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Clinical Decision Making by Fourth-Year Pharmacy Students: Understanding Their Uncertainty

by

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A THESIS

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Abstract

Clinical decision making is a critical process underpinning much of a pharmacist's daily activities. Pharmacists in Alberta have a scope of practice that includes prescribing medications, and prescribing includes clinical decision making. Ensuring pharmacy education actively prepares students for clinical decision making is therefore a priority. While it is known that pharmacists hesitate to make decisions, it remains unclear whether pharmacy students experience similar hesitancy.

Clinical decision making is dependent on many factors, such as knowledge and experience, that need to be considered when investigating hesitancy and uncertainty in decision making by pharmacy students. Adult learning theories of experiential education and reflective practice are applicable to the pedagogy of decision making given that experience is considered a critical influencer in clinical decision making.

This study was designed from a social constructivist paradigm using case study methodology. The purpose was to investigate issues related to hesitancy in clinical decision making by fourth-year pharmacy students. Data was collected through observation of students engaging in simulations, post-simulation interviews, and written reflections. Data analysis included multiple stages of coding, followed by pattern identification and discovery of interrelationships.

The primary themes relating to issues in pharmacy student clinical decision making were relational factors, teaching and learning, degree of certainty, and personal characteristics. These themes represent elements that affected decision making before the final stage where the students were either willing or unwilling to make a decision. Pharmacy students construct their decision making primarily by using the patient care process, through repeated practice, and by observing role models. Students felt facilitated in their decision making when there were positive

relationships with patients and physicians, practise in the skills lab, and development of comfort with ambiguity. Students discussed that strategies for responsible decision making were complex and related to many of the previously mentioned themes. Students struggled with responsibility taking for decisions both throughout the curriculum and in experiential education.

Future research plans include investigating how Albertan students compare with those in other jurisdictions and investigating the training of preceptors to include building student comfort with ambiguity by creating education underpinned by adult learning theories of experiential learning.

Keywords: pharmacy education, pharmacist prescribing, clinical decision making, experiential education, case study, stimulated recall

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Dedication

This work is dedicated to all the pharmacy students I have worked with over the last 20-plus years of teaching, and in particular to the University of Alberta Faculty of Pharmacy and Pharmaceutical Sciences Class of 2020. Thank you for being my teacher.

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List of Abbreviations

APA = Additional prescribing authority

CDM = Clinical decision making

ExEd = Experiential education

PCP = Patient care process

CHAPTER ONE: INTRODUCTION

Pharmacists are primary health-care professionals who ensure the appropriate use of medications. Pharmacists are involved in health promotion, disease screening, chronic disease management, medication education, medication administration such as vaccinations, and the monitoring of effective and safe drug therapy. For over 10 years, pharmacists in Alberta have had the regulatory authority to prescribe medications independently. With a recent change to the undergraduate program at the Faculty of Pharmacy and Pharmaceutical Sciences at the University of Alberta, students can apply to obtain independent prescribing designation directly upon graduation. Approximately 40% of pharmacists in Alberta have this designation, a percentage that is increasing every year (Alberta College of Pharmacy, 2018).

Clinical decision making is a critical step in the prescribing process. Evidence shows that pharmacists, in general, are hesitant to make clinical decisions, let alone prescribe medications (Abuzour et al., 2017; Gregory et al., 2016). To improve our pharmacy program and better prepare students for practice, I set out to gain a deeper understanding of how students come to make clinical decisions and what impinges on their ability to do so. By identifying barriers to and facilitators of decision-making by pharmacy students, our program may develop ways to improve teaching around this construct of decision making.

Statement of Problem

Clinical decision making (CDM) is a complex process that involves health-care providers determining what to do for a patient's care, such as what medications a patient should take and what diagnostic tests should be utilized to understand a patient's condition. Clinical decision making underlies almost everything doctors, nurses, pharmacists, physiotherapists, and other

health-care providers do daily (Higgs et al., 2018). It frames our treatment plans for patients in acute situations and at regular patient follow-ups.

In the pharmacy curriculum at the University of Alberta, CDM is taught and practised in the practice skills courses (University of Alberta, 2020). The practice skills curriculum is designed to scaffold learning from year to year, with increasing complexity of patient cases and problems as students progress through the three-year didactic curriculum. Decision making in the first year of practice skills includes such activities as assessing the required components of a prescription and whether a prescription can be dispensed to a patient from a legal perspective. By the end of their third year, students are determining the appropriateness of drug therapy for complex, multi-morbid simulated patients, which may include a decision to prescribe medications.

While our pharmacy students are allowed to practise prescribing, we have never evaluated whether or not that pedagogical component has impacted their ability to overcome decision-making hesitancy or if it affects their understanding of taking responsibility for decision making. Given the complex, multifactorial nature of decision making, understanding this construct within the practice skills setting will help in developing our curriculum to better address this issue.

Previous research (Abuzour et al., 2017; Gregory et al., 2016; Maddox et al., 2016) has suggested that pharmacists are hesitant to make decisions and take personal responsibility for a variety of reasons, including reticence in the face of ambiguity, need for approval, and fear of failure (Rosenthal et al., 2010). Most previous research on how pharmacists and other health-care professionals make decisions has focused on their decision-making process and what steps they work through to get to a final decision (Anakin, Duffull, et al., 2020; Croft et al., 2017;

Higgs et al., 2018). However, there has been limited inquiry into what happens when pharmacy students hesitate, cannot come to a decision, or do not want to take responsibility for a decision.

Research in the area of chronic disease management has shown that pharmacists' reluctance to make decisions may be closely related to their hesitance to fully take responsibility for patient care decisions (Frankel & Austin, 2013; Gregory et al., 2016; Maddox et al., 2016). As pharmacists' roles have shifted from a primary role as accurate dispensers of medications to a clinical role where they assess the appropriateness of a patient's medication regimen, there has been an identity crisis for some pharmacist practitioners (Kellar et al., 2020). Some pharmacists, for example, may feel more comfortable deferring medication decision making to a perceived authority, such as a physician (Gregory et al., 2016). This reluctance may be reinforced by contextual and cultural factors (Rosenthal et al., 2010). Whether or not some of these barriers can be overcome in pharmacist practice has not been fully explored and, again, this inquiry into factors that underpin hesitancy and uncertainty in decision making has not been investigated in student pharmacists.

In large part, pharmacists were granted prescribing authority to increase accessibility to primary health care (Yuksel et al., 2008). Pharmacists are an integral part of the primary health-care team, often being the first point of contact for patients (Tsuyuki et al., 2018). Tsuyuki et al. (2018) cite studies showing that patients with diabetes see their pharmacists twice as often as they see their family doctors, and that people over the age of 65 see their pharmacists up to two times more in a year than they see their family physicians. Given this frequency of visits, pharmacists have far more opportunities to engage with patients to ensure their drug therapy is indicated, effective, and safe than do most other primary health-care professionals. The ability of pharmacists to screen, assess, and prescribe for patients, because of this accessibility, has been

shown not only to be safe for patients, but to improve outcomes across multiple disease states and different practice settings (Al Hamarneh et al., 2013; Beahm et al., 2018; Poh et al., 2018; Tsuyuki et al., 2016; Tsuyuki et al., 2015).

There is a need to ensure pharmacy students are prepared to take responsibility for their patients' health-care needs as integral members of the health-care team. By further understanding how pharmacy students come to make clinical decisions and the factors that influence the decision-making process, educators can develop learning activities to facilitate reducing students' uncertainty with, and increasing their ability to take responsibility for, CDM.

Background and Context

University of Alberta Faculty of Pharmacy and Pharmaceutical Sciences

The Faculty of Pharmacy and Pharmaceutical Sciences at the University of Alberta is one of 10 pharmacy programs in Canada. Students are accepted into the four-year program after completing at least two years of specified course work in primarily science-based courses. Approximately 130 students are admitted to the program each year. Students begin the four-year program with foundational science courses, such as medicinal chemistry and pharmacology, and from there build knowledge and skills in core competencies, including therapeutics, evidence-based practice, communication, and interprofessional collaboration (University of Alberta, 2020). The program's final year involves experiential education (ExEd) placements in various settings, such as community pharmacies, acute-care sites, ambulatory clinics, and other pharmacy organizations. The ExEd placements are considered to be the capstone courses for the program. Teaching philosophies that inform how the ExEd courses are constructed include reflective learning and situated cognition (Merriam et al., 2007).

Practice Skills Curriculum

It is in the practice skills stream of the pharmacy curriculum that pharmacy students learn to apply their knowledge and practise the professional skills of patient care. Within the patient care process (PCP), students gather data, assess drug therapy for appropriateness, develop a care plan, implement that care plan by making care decisions, and then monitor for outcomes, planning for modifications to therapy if needed (Charrois, 2019; Cipolle et al., 2012). This standardized process is taught in the first year of the program, then practised throughout the second and third years, preparing students for their real-world experience in the final year and future practice. In the third-year practice skills course, students are provided with specific opportunities to practise prescribing. The practice skills curriculum is scaffolded from year to year in order to build student confidence in practising skills related to patient care (Merriam et al., 2007).

Rationale and Purpose

The purpose of my research is to understand how pharmacy students make decisions and to explore factors that influence uncertainty in their CDM. Wright et al. (2019) state that CDM “has not been explored in any detail in the pharmacy literature” (p. 601). They postulate that CDM in pharmacy is tacit and acquired through practice experience; thus, it is critical that pharmacy students practise prescribing in a safe practice skills environment prior to licensure.

Ownership of decisions and evolution of responsibility are two themes that have been identified as impacting pharmacists’ ability to make decisions in practice (Frankel & Austin, 2013). Some pharmacists have reported that they do not need to make clinical decisions, as that is the responsibility of physicians; however, in Alberta, that responsibility is shared by various health-care professionals, including pharmacists (Frankel & Austin, 2013; Gregory et al., 2016).

In cases where there is not a clear, conflict-free solution, pharmacists tend to defer decision making to physicians (Gregory et al., 2016). There is a clear need for research in the area of pharmacist CDM and a deeper focus on the inability of pharmacists to make clinical decisions and take responsibility for them (Anakin, Duffull, et al., 2020; Wright et al., 2019). It has been suggested that overcoming this reticence to take responsibility for decision making could be addressed through curriculum development and “concentrating efforts at the undergraduate level” (Frankel & Austin, 2013, p. 160).

Significance of Research

The primary concern with hesitancy and uncertainty in decision making by pharmacists is a delay in appropriate and timely care for the patient; therefore, the significance of this research is that it could improve patient care if these phenomena were better understood. When a patient presents to a pharmacist, the pharmacist should assess the patient’s medication therapy to determine if it is indicated, effective, safe, and that the patient is able to adhere to the prescribed regimen. If, during the assessment, the pharmacist deems there are or may be issues, they have a duty and obligation to address these concerns (Charrois, 2019; Cipolle et al., 2012). If a pharmacist feels they do not have the knowledge, skills, or ability to deal with drug-related problems, the patient experiences a delay in care, as other health-care professionals, notably physicians, must then become involved to decide how to solve the problem. While it is sometimes entirely appropriate for a pharmacist not to make a decision, it is not uncommon for decisions to be deferred for problems that are solvable at the pharmacist level (Gregory et al., 2016; Rosenthal et al., 2010). These delays in care can lead to increased stress on patients, increased time to treatment, and increased costs to the health-care system, among other outcomes.

The determination of barriers to and facilitators of decision making in pharmacy students is of interest to other pharmacy schools in Canada, most immediately in those jurisdictions where prescribing occurs in pharmacy practice. Other countries, provinces, and states that do not yet have prescribing legislation for pharmacists are considering legislative changes to make this happen, and may need to update their pharmacy curricula to include CDM in pharmacist prescribing. Of note, clinical decision making by pharmacists occurs whether or not pharmacists have been granted the ability to prescribe. The Alberta context, however, allows for an exploration of decision making within the context of independent prescribing. Ensuring that responsibility for decision making is addressed in the curriculum will continue to be important as pharmacy practice continues to evolve. Finally, pharmacy advocacy bodies and regulators could use this information to build upon continuing education for current practitioners to address this previously identified area of concern in pharmacy practice (Gregory et al., 2016).

Key Terms

The following terms will be used throughout this dissertation and are defined below based on the literature.

- **Clinical decision making:** A complex process that includes many different domains (Higgs et al., 2018). It is also a social construct that occurs in a specific context with various other people that need to be considered – the patient, other health-care professionals, and the health-care system. Most basic depictions of CDM include an assessment, a judgment, and a final decision (Higgs et al., 2018; Wright et al., 2019).
- **Initial access prescribing:** Also referred to in the literature as independent prescribing (Stewart et al., 2017), in which a health-care professional takes responsibility and accountability for the assessment and clinical management of a patient (Stewart et al., 2017).

Independent prescribing refers to the decision-making responsibility of the individual provider though it occurs in the context of appropriate communication with other health-care professionals.

- **Pharmacist prescribing:** A pharmacist who completes a process of credentialing can prescribe medications to patients. In Alberta, pharmacist prescribing can take three different forms: adaptation, prescribing in an emergency, and initial access (Alberta College of Pharmacy, 2020).
- **Prescribing:** Defined in the literature as a “complex task that requires a detailed understanding of both the medicines to be prescribed and the diseases they treat” (Cardiff et al., 2018, p. 635). Prescribing includes information gathering, decision making, communicating the decision, then monitoring and follow up (Lum et al., 2013). “Prescribing is not about the final prescription, but the underlying process” (Nazar et al., 2015, p. 281).

