Across the Patient Care Practitioner Threshold: Identifying Threshold Concepts and Evaluating the Teaching of the Pharmacists' Patient Care Process

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Claire Kolar, Pharm.D.

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Kristin Kari Janke, Ph.D.

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Abstract

Background. The practice of the pharmacy now has a specific Pharmacists' Patient Care Process (PPCP) to be utilized by pharmacists and pharmacy educators. There may be threshold concepts associated with students' learning the PPCP. A threshold concept is idea or concept that transforms the learner's way of thinking about a certain topic or discipline. They are often troublesome for the learner, but once identified, can influence the teaching of or be used in the evaluation of the teaching of the PPCP. The first aim of this study was to identify threshold concepts associated with pharmacy students learning the PPCP. The second aim was to create, validate and test an instrument based on the previously identified threshold concepts to evaluate to what extent the PPCP is taught across pharmacy curriculum. **Methods.** The first phase of this study convened five focus groups to identify possible threshold concepts. The data was analyzed by deductive content analysis and confirmed by an expert consensus panel using the Nominal Group Technique. In phase two, the Patient Care Threshold Concepts Evaluation Instrument (PCTC-EI) was created using the identified threshold concepts. A Content Validity Index was calculated for the items on the PCTC-EI. The PCTC-EI was then administered to a purposive sample of pharmacy faculty and students at one institution. **Results.** Five threshold concepts, including Threshold Concept #4 *Discern a patient's medication experience and incorporate his or her individual knowledge and beliefs in to the care provided (Medication Experience)*, were identified from the focus groups and confirmed by the expert consensus panel. Thirty-eight (38) students and faculty, of the 59 invited (64.4%) provided responses to the PCTC-EI. Only 42.1% of respondents stated the average graduate's ability regarding *Medication Experience* was Very Good or Excellent. **Discussion.** The five patient care threshold concepts identified are related to key concepts in pharmaceutical care and complement the PPCP. They can be used in a variety of ways within a pharmacy curriculum. In addition, the results of PCTC-EI illustrate the extent of teaching the PPCP and demonstrate the value of curricular-level evaluation.

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Chapter 1: Introduction

Today pharmacists are being called on to provide patient-centered care in their day-to-day professional roles. Providing direct patient care is something pharmacy students must learn and as a result pharmacy schools are teaching this process in different ways at different times in the curriculum and using various assessments to ensure graduates can provide patient-centered care. However, it is difficult to know when a student crosses a threshold and starts thinking and acting like a practitioner or what exactly this transformation entails. Information about pharmacy students' progression towards providing patient-centered care would give schools valuable data to evaluate the curriculum and inform future decisions.

In order to do an evaluation on patient-centered care education in a curriculum, the items to be evaluated must be defined. Recently, a group of pharmacy organizations came together as the Joint Commission of Pharmacy Practitioners (JCPP) to define the Pharmacists' Patient Care Process (PPCP).[1] The PPCP, consisting of 5 steps (Collect, Assess, Plan, Implement, and Follow-up), provides schools with the process a pharmacist should follow every time he or she assumes responsibility for the care of a patient. However, the PPCP does not provide information about how and where a student learns this process in the curriculum. It does not present the essential elements needing to be taught to transform a student into a patient care provider.

Questions about how and when to teach patient-centered care can begin to be answered by identifying threshold concepts associated with the PPCP. A threshold concept is an idea or piece of information that transforms the learner's way of thinking about a certain topic or discipline and is necessary for a student to progress in his or her learning.[2] These threshold concepts are often troublesome to the learner, but are necessary to change a student's view of something. In

pharmacy school, students are transformed into practitioners as they learn the PPCP, but little is known about the threshold concepts that make up this transformation.

After threshold concepts are identified, they can be used in curricular evaluations. Curricular evaluation, when viewed as a form of program evaluation, is intended to determine how well a program or process is working.[3] Data generated through evaluation is needed to help colleges and schools of pharmacy to make decisions about creating or sustaining successful curriculum and educational programs. Typically data is collected from student ratings of teaching (i.e. "course evaluations") completed by students. However, this information does not provide information on student progression through the curriculum with regard to a specific content area. New methods of evaluation are needed to provide pharmacy schools information about the curriculum over time and the curriculum as a whole.

The purpose of this study is to advance teaching of the Pharmacists' Patient Care Process by identifying and utilizing threshold concepts in improving pharmacy education and transforming pharmacy students into practitioners.

Aims

Aim 1: Identify threshold concepts associated with pharmacy students learning the Pharmacists' Patient Care Process.

Aim 2: Create, validate and test an instrument based on the previously identified threshold concepts to evaluate to what extent the Pharmacists' Patient Care Process is taught across pharmacy curriculum.

Significance

This study has practical significance for colleges and schools of pharmacy. Teaching and assessing the Pharmacists' Patient Care Process is a required part of every pharmacy curriculum.[4] There is more to learn about how this process should and could be taught. Identifying the threshold concepts associated with the PPCP is one step toward better understanding the teaching process needed to ensure students are prepared to be patient-centered care practitioners. In addition, as the PPCP-related curriculum in colleges and schools of pharmacy expands and evolves, evaluation of these programs will be needed. Evaluation can provide relevant information needed to make informed decisions about educational programs. Finally, this process for identifying threshold concepts and using the results to create an evaluation tool is a model that could be used in other areas of pharmacy education. As educators learn more about effective teaching, learning and assessment of pharmacy students, this deeper understanding of effective approaches and strategies can be translated into advances in pharmacy education and practice.

Chapter 2: Review of the Literature

Patient-Centered Care and the Pharmacists' Patient Care Process

Pharmacists Providing Patient Centered Care

Pharmacists have been providing patient-centered care with demonstrated positive outcomes for many years. One of the most well documented examples is the Asheville Project. Starting in 1997, pharmacists in Asheville, North Carolina, have been providing care for patients with various disease states including diabetes,[5,6] hypertension and dyslipidemia,[7] and asthma.[8] The Asheville studies have been able to demonstrate short and long-term outcomes for patients, including clinical, economic and humanistic outcomes.[5,6] For example, in the diabetes studies, the researchers demonstrated an increase in the number of patients with an A1C value in the desired range.[5] The diabetes study also demonstrated economic benefit by illustrating the amount being paid in insurance and medication claims decreased in each follow-up year.[6] Finally, an increase in patient satisfaction with pharmacy services was demonstrated by the Asheville Project.[5]

Other studies of pharmacy services provided have demonstrated similar gains using a variety of measures. Pharmacists at six clinics within one Minnesota healthcare system provided Medication Therapy Management (MTM) services to 285 patients. MTM is a service or a group of services that "optimize therapeutic outcomes for individual pateints."[9] They resolved 637 drug therapy problems and decreased total health expenditures per person.[10] A group of six pharmacists in Ohio were also able to lower A1C values of patients with diabetes by providing MTM services.[11] In Mississippi, 13 community pharmacists started providing patient-centered health care and resolved 1,471 drug therapy problems among 468 patients.[12] Finally, pharmacists in three academic medical centers across the United States were able to decrease the number of drug therapy problems experienced by the patients receiving MTM services.[13]

It has been demonstrated that while pharmacists provide benefit to patients, pharmacists in an active patient care role can also benefit the healthcare system. Smith et al. advocate for pharmacists to play an active role in the medical home model as all health care providers recognize the value in sharing the responsibility of patients using medication.[14] One of the biggest questions around pharmacists' role in the healthcare system is the financial aspect. Is the model of pharmacists providing patient-centered care viable? Ramalho and colleagues demonstrated the return on investment for pharmacists was $1.29 for every $1 spend in MTM services, in addition to improving clinical outcomes and maintaining high patient satisfaction.[15]

Pharmacists are taking on larger roles in patient-centered health care, which has implications for the profession.[16] In response to this growth, and as a way to further advance pharmacists' patient care service, the American Pharmacists Association Foundation published recommendations based on discussion held at a consortium meeting in 2012.[17] Seven recommendations were made, including ensuring the use of consistent and understandable terminology and an examination of education curricula.[17]

Today, more pharmacists are serving in direct patient care roles. The Pharmacists Workforce Survey asks practicing pharmacists about the time they spend on patient care services not associated with medication dispensing.[18] This question was asked of full-time pharmacists in 2009 and 16% of their time was spent on patient care services. When the question was asked of full-time pharmacists in 2014, 21% of their time was spent on patient care services.[18] While not a large increase, this does show patient care services are becoming a larger part of the pharmacist's work. In addition, the American Association of Colleges of Pharmacy's (AACP) Professional Affairs committee has recommended colleges and schools of pharmacy should provide training opportunities for students in environments where pharmacists provide patient-centered care.[19]

Pharmacists' Patient Care Process

In 1990, Hepler and Strand published *Opportunities and Responsibilities in Pharmaceutical Care*, which significantly contributed to the conversation on the future of pharmacy practice.[20] Hepler and Strand advocated for pharmacists to take on a greater responsibility when it comes to patients. They asserted the mission of pharmacy, defined as preventing drug-related morbidity and mortality, is achieved by providing pharmaceutical care. Hepler and Strand define pharmaceutical care as "the responsible provision of drug therapy for the purpose of achieving definite outcomes that improve a patient's quality of life."[20]

The practice of pharmaceutical care has three components, the philosophy of practice, the patient care process, and practice management systems.[21] The patient care process in turn consists of three components, assessment, care plan and follow-up.[21] Pharmaceutical Care is the professional practice of a pharmacist and provides the structure for pharmacists to provide services to patients, such as Medication Therapy Management (MTM). This framework provided the base for the Joint Commission of Pharmacy Practitioners (JCPP) publication of the Pharmacists Patient Care Process (PPCP) in 2014.[1] In 2004, the JCPP set a vision for pharmacy practice in which "pharmacists will be the health care professional responsible for providing patient care that ensures optimal medication therapy outcomes."[22] This vision statement paved the way for the PPCP nearly 10 years later.

The PPCP referenced Hepler and Strand's 1990 publication on pharmaceutical care, but also acknowledges the process is taught and practiced in many different ways across the country.[1] As a result, JCPP strove to create a comprehensive patient care process with input from a variety of resources, including the pharmaceutical care textbook and the American Pharmacists Association MTM model. The published PPCP consists of five steps: Collect, Assess, Plan, Implement, Follow-up: Monitor and Evaluate. Each step is to be carried out using a patient-centered

approach. In addition, it is expected pharmacists will focus on communication, collaboration, and documentation when learning and practicing the PPCP.[1]

In 2013, the Center for the Advancement of Pharmacy Education (CAPE) released Educational Outcomes for pharmacy education. Outcome 2.1, Caregiver, states pharmacy students will "provide patient-centered care as the medication expert."[23] The Accreditation Council for Pharmacy Education (ACPE) reviewed the 2013 CAPE Outcomes when preparing the 2016 Standards for professional pharmacy programs.[4] ACPE also referenced JCPP's Pharmacists' Patient Care Process, in addition to other documents. As a result, the Standards affirm pharmacy graduates are able to provide patient-centered care (2.1) and specifically states pharmacy graduates use the PPCP to provide patient-centered care (10.8).[4]

Teaching Patient-Centered Care in Pharmacy

In pharmacy education, patient-centered care is taught in many different settings, including in the classroom, in laboratory settings, and on experiential placements. A number of studies describe didactic teaching of patient care, however only one study describes teaching patient care using the PPCP. Rivkin describes the incorporation of the PPCP into a required first year pharmacotherapy course using case-based teaching strategies.[24] In another study presenting the teaching of patient-centered care within a didactic classroom setting, Kuhn et al. describe an elective course designed to teach students the delivery of MTM.[25] The description of the course presents the course topics, objectives, and select activities, however, there is little discussion of the framework or foundational material used to create the course.[25] Finally, Poole et al. share their experience of creating a required third year pharmacy course in which MTM is used as a model to prepare students for advanced pharmacy practice experiences (APPEs).[26]

Many examples exist of patient-centered care being taught in laboratory settings. Battaglia and colleagues describe an online program using virtual patients delivered during a third year laboratory class.[27] The authors report using the MTM process defined by the American Pharmacists Association as a model for the virtual MTM visits.[27] Eukel et al designed an MTM experience for third year students in which, after the students completed MTM encounters, they were evaluated on their interviewing and communication skills and their ability to conduct an evaluation of the patient's medical history, medication-related problems, and main complaint.[28]

Frenzel describes third year lab activities designed to complement a didactic pharmaceutical care course and teach students disease state management using electronic medical records.[29] Students were evaluated on their written assessment of the patient, associated goals of therapy, recommendations, and the plan for follow-up.[29] Gallimore and colleagues also incorporated simulated MTM activities into a third year laboratory course, however students were only evaluated on their knowledge of the MTM model and associated terms, their confidence in providing MTM, and intent to provide MTM in the future.[30] Finally, Begley et al. incorporated MTM training into a third year laboratory course, which helped students achieve the curricular outcomes of patient assessment, pharmaceutical care plan development, and drug therapy evaluations.[31]

A number of studies also described patient-centered care learning during experiential experiences. Agness and colleagues present the incorporation of MTM into a longitudinal introductory pharmacy practice experience (IPPE) in which students were expected to assess and manage patients' medications and disease states and develop communication skills.[32] Hardin et al. created an advanced pharmacy practice experience (APPE) focused on MTM. Students had previously learned pharmaceutical care skills in the didactic portion of the curriculum and this APPE rotation allowed them to build their skills, specifically providing patient education, identifying

medication-related problems, and communication skills.[33] Hata and colleagues also describe an APPE with an MTM component.[34] In this experience, students reviewed patients' medical history, completed a medication review, documented drug therapy problems, and completed follow-up.[34]

As evidenced by the examples above, there is not a consistent approach to teaching patient-centered care in pharmacy, nor is consistent terminology used. In addition, most of the activities and experiences described focus on the specific skills associated with providing patient-centered care, such as identifying drug therapy problems and conducting follow-up. In response to the Institute of Medicine's publication of health professions competencies,[35] Zeind and colleagues examined the ways colleges and schools were incorporating the recommended competencies into pharmacy programs.[36] The delivery of patient-centered care was one of the competencies implemented with the highest frequency. The study found colleges and schools were both integrating the content in their curriculum and providing stand-alone courses to teach the delivery of patient-centered care.[36]

The Pharmacists Patient Care Process, as part of the ACPE standards for colleges and schools of pharmacy, gives pharmacy educators an opportunity to advance the teaching of patient-centered care. Uniform language exists in the PPCP, so more research needs to be done exploring how and when it is most effective and efficient to teach patient-centered care. However, the PPCP primarily presents the skills needed, such as collect information and develop a care plan.[1] It does not discuss the way these steps should be taught or the effort required in learning to provide patient-centered care.

Pharmacy Students' View of Practicing Patient-Centered Care

The existence of a defined patient care process, the PPCP, is an important step in encouraging pharmacists to provide patient-centered care, but the lack of a consistent approach to teaching patient care has an impact on the profession. Pharmacy students experience the profession in many different ways over the course of their time in school. Internships, experiential experiences, and other time spent with practicing pharmacists all shape the way pharmacy students view the profession. In surveying pharmacy students' career aspirations, Siracuse et al. found 66% of students chose direct patient care as their immediate aspiration.[37] This is contrasted with their 2008 survey of pharmacy students' work experience in which it was found only 10% of their time at work was spent engaging in direct patient care and nearly 70% of their time was spent dispensing medications.[38]

Urmie and colleagues surveyed pharmacy students in 2007 to determine their intent to provide Medication Therapy Management (MTM) services and found while 60% intend to provide MTM, only 37% indicated they would actively seek to provide MTM if their employer did not already offer the service to patients.[39] Gallimore et al. had similar findings in 2011 when they surveyed pharmacy students after adding an MTM simulation activity.[30] They found 70% intended to provide MTM as practicing pharmacists, but only 38% intended to initiate MTM services if their employer did not provide them.[30]

Pharmacy students have also been asked about the level of preparation they feel to provide pharmaceutical care.[40] In 2002, Ried et al. specifically asked students about the technical, psychosocial, and administrative aspects of pharmaceutical care and the communication skills needed, such as "monitor therapeutic plan" and "recommend drug therapy". They followed a class of pharmacy students through the curriculum and found, upon graduation, the students felt more prepared to perform all aspects of pharmaceutical care. Despite the 41 items on the survey,

students were not directly asked about their understanding of the role of a pharmaceutical care practitioner or the ways this role is different from other views of pharmacy practice.[40] Additional work needs to be done to help pharmacy students see themselves as patient-care practitioners and equip them with the tools needed to provide patient-centered care throughout their careers.

Many pharmacy students state they want to be providing direct patient care upon graduation and many feel they are prepared to do so. However, as demonstrated by the 2014 Pharmacists Workforce Survey, only 21% of full-time pharmacists provide patient care services not associated with dispensing.[18] While this is an increase form 2009,[18] barriers still exist to pharmacists providing patient care services in practice.

A number of studies have shown practicing pharmacists interested in or already providing direct patient care may desire some addition training to feel prepared for their role. Lounsbery et al. surveyed pharmacists interested in providing MTM services and found 38.7% indicated a lack of training on clinical problem solving skills and 29.4% indicated lack of training on therapeutic knowledge as barriers.[41] Similarly, Blake et al. surveyed pharmacists-in-charge of community pharmacies and found one of the top factors facilitating the provision of MTM services, in addition to patient willingness, was if the pharmacists had a sufficient educational background.[42] The importance of effective training and educating pharmacy students to provide patient-centered care goes beyond meeting accreditation standards and has implications for pharmacy practice.

Little has been published illustrating the specific way pharmacy students are taught a patient care process. One example presents an entire curriculum focused on pharmaceutical care and describes the patient care process taught in detail.[43] When a pharmaceutical care curriculum was implemented at the University of Toronto, the faculty determined their current wording of the expected functions of a pharmacist, such as "monitoring patients" was not sufficient.[43] As a

result, they designed a curriculum around the practice of pharmaceutical care and incorporated specific functions of a pharmacist. These concrete, patient-centered functions, such as "develop monitoring plan," became their curricular framework.[43]

The lack of focus in pharmacy education on teaching the patient care process is also evident to educators preparing pharmacists to practice patient-centered care. In 2004, the authors of the original paper on pharmaceutical care, Strand et al., presented a reflection on 25 years of their work.[44] They acknowledged the patient care process had not typically been emphasized in pharmacy curriculum. While this is a key factor in preparing pharmacy students for practice, it was not the biggest challenge they experienced. When teaching patient-centered care, the authors emphasized the main challenge faced by many was the ability to conceptualize pharmaceutical care and the role the pharmacist plays when providing pharmaceutical care.[44] They believe pharmacists need to shift from a "product-focused" role to a "patient-centered care provider" role and state, "the central issue confronting the participants in our training programs was that of re-conceptualizing roles from the 'technical' to the caring."[44]

In 2009, members of the AACP Curricular Change Summit recommended "the majority of [pharmacy] graduates should and will remain centered on providing patient care in community and institutional practice" in order to be "competent providers in today's health care and economic environment."[45] This commitment to patient-centered care starts in colleges and schools of pharmacy. If practicing pharmacists with the opportunity to provide patient-centered care indicate additional training is desired, the shift in the way patient-centered care is taught should start in colleges and schools of pharmacy. Specifically, by seeking to understand the way a student learns the PPCP, educators can better prepare the next wave of graduates to provide patient-centered care and further our understanding of the transformation occurring as pharmacy

students become patient care practitioners. One approach to more thoroughly understanding the way a student learns a discipline is by identifying and utilizing threshold concepts.

Threshold Concepts

Definition and History of Threshold Concepts

Threshold concepts were first defined by Meyer and Land in 2003 as "akin to a portal, opening up a new and previously inaccessible way of thinking about something. It represents a transformed way of understanding, or interpreting, or viewing something without which the learner cannot progress."[2] It is necessary to identify threshold concepts for a given discipline or subject area because of the value they potentially bring to teaching and learning.[46] Identifying threshold concepts is a way for educators to closely examine what is taught, in addition to why and when material is taught.[46] Threshold concepts provide a way for educators to more deeply understand one's learning in order to help students master a discipline or anticipate their struggles.

As discussed, teaching the Pharmacists' Patient Care Process has not been well defined or examined within pharmacy programs. It is necessary to understand more about how students learn to provide patient care, where they struggle, and the areas to emphasize. This deeper examination of the PPCP can be accomplished by identifying and utilizing threshold concepts. Meyer and Land also view the "ways of thinking and practicing" within a discipline as a threshold concept which, when understood, can lead to transformation of the learner.[2] A threshold concept associated with the PPCP would be central to the way a pharmacist thinks and practices patient care. Since this process of becoming a pharmacist able to provide patient care is still being explored, the identification of threshold concepts associated with the PPCP is needed in pharmacy.

Threshold concepts have only recently begun to be discussed in the literature. However, since the first introduction, there has been an abundance of research articles generated in disciplines such

as engineering,[47] economics,[48] and occupational health.[49] The idea of a threshold concept first arose as a contrast to core concepts and a way to expand and make connections to Perkins' work with troublesome knowledge.[2]

A threshold concept is different from a core concept. A core concept is a piece of foundational knowledge, or a building block for a given discipline. However, while core concepts are necessary for understanding of a subject area, they do not transform how a learner views a discipline.[2] Troublesome knowledge, on the other hand, is closely tied to threshold concepts. Troublesome knowledge, according to Perkins, is any type of knowledge (conceptually different, foreign, or ritual/routine) that is difficult for the student to learn.[50] A threshold concept may also be troublesome, or lead to troublesome knowledge,[2] but not all troublesome knowledge is a threshold concept.

Threshold concepts have five defining characteristics identified by Meyer and Land.[2] First threshold concepts are *transformative*. Understanding a threshold concept can lead to any type of transformation, e.g. a shift in personal identity or values.[2] Transformative learning has been extensively discussed and studied in education. Mezirow states transformative learning is "the essence of adult education" and involves changing one's frame of reference by critically examining assumptions and developing autonomous thinking.[51] Threshold concepts build on the idea of transformative learning and encompass additional characteristics.

