Kirkpatrick’s framework of educational evaluation during the planning, implementation, and evaluation of IPE. The authors propose the following modifications to the original framework: outcomes are not hierarchical; gathering data to measure the educational intervention becomes increasingly difficult progressing through the levels; and the goal, after all, is to provide better information for future policy and educational development.
Figure 3. Modified Kirkpatrick’s Model of Educational Outcomes for IPE (from Freeth et al. (2002, p. 14).

Modifications generally address the transfer of skills to practice and then the overall impact of patients and clients. IPE scholars (Barr, 2012; Hammick, 2002; Reeves, 2004) often cite the proposed modified framework appearing in Figure 3. Gross (2012) and Pardue (2015) have proposed that the Freeth et al. (2002) modified Kirkpatrick’s Model of Educational Outcomes serves as its own conceptual framework for IPE planning, implementation, and evaluation. According to Pardue (2015) level three evaluation (behavioral change) is the first tier of interprofessional outcomes that can directly impact patient care. Level four is conducted in the clinical setting and evaluates whether wider changes in the delivery of care and benefits to patients/clients results from interprofessional activities (Hammick et al., 2007).

Conclusion

The literature review serves to inform the research of this interprofessional study providing a historical review, an assessment of the current state of interprofessional education in the United States and abroad, and the need for further evaluation. The scholarship from the United Kingdom and Canada has helped inform practice models for their respective health care systems; however, the timing, implementation, and evaluation as well as the long term impact of
interprofessional learning is not fully understood in the current U.S. health care system. Further study is needed to help understand the most efficient manner of curricular change, content delivery of interprofessional learning, and its full evaluation as a means to overall reform.
CHAPTER THREE

METHODOLOGY

The purpose of this single site, programmatic evaluation was to explore pharmacy and medical students’ perceptions of interprofessional learning after a six-week clinical rotation in a family medicine setting. The following questions drive the methodology and approach to this study:

1. How do the medical and pharmacy students describe learning about other professions?
2. What experiences or activities contributed to interprofessional learning and collaboration?
3. How do medical and pharmacy students perceive that collaboration among health care providers benefit patients?

Setting

The setting for this study and program analysis was a clinical practice in family medicine in conjunction with a mid-size, private university in the northeastern United States. The university comprises graduate health professions education in the following Colleges: Pharmacy, Osteopathic Medicine, Dental Medicine, Social Work, and Health Professions. The research was conducted in an affiliated family medicine practice where third year medical students and fourth year pharmacy students participated in a shared clinical rotation for six weeks for each cohort. This clinical rotation is required for both pharmacy and medical students and each learner has specific objectives and expected outcomes. Medical students learn patient assessment, diagnosis, and courses of treatment in primary care (ACGME, 2011; AOACOM, 2016) while pharmacy
students analyze the assessment and diagnosis and provide consultation on the treatment course (ACPE, 2016).

This shared clinical rotation teaches both pharmacy and medical students how to collaborate and communicate on solving patient care issues that arise in the typical course of patient encounters. These activities are in conjunction with and under the supervision of the faculty pharmacist and physician who are primarily responsible for the direct patient care. Patient encounters often include the pharmacist and physician together in addition to one or more students simultaneously. A faculty pharmacist and physician were assigned to teach students in six week blocks starting in September 2012 through June 2016. The researcher/author of this dissertation (also the faculty pharmacist) teaches both pharmacy and medical students, and the faculty physician also shares in the teaching of both pharmacy and medical students. During the shared clinical rotation, the faculty pharmacist and physician, along with students, interacted with nurses, nurse practitioners, physician assistants, medical assistants, social workers, and other members of the health care team. It is in these interactions that students observed how their faculty communicate directly with all members of the team. Students were given an opportunity to further understand the roles that each member provides for inpatient care. Each team member was asked to provide valuable information according their professional expertise, which is part of the decision making for courses of treatment. Students directly observe collaboration between a physician and a pharmacist while providing patient care.

In addition to seeing patients on site, the family medicine clinic developed a home visit program where the faculty physician, pharmacist, and students saw patients in their own homes for medical visits. These encounters were usually much longer than clinic visits and lasted up to an hour per session. This allowed for transit as well as adequate time for multiple providers to
interact with the patient. During this time, the physician and medical student examined the patient and discussed problems. The pharmacist and pharmacy students reviewed all medications and then the entire team engaged the patient in discussion about problem solving. This includes simple education about disease management, or more complex discussions about the medication therapy and its proper use. These are very typical processes for each profession to do separately; however, done together, these can drive results for patients when team members communicate their findings, culminating in a more complete plan (IPEC, 2011). Occasionally, additional problems such as side effects or worsening of symptoms were discovered by the team that required referral to specialists, and the team then connected the patient with other services in the health care system. Improving patient experience is paramount in the overall health care improvement plan (The IHI Triple Aim, 2017) and is an important part of improving access to quality outcomes in health care (The Affordable Care Act, 2015). In both the clinic and home settings, the students observed the faculty practitioners’ engagement with the patient, and were encouraged to engage directly with the patient in the same encounter. This continued practice allowed students to observe how a physician and a pharmacist interact directly with each other in the context of caring for patients while learning how to interact with patients themselves. Thus, there is continuity in collaboration across both settings in the home and in the clinic.

**Participants / Sample**

This program evaluation employed a retrospective convenience sample of questionnaires completed by pharmacy and medical students beginning in June 2013 through June 2016. Academic calendars run from June to May for both medical and pharmacy students and groups of twelve pharmacy students and six medical students typically completed a shared clinical rotation in family medicine each academic year with two pharmacy students to one medical
student per cohort. Seventy-two (pharmacy and medical) students completed combined rotations from September 2012 to May 2016, though only sixty students were part of the sample. Because the approaches to teaching in this clinical setting were still being developed, and because the faculty were refining the program and developing a research platform as well as deciding upon correct survey instruments, the first twelve students were not part of the research.

Because this was a retrospective, mixed methods program analysis, it was important that the retrospective convenience sample used to gather the data originally have alignment between the theoretical and conceptual frameworks of this study. The conceptual framework describes teaching students in the context of actual patient encounters while faculty physicians and pharmacists mentor students and provide care for patients in a clinical setting. The theoretical framework based on Biggs 3P (1993) and Pardue’s (2015) expansion of Biggs 3P (1993) provided the nexus for pragmatics, which is ideally situated in clinical practice with students. The alignment of theory and practice provided a platform for a mixed methods approach about learner perceptions of working in teams, as well as skills such as developing strategies to help patients attain goals and strengthening cooperation among professions. The frameworks provided a logical progression from theory to practice. To summarize this connection, the concepts of teaching students in actual clinical practice during patient encounters matches well to theoretical models of pragmatism where there are still expected outcomes (Pardue, 2015; Biggs 3P, 1993) such as assessment of learning and teaching clinical skills required for each learner to graduate. The “product,” as described by Pardue (2015) was realized through the evaluation of clinical skills attained by students. All of this was achieved through actual clinical practice with patients.

A strength of the results is the high response rate: Over 80% of students completed the survey instruments and open-ended questions. Pharmacy and medical students who selected the
clinical rotation in family medicine met the definition for interprofessional learning where two or
more health professions students learn about, with, and from each other (IPEC, 2011). The
results are presented in Chapter four.

**Data**

As part of the combined clinical rotation in family medicine, students were asked to
complete a pre- and post-survey online, administered via SurveyMonkey® and stored in Excel®.
For the first two years of this evaluation (June 2013 to June 2015), the survey asked students to
respond to 9 selected questions from the Attitudes Toward Health Care Teams Scale (ATHCT)
to measure changes in attitudes toward teamwork resulting from participation in the combined
clinical rotation. Respondents were asked to indicate the degree to which they agree or disagree
with the statement in this Likert® scale using ordinal responses to measure agreement
(1 = “Strongly Disagree,” 6 = “Strongly Agree”). In addition, students were asked in the post-
survey whether “I have noticed changes in my attitudes toward working on teams since this
rotation” using the same rating scale as the ATHCT and to answer an open-ended question about
their attitude change. The survey instrument contained one open-ended question “In what ways
have your attitudes changed after this rotation?”

Starting in June 2015, a new pre- and post-evaluation survey was implemented in order to
respond to student feedback regarding the utility of the previous questions and to address the
ceiling effect resulting from positive attitudes among participants prior to participation in the
combined clinical rotation. Faculty made this decision largely because a ceiling effect was
observed and believed the use of the SPICE tool (Student Perceptions of Physician/Pharmacist
Interprofessional Clinical Education) might be better suited to evaluating pharmacy and medical
students together. Instead of asking about attitudes toward teamwork in general, questions were
asked about attitudes specific to pharmacy and medicine collaboration using the Student Perceptions of Physician/Pharmacist Interprofessional Clinical Education (SPICE) tool and to ask about changes in individual team skills/behaviors using the Team Skills Scale (TSS).