Organization of the Dissertation

This thesis is organized into six chapters. In this first chapter, I outline the aim of the research as a way to understand how pharmacy students make decisions and to explore factors that influence uncertainty in their CDM in a simulated educational environment. I describe this aim in the context of the problem of CDM in pharmacy practice, along with the rationale and significance of this research. Chapter Two explores the literature with critical review of the issues related to CDM in pharmacy practice. The literature review also explores how different theories have been used to explain CDM, how uncertainty in CDM has been explored in health-care professional practice, and how CDM has been approached from the perspective of adult education. Chapter Three describes the specifics of the research design, including the research questions, and the theoretical framework that informed the case study methodology used in this

inquiry. The sample population, elements of data collection, data analysis, and data integrity are also detailed. Chapter Four describes the findings and the themes that emerged from the transcripts, observations, and student reflections, including relational factors, teaching and learning, degree of certainty, personal characteristics, and enactment of the decision. Chapter Five presents the research findings in relation to each of the research questions, with interpretations of how hesitancy and uncertainty are experienced by pharmacy students. The final chapter explores the contributions this study makes to the adult education literature and to pharmacy education, as well as the implications of the findings. Chapter Six also offers some suggestions for future research in pharmacy student clinical decision making.

CHAPTER TWO: LITERATURE REVIEW

My research aimed to deepen the understanding of why pharmacy students experience uncertainty in CDM and to develop teaching strategies to assist students in overcoming this challenging aspect of acquiring the necessary patient care skills for full scope of practice. By furthering pharmacy pedagogy surrounding CDM, the aim is to ensure that the patients these students care for in the future will benefit from their ability to confidently and competently make decisions as prescribing pharmacists. Figure 1 below maps the approach to the literature review that grounds this research.

Figure 1

Overview of the Literature Review Approach

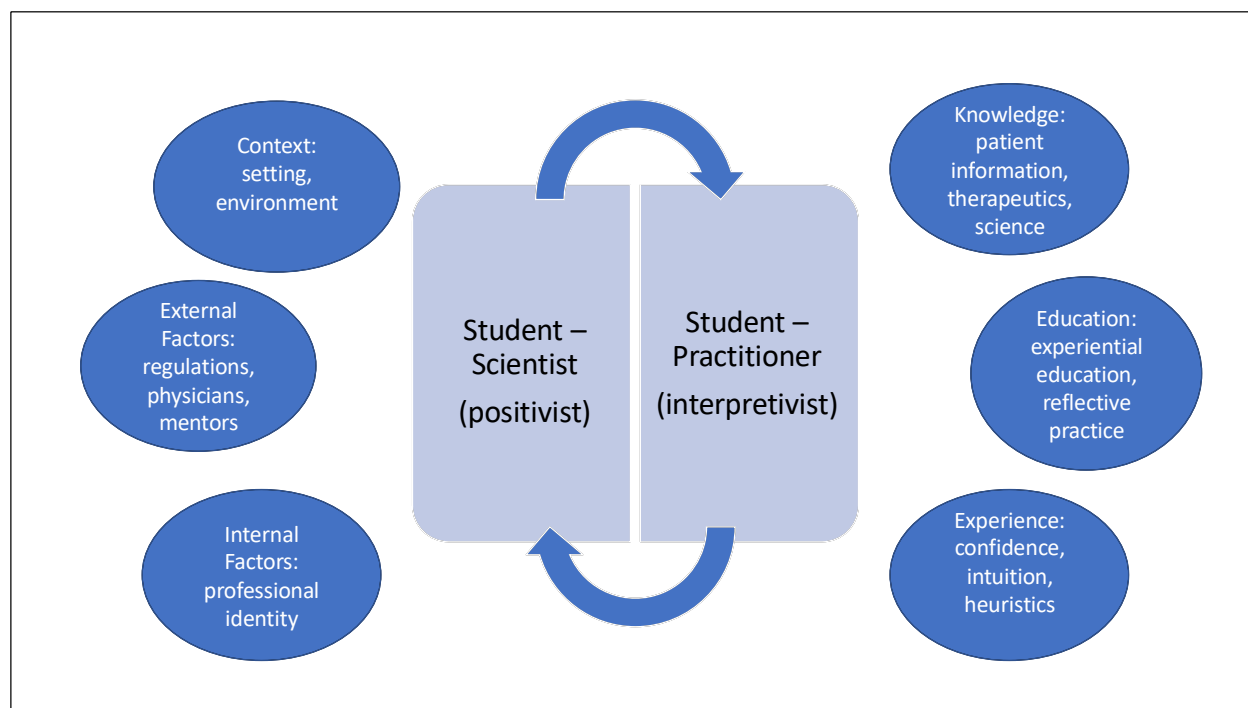


Figure 1 acknowledges two overarching approaches to the research in CDM, the positivist and the interpretivist approaches, and how students may view themselves within these paradigms. Factors that may influence and impact CDM are included, such as experience,

subjective (internal), external, and contextual factors. An exploration of these factors and their influence on CDM and uncertainty is critical to understanding how students develop effective CDM skills.

Key terms that were searched include “clinical decision making,” “clinical reasoning,” and “clinical judgment,” as these terms are often used interchangeably. These terms were then combined with “pharmacy” or “pharmacist,” as well as “medicine” and “nursing.” Searches were conducted from the databases of Google Scholar, ERIC, and PubMed. From these searches, cited reference searches were conducted with key identified articles. Additional search terms that were combined with “decision making” were “uncertainty,” “responsibility,” and “ambiguity.” The search was updated in June 2020 to capture any newly published papers.

This literature review first provides an overview of pharmacist prescribing to set the stage for why CDM is required for pharmacists’ evolving prescribing roles. This is followed by a presentation of the literature on decision making, along with key definitions. Frameworks and theories of CDM are reviewed to provide context for the different ontological paradigms through which decision making can be viewed. Influencers of decision making and the construct of uncertainty and responsibility for CDM will be examined. Finally, an exploration of adult learning theories and their relation to the teaching and learning of CDM is discussed.

Prescribing

Prescribing is traditionally thought of as the pen-to-paper act of writing a prescription after a doctor diagnoses a patient with an ailment. This understanding, however, does not incorporate the aspects of the process that occur prior to the prescription writing. Coombes et al. (2011) developed a model for the prescribing process that includes (a) information gathering, (b)

clinical decision making, (c) communicating the decision (this can mean the writing of the prescription or enactment of the decision), and (d) monitoring and review.

Prescribing has also moved beyond the scope of physicians, with some other health-care professionals now able to prescribe within their knowledge, skills, and abilities. Nurse practitioners were among the first non-physicians to be allowed to prescribe, and pharmacists followed shortly after in Alberta and the United Kingdom (Sodha & Dhillon, 2009). Some literature refers to nurse and pharmacist prescribing as non-medical prescribing; however, pharmacists have pushed back against this term as it implies that the prescribing done is not within the domain of medicine (Tsuyuki & Davies, 2014). In Alberta, pharmacists have been able to prescribe independently for over 10 years (Yuksel et al., 2008).

As discussed in Chapter One, there are three types of pharmacist prescribing in Alberta: adaptation, prescribing in an emergency, and independent prescribing (Yuksel et al., 2008; Alberta College of Pharmacy, 2020). To be an independent prescriber in Alberta, practising pharmacists must submit a portfolio of evidence to the Alberta College of Pharmacy, including three patient cases. This portfolio is then assessed by the College to determine if the pharmacist has an appropriate process for assessing, prescribing, and following up with patients. Pharmacists have to demonstrate they have developed a CDM process that is transparent to other practitioners. Upon graduation, students can apply for their Additional Prescribing Authorization (APA), and, as such, need to be prepared through their undergraduate education to take on this role in practice. Recent research has shown that in Alberta, among pharmacists who have the designation to be an independent prescriber, only a small portion (13.8%) of them utilize all aspects of this designation (Faruquee et al., 2019).

Definitions Related to Decision Making

Many terms are used in the literature to describe processes associated with CDM. Critical thinking within CDM, clinical reasoning, and clinical judgment have also been used to discuss constructs associated with the decision-making process (Benner et al., 2008); therefore, it is imperative to be clear about what CDM means and how it is used throughout this research.

Critical Thinking in Decision Making

Critical thinking within CDM is a process that underlies clinical reasoning and decision making (Benner et al., 2008; Higgs et al., 2018). It involves challenging assumptions and exploring alternatives (Riddell, 2007). In addition, “critical thinking underlies independent and interdependent decision making” (Benner et al., 2008, p. 9). It is generally understood that in weighing alternatives for therapy, clinicians should use critical thinking rather than relying on the familiar or what is already known (Higgs et al., 2018). Critical thinking includes reflection, identification of assumptions, interpretation, and analysis, along with reasoning and consideration of context (Higgs et al., 2018). It is related to the adult learning theory of transformational learning, as it is necessary to engage in critical thinking to transform thinking (Merriam et al., 2007). It is often assumed that by teaching and enhancing critical thinking in health professions, clinical performance and CDM will improve, though there is limited empirical evidence to support this (Riddell, 2007).

Clinical Reasoning

One of the most common terms used interchangeably with CDM is clinical reasoning, the process of gathering and interpreting data, then determining a judgment. Clinical reasoning involves critical thinking and is situated in a particular clinical context (Benner et al., 2008). It requires background scientific knowledge integrated with an understanding of the particular

patient being treated and the practical application of critical thinking skills. Clinical reasoning also occurs in the context of dynamic social relationships. It can be interpreted as the weighing of pros and cons, patient values and goals, and scientific knowledge before a decision is made (Anakin, Duffull, et al., 2020; Higgs et al., 2018). While often used interchangeably with CDM, clinical reasoning in fact precedes decision making.

Clinical Decision Making in Practice

Clinical decision making is a complex construct to define, as the research in this area is diverse in theoretical perspectives, categorization, and semantics (Gruppen & Frohna, 2002). In the context of our research, CDM refers to clinical decisions associated with therapeutic management. In management decision making, different treatment choices are considered, and the outcome may not be reducible to a dichotomous correct or incorrect answer (Cook et al., 2018). Management decisions almost always need to be made in close consultation with the patient, as patient preferences and concerns are important considerations in decision making. In addition, many different health-care providers may need to be involved; therefore, the factor of collaboration needs to be considered.

In Tiffen et al.'s (2014) comprehensive literature review of CDM models, an initial definition of CDM in nursing was developed based on the review. This definition was then presented to nurse practitioners who were also faculty members to refine the definition. The refined definition was then further developed as: "Clinical decision-making is a contextual, continuous, and evolving process, where data are gathered, interpreted, and evaluated in order to select an evidence-based choice of action" (Tiffen et al., 2014, p. 400). Although this decision-making definition was focused on the context of nursing, it is important to note that it is applicable to the other health professions as well.

In medicine and pharmacy this process of data collection, interpretation, and evaluation is highlighted in multiple decision-making definitions and frameworks (Benner et al., 2008; Croft et al., 2017; Wright et al., 2019). Most decision-making processes have similar elements (data collection, interpretation, and evaluation). The differences between them relate primarily to what data is collected based on the scope of practice. For example, a pharmacist would use the PCP of assessing drug therapy indication, efficacy, and safety to collect and interpret data, whereas a nurse may focus on patient symptoms and how to provide care to alleviate those symptoms (Cipolle et al., 2012; Higgs et al., 2018). Although the processes and definitions are conceptually similar, there are minor differences in the focus of the data and the types of decisions being made. In this project, CDM is defined as a context-dependent process that includes data gathering, interpretation, and evaluation, with the outcome being a decision on a choice of treatment.

Theories of Decision Making

It has been proposed that there are two primary research approaches to decision making in medicine: a normative approach and a descriptive approach (Norman et al., 2012). These can be seen as relating to both positivist and interpretivist frames of decision making.

Positivist Theories in CDM

In the normative theoretical approach, decisions are made with the consideration of probabilities and utilities – the probability of an outcome is measured with the desirability of that outcome, which is the utility (Norman et al., 2012). This theoretical approach has been used in computer modelling for decision making, such as in decision analysis approaches where an expected value is calculated for each option and the outcome that maximizes that value is selected. The approach is centred around the belief that only one alternative can be chosen

through the use of dichotomous information. The theory assumes that all decisions can and will be made through a rational approach (Avorn, 2018).

In 1972, Newell and Simon described decision making as a “step-wise” process, involving multiple iterations and moderation using heuristics. A final decision from this process would then be tested for suitability. The normative approach is a standardized, prescriptive approach that weighs risks and benefits to come up with the optimal decision for a patient, or the most rational decision. There is an element of quantification of these parameters to help determine the best management strategy. Examples of decision-making theories that fall under this paradigm include hypothetical deductive, information processing theory, and game theory (Duffull et al., 2017; Duffull et al., 2018; Elstein et al., 2002; Krishnan, 2018).

Interpretivist Theories in CDM

Descriptive theory emphasizes the influence of the person making the decision; that the person is influenced by external and internal factors (Norman et al., 2012). The theory holds that psychology plays a role in decisions and considers psychological parameters, including biases, that can influence decision making. This can also be referred to as behavioural decision theory. Other theories that fall into this interpretivist paradigm include intuitive-humanistic theory and Brooks theory of intrapersonal perceptual awareness (Brooks & Thomas, 1997; Norman et al., 2012). Inherent in these theories is that heuristics are involved, as well as experience, role modelling, pattern recognition, context, tacit knowledge, and intuition (Brooks & Thomas, 1997; Elstein et al., 2002; Krishnan, 2018; Thompson, 1999).