Threshold concepts are also *irreversible*. The learner is likely unable to return to the previous way of thinking after the new perspective is gained.[2] Meyer and Land also describe threshold concepts as being *integrative*.[2] An integrative concept "exposes the previously hidden interrelatedness of something" and brings together different approaches or new ways of thinking.[52] A threshold concept is often *bounded*, meaning it will interface with the edges of a discipline[2] or a boundary

of where one discipline ends and the next begins.[52] Finally, threshold concepts are *troublesome*.[2] A learner may struggle with the concept because it is counter-intuitive, it comes from an alternative perspective, or it is incoherent.[52] These five characteristics, *transformative, irreversible, integrative, bounded, and troublesome*, provide the framework needed to identify threshold concepts.

Threshold concepts are an approach to teaching and learning distinct from other theoretical perspectives. For example, competency-based education is the standard in health professions education, including pharmacy. Competencies describe an individual's qualities, what he or she knows or can do.[53] Competency-based curriculum is needed to ensure students graduating from professional programs are able to step into a practitioner role. However, focusing on competencies alone does not enable an educator to identify which concepts may be troublesome for a learner to understand or which concepts bring about a transformation in one's thinking. Competency-based education alone is limited by looking at the final result and does not provide information on which ideas to emphasize to foster understanding. Identifying threshold concepts complements competency-based education.

The Dreyfus model of skill acquisition is also commonly referenced and used as a model in health professions education. The Dreyfus model has five stages a learner progresses through, novice, advanced beginner, competent, proficient, and expert.[54] As the learner reaches each new stage he or she gains perspective and ultimately switches from making analytical to intuitive decisions.[54] This skill development model provides a way to evaluate a learner's progression, but is not able to inform which knowledge or skills are necessary to teach in order to transform one's perspective. Threshold concepts provide opportunities to illuminate additional aspects of student learning in which the Dreyfus Model can be applied.

The identification of threshold concepts also has implications for assessment. Conversation has begun in pharmacy education about adopting an Entrustable Professional Activity (EPA) model of assessment, based on the model in medicine.[55] The EPA model translates a competency-based educational program into measurable tasks demonstrated by the learner.[53] The EPA model is based on how trustworthy a learner is to perform the tasks or skill independently.[53] Threshold concepts could, in theory, inform which tasks or skills should be measured by an EPA, but the identification of a threshold concept is distinct from creating an EPA. Threshold concept identification is needed to understand which concepts give the learner a new perspective within a discipline.[2] This will initially inform teaching and learning decisions and then play a role in selecting and applying assessment methods.[46]

Identification of Threshold Concepts

Threshold Concepts have been identified in many disciplines, including engineering,[47,56] biochemistry,[57] and occupational therapy.[58] In engineering, Knight and colleagues gathered data from three sources, teachers, students and assessments to determine the threshold concepts in a hydraulics course.[56] The teachers who had taught in the course previously completed a concept map on the main course topics, followed by discussions. Data from the students came in the form of written reflections, focus groups, and class observation. Final examinations were analyzed by reviewing the distribution of answers to determine what concepts were most difficult for students. The data was triangulated and one threshold concept, *Critical flow, or "how water flows under different constraints*," was identified for students in the hydraulics course because it was deemed to be transformative and integrative.[56]

Hesterman et al. have also identified general engineering threshold concepts to be used to create a new course for undergraduate students.[47] Their study had two phases, the Diverging Phase and the Integrating Phase. In the Diverging Phase students, academics, and student tutors participated in interviews and focus groups. In the Integrating Phase, workshops were held for students and

academics to discuss the results of the Diverging Phase. The analysis of the data specifically focused on concepts that were troublesome and transformative. The Diverging Phase identified a list of potential threshold concepts, which were then refined in the Integrating Phase. Four threshold concepts resulted from the two phases of the study, including *Conservation principles or the idea that "nothing is lost*."[47]

In biochemistry, faculty and students were used as data sources to identify threshold concepts.[57] Loertscher et al. describes a process in which 70 faculty members from around the country came together at one of three national workshops held at larger conferences and students at five different institutions participated in focus groups. The data from each workshop or focus group led to a list of threshold concepts, which was further refined by the researchers, resulting in five threshold concepts for biochemistry, two of which were *Steady state, or "the conditions of life in which chemical reactions take place"* and *Free energy or the use of "favorable processes to drive less-favorable processes*."[57]

In occupational therapy, practitioners were the source of data as Tanner attempted to identify threshold concepts associated with practice education.[58] Focusing primarily on troublesome and transformative knowledge, Tanner held two focus groups of occupational therapy practitioners. After the data was analyzed, three threshold concepts, also the themes of the qualitative analysis, were identified. The threshold concepts include *Client-centered practice and the use of self, Developing a professional self-identity,* and *Practicing in the real world.*[58]

While the identification of threshold concepts has been achieved in a variety of disciplines, the process of identifying them is not without challenges. First, as demonstrated above, there is no consensus on methods to use to identify threshold concepts or who to use as a source of data.[46] In addition, there are five defining characteristics of threshold concepts, but not all studies have

given equal weight to each characteristic, so it is difficult to know which, if any, should be prioritized in an identification process.[46] Finally, when utilizing other people as sources of data, it is important to phrase the questions asked using language that is meaningful to the participant.[59] For example, Quinlan et al. found it ineffective to ask participants to "identify threshold concepts" and instead had success by asking about the participants' "perceptions of integrative concepts that were transformative for students."[59]

While no singular method exists for identifying threshold concepts, however, the published studies do share important characteristics. The data analysis approach is typically qualitative and includes academics, students, and practitioners as sources of data. Academics are needed because they are the experts in the content area and know the fundamental concepts of their discipline.[60] Students provide a unique perspective because they may raise issues that would not occur to faculty.[57] It is also important to learn about student learning from students themselves.[46] Practitioners, or in the case of pharmacy, preceptors who provide patient care services, are included because they bring a unique set of knowledge, skills, and experiences.[46,58]

In addition to having a variety of sources of data, it is important for there to be dialogue and conversation involved in identifying threshold concepts.[46] Finally, the identification of threshold concepts is an opportunity to use consensus methodology, such as Nominal Group Technique or the Delphi Technique.[46] Achieving consensus will help ensure the appropriate threshold concepts are identified and provide a solid foundation for additional work utilizing the threshold concepts.

Often, threshold concepts are identified in order to impact students' learning experience.[46] With this goal in mind, the utility of threshold concepts is often focused on their use in teaching decisions, such as the sequence in which course content is presented to students. However, the identification of threshold concepts associated with a discipline can also play a role at a curricular

level, rather than only a classroom level. For example, Barradell and Kennedy-Jones state there may be value in examining when and how threshold concepts could be taught.[61] Focusing on how and when threshold concepts are taught illustrates they could also play a role in evaluation.

Evaluation

Role of Curriculum Evaluation

Evaluation has been defined by many researchers and evaluators. However, one of the most commonly used definitions describes evaluation, specifically program evaluation, as:

> The systematic collection of information about activities, characteristics, and results of programs to make judgements about the program, improve or further develop program effectiveness, inform decisions about future programming, and/or increase understanding.[62]

When some hear 'evaluation', they think of assessment and testing,[3] however assessment and evaluation are two distinct concepts. Assessment, in an educational context, determines student progress and if students have met the learning objectives,[63] while evaluation aims to ask and answer how well something (a process, program, or organization) is working.[3]

Evaluation is also similar yet distinct from research. They may both use the same methods for data collection and analysis, but, research and evaluation are undertaken for different reasons, the objectives of each are different, and each presents findings in distinct ways.[3] However, some evaluation approaches can be used for research purposes.[64] In the medical education literature, evaluation research is considered a valuable method of applied research to determine how well a program is working.[65]

There are many different types of evaluation. An evaluation can be formative and focus on improving the program or process in some way or evaluation can be summative and help determine the value of a program or organization.[3] Evaluations can target the outcomes or impact of a program or be developmental, where the evaluator becomes a partner to the program and is engaged in the decision making process.[3]

An example of formative evaluation in health education literature examined the development of a video to be used to explain treatment and side effects to cancer patient.[66] In this example, the evaluators were present at each major step in the development process and gathered evaluative data in the form of observations, interviews, and review of the materials.[66] This formative evaluation was systematic, timely, and the results of the reviews done at each step of the process informed the next steps in the development of the program.[66]

Despite the many types of evaluation, they all have the same four principles in common.[3] First, as mentioned in the definition above, evaluations are systematic; the process is planned and purposeful. Second, data must be collected to answer the questions posed by the evaluation. Third, evaluation is a way to gain additional knowledge about a program or organization and inform the decisions to be made. Finally, the information uncovered by the evaluation must be used in some way.[3]

Evaluation is used to help make decisions and also improve the decisions being made.[63] In addition, evaluation can be used to help an organization or program design and implement initiatives and can be used to show others why an initiative is needed or is already effective.[3] Finally, doing an evaluation can illustrate how resources should be used and can also demonstrate quality of a program to the stakeholders.[3] Evaluation has many uses, including a role in education-related decisions.

Evaluation is often thought of being applied to social programs or organizations. However, the principles of evaluation can be applied to many aspects of education. Outcomes-based evaluations are commonly used in educational settings. These evaluations typically want to know to what extent the desired objectives have been met. However, there are some who advocate for the use of formative evaluations in educational settings in order to focus on the development of programs.[67] The aim of formative evaluation in education is "to create more successful programs" by providing information decision makers can use to develop and implement the program.[67]

There are few examples of evaluations in health professions education, and even fewer formative evaluations. Most examples are focused on evaluating a specific course[68,69] or the entire curriculum.[70,71,72] Fetterman and colleagues describe their use of "empowerment evaluation", a specific evaluative approach using stakeholders in each step of the process, to create cycles of evaluation to examine the medical school curriculum.[70] Other studies explore the use of continuous curricular feedback[71] or the implementation of a curriculum evaluation committee[72] in to evaluating and improving curriculum. These studies show a variety of methods have been used to evaluate an entire curriculum, but none specifically examined how one key concept, such as patient-centered care, is taught and assessed throughout a curriculum.

Cross-cultural curricula is one concept in medication education that often focuses on knowledge, skills, and attitudes learned in a variety of places within a curriculum.[73] Betancourt discussed the need for evaluation of cross-cultural curricula and presented several strategies that could be used to evaluate material delivered in a variety of ways, not simply in one course.[73] In this case, the author advocated for an evaluative approach designed to determine whether the cross-cultural curricula objectives, related to the knowledge, skills, and attitudes of students, were being met, regardless of the way the content was delivered.[73]

Evaluation in Pharmacy Education

In pharmacy education, the few examples in the literature also focus primarily on curriculum, course, or teacher evaluation. Reid describes the use of a continuous quality improvement model by colleges and schools of pharmacy to examine their curriculum.[74] This approach utilizes existing assessments in a curriculum to determine whether educational outcomes are being met.[74] For example, the method starts with a college or school articulating the definition of a competent practitioner and the associated curricular competencies and objectives. The next steps include obtaining the baseline characteristics of students and the implementation of the designed curriculum. Finally, data collection and evaluation of curriculum outcomes takes place.[74] This continuous quality improvement method provides a thorough examination of a college or school's entire curriculum.

While explicit examples of formative program evaluation do not exist in the pharmacy education literature, tools such as curriculum maps, which have been discussed, could be used to further develop programs. A curriculum map is a visual representation of a curriculum, including specific courses and external influences.[75] Plaza et al. presents the foundation for curriculum mapping in pharmacy and provides a model for colleges and schools to follow.[76] The model utilizes outcome statements to explore the intended, delivered, and received curricula, which are all distinct.[76]

In another example, Kelley et al. describe the steps a college or school could follow to create a curriculum map and provide an example as a case study.[75] The model Kelley et al. present is based on the Porter concept of the curricular chain of causality, which includes four components, the intended curriculum, the enacted curriculum, the learned curriculum, and the assessed curriculum.[77] The principles of curriculum mapping, systematically examining aspects of a curriculum in order to aid decision making, are related to program evaluation. In addition, the

models associated with curriculum mapping can provide guidance for a formative evaluation focusing on one specific aspect of the curriculum.

Many challenges exist when attempting to do any kind of evaluation. For example, the people involved in the program being evaluated may change or switch roles, such as a course instructor being assigned a new teaching role or leaving the institution. Modifications to a teaching team, or other personnel changes can affect what evaluation questions are asked, how data is collected, or how the results are used.[3] In addition, the timing of presenting the evaluation findings can present a challenge. If the findings are not conveyed before a deadline for decision making, the usefulness of the evaluation is limited.[3]

Formative evaluation in particular also has its own set of challenges. First, since formative evaluation informs the decisions made about the development of a program, undergoing the process can cause delays in the development process.[66] Second, the evaluator must build a trusting relationship with those involved with the program in order to obtain the needed information, otherwise the participants may be hesitant to incorporate any changes or suggestions arising from the evaluation.[66] Finally, when evaluating a program or object with some abstract components, such as cross-cultural curriculum, it may be difficult to gather the necessary data by directly measuring it.[73]

Threshold Concepts and Evaluation

The process of identifying threshold concepts has been used to increase dialogue among those involved in educational decisions, instructors and students. It allows educators to go beyond a syllabus and focus attention on "student understanding" and resolving differences.[52] Specifically, tension can arise when various groups (instructors and students) have different expectations for what it means to understand a concept.[52] Identifying the threshold concepts associated with

learning in a particular discipline can help explain why a student has not achieved the level of understanding expected.[52]

In addition to increased dialogue, threshold concepts are beneficial to curriculum design decisions.[78] By approaching teaching from a threshold concept perspective, it allows educators to think about the big picture related to student learning.[61] Understanding threshold concepts provides insight into teaching and learning and should be brought out in the open so all those involved in education can recognize how learners think and practice in a particular discipline.[60] In addition, utilizing a threshold concept approach focuses a "stuffed curriculum" on the most fundamental aspects of learning a discipline.[78] By starting from threshold concepts, activities may be redesigned, introduced with a new conceptual approach, or intentionally re-emphasized in a given course or curriculum.[79]

The process of identifying threshold concepts involves a close examination of the discipline, from the perspective of how students learn. However, identifying threshold concepts is only the beginning.[61] As mentioned, identifying threshold concepts impacts dialogue occurring in educational settings and can influence curriculum decisions. In addition, this in-depth analysis of a discipline can be of benefit to other educational purposes, including evaluation. Identification of threshold concepts paves the way for a systematic evaluation of the concepts to discover how, when, and where they are being taught within a curriculum.

The evaluative approach best suited to examining the threshold concepts associated with the Pharmacists Patient Care Process is formative evaluation. While the outcomes of teaching the PPCP are important and necessary to measure, pharmacy educators need to know more about how, when, and where teaching and assessing the PPCP occur. Colleges and schools need to make decisions about the delivery of the PPCP, including how threshold concepts factor into the

patient-centered care aspects of curriculum. A formative evaluation will provide information to assist in the development of colleges and schools patient-centered care curriculum, specifically the threshold concepts associated with the PPCP.

Chapter 3: Methodology

Aim 1 – Identifying Threshold Concepts

Overview

The first phase of the study addressed Aim 1, Identify threshold concepts associated with pharmacy students learning the Pharmacists' Patient Care Process (PPCP). It involved conducting focus groups, performing data analysis, and convening an expert consensus panel. The focus groups consisted of faculty, students, residents, and preceptors associated with the University of Minnesota College of Pharmacy. The University of Minnesota College of Pharmacy was selected as the site of this study because the institution has been teaching the patient care process as part of pharmaceutical care for over 20 years. In addition, the UMN-COP launched a new curriculum in August of 2013 with an intentional focus on integrating a consistent approach to patient-centered care throughout the curriculum. This study drew specifically on the participants' experiences with the new curriculum. Utilizing the UMN-COP's experience with teaching pharmaceutical care provides additional insight into how the PPCP can best be taught in colleges and schools of pharmacy. For example, a foundational component of the assessment step in pharmaceutical care involves following a specific process (e.g. Indication, Effectiveness, Safety, Convenience) for identifying drug therapy problems which is unique to pharmacists.[21] In contrast, the PPCP mentions problems will be identified as part of the assessment step, but provides very little detail about the process.[1]

Focus Groups

Five focus groups were convened to identify potential threshold concepts. Focus groups were selected because they create conversation and dialogue among participants,[3] which is advantageous when discussing a relatively intangible subject like threshold concepts.[46] In addition, focus groups are a common method for identifying threshold concepts in other disciplines.[57,58] Five focus groups were held in order to obtain a variety of perspectives from

participants with different levels of expertise and experience with ambulatory care pharmacy. Practitioners and students with ambulatory care experience were selected for this study because ambulatory care is the area of pharmacy practice at the UMN-COP in which a patient care process is the emphasized the most. This foundation would allow focus group participants to have conversation from a similar starting point and engage more deeply with the PPCP.

The first focus group was composed of ambulatory care residents in the University of Minnesota Postgraduate Pharmacy Residency Program. Residents had 1-2 years experience providing direct patient care using the patient care process. All 23 participants in the residency program, as identified on the program website, were invited to participate in the focus group.

The second focus group was comprised of pharmacist faculty or instructors at the UMN-COP with 2+ years of experience teaching pharmacy students the patient care process in either a classroom or experiential setting. The pool of classroom faculty consisted of salaried faculty or instructors with direct patient care teaching experience in one or more of the following courses, *Foundations of Pharmaceutical Care, Applied of Pharmaceutical Care,* or *Pharmaceutical Care Skills Lab*, where the patient care process is first taught and reinforced. The experiential faculty pool was drawn from salaried faculty or instructors serving as a preceptor on an ambulatory care rotation site. Twenty four (24) classroom and experiential faculty at the UMN-COP were identified through teaching records and the college website as meeting this criteria and contacted.

The third focus group was made up of practicing pharmacists with 2+ years experience teaching UMN-COP students the patient care process as a preceptor at an ambulatory care rotation site with a defined patient care process, such as the PPCP or pharmaceutical care. The list of preceptors from ambulatory care sites was obtained from the UMN-COP Executive Director of Applied and Experiential Education and 51 were identified as meeting the criteria.

The remaining two focus groups consisted of current pharmacy students at the UMN-COP. The fourth focus group was made up of rising second and third year pharmacy students with classroom experience of the patient care process. Sixty-one (61) student participants were identified by course instructors and teaching assistants in the *Foundations in Pharmaceutical Care* and *Applied of Pharmaceutical Care* courses as potential focus group candidates able to comment on their learning of the patient care process.

The fifth focus group was composed of fourth year students participating in Advanced Pharmacy Practice Experiences (APPEs). Specifically, students who had previously completed the ambulatory care APPE. The list of students who had completed the ambulatory care APPE was provided by the Executive Director of Applied and Experiential Education and 63 students met the criteria.

All participants meeting the inclusion criteria were contacted by email. A variety of participants were sought because it is unknown when pharmacy learners cross the patient care practitioners threshold and it is likely different for each individual. Residents were included because they are in a unique learning environment consisting mainly of direct patient care practice experiences. Faculty and preceptors were both included because they see students in a variety of learning environments and there may be differences in student learning the PPCP in the classroom, lab or experiential settings. Students were included because they are the focus of the teaching,[57] they are the ones experiencing the learning,[46] and since threshold concepts are irreversible, the faculty and preceptors may no longer be able to view the discipline as a novice.[2]

The goal of the focus groups was to generate a list of potential threshold concepts associated with the PPCP which can be refined and used in later stages of the study. Each focus group answered

questions and had conversation around the troublesome concepts, transformative experiences, and pivotal moments experienced when learning to become a patient-centered care practitioner. Questions were designed to elicit ideas, examples, and stories related to the threshold concepts associated with learning the PPCP. The questions were developed by the primary investigator by consulting threshold concepts literature[2,46] and a focus groups study in which threshold concepts were identified for occupational therapists.[58]

After participants were invited by email (Appendix A), they responded to the primary investigator if they were interested and available at the scheduled time. Once participation was confirmed, each participant was sent an electronic calendar invitation to save the date of the focus group. Approximately one week prior to the focus group session an email reminder (Appendix B) was sent which included directions on logging on to Webex and steps to follow if they had trouble logging into the system. At this time participants were also sent an information sheet containing details about the study (Appendix C) and asked to think about a question in preparation, unique to each focus group. For example, the student focus groups were asked to think about "What have been some of the major milestones in your development as a patient care practitioner (so far)?"

The UMN-COP operates a dual-campus model and has ambulatory care experiential sites across the state, so the focus groups were held online using Webex (Cisco, San Jose, CA), a videoconferencing system to ensure participants did not need to be limited by geography. The focus group questions (Appendix D) and Webex technology were piloted with three graduate students in a mock focus group session to ensure questions were clear and the technology use was optimal. The primary investigator led each focus group and each session was recorded using Webex technology within the platform. A second moderator was present to make written observations during the session. Three graduate students rotated through the role of second moderator and each was instructed to monitor the focus group for technology issues and

document anything they heard that stood out to them or was worth noting. Each focus groups lasted between 1-2 hours. The focus group component of this study was determined to be exempt from review by the University of Minnesota Institutional Review Board.

Data Analysis

The data from each focus group was analyzed by the primary investigator using a deductive content analysis approach.[80] First, the recordings of each focus group were transcribed. The transcripts were then coded and the codes grouped into categories. The categories were then collapsed into themes. The primary investigator used the threshold concept framework to interpret the data. The question, "Does this describe a concept that could be transformative, irreversible, integrative, bounded, or troublesome to a pharmacy student learning the PPCP?"[58] was used as a guide in the deductive approach of identifying codes, categories and themes from the data. For the purpose of this study, the themes were considered potential threshold concepts. Once the themes, or potential threshold concepts were identified, the primary investigator wrote a description of the threshold concept using language from the supporting codes and categories.