For the SPICE tool, which contained 10 items, respondents were asked to indicate agreement using a scale ranging from 1 = “Strongly Disagree” to 5 = “Strongly Agree” (with neutral in the middle). The Team Skills Scale contained 17 items in which respondents were asked to rate their own skill level as follows: 1 = “Poor,” 2 = “Fair,” 3 = “Good,” 4 = “Very Good,” and 5 = “Excellent.” Additionally, the post-intervention Team Skill Scale contained three open ended questions:

1. “What about your experience working on an interprofessional team genuinely surprised you or challenged your previous perceptions?”

2. “How do you think this rotation experience might influence your health care practice in the future?”

3. “What do you think are the key benefits to working in interprofessional health care teams? (for providers and patients).”

In summary, data were derived from four areas: survey instruments (ATHCT, SPICE, TSS) and from thematic data in open ended questions on the ATHCT and TSS survey instruments. Collectively they will be used to answer the research questions concerning learning about other health professions, the activities or experiences that contributed to interprofessional learning and collaboration, and student perceptions of patient benefits derived from this collaboration. Secondary benefits of programmatic evaluation will inform the overall improvement efforts of content delivery to pharmacy and medical students.
Reliability and Validity of Instruments

Because this dissertation employed a mixed methods program analysis, it is important to understand and review the original instruments used to collect the data. The Attitudes Toward Health Care Teams Scale (ATHCTS) was evaluated by Kim & Ko (2013) and was found to be both reliable and valid among graduate health care profession students. The researchers used a cross sectional design from 288 graduate students. A confirmatory factor analysis (CFA) provided evidence that the instrument and its subscales were effective to evaluate educational training programs designed to improve attitudes toward interprofessional teamwork. The researchers noted that the instrument could be studied with undergraduates and health care professionals to evaluate different study populations.

A study by Fike et al. (2013), found that the Student Perceptions of Physician-Pharmacist Interprofessional Clinical Education (SPICE) Instrument was both valid and reliable. Faculty members from both pharmacy and medical schools developed the items for the instrument and 179 students completed the scale. Psychometric properties, reliability, and construct validity were assessed using CFA. To further establish the validity of SPICE, the instrument was re-administered to additional cohorts after an interprofessional education clinical experience. Gains were noted in perception scores on all 3 factors (Interprofessional Teamwork and Team-Based Practice, p=0.003; Roles/Responsibilities for Collaborative Practice, p<0.001; Patient Outcomes from Collaborative Practice, p<0.001) further validating the instrument. The Team Skills Scale (TSS) developed by Grymonpre et al. (2010) is used to measure perceived interprofessional team skills including interpersonal skills, discipline specific skills, and geriatric team skills. TSS is often used in conjunction with Attitudes Toward Health Care Teams Scale (ATHCTS). Team Skills Scale was originally validated as part of the evaluation of the New York University
Geriatric Interdisciplinary Team Training (GITT) that trained a cohort of 1341 graduate health profession students. A common factor analysis with underlying structural equational modeling was performed (Hyer et al., 2000), and one factor was retained; it explained of 53% of the total variance. The researcher named this factor “interdisciplinary team skill.” Cronbach’s alpha was .94, indicating high reliability, and the item-to-total scale correlations ranged from .58 to .78. Content validity was determined by an expert panel who ranked the order of most important skills.

**Analysis**

The original survey (ATHCT) was analyzed using descriptive frequencies/summary measures and two-sample t-tests with α set at 0.05 to examine pre-post changes. Surveys were anonymous and therefore cannot be linked for paired t-test analysis. The original survey contained one open-ended question and an inductive thematic analysis was employed to identify key themes. Further, these themes were linked to IPEC core competencies (IPEC Collaborative Practice Report, 2011) which include:

- **Values & Ethics**: Maintain a climate of mutual respect and shared values
- **Roles & Responsibilities**: Use knowledge of own role in collaboration with knowledge of the roles of other health professions
- **Communication**: Employ responsive, responsible, and respectful communication with patients, families, and other health and health-related professionals towards seamless and safe care
- **Teamwork**: Build and apply interactive and productive relationships with team members for patient/population-centered care delivery. (pp. 17–26)
The new surveys, which began in June 2015, contained the SPICE tool which comprises 3 subscales, 10 items, and TSS, which is one overall scale with 17 items, and were analyzed by means and confidence intervals calculated for subscales where applicable, and overall summed scores (confidence intervals calculated using Student T distribution). T-tests were completed for individual items. Responses from the three open-ended questions on the Team Skills Scale were mapped using an inductive thematic approach aligning the themes with the three research questions.

Lastly, triangulation of data from themed analysis and survey instruments were employed to produce greater understanding in this mixed methods approach to the evaluation of interprofessional education of pharmacy and medical students. Triangulation of data was employed to strengthen the understanding between the qualitative data and the themed data from the open-ended questions. The qualitative data provided a rich understanding of the human experience as themes arose and strengthened the results from quantitative analysis. According to Fielding (2012, p. 126), “the social world is dynamic . . . social phenomena do not keep still.” Medical and pharmacy students are aware that health care reform includes interprofessional education and collaboration and their participation is part of that social phenomenon. Therefore, elucidation of complementary findings were evaluated using this mixed methods approach (Creswell, 1998).

**Limitations**

During this study, the researcher took responsibility for ensuring that any biases, values, and self-interests were minimized. This required a high degree of self-awareness to filter out any biases that may have been brought into this research study. The primary objective of the researcher was the clinical instruction of both pharmacy and medical students while teaching
interprofessional competencies. One of the learning objectives for this combined course for pharmacy and medical students is to describe and recall interprofessional competencies. The intervention of clinical teaching and the evaluation of changes in attitudes and perceptions may be closely related since interprofessional education and collaboration are promoted as part of the clinical teaching. Students were expected to complete the survey instruments as part of the rotation and faculty are expected to use those responses to perform programmatic evaluation.

**Participant Rights**

Participants’ right to privacy (Trochim & Donnelly, 2007) was upheld in this study. All survey data were anonymous and confidential. Access was restricted to the investigator and the faculty physician. Researchers have the responsibility to protect the participants and the site throughout a research study (Creswell, 2009). The Belmont Report (1979) outlined three basic principles that guide research: respect for person, beneficence, and justice. Respect for person, also referred to as autonomy, consists of keeping participants’ information confidential, and allowing subjects freedom regarding their participation in the research study. Beneficence refers to protecting subjects from harm and minimizing risks. Justice requires treating subjects of the research study fairly and equally.

During this study, the researcher adhered to the following ethical principles which included confidentiality, anonymity, and privacy (Creswell, 2009). The pre- and post-surveys were an expectation of the course (shared clinical rotation). Confidentiality was maintained as survey instruments were completed without students’ names or identification numbers. All information related to the study has been under the control and view of the researcher stored on a secure, university owned computer with no other shared access. All Institutional Review Board
(IRB) procedures were followed. As the purpose of the study was program analysis, participant loss or refusal to participate had no bearing on achievement of grades for the required rotation.

Summary

To conclude, Chapter three describes the setting for the research, the methodology used to perform this study, the survey instruments used for data collection for programmatic evaluation, the validity and reliability of the instruments, the potential limitations, and the protection of participants’ rights who completed the surveys as part of a required course.
CHAPTER FOUR

RESULTS

The purpose of this programmatic evaluation was to explore pharmacy and medical students’ perceptions of interprofessional learning after a six-week clinical rotation in a family medicine setting. A secondary purpose of this study was to find ways to improve interprofessional education delivery in an experiential practice setting where pharmacy and medical students learn. This chapter details the findings of the data collection and presents information in relation to the primary research questions that were measured by three instruments:

1. How do medical and pharmacy students describe learning about other professions?

2. What experiences or activities contributed to interprofessional learning and collaboration?

3. How do medical and pharmacy students perceive that collaboration among health care providers benefit patients?

Analysis Method

A mixed methods approach was utilized for programmatic evaluation across three instruments that were used in sequential order. The first instrument, Attitudes Toward Health Care Teams Scale (ATHCT) contained 10 survey items that were administered pre-intervention with the addition of one open-ended question that was administered post-intervention, was utilized alone from June 2013 to June 2015. Quantitative analysis was completed using descriptive frequencies/summary measures and two-sample t-tests ($\alpha=.05$) on the 10 survey items pre and post intervention. The hypothesis was that there would be significant improvement
in the measures between the responses pre- and post-intervention. Qualitative analysis was employed using inductive thematic analysis (Creswell, 2009) on the open-ended question.