Combined Theoretical Approaches to CDM

An alternative theory that links the positivist and interpretivist approaches is the dual process theory (DPT) (Marcum, 2012). Based in cognitive psychology, DPT combines the

elements of normative and descriptive approaches into one model, with two systems at play. In system one, influences such as experience and knowledge are considered tacit and intuitive (Marcum, 2012; Pelaccia et al., 2011). Pattern recognition is considered an essential part of this model, with the development of scripts and schema from previous experience. Context plays an integral part in this processing. In system two, the processes are considered more analytical and rational. This system processes more slowly than system one and context is not important. From a pharmacy education point of view, we focus on teaching and learning in system two processes. We teach students to work through PCPs logically and deliberately, without considering previous experience or other system one properties. Theorists who take up the DPT believe both systems are always used for decision making, but one might be used to a greater extent than the other.

Some research has framed CDM as entirely positivist (i.e., clinical decision aids, computer modelling), while other research tends to a more interpretivist framing, particularly in a social constructivist epistemology. For my research, a theory that encompasses both normative and descriptive approaches to decision making makes sense, in order not to eliminate any potential influencers in the decision-making process. As DPT incorporates both positivist and interpretivist paradigms, it is most applicable to this study.

Models of CDM in Pharmacy

The seminal paper by Hepler and Strand (1990) on pharmaceutical care is the first published account of a decision-making framework in pharmacy. Their original pharmaceutical care document did not specifically use the term “decision making”; however, it provided pharmacists with a process for approaching patient care from the frame of medications. The pharmaceutical care model is the designated approach to teaching clinical skills in pharmacy; it

provides more of a step-by-step approach to coming to a recommendation, which is considered the end result (Hepler & Strand, 1990). Within this pharmaceutical care model, decision making is considered primarily tacit (Wright et al., 2019). The decision-making process of this model was then further developed to ensure decisions are evidence-based and logical (Bryant & Pace, 2008).

CDM models in pharmacy have primarily been developed based on literature from other disciplines or the pharmaceutical care framework as the antecedent to patient-centred care in pharmacy (Hepler & Strand, 1990; Tiffen et al., 2014; Wright et al., 2019). In 2017, a group of researchers developed a decision-making framework based on the decisions made by community pharmacists during dispensing (Croft et al., 2017). They concluded that there are seven core thinking processes used during dispensing: considering prescription in context, retrieving information, identifying medication-related issues, processing information, collaborative planning, decision making, and reflection. The issues with this model proposed by Croft et al. (2017) are that it is context-specific (community pharmacy) and based on a product-focused aspect of the profession. Another concern is that the decisions pharmacists came to in the study by Croft et al. (2017) were interpreted as correct or incorrect, in an ultimately positivist sense. This view that a therapeutic decision can be dichotomized into right and wrong answers is inconsistent with a patient-centred approach (Cook et al., 2018). As such, a model to help frame this planned research should be workable across contexts of pharmacist practice and focus on patient-level considerations.

Wright et al. (2019) proposed that CDM in pharmacy should be defined as a “series of cognitive processes and skills that allow pharmacists to make patient-centered, therapeutic decisions,” and that CDM includes “the whole set of cognitive skills required to reach a decision

about drug therapy” (p. 601). The authors felt it was necessary to have a definition that was not contextual to a specific practice setting.

The model proposed by Wright et al. (2019) focused on cognitive processes involved in the process of decision making. The steps in this model include information gathering, clinical reasoning, clinical judgment, and decision making, which are similar to models in nursing, physiotherapy, and medicine (Higgs et al., 2018; Tiffen et al., 2014). Information gathering comprises multiple tasks, including identifying if there is even a need for a decision. It can also include identification of drug-related problems, lab result assessment, patient assessment, and review of the evidence base. In clinical reasoning, pharmacists appraise the information from step one (gathering) and then consider a patient’s goals. The intent is to develop a set of alternatives that could meet the patient’s goals. This step requires critical thinking. In step three, clinical judgment, the alternatives generated through clinical reasoning are prioritized, and an assessment of benefits and risks is considered. Clinical judgment has ambiguity and uncertainty within it (Wright et al., 2019). The final step leads to the action or decision. The decision step includes two primary processes: patient-centred consideration and enactment of the decision. Throughout each step, many different considerations and factors need to be included to ensure patient-centredness; each step is multifactorial and complex.

Duffull et al. (2018) also proposed an advanced view of this basic framework by overlaying a philosophical framework on top of the CDM process. In this philosophical framework, two approaches are considered: non-maleficence and beneficence. In a non-maleficent-based decision-making process, the pharmacist is focused on ensuring the risk with medication therapy is mitigated, which results in a primarily product-focused decision being made. Product-focused decisions are a more traditional approach to pharmacy care, as minimal

patient assessment is included in this decision. Alternatively, a beneficent-focused decision is the care decision that pharmacists make to ensure patients are benefiting from drug therapy. The authors further define three types of beneficence decisions: primary beneficent, secondary beneficent, and co-beneficent. In a primary beneficent service, the pharmacist acts independently and autonomously throughout the decision-making process. In the Alberta pharmacy practice environment, this applies to an independent pharmacist prescriber decision when that individual is working in isolation and cannot consult other team members. A secondary beneficent service means the pharmacist is included and contributes to the decision-making process up to and including clinical judgment; however, another health-care professional makes and enacts the final decision (Duffull et al., 2018). This can be seen in a collaborative prescribing model, where a physician writes the prescription. The final type of beneficent decision making is a co-beneficent model in which responsibility and accountability are shared between two health-care practitioners.

In further research on pharmacy decision-making frameworks, Anakin, Duffull, et al. (2020) used qualitative interviews to determine if the CDM model proposed by Wright et al. (2019) was consistent with CDM by community pharmacist practitioners. Ten pharmacists identified as advanced care pharmacists were interviewed and described their decision-making skills. Four clear themes were linked to the information gathering stage of the CDM framework, including using documented patient information, using communication skills to elicit information, recognizing past experiences and applying these to the current patient, and, finally, referring to existing guidelines. These themes were well-described by participants. In contrast, themes related to reasoning, judgment, and enacting the decision were more difficult for participants to articulate clearly (Anakin, Duffull, et al., 2020). The authors postulated that this

may be due in part to a lack of common language in the profession to discuss how CDM is enacted by practitioners, and they proposed that using a common language may help pharmacists understand this process. The remaining four themes were: generating viable alternatives, weighing risks and benefits, learning to accept uncertainty, and involving other health-care practitioners in the enactment of the decision (Anakin, Duffull, et al., 2020). It is clear that determining the processes pharmacists use to make and enact decisions is hard to describe in the literature. The authors concluded that there is “a need for purpose-built curriculum” in the area of CDM (Anakin, Duffull, et al., 2020, p. 6).

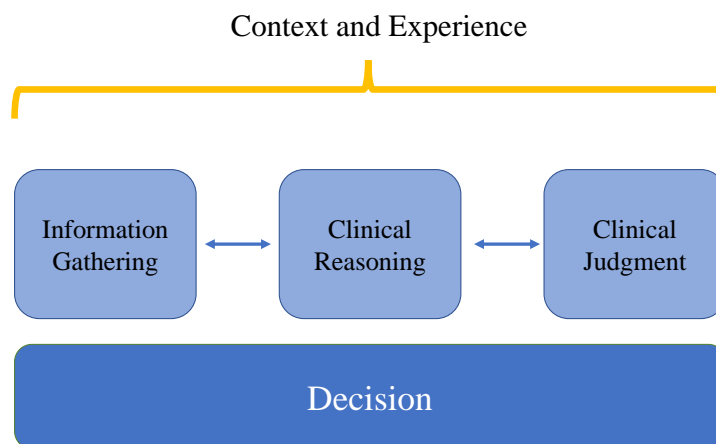
In investigating how pharmacy students construct decision making, further research was completed by this group (Anakin, Cuthbert, et al., 2020). Students were interviewed to discuss their process, and the results were similar to their previous findings with pharmacists in that students used a four-step process to come up with a final recommendation (Wright et al., 2019). Student participants also reported that along with the process of CDM, the attitudes they developed were confidence, open-mindedness, and bias awareness (Anakin, Cuthbert, et al., 2020). In addition, students used words such as “recommendation” and “suggestion” to describe their decisions, which the authors “interpreted to suggest that they were comfortable to relinquish responsibility for treatment decisions to other health care practitioners” (Anakin, Cuthbert, et al., 2020, p. 1). This lack of responsibility taking is explored further in this literature review. The findings describing how students make decisions reflect the results of other research, but do not delve into the points at which students struggle with decision making or the primary influencers of decision making (Tiffen et al., 2014; Wright et al., 2019).

Based on these considered models and frameworks, Figure 2 depicts how decision making is envisioned as a framework in this research. As the elements of decision making may

not occur sequentially or in order, arrows are not included to denote sequence. Instead, decision making is seen as evolving and dynamic, with context and experience influencing every part of the process.

Figure 2

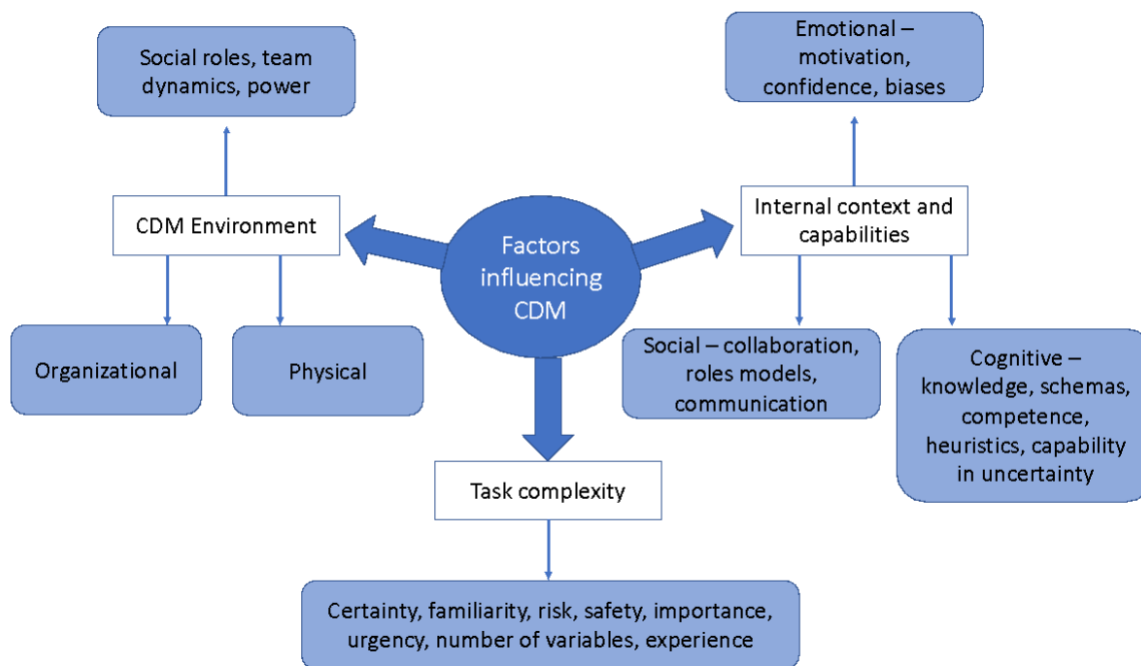
Clinical Decision Making



Note. Adapted from Tiffen et al., 2014; Wright et al., 2019

Influencers of Clinical Decision Making

Multiple factors can influence each element in the CDM process. Themes found in this literature review include: confidence, peer support, role models, social context, experience, autonomy, heuristics, biases, attitudes, safety concerns, and specific professional roles and responsibilities. Factors influencing decision making have been divided into task complexity, internal context and capabilities (such as frames of reference and competence), and the decision-making environment, as depicted in Figure 3 below (Higgs et al., 2018). If these categories are considered with the evidence found in the literature regarding critical influences on CDM, a picture emerges of multiple dynamic, overlapping, and competing influences.

Figure 3*Factors that Influence Clinical Decision Making*

Note. Adapted from Higgs et al., 2018

In a recent systematic review of nurse and pharmacist prescribers and the influences of prescribing decisions, only three studies were found that evaluated influences, and the majority of these studies were carried out in nurse prescribers (McIntosh et al., 2016). Complex influences were found, such as experience in the role, the use of evidence-based guidelines, and peer support and encouragement from physicians. These themes are consistent with other research in the area of decision making that has looked at role modelling and the need to feel a decision is the right one or a need for approval from physicians (Rosenthal et al., 2010). McIntosh et al. (2016) also found that more experienced prescribers relied on heuristics related to intuition and experience, which has been supported by many studies in the area of decision making (Bartels, 2013; Hall, 2002; Hillen et al., 2017; Johansen & O'Brien, 2016).

Context and Experience

Each influence must be considered in relation to a practitioner's level of experience: novice, intermediate, or advanced (Abuzour et al., 2018; McIntosh et al., 2016; Standing, 2007; Young, 2012). For example, advanced practitioners are still influenced by the critical nature of a decision, but they may manage criticality differently from novice practitioners. Novice practitioners also rely less on heuristics, which is logical given they have less experience (McIntosh et al., 2016). Experience is a critical element across all constructs and themes of decision-making influences. In a literature review of decision making in nursing, the authors found that "experience represented the largest influence on decision making" (Nibbelink & Brewer, 2018, p. 925).