Expert Consensus Panel

One month after the final focus group was held and the list of potential threshold concepts with descriptions was generated from the focus group data, an expert consensus panel was convened. Consensus methods traditionally have been used to "define levels of agreement" on a variety of topics.[81] In addition, a consensus method is useful in the identification of threshold concepts so they can be used with confidence in curricular decisions.[46] The goal of the expert consensus panel was to come to agreement on a refined list of threshold concepts. The panel consisted of experts in teaching the patient care process to pharmacy students, in the classroom or at experiential sites because of their familiarity with teaching a patient care process. The expert panel was comprised of pharmacist faculty or instructors at the UMN-COP with 2+ years of experience teaching pharmacy students the patient care process in either a classroom or experiential setting. The pool from which participants were invited was the same as the faculty focus group. Only one

participant selected to participate in both the focus group and expert consensus panel due to scheduling and availability. Potential panelists were contacted by email (Appendix E) to determine their interest and availability. Twenty-four faculty members met the inclusion criteria for the expert consensus panel and were invited to participate.

Where the focus group participants were primarily asked about threshold concepts associated with *learning* the PPCP, the expert consensus panel was centered on refining the threshold concepts from a perspective of *teaching* the PPCP. The panel came together for a single workshop designed to build a consensus list of threshold concepts[47] utilizing a modified Nominal Group Technique (NGT) method.[82] The NGT was selected as the consensus method for this study because it involves face-to-face interaction between participants and is easily able to be modified for specific situation.[82] The traditional NGT method is a four step consensus process consisting of participants generating ideas, sharing ideas, followed by discussion and finally consensus voting on the ideas.[82] The NGT method can be modified in different ways. For example, instead of the participants generating ideas, the moderator can provide the starting topics to be discussed. There could also be additional rounds of discussion and voting or ranking to aid the consensus process.[82] In addition, the NGT method has been used previously in pharmacy to identify examples of patient-centered professionalism found in community pharmacy[83] and to develop a framework for an objective structured clinical examinations (OSCE).[84]

It is recommended an NGT workshop has no more than seven participants and consists of experts with knowledge about the ideas or topics being discussed.[82] Each session is led by a moderator who moves the group through the four steps and ensures all ideas have been discussed. After the ideas have been generated, shared, and discussed, a voting or ranking sheet is distributed. Participants complete their voting or ranking during the session and the results are ultimately shared with the NGT group.[82]

In a recent study of threshold concepts associated with occupational therapy practice, the authors determined which of the threshold concepts generated could be described as transformative in addition to a second characteristic (irreversible, integrative, bounded or troublesome).[58] The concepts with two or more of the characteristics were part of the final list of threshold concepts.[58] For a threshold concept to be included in the final consensus list of the present study, it must be transformative and have one other defining characteristic, such as irreversible or troublesome. It is recommended consensus is defined prior to the NGT session,[81] but a set level of agreement does not exist in the literature. A simple majority,[85] two-thirds,[81] or 80% agreement[85] could all be considered achieving consensus, depending on the type of consensus method used and the needs of the study. In this study, a threshold concept will be included in the final list if two-thirds (67%) of the panelists determine it meets the defined criteria. At the end of the modified NGT session, a consensus list of threshold concepts associated with student learning of the Pharmacists' Patient Care Process will be generated.

In the present study, the modified NGT approach used the list of potential threshold concepts previously generated from analysis of the focus group data as the starting point for the process rather than have participants generate a list of ideas to discuss and vote on. After agreeing to be on the expert consensus panel, the participants were sent a one-page document, *Threshold Concepts Overview* (Appendix F) and a one-page summary of each of the five threshold concepts (Appendix G), to review prior to the NGT session. Using videoconferencing, the panel came together for a 90-minute discussion of the list of threshold concepts and consensus voting, led by the primary investigator.

The session started with a conversation of threshold concepts followed by a discussion of each of the potential threshold concepts. Panelists read the first threshold concept and its short description

and had a few minutes on their own to make notes on their impression of the threshold concept or questions they had about it. Then, the panel discussed the degree to which the proposed threshold concept aligned with the definition of a threshold concept and which of the five characteristics (transformative, irreversible, integrative, bounded, or troublesome) were met for each item. This process was repeated for the four remaining potential threshold concepts. After each potential threshold concept had been discussed as a group, each panelist voted on whether he or she thought the proposed threshold concept was a threshold concept and which of the five characteristics were met for each, using a paper ballot (Appendix H). The results were collected and tabulated by the primary investigator after the session ended. Revisions were made to the language of two of the potential threshold concept by the primary investigator to provide clarifications raised by the panel. The revised threshold concepts were sent back to the participants via email for a second round of voting. The participants voted on the revised language by sending their responses to the primary investigator electronically. The expert consensus panel component of this study was determined to be exempt from review by the University of Minnesota Institutional Review Board.

Aim 2 – Creating Curricular Evaluation Tool

Overview

The second phase of the study addressed Aim 2, create, validate and administer an instrument based on the previously identified threshold concepts (patient care threshold concepts) to evaluate to what extent the Pharmacists' Patient Care Process (PPCP) is taught across a pharmacy curriculum. Pharmacy educators have little to no guidance on when or how to teach students the PPCP.[4] Administering an evaluation tool is an opportunity to ask and answer specific questions about curricular content and in this case, the patient care threshold concepts, which may not be evident if the focus is only on the five skill-based steps of the PPCP.

Creation of Evaluation Instrument

Evaluations can be done for developmental, formative, or summative purposes, among others.[3] A developmental evaluation informs how a program or process is being developed, a formative evaluation informs how a program or process can be improved, and a summative evaluation informs how a program or process performed. In this case, the evaluation tool was intended to be formative.

With these purposes in mind, the goals of the curricular evaluation instrument were outlined:

1. Understand stakeholder perceptions of the status of current teaching of the Patient Care Threshold Concepts in the curriculum
2. Determine the degree and quality of learning of the Patient Care Threshold Concepts in the curriculum
3. Obtain stakeholders views on the optimal timing and methods of teaching and learning the Patient Care Threshold Concepts in the curriculum

The five patient care threshold concepts identified previously were used as the basis for creating the evaluation instrument, combined with the principles of developmental and formative evaluations and information relevant to various stakeholders (e.g. students, faculty, preceptors, administrators). Starting with the specific goals of this evaluation, the primary investigator drafted items to create a survey to be used as the evaluation instrument. The initial evaluation instrument had four parts and thirteen questions. Ten of the questions on this instrument were to be asked of each of the five threshold concepts. Part 1 of the evaluation instrument consisted of four questions asked about when students were first introduced to threshold concepts and when they achieved the transformation associated with each. Part 2 also had four questions and asked Likert-type questions about the threshold concepts and the pharmacy curriculum. Part 3 asked open-ended questions about impactful and challenging teaching of each of the five threshold

concepts. Finally, Part 4 asked three open-ended questions about teaching patient care more broadly. The items were initially reviewed by a second investigator to ensure they aligned with the goals of the curricular evaluation, to improve clarity, and eliminate overlap among questions. Once drafted, the Patient Care Threshold Concepts Evaluation Instrument (PCTC-EI) underwent a validation process prior to administration.

Validation of Patient Care Threshold Concepts Evaluation Instrument (PCTC-EI)

Validation of the PCTC-EI is needed to provide evidence of its validity, or the degree to which the tool "accurately and meaningfully measures what it is supposed to measure."[86] Specifically, the validation process aimed to demonstrate the survey's content relevance and content coverage by calculating the content validity index (CVI).[87] The CVI uses experts to rate the relevance of items on an instrument as a way of quantifying the content validity.[87]

A CVI can be calculated for individual items on an instrument (I-CVI) or for the entire instrument, or scale (S-CVI).[87] The I-CVI is calculated by scoring each item on a Likert-type scale based on relevance. Experts are asked to rate the relevance of each item on the instrument (1 – not relevant, 2 – somewhat relevant, 3 – quite relevant, 4 – highly relevant). Once all ratings are in, the four categories are collapsed into two, not/somewhat relevant and quite/highly relevant. Then a score is calculated for each item by dividing the number of experts who responded quite/highly relevant by the total number of experts responding. For example, if ten experts participated in the process, each would assign a rating to Item A. In this case one expert rated Item A Not Relevant, one expert rated it Somewhat Relevant, one expert rated it Quite Relevant, and the remaining seven experts rated it Highly Relevant. Then the four original categories would be collapsed into two. The Not/Somewhat Relevant category now has two ratings and the Quite/Highly Relevant category has eight. The I-CVI is calculated by dividing the number Quite/Highly Relevant Ratings by the total number of ratings, 8/10. This results in an I-CVI value

of 0.8 for Item A. The S-CVI can then be calculated by averaging all the I-CVI values for the instrument.[87]

The CVI process is commonly used in nursing and literature suggests recruiting 8-10 experts to rate the items.[87] It is also recommended a value of 0.78 be the cutoff score for individual items. Those with a I-CVI somewhat below 0.78 would be candidates for revision and those with a value considerably below 0.78 would be considered for deletion. In addition, if only minor revisions are needed after the I-CVI values are calculated, no further review of the items is needed by experts. If major revisions are made, a second round of review and rating by experts could be considered. The recommended S-CVI value is 0.9, although a value of 0.8 has been accepted.[87]

In the present study, experts were recruited from three colleges of pharmacy. Participants had expertise in patient care or evaluation. Experts were sought who had 3+ years experience as a patient care instructor or 3+ years experience with curricular assessments or evaluation. Eight experts were invited to participate (3 from UMN-COP, 2 from University of Wisconsin School of Pharmacy, and 2 from Concordia University Wisconsin School of Pharmacy). Experts were initially invited via email (Appendix I) and then sent a follow-up email with a link to complete the electronic validation survey (Appendix J) and the PCTC Evaluation Tool Reviewer Guide (Appendix K). They were asked to consider the following question for each item, "How relevant is this item to a curricular-level evaluation of teaching patient care?"

Experts had one week to complete the CVI survey and were sent one reminder to complete the survey by the deadline. The PCTC-EI underwent moderate reorganization after the CVI process. Three items were eliminated, one was relocated, and minor wording changes were made to three others.

Administration of the Patient Care Threshold Concepts Evaluation Instrument (PCTC-EI)

After the CVI process was completed, the updated evaluation instrument was piloted by the three graduate students who served as focus group moderators. The graduate students were asked to review the instrument for clarity and ease of use. Responses were requested within five days and slight wording modifications were made based on the feedback. The PCTC-EI was then administered to a purposive sample of faculty and students at the UMN-COP. The sample included the students who had previously participated in the focus groups (14 students) and the UMN-COP students currently serving on faculty committees at the college (14 students). These students were selected because of their demonstrated interest in the research project or curriculum-related issues. The faculty sample consisted of those who had previously participated in the focus group or were on the expert consensus panel (11 faculty members) and course directors in courses related to patient care (20 faculty members). The required patient care courses included *Foundations of Pharmaceutical Care, Applied Pharmaceutical Care, Pharmaceutical Care Skills Lab, Pharmacy Outcomes* and the Pharmacotherapy Sequence. The elective patient care courses included *Building a Pharmaceutical Care Practice, Advanced Pharmaceutical Care Clinic, Ambulatory Pharmaceutical Care Clinic,* and *Pharmaceutical Care Experience.* These faculty were selected because of their role in teaching patient care at various stages of the curriculum.

Participants were contacted via email (Appendix L) and invited to take the PCTC-EI in Qualtrics (Qualtrics Labs Inc., Provo, UT). The instrument was accessible for one week and participants were sent two additional reminders to complete the evaluation instrument by the deadline. Descriptive statistics were calculated on the quantitative data and inductive content analysis[80] was performed to identify themes from the qualitative data.

Chapter 4: Results

Aim 1 – Patient Care Threshold Concepts

Focus Groups

In total, five focus groups were held over four weeks in the summer of 2016 to identify threshold concepts associated with learning the Pharmacists' Patient Care Process (PPCP). The demographic details of each group are presented in Table 1. The transcripts of the focus groups were reviewed and coded by the primary investigator using the research question *"What are the threshold concepts associated with pharmacy students learning the Pharmacists' Patient Care Process?"* as a guide. Fourteen categories initially emerged from coding of the focus groups transcripts (Table 2). The categories were named and supporting codes from all five focus group transcripts were added to the corresponding categories to provide additional detail and context for the category. After the categories and supporting codes were reviewed by the primary investigator, one category (#9) was discarded because it was determined not to be a potential threshold concept, but instead a strategy for learning the PPCP. From the remaining thirteen categories, five themes, or threshold concepts, emerged from the data (Appendix M). The themes were written as threshold concept statements and each is supported by a detailed description based on the categories and codes.

Table 1. Focus Group Demographics

	Date	Participants	Number Invited	Number Participated	Length
1	June 20, 2016	Ambulatory Care Residents	23	10	1 hour 48 minutes
2	June 28th, 2016	Second and Third Year Pharmacy Students	61	9	1 hour 50 minutes
3	July 11th, 2016	Ambulatory Care Pharmacy Preceptors	51	8	1 hour 18 minutes
4	July 12th, 2016	Fourth Year Pharmacy Students	63	6	1 hour 22 minutes
5	July 13th, 2016	Ambulatory Care Pharmacy Faculty	24	8	1 hour 57 minutes

Table 2. Categories from Deductive Content Analysis

Category	Description
1	Communicate medication information with patients; need personalized process to…; fun; takes time; teach; talk about or describe the process
2	The patient care process is standardized. You do the same thing every time with every patient; understanding conceptualizing process; abstract at first; fits in wider pharmacy context
3	You think through each medication by determining if it is indicated, effective, safe, and convenient (IESC)
4	Process is needed to interact and function within healthcare team; pharmacists are unique
5	The patient agenda drives the visit; patient-centered
6	Every patient is unique; no assumptions; understand their medication experience
7	A flow develops the more comfortable you get with the process; confident; no checklist; process evolved; handle surprises; doing process; don't think about process
8	Must build a relationship with the patient; trust; listen
9	Reflection is needed to get better at the process; takes time
10	Doing the process can make a difference in people's lives
11	Process involves bringing together clinical information; relationship building and process; integrating
12	Learn to care for patients by connecting emotionally with them; whole person
13	Treat the patient, not the disease
14	Ownership; responsibility for patient outcomes; follow-up

The five potential patient care threshold concepts (PCTC) are:

Patient Care Threshold Concept #1 Provide care in which the patient is at the center of each decision made throughout the process

Pharmacists provide patient-centered care by listening to patients and putting their needs, concerns, and desires ahead of their own agenda for the encounter or what should be the outcome, based on guidelines or a preconceived plan. Pharmacists see patients as a whole person, not a series of disease states or drug therapy problems.

Patient Care Threshold Concept #2 Conceptualize and articulate pharmacists' unique patient care process

Pharmacists have a standardized process, using common language (including IESC) and integrating clinical knowledge to provide patient care in a way that is distinct, yet complementary to other health professions. The process is universal and can be followed by any pharmacist in any setting to solve problems arising when providing patient care.

Patient Care Threshold Concept #3 Establish and continually build a relationship with the patient

Pharmacists have an impact on a patient's care when they develop a relationship with the patient and connect emotionally with them. Pharmacists can make a difference in a patient's life as they work together over time and take ownership of the patient's care and outcomes.

Patient Care Threshold Concept #4 Discern a patient's medication experience and incorporate his or her individual knowledge and beliefs into the care provided

Pharmacists recognize each patient has a unique view of their medications and distinct medication taking behavior. Regardless of how one appears on paper, pharmacists do not make assumptions about patients' understanding of medications or their expectations of care. Pharmacists work with patients to uncover the individual complexities of their life and their goals related to medications and use this information when providing care.

Patient Threshold Concept #5 Internalize the patient care process in order to provide care

> Pharmacists are able to provide effective, individualized patient care when they internalize the patient care process, use it routinely without actively thinking about it, enhance it with their own style, and adapt it to respond to the patient in front of them.

The five patient care threshold concepts with their descriptions and illustrative quotes were the starting materials for the Expert Consensus Panel.

Expert Consensus Panel

Six faculty members participated in the Expert Consensus Panel. One panelist was a course instructor in *Foundations of Pharmaceutical Care* and two panelists were instructors in the *Pharmaceutical Care Skills Lab.* Five of the six panelists were ambulatory care preceptors. One panelist had previously participated in the faculty focus group.

After the panelists had reviewed and discussed each of the five patient care threshold concepts and filled out the consensus voting ballot, the primary investigator tabulated the votes. The panel came to consensus on three of the five threshold concepts. As illustrated in Table 3A, at least two-thirds of the panelists agreed patient care threshold concepts #1, #2, and #4 met the definition of threshold concepts, were transformative, and had at least one other defining characteristic. However, consensus was not reached regarding patient care threshold concepts #3 and #5 (Table 3A).

Table 3A. Expert Consensus Panel Voting – Round 1 (n=6)

Patient Care Threshold Concept	Yes – this is a threshold concept	Transformative	Irreversible	Integrative	Bounded	Troublesome
#1 Provide care in which the patient is at the center of each decision made throughout the process	6	6	5	3	0	5
#2 Conceptualize and articulate pharmacists' unique patient care process	6	5	3	4	2	2
#3 Establish and continually build a relationship with the patient	6	6	4	2	0	3
#4 Discern a patient's medication experience and incorporate his or her individual knowledge and beliefs into the care provided	6	6	3	4	1	4
#5 Internalize the patient care process in order to provide care	0	0	1	1	0	0

Table 3B. Expert Consensus Panel Voting – Round 2

Patient Care Threshold Concept	Yes – this is a threshold concept	Transformative	Irreversible	Integrative	Bounded	Troublesome
#3 Create an impact on care by establishing and building a relationship with the patient and taking responsibility for their outcomes	6	4	4	3	0	3
#5 Internalize the patient care process as an automatic or ingrained approach to patient care, adapted to each patient, rather than a series of discreet steps	6	5	4	4	0	0

Based on the discussion during the Nominal Group Technique session and comments made by the panelists on their ballots, the primary investigator reviewed patient care threshold concepts #3 and #5, the categories which informed these threshold concepts, and the original codes supporting the categories and threshold concepts. While agreeing patient care threshold concept #3 was a threshold concept, the panelists felt it was potentially two separate ideas, building a relationship and taking ownership of a patient's care. The first idea, building a relationship was stated in the threshold concept, but the second idea, taking ownership of a patient's care was only present in the description. After revisiting the data, the primary investigator reworded the threshold concept to better align with the supporting categories and codes. As written, the panelists determined patient care threshold concept #5 was not a threshold concept at all. Instead, it seemed like a description of a learner once the threshold had been crossed. Again, after revisiting the data, the primary investigator determined this theme did emerge from the data as a threshold concept and this statement was also revised to better reflect the supporting categories and codes.

The revised patient care threshold concepts are:

Patient Care Threshold Concept #3: Create an impact on care by establishing and building a relationship with the patient and taking responsibility for their outcomes.

Patient Care Threshold Concept #5: Internalize the patient care process as an automatic or ingrained approach to patient care, adapted to each patient, rather than a series of discreet steps.

The revised patient care threshold concepts were sent to the panelists via email for a second round of consensus voting. At least two-thirds of the panelists came to consensus regarding the revised patient care threshold concepts #3 and #5 (Table 3B). The final five patient care threshold

concepts and summaries, identified with data from the focus group and confirmed by the expert consensus panel, are list in Table 4.

Table 4. Patient Care Threshold Concepts with Descriptions [Label]

Patient Care Threshold Concept #1: Provide care in which the patient is at the center of each decision made throughout the process [Patient Centeredness] Pharmacists provide patient-centered care by listening to patients and putting their needs, concerns, and desires ahead of their own agenda for the encounter or what should be the outcome, based on guidelines or a preconceived plan. Pharmacists see patients as a whole person, not a series of disease states or drug therapy problems.
Patient Care Threshold Concept #2: Conceptualize and articulate pharmacists' unique patient care process [Unique Process] Pharmacists have a standardized process, using common language (including Indication, Effective, Safe, Convenient, or IESC) and integrating clinical knowledge to provide patient care in a way that is distinct, yet complementary to other health professions. The process is universal and can be followed by any pharmacist in any setting to solve problems arising when providing patient care.
Patient Care Threshold Concept #3: Create an impact on care by establishing and building a relationship with the patient and taking responsibility for their outcomes [Relationship and Responsibility] Pharmacists have an impact on a patient's care when they develop a relationship with the patient and connect emotionally with them. Pharmacists can make a difference in a patient's life as they work together over time and take ownership of the patient's care and outcomes.
Patient Care Threshold Concept #4: Discern a patient's medication experience and incorporate his or her individual knowledge and beliefs into the care provided [Medication Experience] Pharmacists recognize each patient has a unique view of their medications and distinct medication taking behavior. Regardless of how one appears on paper, pharmacists do not make assumptions about patients' understanding of medications or their expectations of care. Pharmacists work with patients to uncover the individual complexities of their life and their goals related to medications and use this information when providing care.
Patient Care Threshold Concept #5: Internalize the patient care process as an automatic or ingrained approach to patient care, adapted to each patient, rather than a series of discreet steps [Ingrained Approach] Pharmacists are able to provide effective, individualized patient care when they internalize the patient care process, use it routinely without actively thinking about it, enhance it with their own style, and adapt it to respond to the patient in front of them.