From June 2015 until June 2016, a change in instrumentation to the Student Perceptions of Physician/Pharmacist Interprofessional Clinical Education (SPICE) tool was utilized concurrently with the Team Skills Scale (TSS). The SPICE tool contained 10 survey items used pre and post-intervention and the TSS contained 17 survey items used pre and post-intervention, with the addition of 3 new open ended questions added to the post-intervention TSS. Quantitative analysis of pre- and post-intervention items was completed for the SPICE tool and TSS using means and confidence intervals calculating for subscales where applicable, and overall summed scores (confidence intervals calculated using Student T distribution). A qualitative approach using inductive thematic analysis (Creswell, 2009) was utilized for the 3 open-ended questions. Methods used to analyze data follow.

**Attitudes Toward Health Care Teams Scale (ATHCT). Quantitative Analysis**

The ATHCT survey contained 10 items used pre-intervention, with the same 10 items in the post-intervention survey. Analysis calculated in Excel® consisted of descriptive measures (means), and two-sample t-tests (α=.05) on the 10 survey items pre- and post-intervention (Surveys were anonymous and therefore could not link for paired t-test analysis), and confidence intervals for the pre- and post-summary scores.

**Attitudes Toward Health Care Teams Scale (ATHCT). Qualitative Analysis**

The ATHCT post-intervention survey also contained one open-ended question, “In what ways have your attitudes changed after this rotation?” Responses were analyzed using inductive thematic analysis (Creswell, 2009), as follows. Responses were read aloud multiple times in order to discern the meaning of the ideas expressed even if the words varied. Key concepts were
identified initially, and then responses were re-read and coded for those concepts. Themes emerged as similar codes were grouped. Themes were named, and, to the extent that they converged with relevant IPEC (2011) competencies, the IPEC terminology was utilized.

Examples of themes from IPEC (2011) include:

- Increased knowledge/understanding/appreciation of the other health professional’s role and scope of practice
- Increased understanding of impact teams can make on patient care/outcomes
- Increased confidence/ability/skills to reach out/work with other health professions

Responses were also mapped to the four IPEC (2011) competencies: “Roles and Responsibilities,” “Values and Ethics,” “Communication,” and “Teamwork.” Further discussion of these themes is found below.

Student Perceptions of Physician/Pharmacist Interprofessional Clinical Education (SPICE), Quantitative Analysis

The 10-item SPICE survey tool asked respondents to rate their agreement on a scale ranging from 1= “Strongly Disagree” to 5= “Strongly Agree,” and was administered pre- and post-intervention. Data were aggregated using summed scores, and confidence intervals were calculated using Student’s T distribution for the subscales and overall summed score for the entire instrument. Analysis calculated in Excel® consisted of descriptive measures (means) and two-sample t-tests (α=.05) to examine pre- and post-changes.

Team Skills Scale (TSS), Quantitative Analysis

Analysis calculated in Excel® consisted of descriptive measures (means) and two sample t-tests (α=.05) to examine pre- and post-changes. Confidence intervals were evaluated and means were calculated. The 17-item TSS survey asked respondents to rate their own skill level on a
scale ranging from 1=Poor to 5=Excellent. The TSS was administered pre- and post-intervention. Responses to the items were summed to reflect an overall assessment of skills.

**Team Skills Scale (TSS), Qualitative Analysis**

The three open-ended questions used post-intervention survey in the TSS were captured via SurveyMonkey® and transferred to Excel® files. They were analyzed using inductive thematic analysis (Creswell, 2009), as follows. Responses were read aloud multiple times in order to discern the meaning of the ideas expressed even if the words varied. Key concepts were identified initially, and then responses were re-read and grouped according to the three research questions for this study. Mapping to the research questions provided a foundation to understand the impact of interprofessional learning on students and potential benefits to patients.

**Presentation of Results**

The presentation of results was organized in the progression in which the instrumentation was utilized in the programmatic evaluation, with quantitative and qualitative analysis where applicable. The first instrument was the Attitudes Toward Health Care Teams (ATHCT), with both quantitative analysis and qualitative analysis of the open-ended question. Following is the Student Perceptions of Physician/Pharmacist Interprofessional Clinical Education (SPICE), with quantitative analysis. Lastly is the Team Skills Scale with quantitative analysis from the instruments’ items and qualitative analysis from the three open-ended questions.
Attitudes Toward Health Care Teams (ATHCT), Quantitative Analysis

Forty-one students participated in the shared pharmacy and medical clinical rotation between June 2013 and May 2015. Thirty-eight students (93% response rate) completed the pre-test and 36 students (88% response rate) completed the post-test. Despite modest changes in a number of items in the survey instrument, none of the data generated were statistically significant (see Figure 4).

Table 1 below displays Means and Confidence intervals for the ATHCT survey instrument showing the overlap of confidence intervals and thus non-significance as an entire instrument.
Table 1. Means and Confidence Intervals for Attitudes Toward Health Care Teams (ATHCT)

<table>
<thead>
<tr>
<th></th>
<th>Mean ATHCT Summed Score</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre (N=38)</td>
<td>5.07</td>
<td>(4.97 – 5.17)</td>
</tr>
<tr>
<td>Post (N=36)</td>
<td>5.27</td>
<td>(5.16-5.38)</td>
</tr>
</tbody>
</table>

The lack of statistical significance from the data generated across the whole instrument led the faculty pharmacist and physician to change instrumentation in order to assess specific skills of pharmacy and medical students together and to understand their future practice intentions in relation to collaboration together as teams.

Attitudes Toward Health Care Teams (ATHCT), Qualitative Analysis

Inductive thematic analysis (Creswell, 2009) of responses to the open-ended question “In what ways have your attitudes changed after this rotation?” revealed the following four key themes: an increased knowledge, understanding, and appreciation for the other health professional’s role and scope of practice; an increased understanding of the impact teams can make on patient care/outcomes; challenges and/or downsides to IPE; and an increased confidence, ability, or skills to reach out to or work with other health professions. These themes are further illustrated with student quotes following.

Increased knowledge, understanding and appreciation for the other health professionals’ roles and scope of practice. The most prevalent theme (16 occurrences) was an increased knowledge, understanding and appreciation for the other health professional’s role and scope of practice. Another aspect of this appreciation of other professionals was the depth of knowledge that others possessed. Understanding and appreciating the role of other health care practitioners is foundational to future collaboration (IPEC, 2011). This is illustrated by the following quotes, “I also learned a great deal about what services other health care professionals provide and how best to utilize their resources in the future.” and “I more fully understand the
role of pharmacists and their knowledge of medications. I’ve learned that pharmacists can play and important part in patient education in providing counseling, discussing appropriate use of medications, side effects, and interactions.” Students learned to appreciate the knowledge that other health professional bring to collaborative patient care.

**Increased understanding of the impact teams can make on patient care/outcomes.**

The second most prevalent theme (12 occurrences) was an increased understanding of the impact teams can make on patient care/outcomes. Team orientation is described in The IHI Triple Aim (2017) as necessary in the overall improvement of health care outcomes and patient experiences and is illustrated by the following quotes, “I feel more confident working in a team and I have really seen the differences that working in a team can have on patients” and “in select population(s), like those visited by the FMI IPE team, I feel like drastic improvements were made in patient care.” Students saw a difference that team based care could provide, particularly in the setting of the family medicine clinic.

**Challenges and/or downsides to IPE.** Students identified a number of challenges and/or downsides to IP, (7 mentions). Hall (2005) describes professional cultures as barriers to collaboration. Shared leadership models can pose such barriers when decisions need to be made in a timely manner. Barriers to teamwork and shared leadership are consistent with the following quotes, “Team work has many positives, but sometimes teams can result in disjointed care” and “I found the IPE aspects of this rotation very distracting toward the goals of patient care and medical student education.” Further, “While I am not sure team care provides more efficient care, in fact many members of the team may have conflicting opinions that have the potential to delay care.” One student remarked that some educational barriers also posed challenges as quoted, “I didn’t realize that med students were not familiar with so many treatment guidelines.”
While benefits were derived from an interprofessional learning experience, some students identified barriers that made collaboration challenging.