Patient Factors

Patient influences are crucial components of the decision-making process, given that the patient is the central and the most important consideration when making a decision. Patients have increased their voice in this process as they have gained a deeper understanding of their choices, rights, and responsibilities (Higgs et al., 2018). Patients can also determine, and should make known, the level of involvement they want in the process. Patients are influenced by personal context (culture, family, socioeconomic status, personal beliefs, values), health-care needs, and the nature of the clinical practice world (contextual factors such as practice setting) (Higgs et al., 2018). Patients' views on pharmacist prescribing may also have an influence, as patients have been found to have apprehension about pharmacist prescribing related to a misunderstanding about what pharmacist prescribers can actually do in practice (Tonna et al., 2007).

Social Factors

Another principal influencer requiring consideration are the social factors within which a decision is being made. There are social factors regarding the patient and their family, as well as health-care team members, and how society views prescribing and the prescriber. Pharmacist prescribers may have a fear of decision making in relation to these social factors. This includes a fear of making a mistake or a fear of knowledge gaps being evident (Nevalainen et al., 2010; Nibbelink & Brewer, 2018). These fears may lead to hesitancy in decision making.

One critical social factor that appears to influence pharmacist decision making is the perception of physicians on pharmacist prescribing (Abuzour et al., 2018; Maddox et al., 2016; Weiss & Sutton, 2009). This was the focus of much of the early research regarding pharmacist prescribing (Tonna et al., 2007). In recent research conducted in Alberta by Faruquee et al. (2020), physicians with experiences interacting with pharmacist prescribers were interviewed to discuss their beliefs about pharmacist prescribing. One of the primary beliefs was “I am responsible,” meaning the physicians felt they were “ultimately responsible” for the patient and should be considered the primary prescriber for the patient (p. 91). If there was trust developed between the pharmacist and the physician, then collaboration for patient outcomes was easier (Faruquee et al., 2020).

The act of prescription writing is part of a physician’s professional identity that is upheld by other health-care professionals, likely including pharmacists (Weiss & Sutton, 2009). Moreover, “medical dominance can be defined as the power of doctors to control others through a cultural authority based upon the value accorded to their medical knowledge” (Weiss & Sutton, 2009, p.407). The hierarchical culture within the medical system is changed, along with the social structures within the context of CDM, by giving pharmacist and nurse prescribers this

“power.” These social and hierarchical structures may also be influential in the practice of prescribing and the comfort level of pharmacists who have the authority to prescribe.

Summary of Factors Influencing CDM

As shown in Figure 3 above, a multitude of factors can influence prescribers and their decision-making processes. It needs to be kept in mind that these factors may influence how students take up the concept of prescribing and how they may be influenced beyond the intended curriculum of a pharmacy program. However, given the lack of research in student CDM, it is uncertain if these factors are the same for students as they are for practitioners.

Uncertainty in Clinical Decision Making

The terms “uncertainty” and “ambiguity” are often used interchangeably to describe when health-care professionals hesitate to make decisions. The concept of uncertainty has been explored in the literature from positivist and interpretivist approaches. Within the positivist paradigm, the empirical measurement of the degree to which health-care professionals can deal with or tolerate states of uncertainty or ambiguity has been most researched (Hillen et al., 2017; Rosen et al., 2014). Given that the current inquiry adopts an interpretivist framework, evaluating CDM issues related to uncertainty and hesitancy from the interpretivist approach is further explored in this literature review. Specific areas of uncertainty that have been studied within medicine include lack of knowledge associated with uncertainty, physician strategies to cope with uncertainty, effects of uncertainty on the confidence of practitioners, and physicians’ reactions related to uncertainty (Nevalainen et al., 2010).

Interpretivist Approaches to Understanding Uncertainty in CDM

Uncertainty in decision making has been an area of research for several decades and has been defined in a multitude of ways. Fox (1980) interpreted uncertainty from a knowledge-

centric point of view, in which uncertainty stems from a personal limitation of knowledge or the limits of existing knowledge. Fox (1980) suggested that socialization and awareness of uncertainty can help to mitigate the issue in practice.

There are several concerns with this approach, not least that uncertainty is related to far more than acquiring adequate knowledge (Ilgen et al., 2020). The underlying assumption is that all uncertainty in clinical practice is problematic, something that needs to be “solved.” More recent research suggests that uncertainty is inherent in medicine, and “management of uncertainty is more complicated than the simple provision of more information” (Hall, 2002, p. 217). Moreover, “uncertainty in clinical practice is increasingly viewed as something to be resolved rationally” (Engebretsen et al., 2016, p. 596), with the understanding that medicine can be standardized through the use of evidence-based practices. The concern with this approach is the lack of patient-centredness and consideration of the contextual factors at play in any given decision-making scenario (Engebretsen et al., 2016).

Uncertainty in clinical medicine has been seen more as an issue with the ever-increasing volume of evidence and literature that clinicians need to digest to make evidence-based decisions. Often, more and more evidence leads only to marginal benefits with increased risk, and there can be a significant industry bias around which different therapeutic measures are studied and how (Greenhalgh et al., 2014). Evidence-based medicine has also been viewed as an algorithmic, positivist approach to medicine, with little weight placed on the patient-centred focus of health care, including the importance of patient narratives, clinical experience, and patients who may not “fit” guidelines (Greenhalgh et al., 2014). This approach reduces a patient to a decision tree that may not fit their specific situation or patient-specific factors. It has been proposed that as clinical medicine becomes more protocol driven, a physician’s curiosity may

decrease, and this could lead to a lack of validity placed on the intuitive side of their decision making (Greenhalgh, 2013).

Uncertainty can be viewed as a normal element of the decision-making process. An interpretivist framework includes important considerations, such as understanding the context-specific and patient factors involved, for determining how pharmacy students enact decision making.

Uncertainty and Responsibility for Decision Making

For pharmacists dealing with a paradigm shift from product-focused, non-maleficent practice to patient-focused, beneficent practice in the traditional hierarchical structure of health care, there are other factors adding to the complexity of decision making. An unwillingness to take responsibility for, and/or lack of confidence in, decision-making, including in prescribing, are identified barriers to the advancement of the pharmacist role (Frankel & Austin, 2013). Pharmacists often view themselves as not needing to take on the role of being responsible for decision making and so defer decisions to those they view as the more responsible caregiver (Abuzour et al., 2017; Frankel & Austin, 2013; Gregory et al., 2016). Pharmacist prescribers have described difficulty in coming to autonomous decisions and their fear of the responsibility of the decision (Abuzour et al., 2017; Gregory et al., 2016; Rosenthal et al., 2010).

Responsibility-Taking by Pharmacists

Pharmacy practice researchers have explored the concept of responsibility for decision making (Abuzour, 2017; Cope et al., 2020; Gregory et al., 2016; Maddox et al., 2016).

Traditionally the responsibility of pharmacists revolved around ensuring the safe provision of medicine. As pharmacy has advanced to a patient-centred focus, responsibility has shifted to direct patient care. As described by Duffull et al. (2017), this shift in practice has led to a shift in

how decisions are made. Non-maleficent decisions are viewed as more dichotomous – safe or not safe – and, as such, there is potentially less uncertainty in those decisions. As pharmacists' roles have changed, beneficent decisions are more central to the profession and may be subject to many more internal and external factors and, therefore, more susceptible to uncertainty.

Factors that influence pharmacist decision making were investigated in an exploratory study by Gregory et al. (2016). The objective of this research was to characterize how pharmacists made decisions in a community practice setting. Pharmacists were found to defer responsibility for decision making to regulatory bodies or physicians in times of uncertainty. When pharmacists deferred decision making, they would take on a role of helplessness, under the belief they were “just following the rules” (Gregory et al., 2016, p. 94). This study concluded that pharmacists were hesitant to take on the responsibility of a decision when the situation was considered uncertain. They experienced dissonance and discomfort in these situations. However, it is important to note that this research was conducted in Ontario, where the scope of practice for pharmacists differs significantly from Alberta (Canadian Pharmacists Association, 2020). Ontario pharmacists have one of the most limited scopes of practice in Canada. This limited scope may mean that Ontario pharmacists, such as those included in the study, do not have the expectation that they need to be responsible for CDM, given it is not an expectation of their licensing body or patients.

In a study of nurse and pharmacist prescriber decision making, critical incident technique was used to determine examples of experiences where subjects felt it was inappropriate for them to take responsibility for a clinical decision (Maddox et al., 2016). The authors concluded that non-medical prescribers actually made two key decisions in the prescribing context: (1) whether to take responsibility for prescribing and (2) the prescribing decision. Four key considerations

underpinned the decision to take responsibility for prescribing. Firstly, cautiousness was considered, which included potential professional consequences and personal criticisms, along with a feeling of uncertain support from their regulatory body if an error was made. Secondly, the decision to take responsibility was influenced by their perceived competency in the specific situation they were facing. Support from other team members improved their perception of competency and, in turn, their confidence. A third underpinning consideration was their self-defined role in the decision and prescribing process. For example, some participants felt it was more appropriate for a physician to take on the prescribing role in risky situations than a non-medical prescriber. Finally, perceived risk and patient safety was an integral component in the consideration of taking on prescribing. The authors found that “excessive or unnecessary referral can also become a strategy to deal with lost confidence, preventing nurse and pharmacist prescribers from growing in competence and taking greater responsibility” (Maddox, 2016, p. 49). From this we can conclude that increasing confidence and competence may be linked to increased responsibility taking.

Abuzour et al. (2017) also studied how pharmacist and nurse prescribers made decisions. The investigators found that when these prescribers chose not to take responsibility for a decision and to defer decision making to others, it was often due to the risk associated with the decision. If the risk was perceived as being high, the pharmacist or nurse would defer to the physician. The authors also concluded that “non-medical prescribers working in primary care preferred to not take responsibility for prescribing decisions if they felt neither confident or competent” (Abuzour et al., 2017, p. 71). These results are consistent with the findings from Maddox et al. (2016). As noted in the previous section on influencers of CDM, patient safety and

risk are key elements that decision makers consider when determining whether they will make an autonomous decision or defer that decision to someone else they feel has more responsibility.

Most recently, Cope et al. (2020) explored the willingness of pharmacists, nurses, and physiotherapists to take responsibility for prescribing decisions. This inquiry also investigated self-efficacy in prescribing. Cope et al. (2020) found that pharmacists were less likely than nurses to take responsibility for their patient care decisions. Pharmacists were more comfortable with partial or shared responsibility. Pharmacists were less likely to make autonomous decisions but were comfortable continuing therapy started by other prescribers. The authors concluded this might be because the pharmacists viewed this continuation of therapy as being someone else's decision (Cope et al., 2020). This links to the concept of roles and responsibilities explored in the next section. Another interesting finding was that self-efficacy in prescribing appeared to influence the professionals' readiness to take responsibility for decision making. The link between self-efficacy and responsibility in decision making requires further investigation into how this may impact the teaching and learning of pharmacy students in prescribing and CDM.

Responsibility and Role Definitions. Even though prescribing has been a part of pharmacist practice in Alberta for over ten years, there is still inconsistency in how pharmacists take up these expanded roles in patient care. There is also inconsistency in pharmacists' understanding of their responsibility for patient care (Schindel et al., 2017). If pharmacists do not see themselves as primary caregivers and decision makers, they will not feel they should be responsible for decision making.

Faruquee et al. (2020) interviewed family physicians about their perceptions of pharmacist prescribing. One emerging theme was that the physicians felt they were primarily responsible for any prescribing decisions and that pharmacists should ask permission to change

or adjust drug therapy. This belief that physicians are primarily responsible for patient care is shared by many pharmacists as well. Rather than moving to a model of the patient being primarily responsible for their own care, this paternalistic and hierarchical view is still modelled throughout the health care system. This impacts how pharmacists enact their role in patient care.

Summary of Uncertainty in CDM

Uncertainty in CDM has been studied using different research paradigms. There is a shift in the thinking surrounding uncertainty, moving from a belief that it is a problem to be solved to an understanding that it is a normal part of the CDM process. In research related to CDM with pharmacists, a lack of responsibility taking appears to be a factor related to uncertainty, in that when pharmacists are uncertain, they defer CDM to physicians. Lack of responsibility taking is due to many factors, some of which relate to role definition. These are important considerations when determining how best to evaluate uncertainty in pharmacy students. How students understand or model responsibility taking in CDM is unknown, given the lack of research in this area. The research by Anakin, Cuthbert, et al. (2020) has postulated the possibility of a lack of responsibility taking in students based on the language they use, though this has not been fully elucidated.

Teaching Clinical Decision Making

At the University of Alberta Faculty of Pharmacy and Pharmaceutical Sciences, learning in the practice skills lab is scaffolded from year to year. As previously described, students in the first year of the program are provided the legal and ethical basics of the technical aspects of the profession. As these students have minimal understanding of the therapeutic aspects of patient care, making decisions related to the treatment of a patient is outside their scope at this point. In the second year of the program, students are required to practise as if they were pharmacists

without additional prescribing authority. In the practice skills lab, they can adapt prescriptions when necessary and prescribe in emergencies, yet, as they are still developing their knowledge in therapeutics and disease management, they are limited in their scope. In their third year of practice skills, students are allowed to prescribe and practise as if they were pharmacists with the APA designation. The rationale for the program design is based on social constructivism, with a building of skills and increased responsibility as students move through the program (Merriam et al., 2007).