Aim 2 – Patient Care Threshold Concepts Evaluation Instrument (PCTC-EI)

Validation of Patient Care Threshold Concepts Evaluation Instrument (PCTC-EI)

The first iteration of the instrument, the Patient Care Threshold Concepts Evaluation Instrument (PCTC-EI) was made up of four parts and thirteen items. Part 1 asked about locating the patient care threshold concepts (PCTC) in the curriculum. Part 2 consisted of rating PCTC in the curriculum. Parts 3 asked respondents to comment on teaching PCTC in the curriculum and Part 4 asked them to reflect on patient care in the curriculum. Of the eight experts invited to partake in the content validation process to calculate the content validity index (CVI), seven completed the survey. The I-CVI was calculated for each item. Seven of the thirteen items had total or nearly total agreement among the seven experts, or a I-CVI of greater than 0.78. Five items had agreement among five out of seven experts and therefore a I-CVI of 0.71 and one item only had agreement among three experts and an I-CVI of 0.43 (Table 5). Five of the experts also provided written responses to the question, *Does the PCTC Evaluation Instrument have any omissions? Specifically, are there questions that should be asked for a curricular evaluation of teaching patient care?* (Table 6). The overall scale CVI (S-CVI) for the instrument was 0.82.

After calculating the I-CVI values and reviewing the written comments, some changes were made to the evaluation survey. In Part 1, "Locating the PCTC in the curriculum," two items were thrown out (Items 2 and 3). Item 3 had an I-CVI of 0.71 and the decision was made to eliminate both items to simplify the question and eliminate redundancy. In Part 2, "Rating PCTC in the curriculum" the item with lowest agreement and an I-CVI value of 0.43 (Item 3) was thrown out. In addition, Item 2 in Part 2 "Rating", with an I-CVI of 0.71, was revised and added to Part 4, "Reflecting on patient care in the curriculum" as an open-ended question about overall effectiveness. A slight wording change was made to Item 1 in Part 3, "Commenting on teaching PCTC in the curriculum." In Part 4 "Reflecting," besides adding a question about effectiveness from Part 2 "Rating," Item 1 was reworded to focus primarily on resources expended. The

changes made were determined to be minor and therefore a second group of experts was not convened to rate the relevancy again and the S-CVI of the revised scale was not calculated.

Table 5. Content Validity Index Calculations for the Patient Care Threshold Concepts Evaluation Instrument (PCTC-EI) (N=7)

#	Question	Not or Somewhat Relevant	Quite or Highly Relevant	Content Validity Index
Part 1 Locating Patient Care Threshold Concepts in the Curriculum				
1	When are pharmacy students first introduced to Threshold Concept X?	1	6	0.86
2	When should pharmacy students be first introduced to Threshold Concept X?	0	7	1
3	When do pharmacy students achieve the transformation associated with Threshold Concept X?	2	5	0.71
4	When should pharmacy students be expected to achieve the transformation associated with Threshold Concept X?	0	7	1
Part 2 Rating Patient Care Threshold Concepts in the Curriculum				
1	When viewing the curriculum as a whole, how much effort (attention, resources, etc) is put towards teaching each of the Threshold Concepts [No effort – A great effort]?	1	6	0.86
2	When viewing the curriculum as a whole, how effective is the teaching of each of the Threshold Concepts [Very ineffective – Very effective]?	2	5	0.71
3	When viewing the curriculum as a whole, to what degree are each of the Threshold Concepts emphasized [Under-emphasized – Over-emphasized]?	4	3	0.43
4	At graduation, how would you describe the average student's ability regarding each of the Threshold Concepts [Poor – Excellent]?	0	7	1
Part 3 Comments on Teaching Patient Care Threshold Concepts in the Curriculum				
1	What is one way Threshold Concept X is currently being taught?	2	5	0.71
2	What is a challenge to teaching Threshold Concept X?	0	7	1
Part 4 Reflecting on Patient Care in the Curriculum				
1	What is one aspect of the curriculum in which the enduring impact is worth the resources expended?	2	5	0.71
2	What the biggest gap in the curriculum's ability to transform students into practitioners?	2	5	0.71
3	What is one aspect of the curriculum you would not want to lose?	0	7	1

Table 6. Open-ended responses to Content Validity Index Survey

Question: Does the PCTC Evaluation Instrument have any omissions? Specifically, are there questions that should be asked for a curricular level evaluation of teaching patient care?
I like the questions about resources and effort. I wonder if the commitment level and sustainability of effectively teaching patient care also should be evaluated. Many of the experiences needed for this are resource and effort intensive.
What about something asking about students' assessment/evaluation of PCTC? Does the curriculum allow for students to do self-evaluations on PCTC? And/or evaluations of how it's taught?
It feels like assessment of these concepts (and student achievements) isn't evaluated in a direct way. For example, items such as Part 2- Items 2 & 4, and Part 3 items you need to consider evidence of learning, but it isn't explicit in a question (what are key assessment activities used to evaluate student achievement of the PPCP? How do they indicate whether students have attained the threshold concept?). Our understanding of threshold concepts also applies backward design in thinking about the outcomes and evidence of learning that keep the learner and teacher engaged in the process.
1) How are survey respondents supposed to determine WHEN pharmacy students achieve the transformation associated with Threshold X? Re your survey, YES this is a relevant item to your research question, but how will stakeholders make this determination? 2) In Part 2, how are non-faculty stakeholders even supposed to gauge the amount of effort devoted towards teaching the Threshold concepts? Faculty are probably in the best position to answer this question, followed by Residents (who recently graduated from their programs, but may or may not recognize where or to what degree Threshold concepts were "taught" in the curriculum), followed by experienced non-faculty practitioners (who may have NO idea how - or if - these Threshold concepts are addressed in the curriculum). 3) Related to #2 above, even simply handing a faculty member (let alone a Resident or non-faculty practitioner) a copy of a curriculum and asking them to flag the different courses in which Threshold concepts are taught, the degree to which Threshold concepts are taught and how effective that teaching is could prove challenging. Sure, people would probably know to flag Foundations of Pharmaceutical Care and possibly PCLC labs, but what about the Ethics modules in Integrated Endocrinology (where I lead a discussion on the pharmacist's right to refuse to fill an OC prescription) or in Biotech (where I lead a discussion on the patient's right not to know about their genetically-related risks)? How about patient cases in Pharmacotherapy courses? How would a respondent determine much is "enough" coverage of Threshold concepts, and how would a respondent be able to comment on the effectiveness of the teaching of these concepts? 4) In Part 4, the questions asked are dependent upon the respondent's ability to respond to questions in Part 2. If respondents are less-than-intimately-familiar with the Pharmacy curriculum, they would be hard-pressed to identify that one aspect that most contributes to "enduring impact," nor could such respondents readily identify any gaps in teaching Threshold concepts.
What is the metric for success? What do we measure to demonstrate students have "passed the threshold?"

Administration of Patient Care Threshold Concepts Evaluation Instrument (PCTC-EI)

The revised PCTC-EI (Figure 1) was sent to a sample population of 59 total participants and 38 completed the survey, including 17 students and 21 faculty (Table 7). This resulted in a response rate of 64.4%. The evaluation instrument asked about the patient care threshold concepts and various aspects of the curriculum in four parts. In Part 1 "Locating," students and faculty were asked when students at the UMN-COP were first introduced to each threshold concept and when the respondent felt an average student achieved the transformation associated with each threshold concept. Reponses for students and faculty were plotted for each patient care threshold concept. There was a lot of agreement among students and faculty regarding the first introduction of the threshold concepts (Figure 2). For example, the majority of student and faculty respondents stated students are introduced to PCTC #1, *Patient Centeredness,* in the first year of the curriculum (Figure 2A). Alternatively, there was less agreement between students and faculty regarding when students achieve the transformation (Figure 2). As seen in Threshold Concept #4, *Medication Experience,* students and faculty stated this transformation occurs across all four years of the curriculum or even post-graduation (Figure 2H).

Table 7. Demographic Information of Patient Care Threshold Concepts Evaluation Instrument (PCTC-EI) Respondents

Respondent Type	**Emails Sent**	**Surveys Completed**	**Percent of Total Respondents**
Students – Informed	14	10	26.3
Students – New	14	8*	18.4
Faculty – Informed	11	10*	23.7
Faculty – New	20	12	31.6
Total	**59**	**38**	

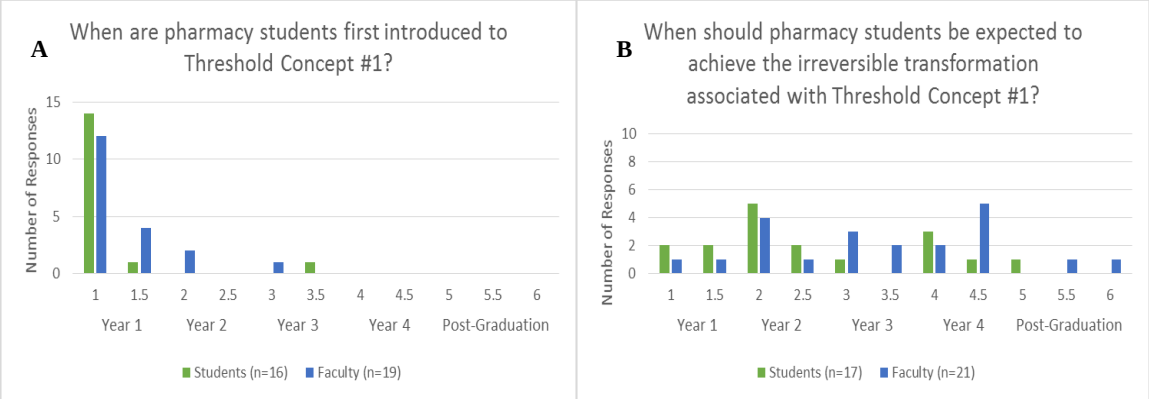
* One completed survey in each of these cohorts was left blank, so they were discarded. 38 total surveys were completed

Figure 1. The Revised Patient Care Threshold Concepts Evaluation Instrument (PCTC-EI)

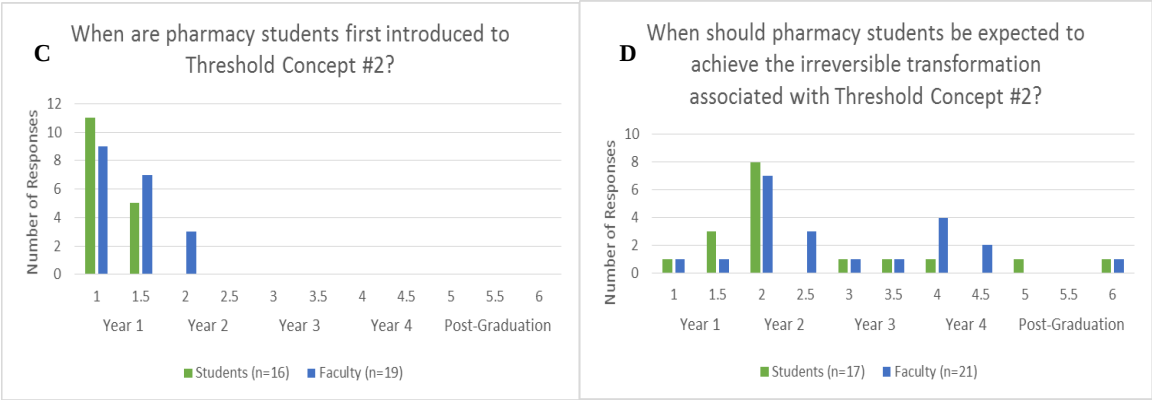
#	Question
Part 1 Locating Patient Care Threshold Concepts in the Curriculum	
1	When are pharmacy students first introduced to Threshold Concept X?
2	When should pharmacy students be expected to achieve the transformation associated with Threshold Concept X?
Part 2 Rating Patient Care Threshold Concepts in the Curriculum	
1	When viewing the curriculum as a whole, how much effort (attention, resources, etc) is put towards teaching each of the Threshold Concepts [No effort – A great effort]?
2	At graduation, how would you describe the average student's ability regarding each of the Threshold Concepts [Poor – Excellent]?
Part 3 Comments on Teaching Patient Care Threshold Concepts in the Curriculum	
1	Describe the most impactful way Threshold Concept X is currently being taught?
2	What is a challenge to teaching Threshold Concept X?
Part 4 Reflecting on Patient Care in the Curriculum	
1	What is one aspect of the curriculum in which the outcome of the endeavor, regarding teaching the PPCP, is worth the resources expended?
2	What one impactful thing could be done to ensure teaching the PPCP is effective?
3	What the biggest gap in the curriculum's ability to transform students into patient care practitioners?
4	Describe one aspect of the curriculum, regarding teaching the PPCP, you would not want to lose and why.

Figure 2 Patient Care Threshold Concept Evaluation Instrument (PCTC-EI) Part 1 Results

Patient Care Threshold Concept #1: Provide care in which the patient is at the center of each decision made throughout the process



Patient Care Threshold Concept #2: Conceptualize and articulate the pharmacists' unique patient care process



Threshold Concept #3: Create an impact on care by establishing and building a relationship with the patient and taking responsibility for their outcomes

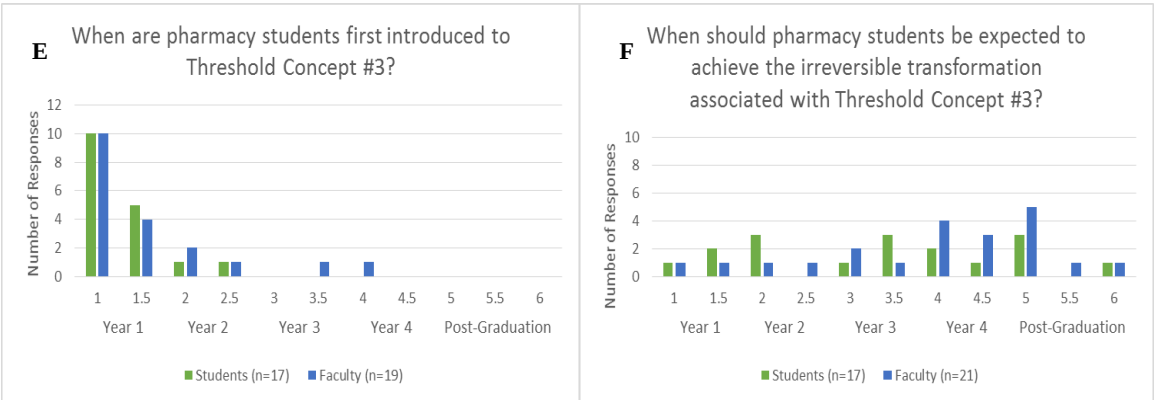
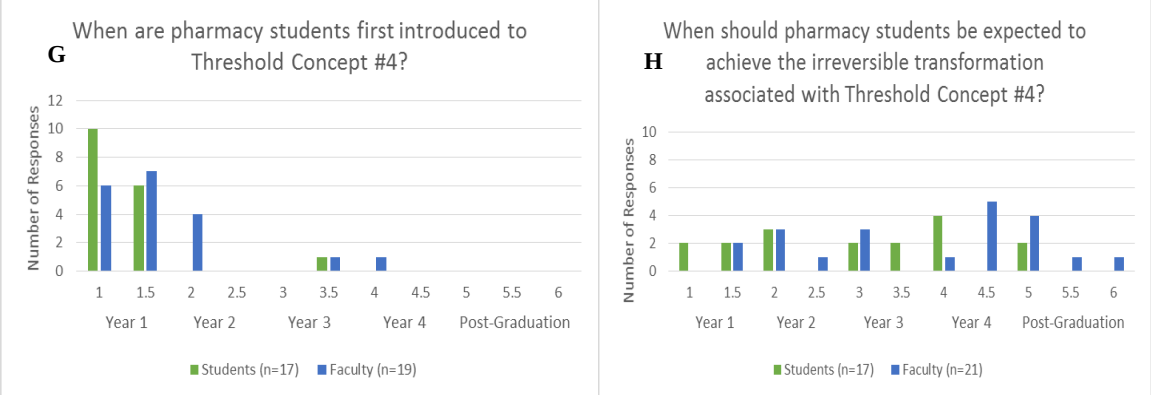
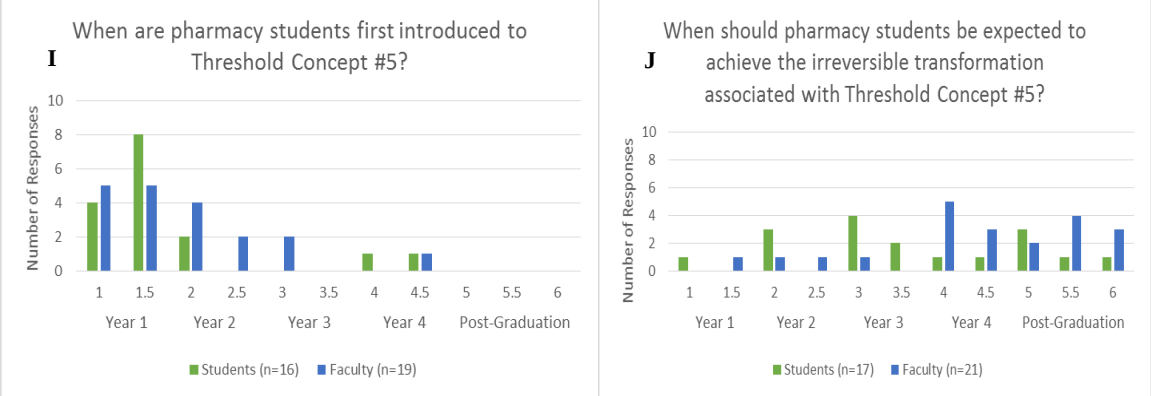


Figure 2 Patient Care Threshold Concept Evaluation Instrument (PCTC-EI) Part 1 Results - Continued

Threshold Concept #4: Discern a patient's medication experience and incorporate his or her individual knowledge and beliefs into the care provided



Threshold Concept #5: Internalize the patient care process as an automatic or ingrained approach to patient care, adapted to each patient, rather than a series of discreet steps



In Part 2 “Rating,” of the PCTC-EI, respondents were asked about the effort put towards each of the threshold concepts and the ability level of an average student at graduation. A majority of students and faculty indicated that “great effort” is expended on PCTC #1, *Patient Centeredness,* (66.7%) and PCTC #2, *Unique Process,* (69.4%) and “some effort” is expended on PCTC #3, *Relationship and Responsibility,* (61.1%) and PCTC #4, *Medication Experience,* (55.6%). The respondents were mixed on PCTC #5, *Ingrained Approach,* with 22.2% stating “a little effort”, 47.2% stating “some effort,” and 30.6% stating a “great effort” was put forward (Table 8).

Table 8. Patient Care Threshold Concepts Evaluation Instrument (PCTC-EI) Part 2 Results

Question: When viewing the curriculum as a whole, how much effort [attention, resources, etc] is put towards teaching each of the following Threshold Concepts? (N=36)				
	No Effort (%)	A Little Effort (%)	Some Effort (%)	A Great Effort (%)
Threshold Concept #1: Provide care in which the patient is at the center of each decision made throughout the process.	0	0	12 (33.3)	24 (66.7)
Threshold Concept #2: Conceptualize and articulate the pharmacists' unique patient care process	0	2 (5.6)	9 (25)	25 (69.4)
Threshold Concept #3: Create an impact on care by establishing and building a relationship with the patient and taking responsibility for their outcomes.	0	5 (13.9)	22 (61.1)	9 (25)
Threshold Concept #4: Discern a patient's medication experience and incorporate his or her individual knowledge and beliefs into the care provided	0	6 (16.7)	20 (55.6)	10 (27.8)
Threshold Concept #5: Internalize the patient care process as an automatic or ingrained approach to patient care, adapted to each patient, rather than a series of discreet steps	0	8 (22.2)	17 (47.2)	11 (30.6)

Question: At graduation, how would you describe the average student's ability regarding each of the following Threshold Concepts? (N=38)					
	Poor (%)	Fair (%)	Good (%)	Very Good (%)	Excellent (%)
Threshold Concept #1: Provide care in which the patient is at the center of each decision made throughout the process.	0	1 (2.6)	13 (34.2)	15 (39.5)	9 (23.7)
Threshold Concept #2: Conceptualize and articulate the pharmacists' unique patient care process	0	2 (5.3)	6 (15.8)	21 (55.3)	9 (23.7)
Threshold Concept #3: Create an impact on care by establishing and building a relationship with the patient and taking responsibility for their outcomes.	0	7 (18.4)	10 (26.3)	17 (44.7)	4 (10.5)
Threshold Concept #4: Discern a patient's medication experience and incorporate his or her individual knowledge and beliefs into the care provided	0	3 (7.9)	19 (50)	10 (26.3)	6 (15.8)
Threshold Concept #5: Internalize the patient care process as an automatic or ingrained approach to patient care, adapted to each patient, rather than a series of discreet steps	1 (2.6)	6 (15.8)	16 (42.1)	12 (31.6)	3 (7.9)

In Part 3 “Comments on teaching” and Part 4 “Reflecting,” the respondents answered open-ended questions. Part 3 “Comments on teaching” asked respondents to write the most impactful way each threshold concept is being taught and a challenge to teaching each threshold concept. The themes from each threshold concept are presented in Table 9. The responses for most impactful teaching were repeated among multiple threshold concepts. For example, the need to practice with real patients was present for PCTC #1, *Patient Centeredness,* and PCTC #3, *Relationship and Responsibility.* The need to interact with real patients was also a theme of the challenges facing teaching threshold concepts. Respondents also felt a challenge in teaching PCTC #1, *Patient Centeredness*, PCTC #3, *Relationship and Responsibility,* and PCTC #4, *Medication Experience,* was a lack of experiences with real patients.

Many respondents also noted the Pharmaceutical Care sequence, Foundations of Pharmaceutical Care followed by Applied Pharmaceutical Care in the first year, combined with the Pharmaceutical Care Skills Lab sequence in years 1-3, and solidified on APPEs was an impactful way to teach PCTC #1, *Patient Centeredness,* PCTC #2, *Unique Process,* PCTC #4, *Medication Experience,* and PCTC #5, *Ingrained Approach,* to varying degrees. For example, PCTC #2, *Unique Process,* is primarily taught in the didactic curriculum and not emphasized on APPEs. PCTC #5, *Ingrained Approach,* in contrast, is only moderately addressed in the early stages of the curriculum, but more of a focus on APPEs.