**Increased confidence, ability, or skills to reach out to or work with other health professions.** A fourth theme (7 mentions) was an increased confidence, ability, or skills to reach out to or work with other health professions. Some students felt more comfortable reaching out and working together. Confidence to reach out to other health care providers is described by IPEC (2011) as part of the collaboration process and is illustrated as follows, “I’m convinced that more was accomplished because we coordinated together than what would have been done had everyone simply worked individually” and “Now I will be more likely to call them for consultations, questions, opinions, and ideas. Overall I feel more comfortable reaching out to other providers to involve them in patient cases.” In summary, these students felt more confident to work with other health professionals as a result of the shared clinical experience.

In the course of answering the question about attitude change in ATHCT, one respondent wrote at length the most influential activity was the home visit patient encounter that contributed to IPE learning. (Home visits were completed by the interprofessional team of pharmacist, physician, medical students, and pharmacy students.) This is illustrated in the following quote, “I want to emphasize that the home visits were the most influential and educational component of the rotation.” This response is relevant to the second research question, “What experiences or activities contributed to interprofessional learning and collaboration?” While the response also included some negative aspects about IPE collaboration, it illustrates that the home visit program was important to the learning experience. Figure 5 below displays the number of times each of the identified themes was mentioned.
Nineteen students participated in the shared pharmacy and medical student clinical rotation between June 2015 and June 2016. Fifteen students (79% response rate) completed the new pre-test and 14 students (74% response rate) completed the new post-test. Across the SPICE tool, three items improved significantly:

- “My role within the interdisciplinary team is clearly defined.” changed from 3.67 to 4.64 (out of 5) pre- to post-intervention (p<.001).
- “I understand the roles of other professionals within the interdisciplinary team.” changed from 3.73 to 4.71 (out of 5) pre- to post-intervention (p<.01).
- “Clinical practice experiences are the ideal place within their respective curricula for medical and pharmacy students to interact.” Changed from 4.33 to 4.79 (out of 5) (p<.05).
Figure 6 depicts the SPICE tool items with results pre- and post-intervention with the statistically significant items marked with an asterisk. Discussion follows below.

<table>
<thead>
<tr>
<th>Student Perceptions of Physician/Pharmacist Interprofessional Clinical Education (SPICE)</th>
<th>Mean Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health outcomes are improved when patients are treated by a team of professionals from different disciplines.</td>
<td>4.93</td>
</tr>
<tr>
<td>Patient satisfaction is improved when patients are treated by a team of professionals from different disciplines.</td>
<td>4.53</td>
</tr>
<tr>
<td>Working with another discipline of students enhances my education.</td>
<td>4.73</td>
</tr>
<tr>
<td>Participating in educational experiences with another discipline of students enhances my future ability to work on an interdisciplinary team.</td>
<td>4.67</td>
</tr>
<tr>
<td>All health professions students should be educated to establish collaborative relationships with members from other disciplines.</td>
<td>4.93</td>
</tr>
<tr>
<td>Clinical practice experiences are the ideal place within their respective curricula for medical and pharmacy students to interact.</td>
<td>4.33</td>
</tr>
<tr>
<td>Physicians and pharmacists should collaborate in teams.</td>
<td>4.87</td>
</tr>
<tr>
<td>During their education, medical and pharmacy students should be involved in teamwork in order to understand their respective roles.</td>
<td>4.80</td>
</tr>
<tr>
<td>My role within the interdisciplinary team is clearly defined.</td>
<td>3.67</td>
</tr>
<tr>
<td>I understand the roles of other professionals within the interdisciplinary team.</td>
<td>3.73</td>
</tr>
</tbody>
</table>

*Pre and post values were significantly different (*p<0.05; **p<.01; ***p<.001)

**Figure 6. Comparison of Mean Student Perceptions of Physician/Pharmacist Interprofessional Clinical Education Pre- vs Post-Interprofessional Experience**

Although there were modest increases in all but one item of the SPICE tool post-intervention, the summed overall SPICE score did not change significantly. One domain of “Roles/Responsibilities,” composed of two questions discussed above, displays a statistically significant change. The understanding of roles and responsibilities is described extensively by IPEC (2011) as necessary toward collaborative actions and this change in this domain shows that students understood the roles and responsibilities as a result of this shared clinical experience.
The item “Clinical practice experiences are the ideal place within their respective curricula for pharmacy and medical students to interact” (p<.05) shows that pharmacy and medical students believe that this clinical experience provided an ideal learning opportunity for both learner types. Table 2 below displays mean summed scores and confidence intervals for the subscales and SPICE summed score overall. No overlap in Confidence Intervals pre- and post-intervention signifies statistical significance.

Table 2. Means and Confidence Intervals for Student Perceptions of Physician/Pharmacist Interprofessional Clinical Education Subscales and Summed Score

<table>
<thead>
<tr>
<th></th>
<th>PRE Mean</th>
<th>95% CI</th>
<th>POST Mean</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Outcomes</td>
<td>9.47</td>
<td>(9.00-9.93)</td>
<td>9.71</td>
<td>(9.29-10.13)</td>
</tr>
<tr>
<td>IP Teamwork</td>
<td>28.33</td>
<td>(27.41-29.26)</td>
<td>29.36</td>
<td>(28.26-30.46)</td>
</tr>
<tr>
<td>Roles/Responsibilities</td>
<td>7.40</td>
<td>(6.38-8.42)</td>
<td>9.36</td>
<td>(8.69-10.02)</td>
</tr>
<tr>
<td>Total SPICE score</td>
<td>45.20</td>
<td>(43.25-47.15)</td>
<td>48.43</td>
<td>(46.39-50.46)</td>
</tr>
</tbody>
</table>

Assessment of Team Skills Scale (TSS), Quantitative Analysis

The intention of the Team Skills Scale was to evaluate the effectiveness of collaboration of pharmacy and medical students’ perception of team function and assisting patients to attain health care goals. Students reported increased skills from pre- to post-intervention for all items in the Team Skills Scale. Prior to participation in the shared pharmacy and medical clinical rotation, the average students’ rating on all of their skills fell between 3.0 (Good) and 4.0 (Very Good). Afterward all average ratings fell between 4.14 (4=Very Good) and 4.93 (5=Excellent).

Post-intervention analysis demonstrated that teamwork skills among pharmacy and medical students improved as a result of the shared clinical rotation with dramatic post-intervention changes across the TSS. Figure 7 below displays dramatic changes reflected in
responses to items pre- and post-intervention; 9 out of 17 items have p values <.001, 3 have p values <.01, and 3 have p values <.05.

**Figure 7.** Comparison of Mean Team Skills Scale Pre- vs Post-Interprofessional Experience

Summing the 17 items results in a score between 17 and 85, with higher scores reflecting a more positive assessment of skills. The results from the instrument as a whole demonstrated statistical significance comparing pre- and post-intervention, with Mean Summed Scores of 62.62 and 78.64 respectively and Confidence Intervals calculated at 56.64-68.59 (pre-intervention) and
74.07-83.22 (post-intervention). The absence of overlap of confidence intervals indicates statistical significance.

**Table 3.** Means and Confidence Intervals for TSS Summed Score. *Two students who completed a pre-test did not answer the TSS questions so N=13 instead of 15

<table>
<thead>
<tr>
<th></th>
<th>Mean TSS Summed Score</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre (N=13*)</td>
<td>62.62</td>
<td>(56.64 – 68.59)</td>
</tr>
<tr>
<td>Post (N=14)</td>
<td>78.64</td>
<td>(74.07 – 83.22)</td>
</tr>
</tbody>
</table>

The results of the TSS indicate the shared clinical rotation for pharmacy and medical students had a positive experience in terms of teamwork and collaboration between the two disciplines.

**Assessment of Team Skills Scale (TSS), Qualitative Analysis**

Responses to the three open-ended questions from TSS, “What about your experience working on an interprofessional team genuinely surprised you or challenged your previous perceptions?” “How do you think this rotation experience might influence your health care practice in the future?” and “What do you think are the key benefits to working in interprofessional health care teams? (for providers and/or patients)” were coded thematically (Creswell, 2009) and then matched to the three research questions. Findings from those results are illustrated by quotes from students.

**Learning about another profession.** Medical students learned to recognize pharmacists (and pharmacy students) as direct providers of patient care during this shared clinical rotation as quoted: “My previous perception of pharmacists was that the profession was geared most toward being an information resource above all else. After my IPE experience I now view pharmacists as primarily health care providers.” Furthermore, students described learning to value the opinions of other health care professionals as they worked together and communicated about solving patient care issues as stated, “They valued our opinion and engaged us in their conversations. We valued them and they valued us and it allowed us to work well and effectively...
Students described interprofessional collaboration as easy and natural. Students were surprised by how natural collaboration could be with another health care professional. One of the most powerful comments about the process of IPE was the student response, “What surprised me most was how easy it was to get along in a team and work together to ensure patient care. . . . I guess I thought it was going to be harder to work as a team than it actually was.” and another said, “I was surprised by how natural, and often effortless, the collaborations were.” Students were surprised how easy team work was, and the collaboration for patient care was easier than expected.