As students construct their learning and skill development through experience, they make meaning through the activities they engage with in the lab environment (Kang et al., 2010). In this learning process, students develop schemata that use “current understandings as their building blocks” (Kang et al., 2010, p. 127). These schemata are not just reflective of what they have learned in the classroom or lab setting; they can also be based on experiences in clinical placements or part-time jobs. Recognition of the development of previous schemata is important in an adult learning setting, and of particular importance when trying to understand where and how learners develop their decision-making skills. This understanding of the role of social constructivism in skills learning is vital when contemplating a deeper understanding of how students make decisions, along with the additional role of experiential learning in an adult learning environment (Merriam et al., 2007)

Teaching strategies to enhance CDM have been investigated in many health sciences professions, including nursing, medicine, physiotherapy, and pharmacy. Topics include teaching critical thinking with reflection, the use of simulation, improving metacognition, and dialectical thinking (Adamcik et al., 1996; Macauley et al., 2017; Medina et al., 2017; Menezes et al., 2015; Vyas et al., 2011). Pharmacists in practice have identified preferred methods of learning about

expanded scope practice, including CDM and prescribing. Preferred methods include peer and team learning (Schindel et al., 2019). In the curriculum at the University of Alberta, the focus has been on reflection and learning through experience.

Reflective Practice

Reflective practice is often associated with professional learning and clinical practice (Merriam et al., 2007). It can be used to help develop deeper understandings of phenomena in practice and is linked to past and current experiences, and the tacit knowledge of a professional (Merriam et al., 2007). It includes the processes of acquiring new knowledge through experience, learning from that experience, integrating that experience with new understandings, and creating new perspectives (Tsingos et al., 2014). The key to reflective practice is being open to new and potentially alternative perspectives that may not have been considered previously (Merriam et al., 2007).

Merriam et al. (2007) describe two primary processes associated with reflective practice: reflection-on-action and reflection-in-action. For reflection-on-action to occur, the learner reflects on a situation or learning experience after it has occurred. This reflection involves a consciousness to re-evaluate what occurred in a specific situation and how things could have been done differently, including identifying feelings associated with the learning experience (Merriam et al., 2007). Alternatively, reflection-in-action occurs during the learning experience; it has been touted as a critical part of professional development (Schön, 1996). Reflection-in-action is meant to help professionals “create new ways of thinking and acting about problems in practice” (Merriam et al., 2007, p. 177). Schön (1996) noted that there are elements to professional practice that can only be developed through practice. Reflection is a critical part of experiential learning.

Reflective practice has been used to enhance decision making in health-care professionals (Edelen & Bell, 2011; Tsingos-Lucas et al., 2016). Nursing students who engaged in reflective journaling during their clinical experience were found to improve their clinical reasoning (Edelen & Bell, 2011). The use of reflective practice in pharmacy education is lacking and has been identified as an area that requires more research; however, the link to decision making is clear (Tsingos et al., 2014; Tsingos-Lucas et al., 2016). Having students engage in activities that encourage them to think about alternative perspectives may push their thinking in new directions.

Experiential Learning and Education

Experiential learning as an adult learning theory is based on the early research of Dewey (1938), who stated that “all genuine education comes about through experience” (p. 13). Experiential learning can be positive and negative, as some experiences may miseducate learners (Merriam et al., 2007). Dewey postulated that experiential learning requires two significant conditions: continuity and interaction (Dewey, 1938). Continuity means that there needs to be a connection from an experience to a previous learning experience in order to see future opportunities. Interaction refers to the understanding that experience does not occur on its own; context and environment need to be considered (Merriam et al., 2007). Experiential learning and experiential education can include simulated practice and professional workplace learning in placements with preceptor role modelling. Professional identity formation is also built through experiential learning.

Simulation Learning

Simulation learning can be considered a type of experiential learning (Farnan et al., 2008). Students can watch simulations and reflect as observers, then actively experiment while

engaging in simulations in a safe environment. Simulation learning has been used in developing clinical reasoning and decision-making skills (Adamcik et al., 1996; Menezes et al., 2015; Vyas et al., 2011).

Simulation can also be used as a way for students to experience uncertainty in CDM. In a study by Farnan et al. (2008), medical residents were asked to recall difficult decisions from one night on-call, and probing questions were used to determine which decisions were made in the setting of uncertainty. One conclusion of this study was that “implementation of a formalised decision-making curriculum, using standardised patient care scenarios with clinical ambiguity, may provide a safe environment for residents to recognise and acquire skills to manage their uncertainty” (Farnan et al., 2008, p. 125). Having students experience uncertainty and clinical ambiguity in a safe environment enables them to learn from experiences without the pressures of actual clinical practice.

Mentorship and Role Modelling

As part of their undergraduate education, pharmacy students in Canada are required to engage in a minimum of 40 weeks of experiential learning placements. Students are assigned to preceptors whom they observe in practice and who oversee the students’ learning. Not all preceptors become mentors for these students, but all preceptors are observed practising in the role of a pharmacist, and this shapes student conceptions of pharmacy practice.

Mentorship in learning prescribing skills has been studied from a social constructivist frame in the pharmacy literature. Mentorship has been postulated as an educational mechanism to advance the profession (Frankel et al., 2014). Peer support and mentorship in teaching pharmacists how to prescribe have been identified as integral to the development of CDM skills

(Weglicki et al., 2015). Weglicki et al. (2015) conclude that “confidence and competency in prescribing are more likely to develop when there are supportive peer groups, mentorship and learning environments that are conducive to personal interaction” (p. 230). Further research has shown that formal mentorship programs for pharmacist prescribers help pharmacists contextualize prescribing in practice, increase their confidence, and provide moral support for prescribing activities (Bowskill et al., 2014; Nieustraten et al., 2011). The social aspects of learning to feel supported by peers and mentors are important considerations when determining teaching and learning strategies to develop CDM skills in pharmacy students.

In a review by Ilgen et al. (2019), the authors postulated that a key factor in teaching students about CDM is to reframe their conceptions about uncertainty in practice. The concept of comfort with ambiguity was reframed to “being comfortable in maintaining uncertainty” (p. 804) as this allows the prescriber to be vigilant in forward planning for the patient. The authors went on to suggest that preceptors should help students develop these forward-planning skills and have open conversations about their comfort in these problematic decision-making instances. They noted that, “Working within a framework of ‘comfort with uncertainty’ allows supervisors and trainees to instead speculate together about the possible downstream events that pose risk . . . while concurrently considering the specific actions that allow them to move forward safely” (Ilgen et al., 2019, p. 805). Discussing uncertainty is an activity that should be fostered in preceptor development, which highlights the importance in experiential learning of ongoing support for and development of mentors and role models.

Professional Identity Formation

In medical education, professional identity formation has been defined as the development of a professional who thinks, acts, and feels like a physician (Cruess et al., 2014;

Cruess et al., 2019). In pharmacy, research in the area of professional identity is relatively new (Noble et al., 2014; Noble et al., 2019). In an article on the lack of profession-hood in pharmacists, the authors suggested that “to manage the cognitive and emotional demands of work in such ambiguous situations, psychologists posit that an internalized professional identity is essential” (Gregory & Austin, 2019, p. 252). Gregory & Austin (2019) also determined that the lack of responsibility taking by pharmacists is directly related to a weak sense of professional identity.

Development of a strong professional identity may be linked with a higher level of practice and an increased sense of accountability in professional roles and responsibilities (Kellar et al., 2020; Jarvis-Selinger et al., 2013). Professional identity formation can be conceived through the perspective of social constructivism, in that internal and external social factors have a significant impact on how students develop and “try-on” different roles as they move through their education and into practice (Kellar et al., 2020).

Professional identities can be developed through experiential learning. A scoping review of professional identity formation in pharmacy provided an overview of curricular factors that may influence professional identity (Noble et al., 2019). Factors include opportunities to practice as professionals early in pharmacy education and to model the professional capabilities of pharmacists, and a need to reconcile the dissonance students feel in experiential placements when their experiences do not match their formal curricular learning (Noble et al., 2019). It has been surmised that undergraduate education plays a role in the early formation of professional identity, and that practice can either build on or undo what has been started (Edwards, 2020). Professional identity formation is complicated and iterative, but is reliant on strong beginnings through thoughtful curricular development.

Workplace Learning

The workplace as a learning environment is a fundamental adult learning construct (Billet, 2004). This type of learning emphasizes the importance of the interaction between the learner and the setting, and can be transferable to other work environments (Billet, 2004). Workplace learning helps frame the “norms and practices” of the work, and this is critical to students learning about how pharmacy practice is translated in different settings (Billet, 2004, p. 314).

In a review by McLellan et al. (2012), a theoretical model was put forth for prescribing education that was informed by theories of expertise development and instructional design theory. As learning to prescribe is strongly tied to social context, the authors stated that it is inappropriate to teach prescribing outside of this context. The concept of workplace learning is important to consider, then, to prepare future prescribers adequately for the realities of prescribing. The authors concluded that a “whole task approach” should be taken to teaching about prescribing, meaning that students’ “knowledge, skills and attitudes must be integrated into the complex social context of the workplace” (McLellan et al., 2012, p. 611). When this framework was applied to a grounded theory study investigating how medical students prepare to prescribe in complex situations, the authors found that learning to prescribe was inextricably linked to the workplace (McLellan et al., 2015). This finding is consistent with workplace learning theory, which holds that there needs to be an understanding of individual and environmental factors, and how those elements interact with each other. These elements of context and workplace learning need to be further considered in advancing the teaching of CDM and ultimately prescribing to pharmacy students.

Summary of Teaching CDM

Several adult learning theories have been applied to the development of CDM skills in medical and pharmacy education from a social constructivist perspective, with a focus on reflective practice and experiential learning. Experiential learning elements have been applied in simulation learning, role modelling and mentorship, professional identity formation, and workplace learning. It is unclear as yet whether any of these elements has a definitive influence on CDM teaching and learning, or how these educational approaches may interact with each other to develop a practitioner with strong CDM skills. There is a gap in the literature exploring the development of CDM in pharmacy students.

Positioning the Research

Clinical decision making is a well-described construct in the health sciences literature, with research addressing multiple issues related to effective CDM (Abuzour et al., 2017; Edelen & Bell, 2011; Tiffen et al., 2014). Several models of CDM in pharmacy practice have been postulated with more recent models focusing on how best to assist a patient, rather being product and harm focused (Croft et al., 2017; Duffull et al., 2018; Wright et al., 2019). The application of these models to CDM by pharmacy students has only recently been explored and further research in this area would be useful to inform our understanding of the construction of CDM by pharmacy students (Anakin, Cuthbert, et al., 2020). Key influencers in pharmacist CDM include multiple social and environmental factors in pharmacy practice; however, it is unknown if these influencers are the same for students. From my review of the literature, what seems to be missing is an understanding of the issues that pharmacists experience with CDM, including factors that cause hesitancy in decision making and how these might be overcome through teaching and learning. Uncertainty in pharmacists is related in part to a lack of responsibility

taking. This is evidenced by pharmacists' use of the word "recommendations," rather than "decisions," to describe the final step of the CDM process (Anakin, Cuthbert, et al. 2020). This element of responsibility taking by pharmacists has been investigated, but it is unclear if this research is directly applicable to hesitancy in CDM by pharmacy students, or if there are other factors that students experience (Abuzour et al., 2017; Cope et al., 2020; Gregory et al., 2016). Specific teaching and learning strategies from an adult learning perspective that best develop CDM skills to overcome uncertainty have not been identified in previous research. The gaps in the literature regarding the CDM processes of pharmacy students, the influencers of their CDM, how they overcome hesitancy in CDM, and what elements of education help develop their CDM, are what informed the positioning of this research inquiry.

Summary of Literature Review

This literature review provided evidence on the research informing how pharmacists make clinical decisions, including their hesitancy in CDM. Hesitancy in CDM has been observed and noted in pharmacists, but has not been explored at length from the perspective of how it can be addressed in undergraduate pharmacy education. The integral role of experiential learning, including a focus on simulation, role modelling, professional identity formation, and reflective practice, needs to be considered as important among adult learning theories related to the development of CDM skills in pharmacy students. From a critical perspective, although the literature has provided a strong foundation for beginning to understand hesitancy in pharmacists, there is still a lack of understanding of these elements in pharmacy students.

Based on the results of the literature review that informed this study, Chapter Three describes the research design for investigating the uncertainty of CDM by pharmacy students,

and offers a rationale for the design and methodology based on an interpretivist frame. The chapter goes on to discuss data collection and analysis, and the trustworthiness of the research.

CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY

The objective of this research was to better understand the phenomenon of decision making in pharmacy students in order to facilitate students' decision making and reduce their decision-making hesitancy within the pharmacy education program at the University of Alberta. This chapter discusses the overarching theoretical framework and how it is linked to the study methodology and data collection methods, focusing on how these align to an interpretivist frame in adult education. The study population, sampling frame, methods of data collection, and data analysis are described. Finally, ethical concerns, research limitations, and the researcher's role are explored to provide a clear understanding of how these influenced the research and, potentially, interpretation of the findings.