There was a wider variety of responses noting the challenges in teaching the threshold concepts. Respondents felt a challenge in teaching PCTC #2, *Unique Process,* is a lack of opportunities to share the pharmacists’ approach to patient care with other health professionals, in interprofessional learning experiences for example. Alternatively, respondents felt to teach PCTC #3, *Relationship and Responsibility,* more time, especially a longitudinal exposure, is needed to develop a relationship with a patient.

Table 9. Patient Care Threshold Concepts Evaluation Instrument (PCTC-EI) Part 3 Results – Themes from Content Analysis

Threshold Concept #1: Provide care in which the patient is at the center of each decision made throughout the process	
Describe the most impactful way the threshold concept is currently being taught.	*What is a challenge to teaching the threshold concept?*
• Introduced in Pharmaceutical Care sequence • Reinforced in Pharmaceutical Care Skills Lab • Solidified with experiences with real patients on APPEs • Opportunities to interact with real patients (e.g. guest speakers, interviews)	• Lack of balance between learning the PPCP and pharmacotherapy courses, between using guidelines and patient-centeredness • Need continued exposures throughout the curriculum in addition to time and space to practice being patient-centered • Need to experience patient-centeredness with real patients • Student mindset must be open to being patient-centered
Threshold Concept #2: Conceptualize and articulate pharmacists' unique patient care process	
Most Impactful:	*Challenge:*
• Introduced in the Pharmaceutical Care sequence • Reinforced in Pharmaceutical Care Skills Lab • Opportunities to distinguish between the Pharmacists' Patient Care Process and other health professions via interprofessional experiences	• Need consistency in the process taught and the language used by faculty to describe it • Need opportunities to practice articulating the process (e.g. interprofessional encounters) • Misperceptions and a lack of understanding of the PPCP exist
Threshold Concept #3: Create an impact on care by establishing and building a relationship with the patient and taking responsibility for their outcomes	
Most Impactful:	*Challenge:*
• Anytime students are exposed to patients, real or simulated (e.g. lab, community teacher, APPEs, extracurricular activities)	• Lack of time, especially longitudinal experiences, with real patients to establish a relationship • Difficult concepts to teach and often need to be experienced and practiced to learn

Table 9. Patient Care Threshold Concepts Evaluation Instrument (PCTC-EI) Part 3 Results – Themes from Content Analysis - Continued

Threshold Concept #4: Discern a patient's medication experience and incorporate his or he individual knowledge and beliefs in to the care provided.	
Most Impactful:	*Challenge:*
• Students' first exposure in the first year Pharmaceutical Care sequence • Lots of opportunities to practice in the Pharmaceutical Care Skills Lab • Solidification of concept on APPEs	• Cases and simulated patients not as effective was to learn as real patients • Demonstrating the value of the concept of medication experience • Need intentional teaching and hands-on practice
Threshold Concept #5: Internalize the patient care process as an automatic or ingrained approach to patient care, adapted to each patient, rather than a series of discreet steps.	
Most Impactful:	*Challenge:*
• Some initial early exposure to the process and ongoing repetition throughout the curriculum (e.g. writing SOAP notes) • Hands-on practice on APPEs using the complete process	• Takes time, practice, and many experiences, which may not all happen during pharmacy school • The process needs to be made relevant for students • The process taught needs to be consistent throughout the curriculum and among faculty • Students are often assessed with a rubric, which does not allow for feedback on the process as a whole

In Part 4 “Reflecting,” the respondents were asked to comment on teaching the PPCP as a whole, rather than commenting on each threshold concept individually. The four questions in “Reflecting” were analyzed individually and the themes from the data are presented in Table 10. The themes from Part 4 “Reflecting,” showed overlap across the four questions. Respondents were asked to share the aspects of the curriculum where they felt the outcome was worth the resources expended and interacting with real patients emerged as a theme. When asked about one impactful thing to be done to ensure effectiveness in teaching the PPCP and the biggest gap in the curriculum’s ability to transform students into patient care practitioners, the same two themes emerged for both questions. The first theme identified was opportunities for authentic practice and reinforcement and the second was the need for a consistent approach to teaching the PPCP across the entire curriculum. There was also overlap between the questions asking about one impactful thing to be done to ensure effectiveness and what aspect of the curriculum they would not want to lose. The theme emerging from these two questions was the Pharmaceutical Care sequence in the first year.

Table 10. Patient Care Threshold Concepts Evaluation Instrument (PCTC-EI) Part 4 Results – Themes from Content Analysis and Illustrative Quotes

What is one aspect of the curriculum in which the outcome of the endeavor, regarding teaching the PPCP, is worth the resources expended?	
Theme	*Illustrative Quote*
• Learning and practicing the PPCP in the Pharmaceutical Care sequence and Pharmaceutical Care Skills Lab sequence (including Outcomes) • Practicing the PPCP on Advanced Pharmacy Practice Experiences (APPEs) • Specific learning and assessment activities, such as complex patient cases and OSCEs • Interacting with real patients • Interacting with practicing pharmacists	"All the hassle setting up opportunities for students to interview as many real patients as possible!" "I would say that anytime practicing pharmacists can be brought in to share their experiences and insights it is well worth the time." "It's a lot of work to organize guest speakers and complicated cases, but it allows for so much learning"
What one impactful thing could be done to ensure teaching the PPCP is effective?	
Theme	*Illustrative Quote*
• Look to graduates to demonstrate effectiveness • Additional and ongoing assessment • Apply a consistent approach across the entire curriculum, including APPEs • Additional opportunities for reinforcement and authentic practice • Feedback	"Universal understanding and application by faculty and preceptors. We can't expect our students to utilize PPCP across various settings if our faculty/preceptors can't apply it across their disciplines." "More practice with applying the care model. We only use it about every 3 weeks in lab. If courses could incorporate more role playing with other students more often it could help ingrain this process more effectively" "Allow adequate time to give feedback either in person, or writing"

Table 10. Patient Care Threshold Concepts Evaluation Tool Part 4 Results – Themes from Content Analysis and Illustrative Quotes - Continued

What is the biggest gap in the curriculum's ability to transform students into patient care practitioners?	
Theme	*Illustrative Quote*
• Faculty and preceptors presenting a unified approach to teaching the PPCP • Managing students with a variety of practice experiences, both in and outside of pharmacy school • A need for more authentic cases and practice experiences • Additional practice, reinforcement, and early exposure to learning patient care	"Consistent process not being applied throughout curriculum" "Basic framework not revisited throughout the curriculum after the fall PD1 year"
Describe one aspect of the curriculum, regarding teaching the PPCP, you would not want to lose and why.	
Theme	*Illustrative Quote*
• The Pharmaceutical Care sequence in the first year • Places to practice and demonstrate patient care (Pharmaceutical Care Skills Lab sequence, including Outcomes, therapy courses, and OSCEs) • The exposure to the basic foundation and theory behind patient care and the PPCP	"Intro to Pharmaceutical Care and Lab. It is so important for students to learn the concept and have a safe place to practice it before seeing real patients" "I think Foundations of Pharm Care was good for ensuring we knew all of the aspects of the PPCP. It was a good foundational course that we need in order to be able to build on our skills"

Chapter 5: Discussion

Patient Care Threshold Concepts

Threshold concepts have been identified in numerous disciplines, from economics[48] to occupational therapy.[58] However, this theoretical framework has not yet been applied to pharmacy or, specifically, to students learning the Pharmacists' Patient Care Process (PPCP). The idea of threshold concepts rose out of a desire to better understand the learning students find difficult.[88] Indeed, one of the great challenges in pharmacy education, and other health professions, is: how does one become a practitioner?[89] The threshold concepts identified in this study begin to show learners and educators the value in naming and discussing patient care threshold concepts to further our understanding of the transformation occurring as pharmacy students become patient care practitioners.

Threshold Concepts and the Pharmacists' Patient Care Process

The Pharmacists' Patient Care Process (PPCP) was the foundation used to identify the patient care threshold concepts in this study. The PPCP was created because of the need for a "consistent process of care in the delivery of patient care services" in pharmacy practice.[1] This consistent process makes many things explicit, including the five steps of the PPCP – Collect, Assess, Plan, Implement, and Follow-up: Monitor and Evaluate. Other important components are more implicit; they are mentioned, but not drawn out fully. Specifically, the PPCP has patient-centered care at its core and also emphasizes collaboration with other providers, communication with patients, and a need for documentation. Finally, the PPCP also mentions the need to establish a patient-pharmacist relationship as a first step, but does not elaborate further.

The patient care threshold concepts can be viewed as complementary to the PPCP (Figure 3). For example, the patient care threshold concepts make some of the implicit components of the PPCP explicit. Patient care threshold concept #1, *Provide care in which the patient is at the center of*

each decision made throughout the process (Patient Centeredness) is an explicit statement about patient-centered care. It emphasizes that the patient is at the center of each decision made. Patient-centered care is mentioned multiple times in the PPCP and multiple steps (e.g. Care Plan, Implement) state the pharmacist takes action "in collaboration with other health care professionals and the patient or caregiver."[1] This may seem like a slight distinction, but in stating the pharmacist collaborates with health care professionals and patients, the PPCP does not communicate patient-centeredness as definitively as the patient care threshold concept, which explicitly states the patient is at the center of each decision made.

The patient care threshold concepts can also serve to highlight aspects of learning the PPCP not specifically named or described. Patient care threshold concept #2, *Conceptualize and articulate pharmacists' unique patient care process (Unique Process)* acknowledges the uniqueness of the pharmacists' approach to patient care. It also recognizes the need for learners to know and be able to describe this process. While the PPCP acknowledges the uniqueness of pharmacists, it never states the approach to care itself is unique.[1] In addition, there is no mention of the need for pharmacists to be able to articulate the uniqueness of this approach, only that a framework for pharmacists to use now exists.

Finally, the patient care threshold concepts take ideas described in the PPCP and draw them out more fully. Both the PPCP and patient care threshold concept #3 state a patient-pharmacist relationship needs to be established. In addition, the stated goal of the PPCP is to optimize patient health and medication outcomes.[1] This is contrasted with patient care threshold concept #3 which states, *Create an impact on care by establishing and building a relationship with the patient and taking responsibility for their outcomes (Relationship and Responsibility).* The patient care threshold concept takes an idea from the PPCP, optimizing patient health and medication

outcomes, and goes a step further by stating the pharmacist actually takes responsibility for those outcomes.

These examples show the complementary relationship between the PPCP and the patient care threshold concepts identified in this study. The PPCP was the launching point for conversations around threshold concepts, but does not fully articulate the more intangible aspects of pharmacist provided patient care. The patient care threshold concepts, alternatively, take the concrete steps of the PPCP and attempt to flesh out the nebulous components of providing care, both those explicitly stated (patient-centered care) and not (taking responsibility for outcomes).

Threshold Concepts and Pharmaceutical Care

The PPCP was influenced by the patient care process component of pharmaceutical care. The practice of pharmaceutical care has a patient care process equivalent to the PPCP, but it includes a more complete discussion of each step and its components, such as medication experience.[21] Without specifically naming it, the PPCP has pharmacists gather a patient's medication experience in the Collect step, but that is where it ends.[1] In contrast, the pharmaceutical care text has an entire chapter on the patient's medication experience, starting with the same information as the Collect step of the PPCP, but expounding on each component.[21]

A close, complementary relationship exists between pharmaceutical care and the patient care threshold concepts identified in this study (Figure 3). For example, the pharmaceutical care text intentionally uses language to highlight the similarities and distinctions of pharmacist patient care process. All practitioners do an assessment, but pharmacists specifically are interested in a patient's medication experience.[21] The patient care threshold concepts acknowledge the uniqueness of the pharmacists' process (PCTC #2, *Unique Process*) and the role of a patient's medication experience (PCTC #4, *Medication Experience*). The patient care threshold concepts

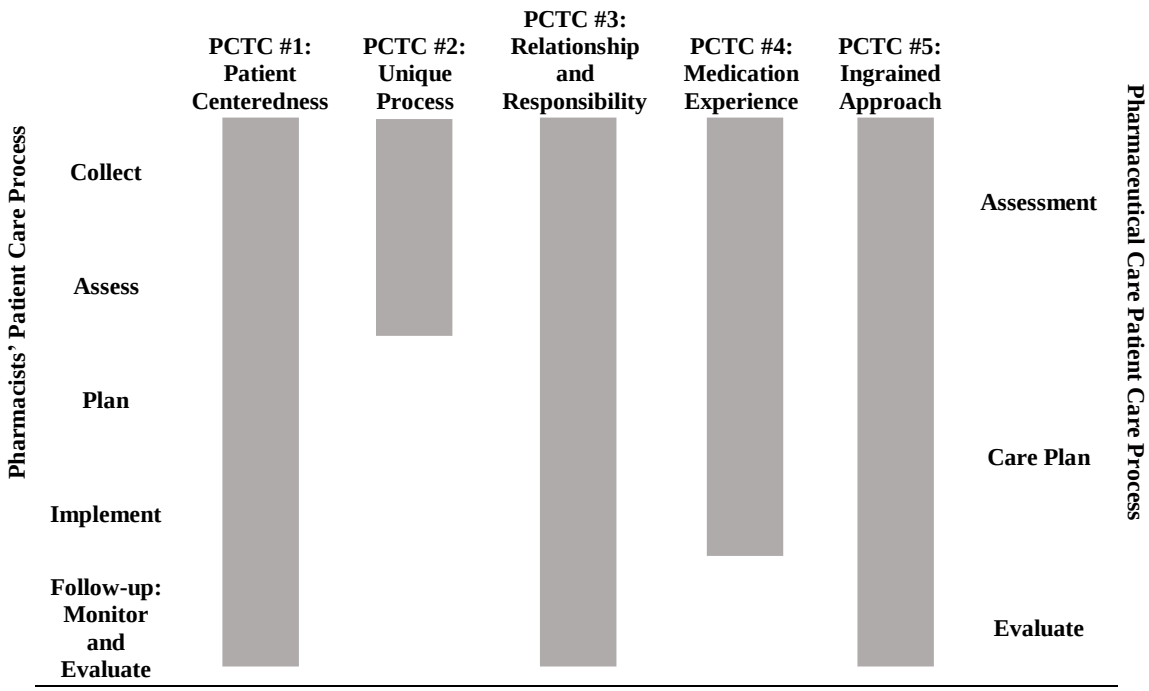
identified in this study overlap with key components of pharmaceutical care, but are presented in a distinct way and specifically focused on the learner's experience.

This overlap is expected as pharmaceutical care has been the method of patient care instruction at the University of Minnesota College of Pharmacy since the 1990s. The fact that the patient care threshold concepts closely align with components of pharmaceutical care reinforces their importance in learning to be a patient care practitioner and instills confidence in their use in pharmacy education. The patient care threshold concepts can also be viewed as a bridge between pharmaceutical care and the PPCP. The patient care threshold concepts highlight more intangible aspects of patient care, which tend to be missing from the PPCP, but are an important component of pharmaceutical care. The patient care threshold concepts take key aspects of pharmaceutical care and present them in a complimentary way to the PPCP. Patient care threshold concept #4, *Discern a patient's medication experience and incorporate his or her individual knowledge and beliefs into the care provided (Medication Experience)*, enriches the Collect step of the PPCP by using the language of the medication experience established in pharmaceutical care.

As Figure 3 shows, the patient care threshold concepts align with both the Pharmacists' Patient Care Process and the pharmaceutical care patient care process. Each PCTC can be mapped to the steps of the patient care process to show the interconnectedness between them. For example, patient care threshold concept #5, *Internalize the patient care process as an automatic or ingrained approach to patient care, adapted to each patient, rather than a series of discreet steps (Ingrained Approach)*, encompasses all five steps of the PPCP and the three steps of pharmaceutical care patient care process. When a learner uses an ingrained approach to patient care, all the steps of the patient care process are being carried out seamlessly. In contrast, PCTC #2, *Unique Process*, specifically applies to the first two steps of the PPCP, Collect and Assess, and the first step of the pharmaceutical care patient care process, Assessment. The uniqueness of

a pharmacist's approach to patient care is evident in the information gathered from the patient and the thought process applied to identify drug therapy problems. The patient care threshold concepts are a way to bring the PPCP and pharmaceutical care together and provide a way to examine and influence a student's development into a patient care practitioner.

Figure 3. Pharmacists' Patient Care Process and Pharmaceutical Care Mapped to Patient Care Threshold Concepts (PCTC)



Threshold Concepts in the Health Professions

Threshold concepts have also been discussed in the context of health professions or practitioner education in general and specifically identified for the disciplines of occupational therapy[58] and palliative care medicine.[89] Other authors have posited caring[90] or interprofessionality[91] as potential threshold concepts. However these concepts arose from personal experience and intellectual reasoning, not a systematic attempt to identify threshold concepts for a specific discipline.

A study of practice education in occupational therapy attempted to identify threshold concepts associated with student learning in a clinical practice setting.[58] Occupational therapy practitioners participated in focus groups aiming to uncover troublesome knowledge and transformative experiences. The authors identified three threshold concepts, *Client-centered practice and the use of self, Developing a professional self-identity,* and *Practicing in the real world.*[58] There is some overlap of the five patient care threshold concepts and the three from occupational therapy, which is expected because both are attempting to learn more about the transition to practitioner. For example, the patient care threshold concept #1, *Patient Centeredness,* is comparable to being client-centered in occupational therapy.

In palliative care medicine, the authors also used focus groups to identify threshold concepts.[89] In this case, the doctors in training came together to discuss the unique learning experiences on the palliative care rotation. From this process, five threshold concepts were identified, *Emotional Engagement, Communication Management, Embodied Shared Care, Active Inaction,* and *Uncertainty Embraced.*[89] Again, there is overlap between these palliative care threshold concepts and the patient care threshold concepts, which is expected because both deal with providing care to patients. For example, both patient care threshold concept #3, *Relationship and Responsibility*

and *Emotional Engagement* from palliative care emphasize the importance of connecting emotionally with a patient.

The patient care threshold concepts identified in this study are similar, yet distinct from the threshold concepts identified in other practice-based professional disciplines. For example, pharmacy does not have direct parallel to the palliative care threshold concept *Active Inaction* in which the doctor in training remains present to the patient even when there is nothing he or she can do. As these examples show, pharmacy has a unique approach to patient care. It is different from occupational therapy or palliative care medicine, yet parallels and points of overlap exist in the teaching and learning of patient care in various health professions. Therefore, the patient care threshold concepts can also serve as a way to further define the distinction between pharmacy practice and other disciplines.

One of the defining characteristics of threshold concepts is 'bounded', so the identification of threshold concepts can help articulate the boundaries of a given discipline.[92] This is an important feature of the patient care threshold concepts because one role of the Pharmacists' Patient Care Process (PPCP) is to present consistent expectations of pharmacy-provided care to patients and other health professionals.[93] Other health professions have similar approaches to patient care; their processes include an assessment, plan, and follow-up, like pharmacy's. However, the patient care threshold concepts, specifically #4, *Medication Experience*, can be used to help pharmacists express the way their approach to patient care differs from nurses, physicians, or occupational therapists.

In addition, patient care threshold concept #2, *Unique Process*, and #5, *Ingrained Approach,* can help a pharmacist develop his or her own professional identity. A solid professional identity is

needed for a pharmacist to utilize the PPCP when providing patient care. The development of professional identity is becoming an important aspect of professional education.

In 2010, the authors of the study on medical education, *Educating Physicians: A Call for Reform of Medical School and Residency,* recommend four goals for medical education, the fourth being a "focus on professional identity formation."[94] Building on this call for professional identity formation to be front and center, Cruess, et al. call for identity formation to be explicit in medical education[95] and Jarvis-Selinger, et al. encourage medical education to incorporate the development of professional identity as a complement to competency-based learning.[96] This call for professional identity formation is echoed in pharmacy education.[97] In 2015, Mylrea, Gupta, and Glass reviewed the state of professional identity development in pharmacy education and concluded the profession needs to "move beyond the demonstration of desirable behaviors, attitudes, and values to a more holistic approach of professional identity formation."[97] Pharmacy students also need to be guided and encouraged in their professional identity development. The patient care threshold concepts go beyond skills a pharmacist performs and attempt to name the intangible aspects of patient care. Emphasizing the patient care threshold concepts can be one mechanism by which student pharmacists develop their professional identity.

In addition to professional identity, the development of expertise is also a component of health professions education.[98] An expert, as described by the Dreyfus model of skill acquisition, has moved from an analytic approach to decision making to an intuitive one.[54] Utilization of the patient care threshold concepts are one way students can demonstrate their progression toward expertise. For example, patient care threshold #5, *Ingrained Approach*, states the transformed learner has internalized the PPCP and uses it without needing to think through the individual steps. This mirrors the description of an expert and can be used as a way to measure one's degree of expertise, as related to learning the PPCP.

Threshold Concepts and Pharmacy Education

Competencies, Educational Outcomes, and Entrustable Professional Activities

Competency based education is focused on the outcomes achieved and the abilities acquired by a learner.[99] In pharmacy education, the Center for the Advancement of Pharmacy Education (CAPE) published educational outcomes for 2013,[23] which were incorporated into the 2016 accreditation standards published by the Accreditation Council for Pharmacy Education (ACPE).[4] The educational outcomes highlight pharmacists' role as patient-care providers[23] and the accreditation standards specifically name the Pharmacists' Patient Care Process (PPCP) as a key element of pharmacy curricula.[4] However, these documents do not provide any additional information or direction on ensuring graduates achieve this outcome.

While the patient care threshold concepts are not designed to be competency statements or educational outcomes, they could be used to inform educational outcomes or competencies at individual institutions. Competencies are observable, measurable, and serve as building blocks for one's development.[99] Competency statements articulate the outcomes of an educational program, which is a shift from determining the success of a professional program based on the instructional processes used.[99] Using competencies alone, with a focus on outcomes, does not provide educators a way to explore the way students become competent. Competency statements do not identify or acknowledge the troublesome aspects of learning a discipline nor do they acknowledge the transformation taking place in the learner. Competency statements identify what a learner can do, not how a learner thinks. Threshold concepts, in contrast, go beyond addressing the skills needed to operate within a discipline and instead make tangible the transformed way of viewing the discipline on the way to mastery.