Experiences or activities that contributed to interprofessional learning and collaboration. Students learned the following through a shared clinical rotation performing patient care activities: building relationships among professionals was important to collaboration, and including other professionals in decision-making improved their own learning. Medical students learned that including pharmacists in patient care helped make better decisions as quoted, “It helped identify areas where pharmacists can truly improve patient care.” and “I am much more likely to include pharmacists in collaborative efforts with regard to patient care.” Medical students were able to build working relationships with their pharmacy student counterparts.

Students working and learning together built relationships and trust while doing patient care activities and link relationship building to collaboration as quoted, “I think this rotation has helped me to see the importance of transparency that is necessary among health professions. Our collaboration has to be more than working through screens and phones, gaining a familiarity and
a relationship with other providers and understanding what they have to offer personally to the process is critical to developing trust and understanding.” These quotes illustrate the value of working together in a shared setting toward building a trusting, working relationship.

As a learning activity, students also came to value the inclusion of other health professions in this shared clinical rotation and found strength to reach out and collaborate with others as quoted, “I am much more likely to include pharmacists in collaborative efforts with regard to patient care” and “This rotation strengthened my abilities to collaborate and consult with other health care professionals.” Further, a student described removing a bothersome barrier as quoted, “I will be more willing to reach out to clinicians. Before, I felt like it was bothersome to the clinician but now I understand they value our input and expertise as well.” Working directly together helped break down barriers that led to collaborative efforts for students in this shared clinical rotation.

Students learned concepts beyond their own curriculum as a result of the shared clinical rotation and expressed adding to their knowledge base. They also demonstrated benefit from each others’ expertise quoted in short phrases, “Learning outside of the typical scope of practice” and “Increases the knowledge base” and “Benefitting from each others’ expertise and knowledge.” Students received direct benefits by learning more than just what the curriculum offered. They learned directly from another profession and added to their knowledge base.

**Perceptions that collaboration among health care providers benefits patients.**

Students described patient care as optimized and more comprehensive from a collaborative approach. Working in teams allowed them to experience care that is more comprehensive for patients as quoted, “Key benefits are using the expertise of each profession to give optimal patient care” and “Working together as a team allows us to treat the patient as an individual and
look at the whole situation.” Students also described patients were more willing to bring up needs that may have been overlooked as quoted, “Patients feel as though you are invested in their health and not just in one area when they know that you are collaborating together. They are more willing to bring up and address their needs that they may think you were previously uninterested in hearing about that may be vital to the overall process.” Students described greater benefits to patients by noting that some things may have been overlooked without the team approach.

Students also described the ways in which input from collaboration across professions improves patient care by bringing different viewpoints to the table as quoted, “When the healthcare providers work together, we all bring a different side of view to the table, and I think it allows us to provide better patient care.” One student described that learning occurred among providers who benefitted from another’s expertise and it resulted in a better patient experience as quoted, “Providers learn from other professional’s expertise in their field, and patients get the most expertise from the most experts.” Students noted that their faculty (providers) learned from the expertise of another profession in addition to better care being provided.

**Conclusion**

The purpose of this mixed methods program evaluation was to explore pharmacy and medical students’ perceptions of interprofessional learning after a six-week clinical rotation in a family medicine setting. A secondary intention of this retrospective study was to explore students’ perceptions of other medical professionals’ contributions to their own learning about team orientation and communication and evaluate how interprofessional learning contributes to collaboration, respect for the roles of other health care professionals, and possible benefits to patients. It was found that medical and pharmacy students participating in the shared clinical
rotation indicate that individual knowledge around their own and other professions’ roles and responsibilities are increasing because of this experience. The quantitative analysis of SPICE and TSS shows improvement across important interprofessional domains such as valuing the skills and knowledge that other professionals possess. The qualitative analysis of the TSS data provides rich descriptions of the actual experiences of the shared clinical rotation. The students provided insight about the enrichment of their learning experience that benefitted them as well as the perceived benefits to the patients.

Though quantitative changes across the entire ATHCT instrument were not statistically significant, results from the open-ended question revealed an appreciation of the roles of other health care providers as well as students’ confidence to reach out to other health professionals in patient care decisions, particularly when understanding the impact teams make on patient outcomes. The open-ended question also revealed the home visit program was the most influential educational aspect of the program.

Additionally, the SPICE tool results show some individual teamwork skills are improving, particularly in the Roles/Responsibilities for collaboration; clinical practice experiences are the ideal place for medical and pharmacy students to interact. Thematic analysis of open-ended questions on the TSS support research questions that the experience enhances student learning and collaboration among professionals is perceived to improve patient outcomes. Finally, students reported a positive experience in terms of observing that collaboration allows individual practitioners to benefit from the expertise of others and this leads to better patient outcomes as a result of informed decision making from collaboration. Chapter 5 will present the conclusion of this programmatic evaluation and discuss the implications for stakeholders and how this will relate this work to the larger body of work in interprofessional
education in health care. Recommendations for action as well as recommendations for further study for researchers are discussed.
CHAPTER FIVE

CONCLUSION

Interprofessional education and its promise for greater collaboration among health care practitioners is receiving widespread attention as a means to improving patient outcomes and reducing human errors that occur due to lack of team work and coordination (IOM, 2001, 2003; IPEC, 2011; The IHI Triple Aim, 2017). Canada and the United Kingdom have produced evidence for more than two decades that interprofessional education across related medical programs regarding process and implementation provided overall improvement in health care delivery (Pardue, 2015), yet the United States has only recently adopted this interprofessional framework into education and practice (IPEC, 2011).

As a review, the purpose of this mixed methods program evaluation was to explore pharmacy and medical students’ perceptions of interprofessional learning after completing a six-week clinical rotation in a family medicine setting. A secondary purpose of this study was to find ways to improve interprofessional education delivery in an experiential practice setting where pharmacy and medical students learn clinical skills and professional behaviors. Conceptually, a pragmatic framework, which is ideally suited for clinical practice, was presented as an approach to ground the study and a framework based on IPEC (2011) competencies provided an approach to evaluate the educational outcomes. IPEC (2011) competencies include “Values and Ethics,” “Roles and Responsibilities,” “Interprofessional Communication,” and “Teams and Teamwork.” These four competencies are elaborated by IPEC (2011) expert panel and were foundational to this programmatic evaluation. Further, the Pardue (2015) framework provided the theoretical stance for this evaluation and Pardue (2015) built upon Biggs 3P (1993) framework with the addition of reflection as part of the learning cycle. Biggs 3P (1993) included the following three
key stages of learning: presage, process, and product. The product stage is the result of student outcomes such as clinical skills, discipline-specific competencies, and professional behaviors, (Freeth & Reeves, 2004). These professional behaviors are the same outcomes described in IPEC (2011) and were a specific aim for teaching interprofessional education to pharmacy and medical students. Pardue’s (2015) addition of reflection allowed learners to understand more fully and value the role of others, which was integral to this programmatic evaluation. Understanding the roles of other health professions is a vital step toward collaboration in actual practice (IPEC, 2011) and urged in the national framework toward health care improvement (The IHI Triple Aim, 2017; The Affordable Care Act, 2015).

**Interpretation of Findings**

This programmatic evaluation was conducted using three instruments in sequential order. First, the Attitudes Toward Health Care Teams Scale (ATHCT) was utilized for the first two years of this study from June 2013 to June 2015. Though the ATHCT provided rich data from student responses in the open-ended question, the instrument as a whole did not show statistical significance pre- and post-intervention when summed. As of June 2015, a new survey was selected in order to respond to student feedback regarding the utility of the previous items in the ATHCT and to address the ceiling effect resulting from positive attitudes among participants prior to participation in the shared pharmacy and medical student clinical rotation. Instead of asking about attitudes toward teamwork in general, the faculty pharmacist and physician chose to ask about attitudes specific to pharmacy/medicine collaboration using the Student Perceptions of Physician/Pharmacist Interprofessional Clinical Education (SPICE) tool and to ask about changes in individual team skills/behaviors using the Team Skills Scale (TSS). This new approach using both instruments allowed further inquiry into the pharmacy and medicine
connection. Specifically, the intent of the SPICE tool was to elucidate what pharmacy and medical students’ perceptions of roles and responsibilities were in a team setting. The intent of TSS was to explore how well the pharmacy and medical team worked together, and if this collaboration might produce benefits for patients by changing practice intentions toward greater future collaboration. In addition, three reflective open-ended questions were added to augment the understanding of the impact the shared clinical rotation was having on students’ perceptions and practice intentions. The results of the new approach using the SPICE/TSS showed significant changes in attitudes and perceptions from pharmacy and medical students while the data from the open-ended questions detailed the rich human experience for these two disciplines working together. Both approaches provided findings toward answering the research questions as follows.