Theoretical Framework

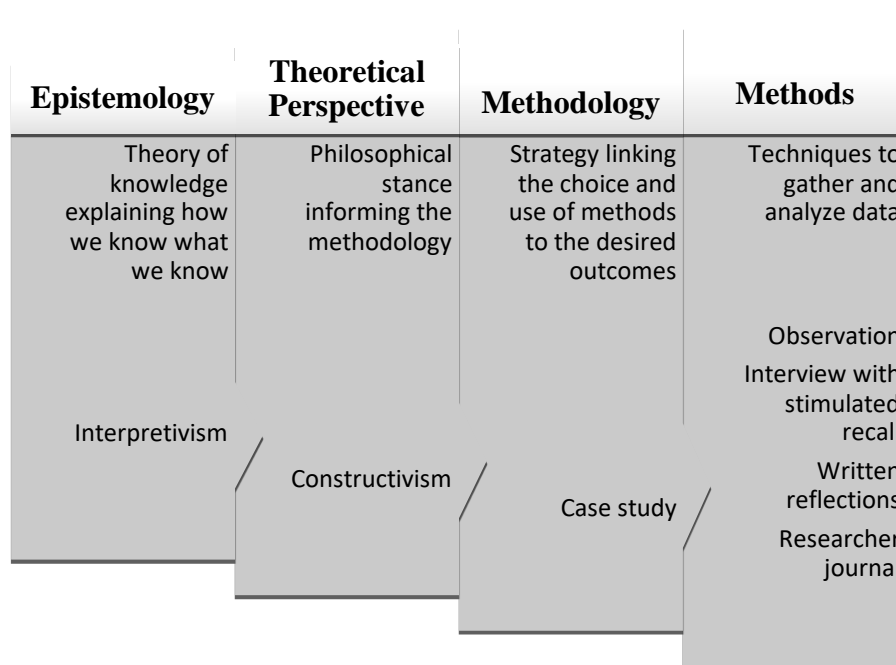
The theoretical framework for this study arises from the philosophical assumptions that inform the methodology. The methods chosen to address the research questions are critical to the design of any study and need to be in alignment with the theoretical perspective and epistemology underlying the study framework. Crotty (1998) described four elements to consider in designing a study: methods, methodology, theoretical perspective, and epistemology.

In interpretivism there is a belief that there are multiple realities which are bound by context (Merriam & Tisdell, 2016). Interpretivism is opposite to positivism, as research from a positivist perspective is based on the belief that there is a single, measurable truth (Lincoln et al., 2018). Interpretivist research focuses on the meanings attributed to practices, interactions, events, people, and artifacts. These meanings are co-constructed through the analysis of conversations and texts. In interpretivist research, the researcher plays an active role in data

collection (Lincoln et al., 2018). Figure 4 shows the link from epistemology to methods that is discussed further throughout this section.

Figure 4

Theoretical Framework Guiding Study Design



Note. Adapted from Crotty, 1998, p. 4

Social Constructivism

The basis of social constructivism is that knowledge is built on social interactions and experiences (Kang et al., 2010; Lincoln et al., 2018). From an ontological standpoint, reality is relative and co-constructed. Knowledge is “constructed through our lived experiences and through our interactions with other members of society” which is in keeping with the interpretivist research paradigm (Lincoln et al., 2018, p. 115). Central aspects of social constructivism include: (a) no one true interpretation of reality (subjectivism), (b) knowledge and meaning are constructed through relationships, and (c) multiple interpretations are possible (Lincoln et al., 2018).

Social constructivism was selected as the research paradigm to be in alignment with interpretivism. Given the inquiry is framed by questions of how and why, positivist approaches would not be appropriate to answering these questions. Answers to the research questions could only be generated through interpretivist paradigms.

Social constructivism relates to my teaching philosophy and views on the classroom setting in that I have observed that students seem to learn more deeply and richly when they learn from each other rather than solely from me as an “expert.” From an epistemological perspective, it seems to me that truth comes from a place of the collective; the community truth. There are multiple voices contributing to the truth, and all participants may take up the truth differently. In the context of pharmacy education, these voices include instructors, mentors, preceptors, practitioners, and peers, as well as, importantly, the public and patients. These voices help students shape their understanding of pharmacy practice and patient care.

Case Study Methodology

To develop a deeper understanding of the phenomenon of interest, a case study was used. Case study can be defined as a way to “describe a phenomenon in context” (Baxter & Jack, 2008, p. 544). In addition, it is “appropriate for describing, exploring, and understanding a phenomenon in its real-life setting” (Anthony & Jack, 2009, p. 1175). As defined by Creswell and Poth (2018), case study can help to “explore an issue or problem using the case as a specific illustration” (p. 96).

There are various perspectives on how to define case study, though there are consistent features throughout these definitions (Creswell & Poth, 2018; Flyvbjerg, 2006; Flyvbjerg, 2011; Miles, 2015; Schwandt & Gates, 2018). Standard elements of a case study include that it is context bound, allows for in-depth exploration, is suited to the study of social phenomena, and

has definitive boundaries around the case (Merriam & Tisdell, 2016; Schwandt & Gates, 2018). Given the specific context of this inquiry in the unique practice environment in Alberta, and the definitive boundaries of the research (CDM in fourth-year pharmacy students in the practice skills lab at the University of Alberta Faculty of Pharmacy and Pharmaceutical Sciences), case study is a relevant and reasonable methodology. Case study can be approached in different ways; thus, it is important to review what various approaches to case study may offer in the social constructivist framing of this inquiry (Hamilton & Corbett-Whittier, 2019; Harrison et al., 2017; Yazan, 2015).

Approaches to Case Study

Just as there are multiple definitions in the literature to describe case study, there are multiple approaches to case study research (Flyvbjerg, 2006; Merriam, 1998; Schwandt & Gates, 2018; Stake 1995; Yin, 2014). Assessing different approaches to case study and evaluating the applicability to this specific research inquiry is imperative to ensure the methodology is in alignment with the theoretical framework. Three commonly used approaches are described by Yin (2014), Stake (1995), and Merriam (1998). There is overlap among these three ways to develop and execute case study research, yet they also diverge in key considerations, such as epistemology, design, data collection, and analysis (Yazan, 2015).

Yin approaches case study from a post-positivist standpoint (Harrison et al., 2017; Yazan, 2015). Post-positivism is evident in the terms he uses that are commonly linked to quantitative research, such as internal validity, external validity, and reliability. These elements are considered integral to each step of the study. Also, methods using the Yin approach are empirical and rigidly applied to the research (Harrison et al., 2017). In relation to case study design, Yin asserts that there needs to be a clear sequential approach to connect data to the

research questions. One major point of divergence in the Yinian approach from earlier positivist models is that it encourages the combining of quantitative and qualitative data sources. The post-positivist elements of Yin's case study methodology can be seen in each step of the research process, from data gathering through analysis to interpretation (Yazan, 2015).

Stake (1995) offers a more fluid mode for case study research. Stake's approach is aligned with constructivism (Harrison et al., 2017; Yazan, 2015), evidenced in his belief that meaning is constructed through an understanding of experiences in their actual context and setting (Harrison et al., 2017). Stake expects readers to understand the knowledge generated by the study in a different way from the researcher. The reader is constructing their knowledge based on their own subjective reality (Stake, 1995; Yazan, 2015). Stake believes that case studies are holistic because the "interrelationship between the phenomenon and its contexts" needs to be strongly considered by the researchers (Yazan, 2015, p. 139). Stake (1995) differs starkly from Yin (2014) in research design, in that Stake does not offer strict design elements, aside from developing the research questions. He believes case study design is fluid and dependent on the research process, the participants, and the researcher.

Merriam (1998) also comes from the perspective of constructivism, which positions her close to Stake (Yazan, 2015). Her case study's primary feature is the delimiting of the case being explored, and she views the case as "a thing, a single entity" (Merriam, 1998, p. 27). Still, her defining of the case may be broader and more flexible than that of Stake or Yin (Yazan, 2015). In Merriam's description, the unique attributes of case study are that it is particularistic, descriptive, and heuristic. It needs to focus on a particular phenomenon (particularistic), offers a thick description of that phenomenon (descriptive), and helps the reader develop a deeper understanding of the phenomenon (heuristic) (Yazan, 2015). Merriam (1998) offers step-by-step

guides to study design, similar to Yin's approach though not as prescriptive, and more clearly laid out than in Stake's model (Yazan, 2015). Merriam (1998) also holds that data collection and analysis should coincide as a foundational construct of qualitative design (Yazan, 2015). In alignment with the constructivist paradigm, she states that data analysis is "the process of making sense out of the data," which involves "consolidating, reducing, and interpreting what people have said and what the research has seen and read – it is the process of meaning making" (Merriam, 1995, p. 178).

Considering each of these possible approaches to case study and their definitions, epistemologic underpinnings, and research design, Merriam's (1998) is the most closely aligned with the research herein. Merriam describes descriptive case study as a way to "illustrate complexities of a situation – the fact that not one but many factors contributed to it" (Merriam, 1998, p. 30). Descriptive case study also provides an end result of a "thick description of the phenomenon under study" (Merriam, 1998, p. 29). Given that the goal is to provide a rich understanding of the phenomenon of uncertainty in clinical decision making, descriptive case study best describes the approach undertaken in this research.

Rationale for a Descriptive Case Study

Case study methodology, as it is being used in this research inquiry, is aligned with social constructivism and has been used in previous research on clinical decision making (Abuzour et al., 2017; Abuzour et al., 2018; Merriam, 1998). One of the key strengths of descriptive case study is that it offers a rich description of the phenomena of interest, providing context and a deeper understanding. Case study allows the researcher to show the importance of a deep understanding of a phenomenon by using multiple sources for data collection (Cresswell & Poth, 2018). Baxter and Jack (2008) state that when asking how and why questions, and when

context is a key factor in the phenomenon of interest, case study offers a strong methodology for consideration. These two factors hold true for this research. Thus the primary purpose of my research, to understand how pharmacy students make decisions and explore factors that influence uncertainty in their CDM, can be achieved through the use of descriptive case study.

One of the critiques of case study methodology, and descriptive case studies in particular, is that there is a lack of transferability of findings (Flyvbjerg, 2006; Schwandt & Gates, 2018). Transferability of the findings of this study to other pharmacy curricula is potentially problematic given the specific context of pharmacist prescribing and decision-making in Alberta. However, a study of this type in Canada that investigates pharmacy student decision making in an environment that includes pharmacist prescribing could only be conducted in Alberta. The uniqueness of the context of pharmacy practice in Alberta is why case study was selected. The knowledge gained from case study can be used to develop practical solutions to problems and can add additional understanding to the phenomenon of interest (Flyvbjerg, 2006).

Another commonly cited argument as to why case study methodology is flawed is that it is believed that this methodology cannot be used for theory building (Flyvbjerg, 2006; Schwandt & Gates, 2018). The practical knowledge generation of case study is considered a strength of its utility in research, and theory building should not be considered the only outcome of social science research (Flyvbjerg, 2006). In my study, understanding of the phenomenon is the goal; not a generation of theory around why pharmacy students hesitate to make decisions.

Descriptive case study takes into account the important role of context, is aligned with social constructivism, and has the strength of developing a deeper understanding of the phenomenon of interest. Therefore, descriptive case study is considered a suitable methodology for this research.

Research Questions

This study is framed around one primary and three secondary research questions. The primary research question for this inquiry is:

- What factors (context, internal factors, task complexity) contribute to issues such as uncertainty and hesitancy in clinical decision making by fourth-year pharmacy students?

Secondary research questions include:

- How do students construct decision making during a patient interaction (decision-making frameworks)?
- What factors help facilitate the development of clinical decision-making skills in fourth-year pharmacy students?
- What strategies do students use to become comfortable with taking responsibility for decision making?

In keeping with the original purpose of this research outlined in Chapter One, these research questions intend to provide understanding of the construct of CDM in order to enhance the curriculum of pharmacy education. The focus of educational development is on the practice skills lab and is informed by experiential education constructs.

Population and Sample

All students enrolled in their fourth year of the pharmacy program at the University of Alberta were invited to participate. The rationale for selecting fourth-year students as the population of interest is that they all had completed their undergraduate didactic course work and, in particular, their course work in the practice skills curriculum. The fourth-year students were on experiential placement in their final year of the program. As previously discussed, the

majority of CDM education is embedded in the practice skills stream. As such, by their fourth year students have the theory and practice afforded by the curriculum to work through the decision-making process using clinical judgment and reasoning. Their lack of experience is noted, in that these students have had only eight weeks of defined experiential placement before entry into their fourth year. They would be considered novice decision makers, and, as shown in the literature review, CDM differs between novice and experienced practitioners (Oliver & Butler, 2004).

The sampling technique used was purposeful sampling (Creswell, 2015; Merriam, 1998). Students were selected based on different characteristics and traits to get multiple perspectives on uncertainty and hesitancy in CDM (Creswell, 2015). One dimension for selection was experience. As noted in the literature review, experience has been found to be one of the most important influencers in the decision-making process (Nibbelink & Brewer, 2018). It is therefore crucial to recognize the role of prior experience in adult learners and how it influences learning and knowledge construction (Merriam et al., 2007). Previous experiences influence how students have seen decision making enacted in practice. In order to account for differences in pharmacy experience, participants were selected to ensure a range of experiential backgrounds, from no experience, to some experience, to significant pharmacy work-related experience outside of experiential rotations in the program.

The goal was to have enough participants to offer a clear description and explanation of the case from various perspectives. An exact number for sample size in case study is difficult to define a priori, and therefore the initial sampling frame was based on maximal variation (Creswell & Poth, 2018). This approach was not meant to limit participant recruitment to only

six, but only to provide guidance on participant selection. The initial sampling frame is described in Table 1.

Table 1

Characteristics to Help Guide Participant Selection

	Gender	Previous Pharmacy Experience
Participant 1	Male	Only in experiential rotations
Participant 2	Female	Only in experiential rotations
Participant 3	Male	Previous employment in a pharmacy (<1 year)
Participant 4	Female	Previous employment in a pharmacy (<1 year)
Participant 5	Male	Previous employment in a pharmacy (>1 year)
Participant 6	Female	Previous employment in a pharmacy (>1 year)

A total of eight participants were included in the study from the 125 students that were enrolled in the fourth year of the pharmacy program in the year the study was conducted.