The patient care threshold concept #3, *Relationship and Responsibility*, illustrates the value of relationship and connecting emotionally with a patient, in addition to taking ownership of the patient's care and outcomes. This threshold concept could be used to design a competency statement at an institution to ensure learners progress towards demonstrable competence in patient-centered care. However, this threshold concept can also help an educator anticipate the struggles learners may have while learning the PPCP or their inability to transfer the material they learned from one setting to another. If learners do not recognize building relationships with patients or taking responsibility for their outcomes is an integral part of being a patient care provider, they may struggle to demonstrate competence in this area. Once identified, threshold concepts can shape many components of the learning process and be a tool used to uncover aspects of learning overlooked by competency-based education alone.

The 2013 CAPE educational outcomes purposefully went beyond the knowledge and skills a pharmacy graduate must have to include an affective domain designed to specifically highlight personal and professional development.[23] The affective domain was included because it was seen as a bridge connecting the core pharmacy content students learn to the application of this material in patient care and pharmacy practice. It consists of four components in which pharmacy graduates must be competent; self-awareness, leadership, innovation and entrepreneurship, and professionalism.[23] Threshold concepts, by design, are related to both cognitive domains (thinking and reasoning) and affective domains (emotions and feelings). They shift how a learner views something intellectually and also how one experiences it.[100] As a result, an opportunity exists to use threshold concepts in exploring the affective domain in pharmacy education. For example, patient care threshold concept #5, *Ingrained Approach* requires a certain amount of self-awareness on the part of the learner. One must be cognitively aware of the steps of the PPCP and the way to employ them effectively when providing patient care. However, the learner must also be tuned in to the experience of delivering patient care in this way. One no longer walks through

the steps of the PPCP, but provides care in a way that is uniquely their own and solely focused on the patient in front of them. This transformation comes about only with self-awareness on the part of the learner and therefore can be illustrative of the affective domain of the 2013 CAPE educational outcomes.

While competency-based education is the standard in health professions, the challenge comes when competencies need to be operationalized in a curriculum.[53] Medicine has developed, entrustable professional activities (EPAs) as a way to translate competencies into clinical practice.[101] An EPA is "a unit of professional practice, defined as tasks or responsibilities."[101] EPAs are a way to assess practice skills and typically require multiple competency statements to demonstrate the standard has been met.[55] While EPAs are in the early stages of development in pharmacy, the examples provided in the literature often have at least one EPA statement related to providing patient-centered care.[55] EPAs and threshold concepts are distinct, yet complementary, as both aim to help learners achieve mastery in different ways. Threshold concepts originated from a desire to better understand student learning a new discipline, not specifically created as a mechanism for assessment or evaluation, like EPAs. Once identified, however, threshold concepts can be utilized in many ways, including as an influence on EPAs.

Prior to threshold concepts being used to inform assessment tools, educators must better understand the way each threshold concept impacts student development and learning. For example, a component of patient care threshold concept #3 is *taking responsibility for [a patient's] outcomes.* Before this patient care threshold concept can be integrated into an assessment of some kind, educators must discover the places in the curriculum students encounter this concept, the methods used to convey this concept, and the role it may play in the student's development, or transformation, into a practitioner. Only then can the conversation turn to utilizing threshold concepts in assessment or evaluation.

Once the transformative aspect of threshold concepts is explored, they can be applied to the development and utilization of EPAs. Incorporating EPAs into competency-based education is a mastery learning approach[53] and threshold concepts can be a way for learners and educators to have a conversation around difficult learning and achieving mastery.[88] The patient care threshold concept #3, *taking responsibility for [a patient's] outcomes* is a challenging concept for learners and a transformation occurs when it is attained. The first step in capitalizing on the relationship between threshold concepts and EPAs is to acknowledge this concept, *taking responsibility for [a patient's] outcomes,* is part of mastering patient-centered care. By using the patient care threshold concept as a starting point, the patient-centered care EPA becomes more accessible to learners and educators are given additional insight into ways this EPA can be achieved.

Transformative Learning Theory

An opportunity exists to weave the patient care threshold concepts identified in this study into current and future teaching models of the PPCP. While many colleges and schools of pharmacy teach patient care using a variety of methods,[1] some have begun to incorporate the PPCP into their curriculum[24]. As more colleges and schools look to the PPCP as the model for teaching patient-centered care, the patient care threshold concepts will become more relevant and applicable in educational settings. In addition, threshold concepts can and should be used to improve students' learning experiences.[102] One way to go about the implementation of the patient care threshold concepts is by looking to transformative learning theory.

The fundamental and "non-negotiable" characteristic of a threshold concept is that it is transformative.[88] A transformative threshold concept can be further explored and operationalized by using transformative learning theory. Transformative learning theory arose from Meizrow's work regarding perspective transformation and the theory posits learners undergo shifts in frame

of reference.[103] A frame of reference is made up of one's habits of mind and points of view. Habits of mind are "broad, abstract, orienting, habitual ways of thinking, feeling, and acting influenced by assumptions that constitute a set of codes."[51] Habits of mind inform a point of view, which is the "constellation of belief, value judgement, attitude, and feeling that shapes a particular interpretation."[51] In the case of pharmacy education, a habit of mind could be the way students view a pharmacist's role in health care as the medication expert. The resulting point of view would then be a pharmacist makes recommendations primarily based on the information he or she knows about medications.

According to Mezirow, there are ten steps involved in undergoing a transformation, starting with a disorienting dilemma.[51] The disorienting dilemma can come from a variety of places or experiences, and serves as a catalyst for transformation because one's previous way of thinking or knowing has been disrupted.[104] Following the disorienting dilemma, the process of transformation includes self-examination and critical assessment of one's assumptions. Then there is the recognition others experience the transformation, followed by exploring options for and planning some kind of action. Next, one gains the knowledge and skills needed to implement the plan, tries out this new role, and ultimately becomes confident in the new, transformed role. The final step is reorientation back into one's life with this new perspective.[103]

As outlined, transformation is a complex process with multiple opportunities for educators to intervene and guide learners. Mezirow also notes two key components needed to shift one's frame of reference are critical reflection and discourse.[103] Critical reflection involves self-examination and assessment of one assumptions informing one's habits of mind and point of view. It requires the reassessment of our knowledge and beliefs and exploration of why we think or act the way we do.[104] Discourse provides the space for us to work through new information in order to reach consensus and validate the new idea.[104] Critical reflection and discourse are

necessary processes for one to make meaning of new information or experiences and, ultimately, learn.[104]

Threshold concepts provide a way to describe the transformation occurring as a student learns a discipline. The patient care threshold concepts, each taken individually or all five as a whole, could be seen as a disorienting dilemma. If a pharmacy student's habit of mind is pharmacists are medication experts, when they are introduced to the Pharmacists' Patient Care Process, the idea of a pharmacist being a patient care provider requires a shift in frame of reference. Likewise, if a student's point of view is of pharmacists making recommendations based on their knowledge of medications, it may be difficult for a student to grasp the idea of decision-making based on the patient first and medication second, as noted in patient care threshold concept #1, *Patient Centeredness*.

Once the PPCP and associated threshold concepts are seen as a disorienting dilemma, the steps of transformative learning theory could be used to shape the student's learning experiences, each could be further explored and implemented in the context of transformative learning theory. For example, pharmacy learners undergo the transformation associated with patient care threshold concept #3, *Create an impact on care by establishing and building a relationship with the patient and taking responsibility for their outcomes (Relationship and Responsibility)*. By applying the steps of transformative learning to this patient care threshold concept, a pharmacy educator could aim to shift the learner's frame of reference regarding establishing and building a relationship and taking responsibility for outcomes.

The first part of this threshold concept addresses the relationship between pharmacist and patient. This relationship is distinct from other types of relationships and described in pharmaceutical care as a therapeutic relationship.[21] A therapeutic relationship, as defined by Cipolle, Strand and

Morley, is a partnership between the practitioner and patient and serves as the foundation of all interactions.[21] Both the practitioner and patient have responsibilities within the partnership and the ultimate goal is to "optimize the patient's medication experience."[21] This type of relationship is likely different from any other relationships the learner has previously been exposed to. By intentionally guiding a learner through the steps of transformative learning, one could bring about the shift in frame of reference needed to operate with this new view of the pharmacist-patient relationship and simultaneously the learner begins to move across the threshold towards a patient care practitioner. For example, an educator could engage a learner in an examination of his or her existing relationships and explore the assumptions a learner has regarding their relationship with patients. An educator could also guide a learner through making a plan of action and implementing the plan in order to develop the therapeutic relationship with future patients and a transformed way of viewing the learner's role in providing patient care.

Likewise, the second part of patient care threshold concept #3, *take responsibility for outcomes*, is also an opportunity to apply transformative learning theory, in order to move a learner across the threshold. To take responsibility for a patient's outcomes also requires a shift in the learner's frame of reference. For many, it is a completely new way to think about pharmacy. Instead of simply providing a recommendation, the pharmacist takes ownership of the decisions made regarding a patient's care and continually works to ensure the desired outcome is met. For example, as mentioned above, if a pharmacy student's habit of mind is of the pharmacist as medication expert, he or she may view the idea of taking responsibility for a patient's outcomes as a disorienting dilemma. The educator could engage the learner in critical reflection and discourse in order to uncover why the student views the pharmacist in a certain way, have dialogue with others to make meaning of this new information, and ultimately undergo transformation associate with this patient care threshold concept.

Regardless of the methods used to teach a specific patient care threshold concept, pharmacy educators should utilize the steps of transformational learning theory to better ensure the transformation occurs. In a review of transformative learning and its application to pharmacy education, Lonie and Desai advocated for using the tenets transformative learning theory to ensure students are prepared to deliver patient care by specifically developing the skills of metacognition and self-reflection.[105] Integrating the patient care threshold concepts with transformative learning theory in pharmacy education could take many different approaches. For example, time and space could be dedicated to intentional critical reflection on the pharmacist-patient relationship so a student could critically assess his or her assumptions. In addition, circumstances could be created for the learner to engage in discourse as he or she tries out the role of a pharmacist taking responsibility for a patient's outcomes. The transformative nature of threshold concepts provides a way to specifically and deliberately incorporate transformative learning theory into pharmacy education.

Applying the Patient Care Threshold Concepts to Pharmacy Curricula

While, transformative learning theory can be used to inform the design of teaching and learning experiences related to the patient care threshold concepts, it is the specific learning activities and patient encounters that will create the space for transformations to occur. Incorporating the patient care threshold concepts into the teaching of the PPCP needs to take many forms and happen at many places in the curriculum. Every patient encounter, practice encounter in a classroom, simulated encounters in lab courses or authentic encounters at extracurricular health fairs or on Advanced Pharmacy Practice Experiences (APPEs), is an opportunity to enact patient care threshold concept #1, *Provide care in which the patient is at the center of each decision made throughout the process.* Pharmacy students should be practicing patient-centered care in every encounter by putting the patient's needs, concerns and desires, not his or her disease state or lab value, at the center of every decision made.

Related to patient-centered decisions is the idea of a patient's medication experience, which appears in patient care threshold concept #4, *Discern a patient's medication experience and incorporate his or her individual knowledge and beliefs into the care provided.* There are many ways to weave this concept throughout a pharmacy student's educational experience. Once a student learns about the medication experience and its importance, he or she can practice obtaining medication experiences from every patient interaction. Students working or studying in acute care settings can seek the patient's medication experience from talking with the patient, their family or caregiver, or from reviewing their medical history. Likewise, if students participate in taking a patient's medication history, they should be trained to inquire about a patient's understanding of their medications, their view of their medications, and any values or beliefs impacting their medication-taking behavior. Students should learn a medication history is not complete without the medication experience of the patient.

The patient care threshold concepts lend themselves to the teaching and learning of the PPCP, but they also could have a role in assessment and evaluation. Assessment of these somewhat intangible concepts may be challenging, but is a necessary component to ensure students provide patient care holistically. It is more straightforward to assess a student's grasp of aspects of the PPCP by reviewing a written care plan or other documentation. However, assessing a component of the PPCP or a product generated from a patient encounter may fall short if the goal is to ensure students become patient care practitioners. The patient care threshold concepts can be incorporated into competency statements supporting a patient care EPA, but they can also be used to determine a student's incremental progress toward patient care practitioner.

One method of assessment to apply to the patient care threshold concepts is Miller's Pyramid, which includes four steps, "Knows," "Knows How," "Shows How," and "Does."[106] These four

steps guide students through levels of assessment so they ultimately end up able to do the professional behavior. For example, patient care threshold concept #1, *Patient Centeredness*, lends itself to these four levels of assessment. As a student progresses through the curriculum, he or she learns about patient centeredness ("Knows") and is able to demonstrate competence with this concept ("Knows How"). From there, the student demonstrates his or her ability to be patient centered to an instructor or preceptor ("Shows How") and finally acts in a patient centered at each patient encounter ("Does"). This approach to assessment is one way to show pharmacy students are progressing and learning the patient care threshold concepts in addition to the skills of the PPCP.

Cruess, Cruess, & Steinert recently proposed amending Miller's Pyramid by adding a fifth level, "Is," to incorporate one's identity, which may be an even better fit for assessing the patient care threshold concepts.[107] The patient care threshold concepts irreversibly transform a learner into a patient care practitioner, resulting in a new identity. This change in the learner's identity should be assessed. The idea of "Is" in the amended pyramid goes beyond simply demonstrating one's ability to be patient centered, for example. Instead, the learner demonstrates attitudes and values instead of only behaviors and "thinks, feels, and acts" like a practitioner.[107] Patient centeredness goes from being a way a pharmacist behaves to the way she views herself. Assessing the "Is" level of assessment follows existing methods examining professional identity, such as a self-assessment tool, and is not without challenges.[107] However, training students to become patient care practitioners is one of the goal of pharmacy education[4] and, therefore, a variety of assessment methods and approaches are needed to ensure this transformation occurs. There are many ways to incorporate the patient care threshold concepts into assessment of the PPCP. In addition to assessment, the patient care threshold concepts could be used as tools for evaluation, specifically curricular evaluation.

Threshold Concepts and Curricular Evaluation

The patient care threshold concepts (PCTC) were used to create the Patient Care Threshold Concepts Evaluation Instrument (PCTC-EI) to determine the extent to which the PCTC are taught at a curricular level. A Content Validity Index (CVI) process was used to demonstrate evidence of validity of the PCTC-EI. A CVI survey was administered to a group of faculty and students at the UMN-COP. The respondents indicated authentic practice is a key factor in teaching patient care and learning the PCTC follows a progression through the curriculum.

Evaluation has played an important role in education for many decades and can take many forms.[108] In the health professions, learning outcomes are often the starting point for curricular assessment and evaluation and a program is considered successful if the stated outcomes are determined to be met.[108] For example, learning outcomes have served as the basis for curriculum mapping.[76] Creating a curriculum map illustrates the material being taught, how it is taught, where it is taught, and how it is assessed.[109] This curriculum map can then inform an evaluation process and lead to improvements in the curriculum.[75]

Assessments are also used to determine if students met specified learning outcomes and viewing these assessments in the context of a curriculum can also be valuable when evaluating a curriculum. Information from assessments can be used to make improvements or create change in a curriculum.[110] For example, institutions have proposed using EPA statements as a way to frame a curriculum and as a method of evaluation.[55] However, each of these methods for obtaining information to be used to evaluate a curriculum are based on previously identified outcomes. Using an outcomes-based model assumes the stated outcomes are the most appropriate, if not the only, thing to be measured when evaluating a curriculum. By taking a step back and applying a programmatic approach to curricular evaluation, other evaluative questions can be asked and answered.

A program evaluation is undertaken to determine how well a program is working.[3] It involves collecting data in order to gain more knowledge or inform decision making and putting the information gathered to use. Ultimately, evaluations answer questions about a program's value or worth.[3] In education, the information gathered for an evaluation can include, but is not limited to, a curricular map or student performance data. Curricular maps and student performance data are important pieces of information, but on their own do not determine a program's value or how well it is working. More information from a variety of sources is needed to paint a more complete picture of a curriculum through evaluation.

In this study, a program evaluation model was used to convert the patient care threshold concepts into a curricular evaluation tool with the goal of looking across courses and experiential education to evaluate teaching patient care and the PPCP. It is important to gather a variety of information to use when making curricular decisions, including, but not limited to outcomes-based evaluation. By applying the threshold concept framework to the program evaluation process, new information about the pharmacy curriculum was obtained.

By using the Patient Care Threshold Concepts Evaluation Instrument (PCTC-EI) to look at patient care across the curriculum, a few key findings emerged. First, it became clear patient care educators must capitalize on every patient encounter, simulated, real, case-based, or authentic, in the classroom, lab or experiential setting. The idea of needing more practice and more encounters with real patients was evident for every threshold concept. In Part 1 "Locating" of the PCTC-EI, respondents noted students are first introduced to all five threshold concepts relatively early in the UMN-COP curriculum, but do not achieve the transformation until later (Figure 2, pg. 50). In between first introduction and achieving the transformation are many opportunities to practice patient care and have a variety of experiences. In Part 3 "Comments on teaching" the challenges

expressed for all five threshold concepts include needing repeated exposures, opportunities to practice, and time to have a variety of experiences (Table 9, pg. 55). Finally, in Part 4 "Reflecting" the need for authentic practice and intentional reinforcement were responses to all four questions asked about patient care in the curriculum (Table 10, pg. 58).

When asked to evaluate the curriculum from a variety of perspectives through the PCTC-EI, student and faculty respondents continued to express a need for more practice and experiences to effectively learn the five threshold concepts. However, pharmacy school is a finite period of time in which students can only learn and experience so much. So, every patient encounter or experience in which the PPCP or one or more of the threshold concepts is not addressed or reflected on is a missed opportunity to provide the additional practice requested. Educators need to find creative ways to expose students to real patients, but the answer does not have to be an increase in volume. If every patient encounter is meaningful, there is less pressure on colleges and schools of pharmacy to continually add more to the curriculum.

One way to ensure patient encounters are meaningful is by designing them to be significant learning experiences. Fink has created a taxonomy of six types of significant learning, including foundational knowledge, application, integration, human dimension, caring, and learning how to learn.[111] These six types of learning interact with each other to create significant learning experiences and as more types of learning are included in the design of a learning experience, such as a patient encounter, the more valuable it is to the learner.[111] If each patient encounter is designed to incorporate multiple types of learning, such as foundational knowledge, application, human dimension, and caring, there is a greater chance the encounter will be meaningful to the learner.

Another key finding from the results of the PCTC-EI is the acknowledgement of the progression of courses in which the PPCP and the five threshold concepts are taught. As shown in the results of Part 1 "Locating" (Figure 2, pg. 50), Part 2 "Rating" (Table 8, pg. 53), and Part 3 "Comments on teaching" (Table 9, pg. 55) Parts 1, 2 and 3, not every threshold concept progresses through the curriculum at the same pace. Patient care threshold concept #2, *Unique Process*, has an early introduction and relatively early achievement of transformation. At graduation the majority of respondents felt the average student's ability regarding patient care threshold concept #2 was Very Good or Excellent (79%). In addition, respondents did not specifically mention APPEs as a place of impactful teaching for this threshold concept. In contrast, patient care threshold concept #5, *Ingrained Approach*, is also introduced early, but not achieved until later in the curriculum, such as in the fourth year or at graduation. Only 39.5% of respondents felt the average student's ability regarding Threshold Concept #5 was Very Good or Excellent at graduation. The respondents also felt practice on APPEs was needed to achieve the transformation associated with this threshold concept. Despite these differences in progression, the respondents did acknowledge student learning of all five patient care threshold concepts benefit from a progression through the curriculum. Importantly, threshold concepts are not learned or experienced in one place or in one course. They may be introduced in the classroom, simulated in the lab, and practiced authentically on APPEs.

If a college or school of pharmacy has a defined progression for learning the PPCP and the five threshold concepts, there is an opportunity to promote consistency in language and process among faculty. As mentioned in Part 4 "Reflecting" of the PCTC-EI, respondents felt a gap in the curriculum was the lack of a unified approach to the PPCP among faculty and preceptors (Table 10, pg. 58). When teaching of patient care is isolated in a single course or inconsistent terminology is used from one course to the next, it is challenging for students' learning experiences build on one another and for them to advance toward mastery of the PPCP. In

addition, without a consistent approach and cohesive use of terminology, students lack the opportunities to struggle with the threshold concepts and eventually work their way toward crossing the patient care threshold.

Committing to a process also creates a foundation on which other knowledge and experiences can be built. For example, in Part 3 "Comments on teaching," some respondents noted the challenge to be patient-centered when students are engrossed in learning pharmacotherapy topics, such as guidelines to follow when treating various disease states (Table 9, pg. 55). An established progression provides a way to ensure students keep revisiting the threshold concepts and move towards achieving the transformation associated with them. Identifying and utilizing a progression, along with consistent terminology among faculty, provides an opportunity for colleges and schools of pharmacy to integrate their teaching of the PPCP throughout their curriculum. Colleges and schools of pharmacy should consider introducing the PPCP early in the curriculum to allow time for the progression to occur. Following an early introduction, they should then intentionally weave teaching of the PPCP and the patient care threshold concepts throughout all aspects of student learning, such as in lab courses, pharmacotherapy courses, IPPEs and APPEs. This will engage faculty with a variety of different teaching roles and prevent patient care learning experiences from being limited to a single course or experiential rotation.