**Finding # 1: Increased Knowledge Eases the Act of Collaboration**

Students found that learning about other health care professionals made it easier to work with another profession collaboratively in patient care resulting from this shared clinical rotation. Students described learning about the knowledge that other student health professionals possessed. It was not just understanding, but appreciation for the knowledge and skills that other professionals possessed that made it more likely for students to reach out to other health care professionals for patient care concerns. The first research question of this study asked, “How do medical and pharmacy students describe learning about other professions?” The most prevalent theme (16 mentions) by inductive thematic analysis (Creswell, 2009) of the ATHCT was an increased knowledge, understanding, and appreciation of the other health professionals’ roles and scope of practice. Analysis of the initial survey open-ended question (ATHCT) and the new surveys (SPICE and TSS) from post-intervention showed that students learned the depth of knowledge that other health care professionals possessed. Specifically this experience led to an
increased confidence, ability, or skills to reach out to, or work with other health professions as a result of this increased knowledge. Both of these related findings are consistent with the IPEC (2011) framework as measures toward increased collaboration among health care providers. IPEC (2011) described at length the lack of understanding health care professionals possess about other health professions, which is a known barrier to collaboration in patient care decisions (The IHI Triple Aim, 2017). The importance of this finding underscores the impact of teaching pharmacy and medical students together with the goal of future collaboration and successfully removing knowledge gaps that prevent collaboration.

**Finding # 2: Activities That Enhanced Learning Leading to Collaboration**

Students found that shared activities enhanced their learning and further contributed to collaboration. The second research question asked, “What experiences or activities contributed to interprofessional learning and collaboration?” In the open-ended question contained in ATHCT, one respondent remarked at length that the home visit program was the most valuable educational experience in the shared clinical rotation. At this study site, home visits are reserved for those patients with complex medical problems who may be at risk for rehospitalization or exacerbation of a condition if left untreated. The faculty physician, pharmacist, and students participate in seeing patients together in the patient’s home. Typically, a clinic visit encounter at the study site is approximately 15 minutes whereas a home visit can take 60–90 minutes. In a home visit encounter, the team works on solving complex patient problems. The physician and medical student perform assessment and examination of the patient. The pharmacist and the pharmacy student will review the medication and related medical devices. The team will discuss all findings and make appropriate recommendations, including new medication dosing, or referral to other health care specialists if needed. In these in-depth encounters, the students are
participating in the dialogue between the pharmacist and physician especially when prescribing changes are needed, which is often. These discussions include a review of the examination of the patient, findings, and possible outcomes.

Results of this study imply that shared decision making, as an activity, coupled with the sharing of expertise contributed to well-informed decisions. IPEC (2011) elaborated the effect of team decision making and points to evidence of greater patient satisfaction and improved health outcomes (IOM, 2015). To punctuate this point, all of the collaborative discussion during home visits was conducted with the patient’s input, which further served to educate the patient in the health care process. Improved patient access and improved health care experiences are hallmarks of The IHI Triple Aim (2017) and are encouraged in the overall improvement of health care delivery. Students observed in the clinic and home visit settings that coordinated care among professionals with patient involvement improved the patient’s experience. This observation implies that practice intention may change toward greater collaboration as a result of this shared decision making as quoted “I’m convinced more was accomplished because we coordinated together than what would have been done had everyone simply worked individually” and “Now I will be more likely to call . . . for consultations, questions, opinions, and ideas.”

An approach taken at this shared clinical rotation to overcome knowledge barriers was to provide intentional educational activities such as shared didactic sessions and problem solving through faculty-led patient cases. Students worked in teams to solve complex problems and derive answers that were reviewed by faculty. Instead of one perspective from medical students, the team included a pharmacy student and often other disciplines were present, such as social work and physician assistant students. This allowed each profession to contribute to the discussion and the resulting solution. During these educational sessions, pharmacy students
participated by sharing knowledge related to appropriate medication management and the medical student augmented this by providing knowledge of proper diagnosis and assessment of the patient’s condition. The students were able to learn from and about another discipline, and learned about how that profession contributes to patient care. The IHI Triple Aim (2017) propounds knowledge of other health professionals’ scope of practice as means toward future collaboration, and thus underscores the importance of understanding the roles of others in the health care setting. The shared clinical experience provided an opportunity for students to receive a more comprehensive viewpoint to solving patient’s health care needs. Thus, this finding is significant in that the activities provided greater opportunity for collaboration resulting from this experience.

**Finding # 3: Collaboration Benefits Patients**

Students observed that collaboration produced direct benefits for patients as well as their family and supportive caregivers. Specifically, students observed that better patient care decisions were made resulting from collaboration, and more importantly, the team approach had a positive effect on the larger support system for the family and caregivers. The results from two items from TSS support this finding regarding patient benefits and effects of teams on patients and caregivers. The results of the first item “Ensure that patient/family preferences/goals are considered” demonstrated statistical significance (p<.00) and the second item “Develop intervention strategies that help patients attain goals” (p<.001) underscore this finding. Health care decisions that impact patients, their families, and their supportive caregivers are suggested as one of several measures needed to provide comprehensive and person-centered care (The IHI Triple Aim, 2017). This finding is consistent with calls for health care reform that meets
established quality goals and improves patient experience (The Affordable Care Act, 2015; The IHI Triple Aim, 2017).

The third research question of this study asked, “How do medical and pharmacy students perceive that collaboration among health care providers benefit patients?” At this study site, decisions were made as a result of the collaborative discussions and students found this give and take directly benefits the patient. Complex medical conditions often require additional help from family members and other caregivers when patients are unable to care for themselves alone. Students noticed and responded that the team approach has a positive benefit for patients as well as their family and caregivers. Supporting this finding was the theme revealed in the open-ended question contained in the ATHCT, an increased understanding of the impact teams can make on patient outcomes (12 occurrences) and was the second most prevalent theme by student responses. Further the items from TSS “Address clinical issues succinctly in interprofessional meetings” (p<.05) and “Develop an interprofessional care plan” (p<.001) are both related to the collaboration and team approach that benefit patients and showed statistical significance. Team orientation is described extensively by The IHI Triple Aim (2017) as necessary for overall health care improvement and delivery in the United States and IPEC (2011) detailed the need for team orientation in health care. The give and take among team members fully participating in shared decision making will lead to better results for the patient and thus underscores the importance of this finding.

Finding #4: Students Learned to Function Effectively on Interprofessional Teams

Effective functioning teams are encouraged as means toward improving health care and patient outcomes as well as reducing human errors (The IHI Triple Aim, 2017; IOM, 2015; IPEC, 2011). Clearly defined roles on health care teams are foundational to the functioning and
effectiveness of those teams (IPEC, 2011). Evaluation of the SPICE tool revealed significance in the role and understanding of effective teams. The subscale “Roles and Responsibilities for collaborative care” in the SPICE tool contained two items that revealed statistical significance. “My role within the interdisciplinary team is clearly defined” (p<.001) and “I understand the roles of other professional within the interdisciplinary team” both contribute to the finding that students had clear roles on the team and understood the role of others on the team.