Data Collection

In keeping with case study methodology, multiple sources of data were used to ensure a rich data set (Creswell & Poth, 2018). There were four sources of data: observation of interactions in a practice simulation, interviews with stimulated recall, written reflections, and a researcher journal.

Participants engaged in a typical simulated interaction, as previously experienced in their earlier years of pharmacy school, in which students assess the patient, determine the problem at hand, then decide how to help the patient (Seybert, 2011). Interactions in the practice skills lab are typically 7 to 12 minutes in length; generally, they increase in length and complexity as the

student progresses. For this study, a trial interaction was developed with no one specific correct answer, in which a multitude of alternatives could be appropriate for the care of the patient (Appendix A). The original case was modified after a one-student trial (further details in Chapter Four).

Observation of Interaction

As the students interacted with the simulated patient, the room was monitored with video-recording and live-stream equipment, which is typical during practice skills lab activities. Live-streaming allowed the researcher to observe their actions without directly interfering with their interaction. Using the form in Appendix B, observations were documented to help prepare for the interview with stimulated recall. Specific times were noted during the interaction where hesitancy or uncertainty were apparent, so that during the stimulated recall interview these time points could be discussed in further detail. It was also noted when students made a clear decision.

Interviews with Stimulated Recall

Stimulated recall is a qualitative data collection method that is “considered to be an approach that is particularly suitable for examining processes and has most frequently been used to study learning processes, interpersonal skills, and decision-making processes” (Hodgson, 2008, p. 212). It is considered an introspective method that can help elucidate cognitive processes (Gass & Mackey, 2015).

Video-recording of student interactions in the practice skills lab allowed for the recording and playback of their interactions. The stimulated recall interview was done immediately after the interaction to ensure the student was still in the interaction mindset but before deeper reflection on the interaction occurred. The interview’s timing was meant to increase the accuracy

of recall (Gass & Mackey, 2015). Importantly, this method helps participants recall but not necessarily reflect on the event, hence the addition of data collection through a written reflection to augment the interview data (Hodgson, 2008).

The benefit of stimulated recall over other introspective analysis methods is that it can be used immediately after the interaction and not interfere with what the student is trying to do during the interaction (Lundgren-Laine & Salantera, 2010). Think-aloud techniques that are used during an interaction, which have been used in decision-making research previously, may modify how a student approaches an interaction and how they come to a decision (Abuzour et al., 2017; Croft et al., 2017; Gregory et al., 2016). To simulate what the students are used to in the typical lab setting, they completed the interaction as they usually would, by interviewing a simulated patient and working through the case. Reflecting during the interaction may have changed their approach. By using an introspective method immediately after the interaction, the objective was to better understand the students' thought processes and perceptions without interfering with their performance of the activity itself.

Stimulated recall was used after the participant's interaction. The participant and interviewer would watch the video with time points noted by the interviewers observation of the interaction (Appendix B). The interviewer would then stop the video and ask the corresponding question related to that point of the video. The interview was completed after all time points were discussed and the entire video was watched.

Student Written Reflections

To further understand the students' perspectives on their learning and decision making, participants completed written reflections one to two weeks after the interaction. The aim was to collect different data from the stimulated recall interviews. The reflections were intended to

focus on deeper learning about decision making. Reflections are consistent with the social constructivist paradigm as they can promote self-assessment and a “transfer of conceptual knowledge out of the classroom and into different contexts” (Kang et al., 2010, p. 128). With reflection, students build knowledge that can then be used in actual practice, which is the main objective of teaching in pharmacy. Reflection has been shown to help students construct their knowledge (Kang et al., 2010).

The students were only provided with specific questions to prompt their reflections (Appendix C). The questions focused on what elements of their teaching and learning experiences contributed to the development of their CDM skills and how they envision the importance of CDM responsibility as professionals.

Researcher Journal

Throughout the research process, a researcher needs to document thoughts, observations, decisions, questions, and reflections that arise (Bloomberg & Volpe, 2016; Merriam & Tisdell, 2016). These reflective field notes can move beyond just describing events to serve as a preliminary interpretation of data (Merriam & Tisdell, 2016). This data collection method differs from the straightforward observation protocol (as indicated in Appendix B) that guided the stimulated recall interviews, to include reflections on the research process. As discussed by Creswell (2016), “sufficient reflexivity exists when researchers record notes during the research process that reflect their own personal involvement” (p. 225).

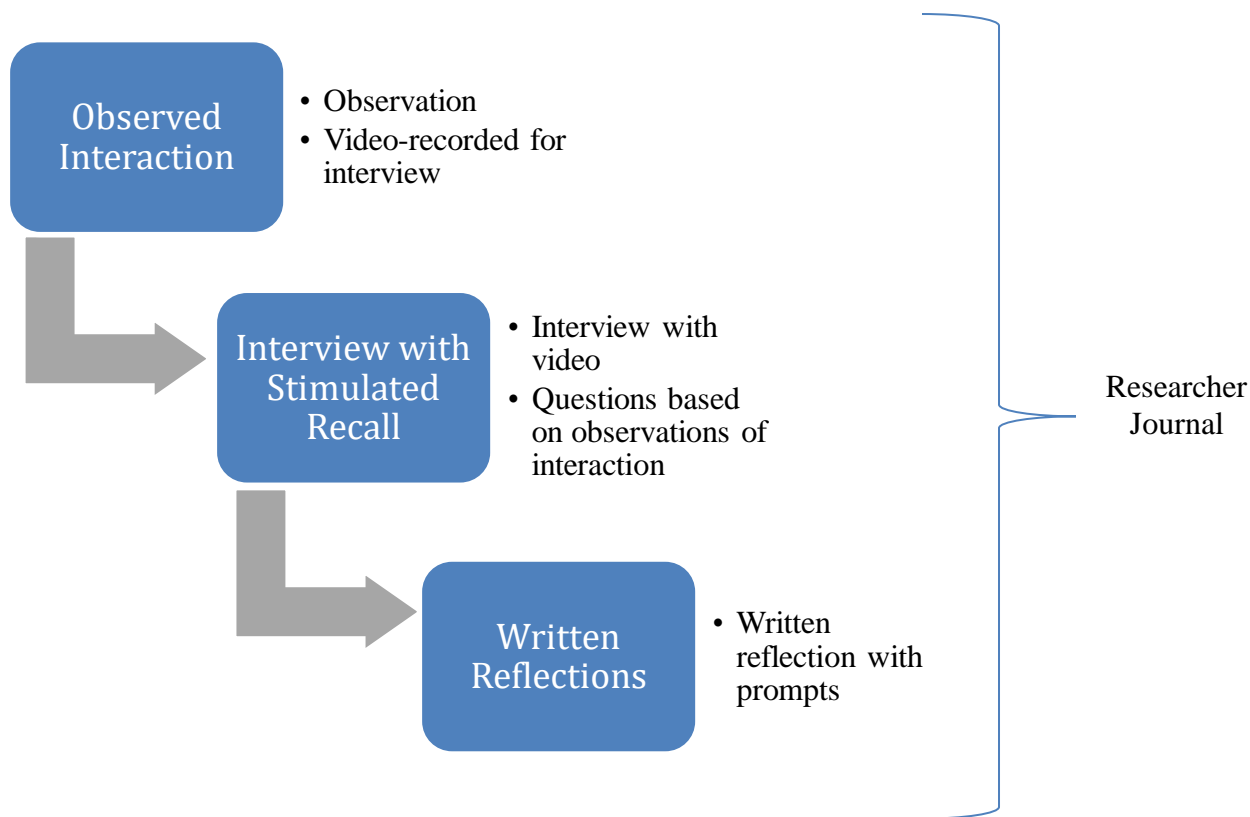
Summary of Data Collection

Data collection occurred at multiple time points in the study to understand different elements of the decision making of pharmacy students, as shown in Figure 5. The early stages of data collection (observed interaction and interview with stimulated recall) are rooted in working

memory and short-term memory of the interaction. They reflect the students' initial processes and perceptions of decision making. The later stages of data collection (written reflections) rely on longer-term memory in endeavouring to understand how decision making has been constructed during their pharmacy education experiences. The final stages of data collection investigated the social constructivist aspects of decision making and how those relate to the students' pharmacy education journeys.

Figure 5

Elements of Data Collection



Data Analysis

Data analysis occurred simultaneously with data collection, in keeping with a constructivist case study approach (Merriam, 1998). Initially, data from the interviews were transcribed verbatim, along with observations made during the actual interactions. All interview

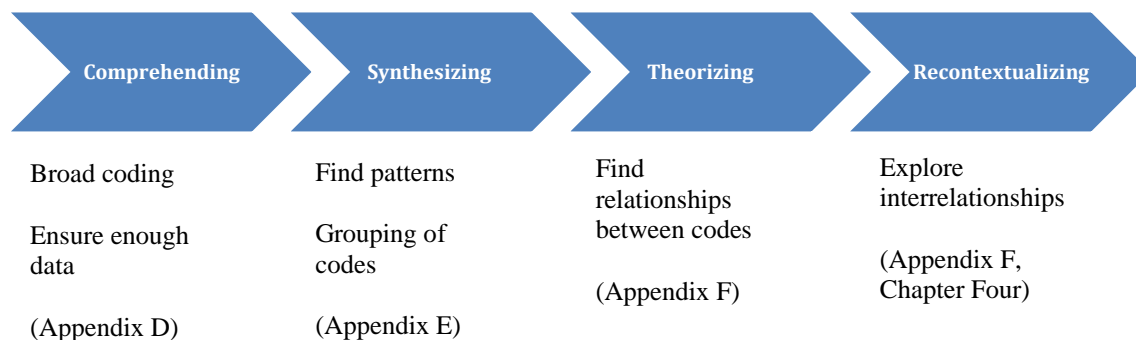
transcripts, audio recordings, and student reflections were kept in password-protected files labelled by student number. Each student was then given a pseudonym for reporting of the findings.

The data analysis framework was taken from the perspective of my interpretation of what they were saying, rather than just an analysis of the words they used to answer the interview questions. This is important as I was observing them during the interaction and the interview and was able to observe hesitancy in how they answered questions, which may not come through in only a simple reading of the transcripts. This was also noted in my researcher journal.

Stages of data analysis are represented in Figure 6 below (Houghton et al., 2015; Morse, 1994).

Figure 6

Stages of Data Analysis



In the comprehending stage, methods were employed to help ensure adequate data was gathered to offer in-depth descriptions of the participants and the phenomenon of interest. Broad coding was used to ensure no themes or developments in the data were lost or reduced at this stage (Mays et al., 2006; Miles et al., 2014). Both inductive and deductive coding was used at this stage. Deductive coding uses a pre-determined list of codes to inform the coding process. In inductive coding, “codes emerge progressively during data collection” (Miles et al., 2014, p. 81).

Some examples of the initial list of codes that were applied to the data include identifying elements of the decision-making process, contextual factors related to decision making, and indicators of hesitation, as developed from the literature review. This deductive coding was employed alongside inductive coding to ensure that new, emerging concepts were not missed in the coding process (Miles et al., 2014). First-round coding from this comprehending stage is documented in Appendix D.

In the synthesizing phase of data analysis, patterns were investigated, in particular in participants' perceptions of decision making in the context of their interactions, as well as the follow-up perceptions in their narratives. Thematic analysis was employed in the second cycle of coding to find groupings of codes that could be considered categories, explanations, relationships, and related to theoretical constructs (Miles et al., 2014). This second stage of coding during the synthesizing phase is outlined in Appendix E.

In the subsequent theorizing stage, an attempt was made to find relationships between codes to ensure a deeper understanding of the linkages between constructs. These interrelationships between themes offer a more vibrant picture of the hesitancy of pharmacy students in CDM. The first draft of themes from the theorizing phase is found in Appendix F. Finally, during recontextualization, overarching explanations for the data were developed and analyzed. Further examination of the patterns and interrelationships in the data was imperative for a deeper understanding of the phenomenon of interest. The findings of this final stage of analysis are presented in Chapter Four.

Trustworthiness and Integrity

Validity and reliability in qualitative research can be approached from different perspectives, and a variety of terms have been used to describe these constructs in different

frameworks (Creswell & Poth, 2018). From a social constructivist perspective, the quantitative parameters of internal validity, reliability, and external validity are considered as credibility (internal validity), consistency (reliability), and transferability (external validity) (Lincoln et al., 2018; Merriam & Tisdell, 2016; Morse, 2018). In this inquiry, trustworthiness was achieved by using multiple methods, ensuring the lenses of the researcher, the participants, and the reader were all considered (Creswell & Poth, 2018). The approach identified a priori to ensure credibility, consistency, and transferability is represented in Table 2.

Table 2

Summary of Methods to Ensure Study Integrity

	Credibility	Consistency	Transferability
Definition of construct	How congruent are the findings with reality? (Merriam & Tisdell, 2016)	Are the findings consistent with the data collected? (Lincoln et al., 2018; Merriam & Tisdell, 2016)	How usable are the findings to readers? (Creswell & Poth, 2018; Merriam & Tisdell, 2016)
How achieved	Triangulation Member checking Reflexivity	Audit trail	Thick description Maximum variation sampling
What lens is considered?	Researcher's Participant's	Reader's	Reader's

Triangulation

Using more than one method of data collection and multiple sources of data, the data was triangulated to increase trustworthiness. This method corroborated the data through the researcher's lens. Each student worked through a patient case in a simulated interaction, after which the student was interviewed by the researcher using video-stimulated recall. The interviewer guided the student through the interactions and discussed when key decisions were made or not made. After the interview, the student had two weeks to write a reflection and consider what they had learned from the experience regarding their CDM. From a constructivist perspective, the time for reflection between the two points of data collection allowed for meaning-making and uncovering themes that did not arise during the first stage of data collection (Merriam et al., 2007). In addition to data from the reflection and stimulated recall interview, the researcher collected observations during the interaction. The different types of data collected from the various sources were cross-checked to verify the findings.