In addition to the individual findings from the PCTC-EI, administering a curricular evaluation instrument specifically inquiring about the five patient care threshold concepts has other advantages. First, by looking across the curriculum, key pieces of information were uncovered that may have remained hidden by just evaluating course by course. For example, the lack of consistency in the way faculty and preceptors present the patient care process identified in Part 4 "Reflecting" may not be evident by only looking at courses independent of each other (Table 10, pg. 58). In addition, some educators may assume the PPCP or the five patient care threshold

concepts cannot really be learned or mastered until APPEs. However, Part 1 "Locating" of the PCTC-EI illustrated many respondents felt the transformation associated with Threshold Concept #2, *Unique Process*, is achieved before APPEs begin in the fourth year (Figure 2, pg. 50). Finally, taking a curricular-level approach to evaluation provided an opportunity to ask the same questions of faculty and students. The unique experiences of each group can add more perspectives and insights into the evaluation results.

Using an evaluation tool to look at specific concepts across the curriculum can also illustrate gaps in the curriculum. The PCTC-EI demonstrated the five threshold concepts are often learned and reinforced in a progression throughout the curriculum. The respondents stated this progression typically includes the Pharmaceutical Care sequence in the first year, followed by the Pharmaceutical Care Skills Lab sequence, and finally on APPEs. However, respondents did not include the Pharmacotherapy sequence in this progression. There are likely many reasons this is the case, but without an evaluation looking across the curriculum, this may not have been discovered. Faculty and students may believe the PPCP or the five patient care threshold concepts are reinforced in the Pharmacotherapy sequence, but that was not evident in this evaluation survey and highlights a need for further discussion among faculty.

Utilizing a curricular evaluation tool to gather information on a broad and ubiquitous concept, like the patient care process, also provides an opportunity for triangulation of data. The PCTC-EI has multiple components, which allowed for findings to be supported by different pieces of information. The idea of students progressing through their learning of the patient care threshold concepts in various places across the curriculum was first illustrated in Part 1 "Locating" and reiterated by the themes from the open-ended questions in Part 3 "Comments on Teaching" and Part 4 "Reflecting." This provides multiple ways of presenting and understanding the findings. In addition, an evaluation tool, like the PCTC-EI, can be used in conjunction with other data

collected about individual components of the curriculum, such as student course evaluations, student performance on milestone assessments, or feedback on student learning from preceptors. Triangulation of data can take many forms and be used to provide additional information to strengthen or enrich findings.

Finally, collecting and analyzing the results of an evaluation is not enough. The stakeholders and others engaging in the evaluation need to take steps to implement the findings.[3] In the case of a formative curricular evaluation, the results should be used to make curricular improvements or influence future decisions made. For example, the PCTC-EI found the faculty do not have a unified approach to teaching the patient care process (Table 10, pg. 58). This finding could lead to an opportunity for faculty development and training to ensure each course instructor is using consistent terminology and presenting the same process each time the students encounter teaching of the patient care process in the curriculum.

Next Steps: Future Research and Study Limitations

Patient Care Threshold Concepts

Identifying patient care threshold concepts is hopefully the first step of many in attempting to understand the Pharmacists' Patient Care Process (PPCP) more deeply and utilize it in pharmacy education. The five patient care threshold concepts were identified from students, residents, faculty, and preceptors associated with one college of pharmacy and drew on their experience with ambulatory care. The PPCP is meant to be used broadly across pharmacy practice sites and across the country. Future research should attempt to verify these findings in additional practice settings, such as acute care or community pharmacy practice. Other studies could attempt to identify threshold concepts associated with learning the PPCP by using different methods or a different group of participants and then triangulate the findings with the results of this study to have a more robust set of patient care threshold concepts for pharmacy education.

Since threshold concepts originated as an educational theory, they are not always easily accessible to those who do not have a background in or are not interested in theoretical frameworks. As a result, it can be challenging to explain the idea of threshold concepts in a way educators, preceptors, and students can grasp. The findings of this study generated five patient care threshold concepts, which makes the theory more tangible, but additional work should be done to familiarize those in pharmacy education with the idea of threshold concepts. It may be tempting to take the PPCP at face value and simply incorporate the five step process into curricula, but this study illustrates a transformation is going on below the surface as students become practitioners. This transformation must be attended to as well.

Finally, as colleges and schools of pharmacy implement the PPCP and work it into pharmacy curricula, the patient care threshold concepts should continue to be part of the conversation. Learning activities, patient care experiences, and PPCP-related assessments should seek to do more than simply implement the PPCP as first presented. However, any supplemental ideas or information about delivering patient-centered care should also be evidence-based. The patient care threshold concepts provide additional material for patient care educators, but potential mechanisms for integrating them with the PPCP need to be explored further. In addition, this study showed the PPCP is a starting point for research around the formation of pharmacy students into practitioners. Identifying threshold concepts is only one of many ways the impact of the PPCP in pharmacy education can be broader and more effective.

Threshold Concepts and Pharmacy Education

The identification of threshold concepts in pharmacy is not limited to patient-centered care or the PPCP. Patient-centered care provider, or caregiver, is only one of the 15 educational outcomes outlined by CAPE in 2013.[23] Pharmacy graduates are also expected to be problem-solvers,

educators, and health advocates, for example. Because of their role in the cognitive and affective domain, the identification of threshold concepts may be particularly relevant to the CAPE outcomes in the personal and professional development domain, such as leadership.[23]

Additionally, the idea of utilizing threshold concepts does not need to be confined to pharmacy education. In fact, threshold concepts could be applied to interprofessional practice and education. A commentary piece suggested interprofessionality itself could be considered a threshold concept,[91] but one could argue interprofessionality should be viewed as a discipline and instead attempt to name and identify threshold concepts associated with interprofessional practice, or being a pharmacist who practices on an interprofessional team. Threshold concepts are identified in order to improve the learning environment and are often discovered when one asks a learner, "what did you find difficult?"[88] Taking this approach to interprofessionality may uncover threshold concepts that underlie the challenges associated with becoming part of a high functioning interprofessional team. The work utilizing threshold concepts in pharmacy education is just beginning.

Role of Curricular Evaluation

As evidenced by the PCTC-EI, threshold concepts can also play a role in curricular evaluation. The PCTC-EI itself can be used at other institutions to uncover information about teaching patient care, with slight modifications to accommodate unique aspects of other programs, if needed. For example, the PCTC-EI is based on the UMN-COP curriculum which is a four year program with IPPEs taking place in the summer after the first and second years of the program. The tool could be adapted for use at a three year program or a college with longitudinal IPPEs. If the PCTC-EI is used at a variety of institutions, the subsequent findings from other institutions can be compared in order to start conversations across colleges and schools of pharmacy about teaching the PPCP and ways to learn from one another.

In addition, adopting a program evaluation model for curricular evaluation can be used to evaluate other aspects of a curriculum. Evaluating the teaching of patient care in a pharmacy curriculum is only one application of evaluation. Evaluating a curriculum by looking outside and across courses can start conversations among faculty and show patterns emerge regarding the teaching of various, fundamental concepts. Specifically in pharmacy education, colleges and schools are using curricular maps to create dialogue about curriculum and guide curricular decisions. Not only do curricular maps create transparency,[109] they can also bring together faculty to have informed conversations and make decisions about the curriculum.[112] Whether incorporating new teaching related to the Pharmacists' Patient Care Process or examining the curriculum as a whole, curricular evaluation needs to be a priority for colleges and schools of pharmacy seeking to make curricular changes and improvements.

Limitations

This study, like all, has limitations. The first aim of this study was to identify and name threshold concepts associated with the Pharmacists' Patient Care Process (PPCP). The PPCP is designed to be the approach used by pharmacists providing care to patients regardless of practice setting. However, this study specifically sought out students, residents, faculty, and preceptors who had experiences, taught, or practiced patient care in an ambulatory setting. This decision was intentional, but not without limitations. The decision to focus on ambulatory care was made because those experiencing, teaching, and practicing ambulatory care pharmacy are familiar with and use a patient care process. Even if they were less familiar with the PPCP, a defined patient care process is part of their day-to-day activities. The goal was to have deeper conversations around learning the PPCP, not about the process itself, so participants with established experience of a patient care process were sought. However, this left out perspectives from other areas of

pharmacy and may make the application of this study's findings more challenging in acute care or community practice settings.

There is no agreed upon method for identifying threshold concepts. The threshold concept framework is a relatively new theoretical field and as a result many examples exist in the literature of ways the concepts have been identified. On one hand this makes for a dynamic area of research with opportunities to explore new methods and techniques. However, it also means there is not an accepted standard by which to evaluate specific studies. In addition, the actual process for generating threshold concepts can be difficult. Novices are asked to anticipate a threshold concept they have yet to cross and experts are asked to recall a previous state of knowledge, even though threshold concepts are by definition irreversible.[113] This may cause problems because one's memory or their ability to speculate can be flawed. Gathering data from a wide variety of people, at various stages of their learning, in addition to asking educators to comment on their observations of learners, are ways to mitigate this challenge, but gaps in the threshold concepts identified may remain.

The identification process for the patient care threshold concepts utilized focus groups held via video conference. One advantage to using focus groups is the interaction between participants.[114] Discussing questions and responses with other participants over a video call has a different dynamic than being in a room together and there may have been less interaction as a result. In addition, while each focus group had some familiarity among members, certain groups, especially the ambulatory care residents and faculty, knew their fellow participants very well, which also could have affected the group dynamic and resulting conversation. Focus groups can also be dominated by vocal members and therefore have fewer opportunities for less vocal member to contributed.[114] This was minimized by the moderator calling on participants by name and redirecting the conversation if it was veering off course, but could not be avoided entirely.

The data analysis of the focus group transcripts was completed using a deductive content analysis approach.[80] This approach has previously been used to identify threshold concepts in medicine.[89] In the current study, the primary investigator started with the threshold concept framework and coded the data with this framework as a guide. The resulting themes became the foundation for the patient care threshold concepts. Threshold concepts have also been identified using a grounded theory approach to qualitative analysis.[115] In this approach no external framework is used. The themes are identified from the ground up and then the researchers determine if any of them meet the criteria for threshold concepts. Since examples of both content analysis and grounded theory approaches can be found in the literature, no single model for identification of threshold concepts exists. If deductive content analysis is used and the researchers use the threshold concept framework to guide the analysis, the kind of themes that emerged from the data could be limited. If a grounded theory approach is used, there is no guarantee the themes which emerged from the data will align with the characteristics of threshold concepts.

In this study, the primary investigator opted to start the analysis with the threshold concept framework in place because of the way questions were put to the focus groups. Participants were asked about each of the five characteristics of a threshold concept individually, such "What is troublesome for students when learning the patient care process?", rather than specifically asked to identify threshold concepts which were transformative, troublesome, irreversible, etc., associated with learning the patient care process. The primary investigator selected to ask a variety of questions aimed to uncover threshold concepts upon analysis rather than ask participants to conceptualize the idea of threshold concepts and then share their views and insights. Therefore, it was necessary to take a deductive approach to the analysis and start with the threshold concepts framework to determine to what extent the concepts shared by the focus group participants aligned with the five characteristics of a threshold concept. In addition, this

question of the identified concepts meeting the criteria for threshold concepts was also going to be put to the expert consensus panel.

An expert consensus panel was used to verify the threshold concepts identified from the focus groups using a modified nominal group technique. In this study two modifications were made to the traditional nominal group technique format. The participants were given the proposed threshold concepts as a starting point for discussion and the expert consensus panel participated in a second round of consensus voting after updates were made to two patient care threshold concepts by the primary investigator. This is not a typical step in nominal group technique process, however, modifications to the nominal group technique are common in the literature.[116] In this case, the panelists articulated specific concerns regarding the language of two threshold concepts the primary investigator felt could be addressed by reviewing the results of the focus group data analysis. Despite the modifications, the nominal group technique used in this study met the criteria outlined by Waggoner, et al. which include having a heterogeneous panel of 5-10 members and being transparent about the process of reaching consensus.[116]

The development, gathering of evidence of validity, and administration of the PCTC-EI also has limitations. The curricular evaluation process was intended to be developmental and formative and focus primarily on the teaching of the Pharmacists' Patient Care Process (PPCP). The questions were written to reflect this focus, but likely did not capture all aspects needed to comprehensively evaluate patient care teaching in the curriculum. In addition, the evaluation tool was written using the UMN-COP curriculum as the starting point, which already includes some instruction around the PPCP. The instrument may need to be adapted to be used at other institutions depending on the degree to which the PPCP has been incorporated into the curriculum. The evaluation tool would also need to be modified if the placement of experiential learning at other institutions differs from the structure at the UMN-COP.

Calculating the CVI is only one way of demonstrating evidence of content validity of an instrument. The confidence of the CVI depends on the experts involved in the process and the extent to which they were instructed in the CVI process. The outcome of the CVI process can be negatively impacted if the experts are not given clear instructions. The CVI experts were selected because they had expertise in either patient care instruction or curricular assessment and evaluation. Some experts had experience with both, but not all. This spectrum of expertise may have led to more variation in the CVI values. In addition, the CVI was the only validation process the evaluation tool underwent. As the instrument continues to be used and refined, additional methods of demonstrating evidence of validity may be useful.

Finally, the PCTC-EI was administered to a relatively small, purposive group of faculty and students. The group of faculty encompassed a variety of roles and levels of experience at the UMN-COP, but the sample was made up of faculty at one institution who teach in a small subset of courses. The faculty members' familiarity with the PPCP and teaching patient care was desired in this instance, but should be kept in mind when reviewing the results of the survey. The purposive sampling of students also focused on those with demonstrated interest in patient care or the curriculum. This provided a sample of students who have spent some time thinking about the curriculum, however, students without this previous experience may have expressed different opinions and views on the questions asked on the survey.

Conclusions

Overall, this study aimed to explore teaching and learning of the Pharmacists' Patient Care Process (PPCP) using the threshold concepts framework by drawing on the specific experience and expertise of students, faculty, residents, and preceptors affiliated with the UMN-COP. This approach utilized focus groups and an expert consensus panel to identify five patient care

threshold concepts which emphasize a pharmacist's unique approach to patient care. The five patient care threshold concepts can be used to enrich teaching and assessment of the PPCP and show there is more to becoming a patient care practitioner than learning skills. The patient care threshold concepts emphasize the unique aspects of a pharmacist's approach to patient care and can be used to inform competency statements and entrustable professional activities. In addition, Transformative Learning Theory can provide a way to better understand and operationalize the patient care threshold concepts within a pharmacy curriculum.

This study also provided a unique approach to conducting curricular evaluation by looking outside individual courses or assessments for data and instead taking a programmatic evaluation approach utilizing the threshold concept framework. This process produced specific information about teaching patient care across the UMN-COP curriculum, such as a continued need for authentic practice and the opportunity for student learning of the patient care threshold concepts to intentionally progress throughout the curriculum. This study offered a threshold concept framework and evaluation tool to be used in future scholarly teaching and research supporting and advancing the Pharmacists' Patient Care Process.

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Appendices

Appendix A: Focus Group Invitation Email (Student)

Subject: Invite to be in Focus Group

Hi XXXX,

As you may know, since finishing my time as the TA for Foundations of Pharmaceutical Care, I have been working on my dissertation research. I am interested in how pharmacists and pharmacy students learn the patient care process and how to become practitioners.

I am reaching out to you because as a PD4 student you have learned the patient care process in the classroom and while on your ambulatory care APPE. As a result, I would like to invite you to take part in my research study as a focus group participant. I am reaching out to you specifically because of your recent ambulatory care experience.

Specifically, the purpose of my study is to advance teaching of the Pharmacists' Patient Care Process by identifying and utilizing threshold concepts in improving pharmacy education and transforming pharmacy students into practitioners. I believe your experiences as a pharmacy student would provide valuable insight to my project.

If you agree to be in this study, I would ask you to participate in one 2-hour focus group session. The session will be held via an online meeting platform and will be audio recorded. I will lead the focus group and a second moderator will also be present to take notes and make observations. Note: While I will draw on your APPE experience, this is my own study and not connected to your rotations.

The focus group will be held on **XXXX**.

I realize in your PD4 year you have other demands on your time. Thank you for considering being a participant in this research study. Let me know if you have additional questions.

I hope to hear from you by XXX.

Thank you,
Claire Kolar

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Claire Kolar, PharmD
PhD Candidate - Social and Administrative Pharmacy
University of Minnesota College of Pharmacy
7-164 Weaver-Densford Hall
308 Harvard St. SE
Minneapolis, MN 55455

Appendix B: Focus Group Reminder Email (Student)

Subject: XXXX Focus Group

Hello Focus Group Participants,

First, thank you for agreeing to be part of this research study. I am looking forward to the conversation we will have on Tuesday.

A reminder of the focus group date and time: **XXX**

If you have not used Webex before it is an online meeting platform in which you can participate via video and audio or audio alone. I will send you a Webex meeting invitation today as a separate email and a final reminder shortly before the focus group is scheduled to start.

When it is time for the focus group, simply click on the link "Join Webex meeting" in your invitation or reminder email. Then follow the prompts to enter the meeting space. Once the meeting has launched, you will need to click to connect to the audio and also click to connect to video. There is a chat function on Webex, so feel free to send me a message or email if you have any trouble. If your audio is unable to connect, let me know via chat or email and I will give you a number to call in via phone.

If your computer does not have a microphone or if it is not working, a toll-free phone number will be available to use to call in. Webex also available for mobile and tablet devices if needed.

Attached is an information sheet regarding this research for your records. You do not need to do anything with this form.

Finally, in my initial communication I mentioned the purpose of this research study was to learn about how pharmacy students learn the patient care process, so our conversation will aim to uncover information about this learning. If you could, prior to the focus group, give some thought to the following question -

What have been some of the major milestones in your development as a patient care practitioner (so far)?

Reflecting on this question will hopefully give us a good starting place for our conversation.

Thanks again for agreeing to participate and see you XXX!
Claire

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Claire Kolar, PharmD
PhD Candidate - Social and Administrative Pharmacy
University of Minnesota College of Pharmacy
7-164 Weaver-Densford Hall
308 Harvard St. SE
Minneapolis, MN 55455

Appendix C: Information Sheet for Research (Focus Group)

INFORMATION SHEET FOR RESEARCH
Advancing the Pharmacists' Patient Care Process by Utilizing Threshold Concepts to Improve Pharmacy Education and Transform Pharmacy Students into Practitioners

You are invited to be in a research study or pharmacy student learning of the Pharmacists' Patient Care Process. You were selected as a possible participant because of your experience teaching or learning the Pharmacists' Patient Care Process. We ask that you read this from and ask any questions you may have before agreeing to be in the study.

This study is being conducted by: Claire Kolar, Pharm.D., Pharmaceutical Care & Health Systems, University of Minnesota College of Pharmacy.

Procedures:

If you agree to be in this study, we would ask you to do the following things:

Participate in one 2-hour long focus group. The focus group session will be audio recorded and a moderator will be present to take notes and make observation.

Confidentiality:

The records of this study will be kept private. In any sort of report we might publish, we will not include any information that will make it possible to identify a subject. Research records will be stored securely and only researchers will have access to the records. Study data will be encrypted according to current University of Minnesota policy for protection of confidentiality. Only the primary investigator will have access to the audio recordings. The recordings will be deleted once data analysis and dissemination of the research is complete.

Voluntary Nature of the Study:

Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with the University of Minnesota. If you decide to participate, you are free to not answer any question or withdraw at any time without affecting those relationships.

Contacts and Questions:

The researcher(s) conducting this study is (are): Claire Kolar and Kristin Janke. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact them at 7-159 Weaver Densford Hall, 308 Harvard St SE, Minneapolis, MN 55455, 612-624-6105 or 612-626-4648, joh07220@umn.edu or janke006@umn.edu

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), **you are encouraged** to contact the Research Subject's Advocate Line, D528 Mayo, 420 Delaware St. Southeast, Minneapolis, Minnesota 55455; (612) 625-1650.

You will be given a copy of this information to keep for your records.

Appendix D: Focus Group Question Schedule (Students)

Focus Group Question Schedule B: Junior Students

Opening:

1. Tell us who you are, where you have or will do an IPPE this summer, and what you most enjoy doing when you are not practicing pharmacy?

Introductory:

2. What is the first thing that comes to mind when you think about learning the patient care process?

3. Describe one of your first impressions of learning the patient care process.

Transition:

4. Think about your learning of the patient care process, what have you learned that is not found in a textbook or on a slideset?

5. Describe a pivotal, or light bulb-type, moment you have had learning the patient care process.

Key:

6. What has been troublesome (or difficult) in your learning of the patient care process? *Can you give an example?*

7. Think about your learning of the patient care process. Can you give an example of something that once it is learned, it can never be unlearned? *How did you know?*

8. Describe the transformation that occurs when someone internalizes and understands the patient care process in a way that affects their practice of it. *What contributes to this transformation?*

9. Describe what it is like to cross the threshold and become adept at utilizing the patient care process. *Be specific.*

Ending:

10. If you were going to give another student learning the patient care process one piece of advice, what would it be?

11. *Did we miss anything?* Is there anything you want to share about learning the patient care process that has not come up?

Appendix E: Expert Consensus Panel Invitation Email

Subject: Invitation to Consensus Panel Workshop

Hi XXX,

I previously reached out to you to participate in a focus group regarding the patient care process. I am moving on to the second phase of my dissertation research and contacting you again for a different purpose.

I am contacting you to see if you'd be willing to be on an Expert Consensus Panel on pharmacy student learning of the Patient Care Process. You were selected as a possible participant because of your experience and expertise in teaching the Patient Care Process.

The purpose of this study, which is a component of my dissertation research, is to use the information generated from the focus groups and confirm Threshold Concepts identified in my analysis (this will be explained further to panelists). Through the use of the Nominal Group Technique, participants will come to consensus on the concepts associated with learning the Patient Care Process.

If you agree to be in this study, we would ask you to participate in one 2-hour workshop utilizing a modified Nominal Group Technique (NGT) format. The Nominal Group Technique is a consensus methodology in which participants are presented a list of potential threshold concepts, the concepts are discussed as a group, and then individual participants vote on whether the concepts meet stated criteria. The NGT workshop will be audio recorded. If you agree to participate, more details on the format and expectations will be provided. Minimal preparation will be expected outside the workshop session.