Additionally, the significant results of five items from the TSS support the finding that students were able to function effectively in interprofessional teams as a result of this shared clinical rotation:

- “Function effectively in an interprofessional team” (p<.001),
- “Raise appropriate issues at team meetings” (p<.001),
- “Recognize when the team is not functioning well” (p<.001),
- “Intervene effectively to improve team functioning” (p<.001),
- “Help draw out team members who are not participating actively in meetings” (p<.01)

Further, when asked the open-ended question from the TSS, “How do you think this rotation experience might influence your health care practice in the future?” one student responded “Communication, teamwork, collaboration all better the overall care that we can provide to the patient.” This post-intervention response illustrates the effective functioning of teams observed by students and highlights future practice intentions toward team orientation as a result of this shared clinical experience.
Finding #5: Pharmacists Were Viewed as Direct Providers of Health Care

It was an unanticipated finding that medical students viewed pharmacists as direct providers of health care. Under U.S. law, pharmacists are not currently recognized as direct providers of health care (Centers for Medicare and Medicaid Services, 2017); however, the profession of pharmacy is undergoing changes in practice and is petitioning lawmakers to reflect those changes. As a result of these shared clinical rotations, pharmacists were viewed as direct providers of health care by several medical students. When asked the question from the TSS, one medical student responded, “My previous perception of pharmacists was that the profession was geared mostly toward being an information resource above all else. After my IPE experience I now view pharmacists as primarily health care providers.” Another medical student stated “It helped identify areas where pharmacists can truly improve patient care.” Yet another medical student response indicated that “I am much more likely to include pharmacists in collaborative efforts with regard to patient care.” Further, the results from two items on TSS “Treat team members as colleagues” (p<.05) and “Strengthen cooperation among professions” (p<.001) demonstrated significance from this shared clinical rotation. These results, along with the direct quotes, imply that pharmacists were viewed as direct providers of health care in patient care settings with physicians and medical students. This change in perception is a significant finding resulting from this shared clinical experience.

Implications

While no longitudinal evaluative studies describing the results of teaching pharmacy and medical students together yet exist in the U.S., there are small pilots and case reports detailing shared clinical rotations in both inpatient and outpatient settings. This evaluation along with the current studies have implications for both research and practice models in pharmacy and
medicine. The results from this study have direct implications for academic settings and health care systems particularly in methodology and evaluation, which are detailed below. Results of this 3-year evaluation reflect the work of teaching pharmacy and medical students together in a family medicine clinic with 2 to 3 students simultaneously for a six week period over 3 years. While the sample size is small (n=60), the longitudinal approach was intended to provide the basis of research and scholarship for other similar programs. Using the IPEC (2011) competencies and common language as suggested by this study will provide a platform for the evaluation of interprofessional education and will add to the body of knowledge particularly in its delivery and curricular outcomes. Additionally, health care systems may derive benefit from the results of the educational interventions that produced greater collaboration and practice change intentions. Collaboration among health care organizations and academic medical institutions hold promise for health care reform as advocated by The IHI Triple (2017). Implications for academic (pharmacy and medicine) stakeholders in addition to existing health care systems are discussed following.

**Academic Institutions**

Academic institutions with medical-related programs such as nursing, pharmacy, medicine, physical therapy, social work, occupational therapy, and other allied health disciplines are adopting interprofessional education as a teaching modality (Accreditation Council for Graduate Medical Education, 2011; Accreditation Council for Occupational Therapy Education, 2010; Accreditation Council for Pharmacy Education, 2011; Accreditation of Colleges of Osteopathic Medicine, 2016; American Association of Colleges of Nursing, 2008, 2011). Instructional guidance and implementation strategies are readily available through professional accreditation organizations (AACN, 2012; ACGME, 2011; ACOM, 2016; ACOTE, 2010;
ACPE, 2016) and provide the impetus for integration with other health care disciplines. Academic settings offering diverse medical and allied health profession programs still struggle with timing, alignment, and scheduling IPE opportunities for students, and silos are still reported as significant barriers to providing IPE instruction to multiple health professions simultaneously (IPEC, 2016). To this end, IPE cannot be something merely tacked on to existing curricula. It will require significant institutional engagement in order to promote meaningful IPE activities for students (Barnsteiner et al., 2007). Furthermore, academic leaders should seek collaborative relationships within their own institutions with other medical related fields in order to overcome barriers and facilitate learning opportunities, and thus provide early training in interprofessional education before clinical practice. The implications of early interprofessional education has shown an increased collaboration in actual clinical practice (CIHC, 2012; CAIPE, 2012), which is needed for current practice models in the U.S. (The IHI Triple Aim, 2017).

**Pharmacy Considerations**

Calls from numerous organizations (ACPE, 2016; IOM, 2015; IPEC, 2011) are advancing pharmacy curricular efforts and encouraging intentionality of pharmacy collaboration in actual practice. Growing pedagogical attention in pharmacy programs across the United States is contributing toward positive outcomes in perceptions favorable toward interprofessional collaboration (IPEC, 2011; IPEC, 2016). Didactic instruction is increasing due to accreditation mandates (ACPE, 2016), but its sequencing in the curriculum is not well understood in terms of best placement for experiential learning in actual practice settings (IPEC, 2016). Assessment of outcomes and programmatic evaluations from clinical practice may help to inform curricular timing to understand what actual works in practice settings. This study provided a conceptual framework, a theoretical stance, and a methodological approach with validated instrumentation.
that may serve to inform curricular instruction from its results. The evaluation of student learning in clinical practice using a systematic framework to evaluate IPEC (2011) domains is important in understanding the future role of pharmacy collaboration among health care providers and how curricular instruction might be improved to prepare pharmacy students for the future (IOM, 2015; ACPE, 2016). Pharmacy faculty may benefit from using the methodology and approaches from this study and contribute findings toward the delivery and assessment of interprofessional education.

Medical Considerations

Accreditation standards across medical education now require all medical students learn collaborative skills in communication and teamwork (ACGME, 2011; AOCOM, 2016). Siloed learning continues in the first two didactic years of medical school and poses challenges when students are immersed into clinical settings with the expectation to collaborate in teams (IOM, 2015). Stereotypes persist with doctors perceived as serving as team leaders and giving orders (IOM, 2015). Instructional seminars (usually non-credit bearing) are now regularly offered in order to prepare medical students for collaborative teamwork (AOCOM, 2016); however, it is still not understood how sequencing these offerings best prepare medical students for actual collaboration in practice.

Programmatic evaluation of IPE in actual practice may serve to inform curricular changes needed for medical education. This study provided a framework for programmatic evaluation of medical education in the clinical setting with another learner type (pharmacy). Potential for the assessment of complementary learning exists specifically, as the definition of interprofessional learning was defined as “two or more health disciplines who learn with, from, and about each other to improve collaboration and the quality of care” (CAIPE, 2002). It is implied that the
results of this study will benefit the sequencing of interprofessional learning for medical students who learn with another health profession. Physicians need other health care practitioners such as pharmacists to provide expertise in medication management and this study provides an approach to study the impact of providing a clinical experience to medical students with pharmacy students.

**Health Care Systems**

For several decades, the IOM (1972, 2001) has urged health care systems to link IPE to collaborative practice as a standard for health care professionals (Pardue, 2015). The recommendations of the expert panel of IPEC (2011) provided a common framework and language to create a shared model of IPE across health professions. It is now incumbent upon health care accrediting bodies to regulate the extent to which that framework of communication, collaboration, teamwork, and knowledge of roles and responsibilities are evident in the review and accreditation process. This study utilized a conceptual framework of pragmatism (Barr, 2013), which is ideally situated for evaluation in health care systems. Since actual patient care is ongoing, IPE training and evaluation may occur at any phase of the patient care process and still utilize IPEC (2011) competencies as the basis for assessment. The results of this study suggest that interprofessional learning and collaboration may benefit health care systems and may become part of their overall improvement processes. Teamwork and team orientation in order to improve patient outcomes are an accreditation standard of The Joint Commission (n.d.) which provides the accreditation and standards of care for most health care organizations in the U.S. The Team Skills Scale (TSS) used in this study, specifically intended to measure team function in patient care, may provide rich data when implemented in health care systems, and thus serve to further inform where health care systems may improve delivery of care.
Study Site

The results of this evaluation have implications for the study site. The secondary purpose of this study was to find ways to improve interprofessional education delivery in an experiential practice setting where pharmacy and medical students learn. Lave & Wenger (1991), as cited by Barr (2013), stated “learning in practice is coparticipation, calling on a shared repertoire of communal learning resources” (p. 6). The study site is a learning community where pharmacy and medical students coparticipate in learning together in an actual family medicine clinic. Faculty provided learning opportunities for students during patient encounters and the results from student responses may inform what activities have the most direct effect on learning and hold the potential for greatest collaboration and potential for practice changes. Specifically, the results of improved knowledge around the roles and responsibilities of health care professionals, as well as the improvements in team function are domains to keep and improve upon in order to change practice habits in the future.

Recommendations for Action

Sullivan and Decker (2001) described successful transformative efforts where leaders articulate vision and effect change that is deep and lasting by exerting idealized influence. The vision for the future must have the promise of positive outcomes, and in the case of health care, must be easily accessible, cost effective, and delivered in a quality manner (The IHI Triple Aim, 2017). The transformational change in the health care landscape must come from leaders on many levels. Our nation’s health care system continues to experience significant, and at times, dramatic change (The Affordable Care Act, 2015). Elected officials can rely upon established outcomes from national health services such as the U.K. and Canada, even if they do not embrace single payer sources (CIHC, 2010). Evidence from studies over two decades has
demonstrated teamwork and collaboration in health care provided better outcomes at lower costs with higher patient satisfaction (CAIPE, n.d.; Kitto et al., 2011). Health care leaders and elected officials may apply features from these models toward workable solutions in the United States. Collaborative competencies such as teamwork, collaboration, understanding of roles/responsibilities, and values/ethics, are not domains that cost money, and therefore should be embedded into the culture of health care at every level (IOM, 2015) if transformational change is to occur. The potential to embed the domains associated with collaboration deeply within the fabric of the U.S. health care system now exists, not just as theories but as proven approaches to better outcomes and patient experiences (IOM, 2015; IPEC, 2016). Therefore, it is recommended that academic medical institutions partner with health care systems and use established frameworks and common language in order to evaluate the full impact that collaboration produces in health care.

**Recommendation for Further Study**

It is recommended that three areas of inquiry receive further study. First, the effect of shared leadership should be studied among medical students particularly when working in interprofessional teams. Second, multisite studies are needed to fully understand interprofessional teamwork in actual practice settings. Meta-analysis of aggregated data may add to the significance of findings with larger pooled cohorts. Third, health care systems and academic medical institutions using existing IPEC (2011) framework should evaluate the effect of teamwork and its role in process improvement in patient care.

1. Professionals from any discipline are encouraged to assume leadership roles on the health care team, but physicians most commonly fill this role. It is somewhat natural to assume this leadership, since by their licensure they have prescriptive autonomy
and historically have made the final decisions. Further study of medical students’
values and attitudes toward shared decision making should be evaluated as well as
their future practice intentions toward more collaboration.

2. Additional longitudinal studies as well as multisite studies are needed to understand
the practical value of interprofessional education and whether that education
improves teamwork in real practice settings. Utilizing validated instruments such as
SPICE and TSS together may provide greater significance with larger cohorts
particularly when evaluating pharmacy and medicine together both clinically and
educationally.

3. Programmatic evaluation using IPEC (2011) competencies as a framework are needed
by health care systems as well as academic institutions in order to understand the
value of team based care in each setting. Using a common framework for evaluation
has the potential to provide insight to current processes and identify areas for
improvement within each setting. The IPEC (2011) framework is ideally suited for
both small and large organizations and cooperation and sharing of results may lead to
greater efficiencies in delivery of patient care.

Conclusion

Health care education has seen dramatic changes posed by governmental and
accreditation regulations, and to answer this call, must prepare graduates to function in teams in
actual practice settings to meet these challenges. Leaders in educational institutions must
incorporate skills and competency requirements that allow students practice opportunities in
order to prepare them to function in a newer paradigm of collaborative care. Health care
education must find partners within its programs and build relationships that foster collaboration
among their disciplines. These partnerships will provide opportunities to learn professional behaviors and embrace collaborative skills necessary to provide health care in the future.

In order to begin to process improvements, organizations should choose the IPEC (2011) framework competencies and use validated instruments such as SPICE/TSS in order to evaluate the end-products of interprofessional education—namely collaboration and its effects on patient outcomes. The significance of this study is the contribution to the current literature evaluating the interprofessional education of pharmacy and medical students. The findings of increased knowledge and understanding for the roles and responsibilities of other health care providers, increased collaboration and teamwork on behalf of patients, and the recognition by students of the benefits of collaboration as a result are provided by this shared clinical experience. Results from this evaluation uphold the benefits of understanding the knowledge that other health professionals possess as well as the potential for greater collaboration as a result that this knowledge that will ultimately benefit patients. Collaborative learning as well as collaborative practice findings are consistent with worldwide calls to improve health care delivery, improve patient experiences in health care, and reduce error and harm (WHO, 1988; The IHI Triple Aim, 2017).
REFERENCES


Private insurers are sure to follow. *Hospital and Health Networks, 81*(11), 34–38.


https://www.youtube.com/watch?v=EcnufgQzMjc&feature=youtu.be


Gross, C. J. (2012). *Development of an instrument to measure collaborative competencies in interprofessional health care education*


APPENDIX A

ORIGINAL 2013–2015 PRE-SURVEY

<table>
<thead>
<tr>
<th>ATHCT (Attitudes Toward Health Care Teams)</th>
<th>Strongly Disagree</th>
<th>Moderately Disagree</th>
<th>Somewhat Disagree</th>
<th>Somewhat Agree</th>
<th>Moderately Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
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<td>The team approach improves the quality of care to patients.</td>
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<td>Health professionals working on teams are more responsive than others to the emotional and financial needs of patients.</td>
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<td>The give and take among team members help them to make better patient care decisions.</td>
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<td>I have noticed changes in my attitudes toward working on teams since this rotation.</td>
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</table>
1. Please be completely honest as you rate the extent of your agreement with each of the following statements:

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<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Agree</th>
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</thead>
<tbody>
<tr>
<td>Working with another discipline of students enhances my education.</td>
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<td>My role within the interdisciplinary team is clearly defined.</td>
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<td>Health outcomes are improved when patients are treated by a team of professionals from different disciplines.</td>
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<tr>
<td>Participating in educational experiences with another discipline of students enhances my future ability to work on an interdisciplinary team.</td>
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<tr>
<td>All health professions students should be educated to establish collaborative relationships with members from other disciplines.</td>
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<tr>
<td>I understand the roles of other professionals within the interdisciplinary team.</td>
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<td>Clinical practice experiences are the ideal place within their respective curricula for medical and pharmacy students to interact.</td>
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<td>Physicians and pharmacists should collaborate in teams.</td>
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<tr>
<td>During their education, medical and pharmacy students should be involved in teamwork in order to understand their respective roles.</td>
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</table>
## TSS (Team Skills Scale)

2. Please rate your ability to carry out each of the following tasks:

<table>
<thead>
<tr>
<th>Task</th>
<th>Poor</th>
<th>Fair</th>
<th>Good</th>
<th>Very Good</th>
<th>Excellent</th>
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<tbody>
<tr>
<td>Function effectively in an interprofessional team.</td>
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<td>Treat team members as colleagues.</td>
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<td>Identify contributions to patient care that different professionals can offer.</td>
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<td>Apply your knowledge of geriatric principles for the care of older persons in a team care setting.</td>
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<td>Ensure that patient/family preferences/goals are considered when developing the team's care plan.</td>
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<td>Handle disagreements effectively.</td>
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<tr>
<td>Strengthen cooperation among professions.</td>
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<tr>
<td>Carry out responsibilities specific to your profession's role on a team.</td>
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<td>Address clinical issues succinctly in interprofessional meetings.</td>
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<td>Participate actively at team meetings.</td>
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<td>Develop an interprofessional care plan.</td>
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<td>Adjust your care to support the team goals.</td>
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<td>Raise appropriate issues at team meetings.</td>
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<td>Recognize when the team is not functioning well.</td>
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<td>Intervene effectively to improve team functioning.</td>
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<tr>
<td>Help draw out team members who are not participating actively in meetings.</td>
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## APPENDIX C

### ORIGINAL 2013–2015 POST-SURVEY

### ATHCT (Attitudes Toward Health Care Teams)

1. For the following items, please indicate the degree to which you agree or disagree with the statement:

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Moderately Disagree</th>
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<td>The team approach improves the quality of care to patients.</td>
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<tr>
<td>Health professionals working on teams are more proactive than physicians in addressing the emotional and financial needs of patients.</td>
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<td>The give and take among team members helps them to make better patient care decisions.</td>
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2. In what ways have your attitudes changed after this rotation? Describe Below:


### SPICE (Student Perceptions of Physician-Pharmacist Interprofessional Clinical Education)

1. Please be completely honest as you rate the extent of your agreement with each of the following statements:

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
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<td>Raise appropriate issues at team meetings. Recognize when the team is not functioning well. Intervene effectively to improve team functioning.</td>
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<tr>
<td>Help draw out team members who are not participating actively in meetings.</td>
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<tr>
<td>TSS Open-Ended Questions</td>
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<tr>
<td>3. What about your experience working on an Interprofessional Team genuinely surprised you or challenged your previous perceptions?</td>
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<td>4. How do you think this rotation experience might influence your healthcare practice in the future?</td>
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<tr>
<td>5. What do you think are the key benefits to working in Interprofessional healthcare teams? (for providers and/or patients)</td>
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</table>