The workshop will be scheduled based on the availability of participants, but I am hoping to conduct it the week of XXXX.

In your reply, please indicate if you are interested in being on the Consensus Panel and participating in the Nominal Group Technique workshop and if you are generally available the week of XXXX. I will follow-up with those who are interested and select the final panel members based on availability.

Thank you for your consideration and let me know if you have any questions,
Claire Kolar

****

Claire Kolar, PharmD
PhD Candidate - Social and Administrative Pharmacy
University of Minnesota College of Pharmacy
7-164 Weaver-Densford Hall
308 Harvard St. SE
Minneapolis, MN 55455

Appendix F: Threshold Concepts Overview for Expert Consensus Panel

Threshold Concepts Overview

Threshold Concept: "akin to a portal, opening up a new and previously inaccessible way of thinking about something. It represents a transformed way of understanding, or interpreting, or viewing something without which the learner cannot progress." (Meyer & Land, 2003)

- It is necessary to identify threshold concepts for a given discipline or subject area because of the value they potentially bring to teaching and learning.
- Identifying threshold concepts is a way for educators to closely examine what is taught, in addition to why and when material is taught.

Meyer and Land also view the "ways of thinking and practicing" within a discipline as a threshold concept which, when understood, can lead to transformation of the learner. Since the process of becoming a pharmacist able to provide patient care is still being explored, the identification of threshold concepts associated with the PPCP is needed in pharmacy.

A threshold concept is different from a core concept. A core concept may be a piece of foundational knowledge, or a building block for a given discipline. However, while core concepts are necessary for understanding of a subject area, they do not transform how a learner views a discipline.

Threshold concepts have five defining characteristics identified by Meyer and Land.

1. ***Transformative***. Understanding a threshold concept can lead to any type of transformation, e.g. a shift in personal identity or values.
2. ***Irreversible***. The learner is likely unable to return to the previous way of thinking after the new perspective is gained.
3. ***Integrative***. An integrative concept exposes the previously hidden interrelatedness of something.
4. ***Bounded***, meaning it will interface with the edges of a discipline or a boundary of where one discipline ends and the next begins.
5. ***Troublesome***. A learner may struggle with the concept because it is counter-intuitive, it comes from an alternative perspective, or it is incoherent.

Appendix G: One Page Summaries of the Five Patient Care Threshold Concepts for the Expert Consensus Panel

Patient Care Threshold Concept #1 Summary

#1 Provide care in which the patient is at the center of each decision made throughout the process

> Pharmacists provide patient-centered care by listening to patients and putting their needs, concerns, and desires ahead of their own agenda for the encounter or what should be the outcome, based on guidelines or a preconceived plan. Pharmacists see patients as a whole person, not a series of disease states or drug therapy problems.

Quotes from Focus Groups:

"One of the things I'm trying to show the students is how to look at the whole person, and not necessarily individual disease states, or guidelines, as some have mentioned. I'm taking a step back and looking at how all those pieces fit together for taking care of that whole person."

"Most pharmacy students, when they come out of school, think this is a patient-centered plan because I'm doing what's best for the patient, but not considering what the patient believes is best for themselves."

"When I first started seeing patients on my own or would go into co-visits with my precpetors, I had a tendency to go in with an agenda, which might not be in alignment with what the patient wanted to talk about. So learning to either fuse those together or go by the patient's agenda and then bring it around to my own was a key learning area."

"Patient-centeredness is so important and it's hard to teach and in the classroom you learn, this is how you treat condition A, B and C, and this is first line based on what the guidelines say, but what if the patient doesn't want to do any of that? And what if they say, I've tried that, I don't want to take that any more, I have a side effect and all your first five options they don't want to do. You can't just memorize what you're supposed to do. You have to roll with it and determine what the patient really wants to do and what they're willing to do and you can't force someone to do anything."

"In case presentations and talking through patients with students, you see that shift when they stop thinking about the patient in terms of drug therapy and they start thinking about the patient as a person."

Notes:

Patient Care Threshold Concept #2 Summary

#2 Conceptualize and articulate pharmacists' unique patient care process

> Pharmacists have a standardized process, using common language (including IESC) and integrating clinical knowledge to provide patient care in a way that is distinct, yet complementary to other health professions. The process is universal and can be followed by any pharmacist in any setting to solve problems arising when providing patient care.

Quotes from Focus Groups:

"I teach them how to go in and interact with a real-live patient. How do you introduce yourself, how do you introduce the comprehensive patient care process that a pharmacist provides and how is that different from something else they might already be getting in health care or how does that differ from the service they are used to receiving at the pharmacy?"

"I was working on some transition of care work and I was trying to explain what we do to our nurses, both at homecare and the transitional care unit. And they did not understand what our process was and I had to rephrase things. That was when I realized we do things a little bit differently from the other care providers."

"I realized it's a standardized thing. When I was learning kind of about a patient care process outside of Minnesota, I got bits and pieces of how do you interact with a patient and what do you when you're assessing a patient, but being able to have a common language with all the other pharmacists that we talk with now, the other residents in our group – it's like IESC, we assess the patient, we follow-up. Having that common language to talk about and then also being able to share that with other members of the care team is also what I think about when I think about the patient care process."

"I guess whatever situation I'm in, I'm like okay, I'm going to assess the patient, going to make a plan, going to follow-up, no matter what it is, so that's definitely been engrained."

Notes:

Patient Care Threshold Concept #3 Summary

#3 **Establish and continually build a relationship with the patient**

Pharmacists have an impact on a patient's care when they develop a relationship with the patient and connect emotionally with them. Pharmacists can make a difference in a patient's life as they work together over time and take ownership of the patient's care and outcomes.

Quotes from Focus Groups:

"One of the things that they didn't talk about in school was how much time you spend building a relationship with the patient. There are changes that I would not have been able to make at just one visit. It took until 3 or 4 visit until I could make those changes."

"How do you establish your relationship with a patient and how do you establish trust so they know you care about them and that they can trust you and that you do have their best interests in mind as well?"

"I think some of it is the emotions that are conveyed during a visit, that don't come through in the didactic curriculum, when you're looking at a sheet or you're role playing with a lab partner. What comes through and how the patient really interacts with you, becomes so much more human."

"The thing I talk a lot about with them is responsibility. As a pharmacist, it's not just your responsibility to point out the problems, but to really find resolutions for them. And it's your job to continue to follow that until it is no longer an issue. A lot of students find the problem and then they maybe talk to a doctor about it and think they're done. But there's a whole lot more to that, that you really truly are responsible for that patient's medication outcome."

"One more thing is follow-up. They find themselves at that point and they're done, but you're not done. You need to follow-up on did it work, did it not work, do we need to adjust, how do we tinker? And they want to close the chapter, move on, and often times not come back. And that's not the way it works with real live people."

Notes:

Patient Care Threshold Concept #4 Summary

#4 Discern a patient's medication experience and incorporate his or her individual knowledge and beliefs into the care provided

> Pharmacists recognize each patient has a unique view of their medications and distinct medication taking behavior. Regardless of how one appears on paper, pharmacists do not make assumptions about patients' understanding of medications or their expectations of care. Pharmacists work with patients to uncover the individual complexities of their life and their goals related to medications and use this information when providing care.

Quotes from Focus Groups:

"Patients could look really similar on paper, same age, disease state, medications, and then you go in with your agenda and the visits can be so dramatically different based on how they perceive you, how they perceive the service, what they're willing to get out of it."

"Never assume patients know anything about their disease states."

"Sometimes I think we equate general education level with medical education, so just because someone is learned in whatever their profession is, it doesn't mean they have a good understanding of their medication."

"You can tell a patient this medication is going to save their life, but if they can't afford it or the side effects are intolerable, who cares?"

"That's the biggest thing, realizing they're people too. There are things about their health care that scare them, there are things that they're worried about, and parts of their healthcare they're really comfortable with. So, that's one of those things you're never going to really learn in the textbook, the personal aspect of it."

"I would say for me the pivotal moments have been seen more so in our residents than our students one being when they realize just how important the medication experience is. A lot of times they're so focused on the technical IESC, they complete disregard the medication experience or forget about it and all of a sudden the patient comes back to follow-up and couldn't execute the plan because of X, Y or Z. and they're like, I probably should have thought of that when making the plan."

Notes:

Patient Care Threshold Concept #5 Summary

#5 Internalize the patient care process in order to provide care

> Pharmacists are able to provide effective, individualized patient care when they internalize the patient care process, use it routinely without actively thinking about it, enhance it with their own style, and adapt it to respond to the patient in front of them.

Quotes from Focus Groups:

"I'm enjoying in particular watching the fourth years I have on rotation right now in that transition phase. This is the first block and seeing how it's still kind of clunky for them to use that patient care process, but how they are using those tools they learned in the classroom and how they are trying to make it their own style and way of performing on their own with just minimal guidance."

"I think when the person stops thinking about the process and they can take better care of the patient. They dig deeper and really listen and understand and really evaluate and come up with the best way to resolve the drug therapy problems and to develop a plan because they're not focusing on the process, but they're focusing on the patient."

"I think when you internalize it, you really just have these tools and use them and not really even think about it."

"I think the big shift for me, when I really started feeling comfortable, was when I did realize that it was just a platform to see my patients and that I was my own person outside of that."

"I think when you internalize it, it's just like becoming really good at anything to where it's no longer a checklist of I have to do this and then I have to do this and I have to do that. Bear with me, but I think about fly fishing when I first started out thinking, ok I've got to pull back and do all these separate parts to all of a sudden is just became a fluid thing. I don't really have to think about all the things I'm doing when I'm in the room with a patient, it just kind of becomes a natural process."

Notes:

Appendix H: Expert Consensus Panel Voting Ballot

Consensus Panel Ballot: Threshold Concepts

Threshold Concept #1: Provide care in which the patient is at the center of each decision made throughout the process

1. Is this a Threshold Concept? ☐ Yes ☐ No
2. Which of the characteristics of a Threshold Concept does it meet? [Check all that apply]

☐ Transformative ☐ Bounded
☐ Irreversible ☐ Troublesome
☐ Integrative

Threshold Concept #2: Conceptualize and articulate pharmacists' unique patient care process

1. Is this a Threshold Concept? ☐ Yes ☐ No
2. Which of the characteristics of a Threshold Concept does it meet? [Check all that apply]

☐ Transformative ☐ Bounded
☐ Irreversible ☐ Troublesome
☐ Integrative

Threshold Concept #3: Establish and continually build a relationship with the patient

1. Is this a Threshold Concept? ☐ Yes ☐ No
2. Which of the characteristics of a Threshold Concept does it meet? [Check all that apply]

☐ Transformative ☐ Bounded
☐ Irreversible ☐ Troublesome
☐ Integrative

Threshold Concept #4: Discern a patient's medication experience and incorporate his or her individual knowledge and beliefs into the care provided

1. Is this a Threshold Concept? ☐ Yes ☐ No
2. Which of the characteristics of a Threshold Concept does it meet? [Check all that apply]

☐ Transformative ☐ Bounded
☐ Irreversible ☐ Troublesome
☐ Integrative

Threshold Concept #5: Internalize the patient care process in order to provide care

1. Is this a Threshold Concept? ☐ Yes ☐ No
2. Which of the characteristics of a Threshold Concept does it meet? [Check all that apply]

☐ Transformative ☐ Bounded
☐ Irreversible ☐ Troublesome
☐ Integrative

Appendix I: Content Validity Index Process Invitation Email (External)

Subject: Response Requested: Evaluation Tool Reviewer?

Hi XXXX,
My name is Claire Kolar and I'm currently a Ph.D. student at the University of Minnesota. I'm wondering if you'd be able to help out with a validation process of a survey I've created as part of the final stage of my dissertation? I am looking for experts in teaching patient care to pharmacy students outside the University of Minnesota and Kristin Janke recommend you as a potential review. The details regarding the process are below. Let me know if you have any questions.

Patient Care Threshold Concepts (PCTC) Evaluation Tool Reviewer
Your expertise in teaching patient care is requested! I am in the process of developing a tool to evaluate the teaching of patient care at a curricular level and am seeking individuals with experience in teaching patient care or assessment and evaluation to help judge the tool.

What participation requires
Your participation would entail reviewing the tool and completing an anonymous survey about the tool. With your help, the quality and validity of the PCTC Evaluation Tool will be improved.

Background
Previous research, involving focus groups and expert consensus, has identified five Threshold Concepts associated with learning the Pharmacists' Patient Care Process (PPCP). The PPCP was informed by Pharmaceutical Care and consists of five steps, Collect, Assess, Plan, Implement, Follow-up: Monitor and Evaluate. A Threshold Concept is a new or transformed way for a learner to think about or understand something. In this case, these five concepts take pharmacy students *across the threshold* to patient care practitioners.
This survey asks the respondent to reflect and comment on the extent that these Threshold Concepts are present in a pharmacy school's curriculum.

Goals of curricular evaluation using the PCTC Evaluation Tool
The PCTC Evaluation presents the five Threshold Concepts previously identified and asks respondents to answer questions about their role in the curriculum. The tool helps to:

1. Understand stakeholder perceptions of the status of current teaching of the Patient Care Threshold Concepts in the curriculum.
2. Determine the degree and quality of learning of the Patient Care Threshold Concepts in the curriculum.
3. Obtain stakeholders views on the optimal timing and methods of teaching and learning the Patient Care Threshold Concepts in the curriculum.

If you are willing to participate, reviewers will be examining the questions and rating their relevance. I will send you the PCTC Evaluation Tool, a link to the Qualtrics survey, and detailed instructions for completing your review. I anticipate it will take you 15-20 minutes to complete the survey and would ask you be able to complete it within one week's time.

Please let me know if you are willing to participate by the end of the week. Thank you for considering,
Claire Kolar

****

Claire Kolar, PharmD
PhD Candidate - Social and Administrative Pharmacy
University of Minnesota College of Pharmacy
7-164 Weaver-Densford Hall
308 Harvard St. SE
Minneapolis, MN 55455

Appendix J: Content Validity Index Process Detail Instruction Email

Subject: PCTC Evaluation Tool Review

Hello XXX,

Thank you again for agreeing to review the Patient Care Threshold Concepts (PCTC) Evaluation Tool. I appreciate your valuable time and input.

Attached to this email is a document that contains background information on the Patient Care Threshold Concepts and curricular evaluation, followed by the evaluation tool questions for you to review. Below is the link to a brief survey that will capture your responses to the over-arching question of this review process, "How relevant is each item to a curricular-level evaluation of teaching patient care?" Please complete this survey by XXX.

Follow this link to the Survey:
${l://SurveyLink?d=Take the survey}
Or copy and paste the URL below into your internet browser:
${l://SurveyURL}

Thank you for sharing your expertise!
Claire Kolar

Follow the link to opt out of future emails:
${l://OptOutLink?d=Click here to unsubscribe}

Appendix K: Patient Care Threshold Concepts Evaluation Instrument Reviewer Guide

Patient Care Threshold Concepts Evaluation Instrument Reviewer Guide

Patient Care Threshold Concepts (PCTC)
Previous research, involving focus groups and expert consensus, has identified five Threshold Concepts associated with learning the Pharmacists' Patient Care Process (PPCP). The PPCP was informed by Pharmaceutical Care and consists of five steps, Collect, Assess, Plan, Implement, Follow-up: Monitor and Evaluate. A Threshold Concept is a new or transformed way for a learner to think about or understand something. In this case, the five threshold concepts below take pharmacy students *across the threshold* to patient care practitioners.

> **Threshold Concept #1:** Provide care in which the patient is at the center of each decision made throughout the process
>
> **Threshold Concept #2:** Conceptualize and articulate pharmacists' unique patient care process
>
> **Threshold Concept #3:** Create an impact on care by establishing and building a relationship with the patient and taking responsibility for their outcomes.
>
> **Threshold Concept #4:** Discern a patient's medication experience and incorporate his or her individual knowledge and beliefs into the care provided
>
> **Threshold Concept #5:** Internalize the patient care process as an automatic or ingrained approach to patient care, adapted to each patient, rather than a series of discreet steps.

Curricular evaluation using the Patient Care Threshold Concepts Evaluation Instrument
This curricular evaluation aims to be both developmental and formative. A developmental evaluation informs how a program or process is being developed. A formative evaluation informs how a program or process can be improved. The goals of this evaluation are to:

> 1. Understand stakeholder perceptions of the status of current teaching of the Patient Care Threshold Concepts in the curriculum.
>
> 2. Determine the degree and quality of learning of the Patient Care Threshold Concepts in the curriculum.
>
> 3. Obtain stakeholders views on the optimal timing and methods of teaching and learning the Patient Care Threshold Concepts in the curriculum.

For Reviewers -
Keeping in mind the Patient Care Threshold Concept framework for teaching patient care and the goals of the curricular evaluation, please review the items below while considering:

> **How relevant is each item to a curricular-level evaluation of teaching patient care?**

When you are ready, please complete the brief survey on the PCTC Evaluation Tool using the link via email.

Patient Care Threshold Concepts Evaluation Instrument

Part 1. Answer the following questions for each of the five Threshold Concepts (using a sliding-scale timeline ranging from matriculation to 2 years post-graduation).

1. When ***are*** pharmacy students ***first introduced*** to Threshold Concept X?

2. When ***should*** pharmacy students be ***first introduced*** to Threshold Concept X?

3. When ***do*** pharmacy students ***achieve the transformation*** associated with Threshold Concept X?

4. When ***should*** pharmacy students be expected to ***achieve the transformation*** associated with Threshold Concept X?

Part 2. Answer the following questions for each of the five Threshold Concepts (likert-type scale).

1. When viewing the curriculum as a whole, how much effort (attention, resources, etc) is put towards teaching each of the Threshold Concepts [No effort – A great effort]?

2. When viewing the curriculum as a whole, how effective is the teaching of each of the Threshold Concepts [Very ineffective – Very effective]?

3. When viewing the curriculum as a whole, to what degree are each of the Threshold Concepts emphasized [Under-emphasized – Over-emphasized]?

4. At graduation, how would you describe the average student's ability regarding each of the Threshold Concepts [Poor – Excellent]?

Part 3. Please respond to the following questions regarding the teaching of each Threshold Concept (open-ended).

1. What is one way Threshold Concept X is currently being taught?

2. What is a challenge to teaching Threshold Concept X?

Part 4. When you view instruction around teaching the Pharmacists' Patient Care Process as a whole… (open-ended)

1. What is one aspect of the curriculum in which the enduring impact is worth the resources expended?
2. What the biggest gap in the curriculum's ability to transform students into practitioners?
3. What is one aspect of the curriculum you would not want to lose?

Appendix L: Patient Care Threshold Concepts Evaluation Instrument Invitation Email (Student – New)

Hello XXX,

I am writing to request your participation in an evaluation survey about teaching in the patient care domain at the UMN College of Pharmacy, the Patient Care Evaluation Survey. You were selected as a potential participant because of your role as a student representative on one of the faculty committees. I am a Ph.D. student in the SAPh department at the College of Pharmacy and this evaluation survey is a component of my dissertation research which is focused on student learning of a patient care process. As a student with a unique perspective on the curriculum, I value your input.

The survey should take about 20 minutes and has a variety of question types, including some open-ended fields. Also, due to this variety of questions, I recommend taking this survey on a computer or tablet, rather than a cellphone. I would ask you to complete the survey within one week, or by Monday, Feb 20th.

More information regarding my dissertation project and how this evaluation survey fits in can be found on the introduction page of the survey. If you are willing to participate, follow the link below.

Follow this link to the Survey:
${l://SurveyLink?d=Take the survey}
Or copy and paste the URL below into your internet browser:
${l://SurveyURL}

Thank you for considering. Do not hesitate to contact me if you have additional questions.
Claire

Claire Kolar, PharmD
PhD Candidate - Social and Administrative Pharmacy
University of Minnesota College of Pharmacy
7-164 Weaver-Densford Hall
308 Harvard St. SE
Minneapolis, MN 55455

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Appendix M: Threshold Concepts Content Analysis Categories

Threshold Concepts and Categories

Threshold Concept	Categories
Patient Centered Care – Pharmacists provide patient-centered care by listening to patients and putting their needs, concerns, and desires ahead of their own agenda for the encounter or what should be the outcome, based on guidelines or a preconceived plan.	**5. The patient agenda drives the visit; patient-centered**
	13. Treat the patient, not the disease; gray
Conceptualize and describe pharmacists' unique patient care process – Pharmacists have a standardized process, using common language (including IESC), that integrates clinical knowledge with relationship building to provide patient care in a way that is distinct, yet complementary to other health professions	**1. Communicate medication information with patients; need personalized process to…; fun; takes time; teach; talk about or describe the process**
	2. The patient care process is standardized. You do the same thing every time with every patient; understanding conceptualizing process; abstract at first; fits in wider pharmacy context
	3. You think through each medication by following IESC
	4. Process is needed to interact and function within healthcare team; pharmacists are unique
	11. Process involves bringing together clinical information; relationship building and process; integrating
Relationship with the patient – Pharmacists have an impact on a patient's care when they develop a relationship with the patient, connect emotionally with them, and take responsibility for their care.	**8. Must build a relationship with the patient; trust; listen**
	10. Doing the process can make a difference in people's lives
	12. Learn to care for patients by connecting emotionally with them; whole person
	14. Ownership; Responsibility or patient outcomes; follow-up
Medication Experience – Each patient has a unique experience or view of his/her medications and a unique approach to taking medications	**6. Every patient is unique; no assumptions; understand their medication experience**
Internalize patient care process in order to provide care – Pharmacists are able to provide patient care when they internalize the patient care process, make it their own and adapt it to the patient in front of them	**7. A flow develops the more comfortable you get with the process; confident; no checklist; process evolved; handle surprises; doing process; don't think about process**