Member Checking

Member checking was one strategy used to confirm interpretations of meaning with study participants and ensure that the participant's lens was considered and reflected in the study, an important element in the trustworthiness of the research. Participants were offered an opportunity to review transcripts and provide feedback or corrections following their interviews. All students responded that the transcripts were reflective of the interview and their statements.

Audit Trail

Collecting "good data" ensures rigour (Morse, 2018, p. 808). An audit trail was used to track decisions regarding methods and analysis and why those decisions were made (Morse, 2018). The researchers' journal kept throughout the research process was integral in providing a

clear audit trail. Video recordings of student–patient interactions and audio recordings of post-interaction interviews also served to increase credibility and reliability. The recordings enabled reflection and recoding of data collected and initially coded in real time, and evaluation of continuity in the developed codes.

Reflexivity

As case study methodology is within the interpretivist frame, and based on the ontological view that reality is subjective, it was critical that I as a researcher considered my positionality and role throughout the research process. I reflected on my influence on the data collection and analysis from the perspective of teacher, researcher, practitioner, and insider. To ensure this reflexivity, I kept a journal throughout the process of data collection and analysis to reflect on my personal involvement through each stage. My positionality and its impact on my role as a researcher are more fully described in the upcoming discussion of the role of the researcher.

Thick Description

As case study attempts to offer a deep and thorough description as its primary objective, the opportunity to provide a thick description of the phenomenon of interest is embedded within the study design itself. Clear details pertaining to the setting, the participants, and interactions between the researcher and participants help develop this thick description (Creswell, 2016). These descriptions, offering “abundant, interconnected details, and possibly cultural complexity” (Stake, 2010, p. 49), are depicted in Chapter Four.

Summary of Trustworthiness and Integrity

In undertaking this research, it was vital that the inquiry be conducted with credibility, consistency, and transferability. Table 3 demonstrates how data integrity was ensured throughout

data collection and analysis. The measures taken to gather data that is credible, consistent, and conceivably transferable builds trust in the results.

Table 3

Trustworthiness of Analysis

Credibility	Consistency	Transferability
Triangulation: Used multiple data sources.	Audit trail: Examples of coding provided in	Thick description: All themes are supported by
Member checking: All transcripts were reviewed by participants.	Appendices. Recordings, transcripts, and reflections are kept in secured files.	quotes and examples from the data.
Reflexivity: Researcher journal was maintained throughout data collection and analysis.		Maximum variation sampling: Students were selected based on variation in experience (see Table 1).

Limitations and Delimitations

As with any research inquiry, some limitations need to be considered for their potential effect on the results and interpretation of the findings. One major limitation is my bias as a pharmacist, with a vested interest in this research as it represents my work related to the teaching and learning experiences of students in the practice skills lab. I feel that I have a particular interest in this work and the outcomes of this research. These considerations of positionality were captured in my reflexive journaling during data collection and analysis.

Qualitative researchers often embark on projects in areas they are familiar with, given their desire to understand phenomena they come across in their own practice; this is the case in

this study. Given my role as a pharmacy educator, study participants possessed prior knowledge of me, and shared relationships with me. This fact may have influenced the results of the study. Also, there is a possibility that research participants responded according to what they believed I wanted to hear, to influence or impress me. I have access to students within my program and, therefore, those were the people I approached to volunteer for the study. I could not easily access students from other pharmacy programs, and, as such, the transferability of my findings to other programs has not been explored. This is a limitation of this study.

The study is delimited by its context. Given the uniqueness of the practice context in Alberta, it offers the opportunity to investigate student decision making related to pharmacist prescribing. This cannot be done elsewhere in Canada. The responsibility of decision making in the Albertan context may be different from the responsibility students in other jurisdictions feel with regard to decision making. Still, while context is a delimiting factor, it is also the factor that makes this inquiry unique, and certainly there are other jurisdictions in which the findings may be of relevance. Another delimitation is that only one cohort of students was included in the purposeful sampling frame. Students progress through the program as a cohort and are enrolled in all the same classes at the same time. It is assumed, therefore, that each student included in this study would have experienced the same intended curriculum, including in the teaching of CDM. This limitation to one cohort does not allow for an analysis of differences between different years of the program. The findings are only reflective of students enrolled in the fourth year of the pharmacy program in September 2019.

Ethical Considerations

Researchers must ensure that research on human subjects is carried out ethically and adheres to standards. This study conformed to the ethical standards and protocols of the

University of Calgary Research Ethics Board and the University of Alberta Research Ethics Board. Ethics approval was received prior to student recruitment.

Consent was secured by providing information about the study, including its purpose, general design, and plans for dissemination, to prospective participants when invited to be part of the study. Participation in the study was completely voluntary, and this was stressed in invitations sent out to selected students. Participants were reminded at the start of simulated interactions and subsequent stimulated recall interviews that they were free to withdraw at any point during the study period. In order to participate, students were required to consent to the video recording of interactions and audio recording of interviews.

The privacy and confidentiality of participants were ensured, as was their anonymity. As there is only one pharmacy school in Alberta, my descriptions of the participants needed to be limited and not include any identifying information to ensure anonymity (Cohen et al., 2017). Pseudonyms were assigned to each participant, and any identifying factors that could unmask the participants were excluded from Chapter Four. All responses and documentation arising from the inquiry were treated as confidential, and all digital audio and video files and transcripts were stored in password-protected files on my computer.

Benefits and risks of study participation were considered as part of the ethical conduct of this inquiry (Cohen et al., 2017). By having participants share personal details and information in interviews and reflections, unexpected feelings could occur during the data collection process (Kvale, 2007). Participants were advised of this risk during the consent process. On the other hand, participation in this research may have also produced benefits for participants. The student participants may have developed new knowledge they can take forward into their practice and insights that could change their perspectives on pharmacy practice.

Finally, it should be noted that, in ethical considerations, power is a strong influencer (Cohen et al., 2017). I was cognizant of the powerful relationship I have with the students. It is possible that participants responded in ways they anticipated I would want to hear (Kvale, 2007). To address this concern regarding power differential, I conducted this research during their fourth year, when I no longer taught or coordinated any of their courses. At this stage of their education, my power related to their marks was at a minimum, which hopefully reduced the ethical issue of power differential.

Role of the Researcher

Social constructivism holds that “findings are due to the interaction between the researcher and the subject” (Lincoln et al., 2018, p. 116). In alignment with the interpretivist paradigm, I played a role in the data collection and need to be aware of how that influenced the study.

Reflecting on my positionality, I considered my role as a researcher to be that of an “insider.” I am a practising pharmacist and educator in Alberta, heavily influenced by my previous research in the area of pharmacist prescribing (Al Hamarneh et al., 2013; Charrois et al., 2012; Charrois et al., 2013; Tsuyuki et al., 2015). My previous experiences in pharmacist prescribing, including as a prescriber myself, have led to some of my research questions and certainly framed my queries regarding decision-making responsibility and hesitancy in practitioners. This is supplemented by my observations, as an educator, of students participating in lab activities. I have constructed knowledge regarding decision making from these previous experiences that I acknowledge may have influenced my understanding and interpretation of the data.

In consideration of my influence on the students during data collection, I attempted to minimize direct interaction with participants during the simulated scenarios. As discussed in the data collection section above, the simulations were similar to those in the students' regular practice skills labs. As case study is situational, I wanted the consistency of the standard setting maintained. For the post-interaction stimulated recall interviews, I engaged with the participants. As I am intimately familiar with the decision-making teaching we undertake in our curriculum, I was able to actively probe students, making my role and positionality essential to this process. As an instructor within the program, I feel some ownership in how students construct their roles as prescribers, and that may lead to some bias in how I expected students to answer interview questions. I needed to be aware of these biases as I analyzed the data.

Researcher Assumptions

There are three assumptions I made as a researcher in designing and implementing this study. Firstly, I assumed the students wanted to make decisions, but felt held back in making these decisions for reasons that needed exploring. Students are provided opportunities, throughout the practice skills curriculum and in their practical experiences, to make decisions. Given our scope of practice in Alberta, pharmacists are required to make decisions daily.

Secondly, I assumed the students had enough information provided as part of the simulation scenario to make decisions. The cases were written, trialled, and vetted by practising pharmacists to ensure a decision could be made with the information provided. Previous research shows that pharmacists often cite a lack of information as a rationale for not making decisions, so that was explored during the post-scenario interviews and reflections.

Finally, during interviews and reflections, I assumed the students provided me with honest responses that were not unduly influenced by my presence. It was important that participating students trusted in the confidentiality of all responses.

Summary of Research Design

This section has outlined the conceptual and theoretical framework informing this inquiry into how pharmacy students make clinical decisions and their hesitancy to make these decisions. The ontological, epistemological, and methodological assumptions underpinning the study's theoretical framework were discussed in the overarching interpretive paradigm. Decisions regarding methodology, data collection, and analysis were presented within the context of social constructivism. Finally, considerations of context, trustworthiness, ethics, and the researcher's role were presented. Chapter Four describes the findings, including the themes that were generated through analysis of the collected data.

CHAPTER FOUR: FINDINGS

The findings from this study are presented by first describing the participants who volunteered for the study and the context of data collection. This is followed by rich descriptions of the themes that were developed based on the data collected. Data collection took place from October 2019 to January 2020. Data analysis continued through to April 2020. Data was collected from observed interactions, interview transcripts, written reflections, and field notes, including the researcher's reflective journal.

Participants

Recruitment of pharmacy student participants occurred over two months. An initial recruitment e-mail was sent out to all fourth-year pharmacy students at the Faculty of Pharmacy and Pharmaceutical Sciences at the University of Alberta in early October 2019. An additional e-mail was sent out in November 2019 to increase participation.

A total of eight students were enrolled in the study. Participant demographics are included in Table 4. The first participant was interviewed in October 2019 as a trial of the case and procedures. After this first participant's interaction, the simulated patient case was modified. The original case did not allow for the participant to make a prescribing decision, and was modified to produce a scenario in which the participant, if they so chose, could legally prescribe medications for the simulated patient. The first participant's data was not included in the final analysis, given it was conducted with a different patient case. The updated patient case is documented in Appendix A.

The remaining participants all engaged in the updated interaction and the findings are reflective of these seven participants. These participants were in the midst of their final year of the undergraduate Doctor of Pharmacy program at the University of Alberta, which includes four

eight-week clinical ExEd rotations at different types of pharmacy sites (community, acute care, long-term care, etc.)

Table 4

Participant Characteristics

Participant Pseudonym	Paid Work Experience (Duration – Site)	Gender	Date of Interview
Caitlin	1.5 years – community	F	Oct. 23, 2019
Aaron	4 months – community	M	Nov. 7, 2019
Andrew	3 years – community	M	Nov. 19, 2019
Luke	3 years – community and primary care network	M	Dec. 15, 2019
Lauren	3 years – community and hospital	F	Jan. 9, 2020
Jessica	<1 year – community	F	Jan. 24, 2020
Julia	< 1 year – community	F	Jan. 25, 2020

As per the sampling frame (Table 1), participants were selected purposefully to ensure different levels of paid pharmacy experience, as shown in Table 4. This experience ranged from a few months to several years. The sampling plan was to recruit an equal number of male and female students, but fewer males volunteered for the study than females. From a class comprising 39% male and 61% female students (personal communication, K. Cor), a total of 14 students volunteered for the study, 11 of them female. All three male participants who offered to participate were asked to volunteer for the study. The four female participants were selected based on previous experience and proximity to Edmonton during the interview times. Thematic

analysis that occurred alongside data collection, allowed me to identify after Jessica's and Julia's interviews and reflections, that no new themes had emerged, and therefore no more participants were recruited. All participants participated in the interaction and stimulated recall interview. All participants except Aaron submitted a written reflection.

Context of Data Collection

All interactions and interviews were conducted in the practice skills lab space at the Faculty of Pharmacy and Pharmaceutical Sciences at the University of Alberta. The participants were all familiar with this space, having had weekly to biweekly practice skills labs throughout the previous three years of their undergraduate education.

As in a regular practice skills lab the interactions were conducted in small interview rooms equipped with a computer for the participant to use if they needed to reference information online. The simulated patient was briefed prior to the interaction, then went into the interview room with a timer set for 10 minutes, the typical amount of time allotted to a patient interview during a regular practice skills lab. I set up the live-stream camera to watch the interview in real time from another room, and recorded the participant-patient interaction for the purposes of the subsequent interview. I was in a separate room with the door closed, so the participant and the simulated patient could not see me, nor could I intervene in their interaction in any way. Once the participant felt they had completed the interaction, or the timer went off, I would stop the recording and go into the interview room. The simulated patient would then leave the practice skills lab and I would conduct the interview with the participant in a different interview room. The intent was to ensure the study activities would feel as much as possible like a routine practice skills lab.

Data Analysis

As discussed in Chapter Three, the first round of coding was broad. It resulted in a total of 91 codes (Appendix D). This coding was then further refined into 80 codes in nine categories (Appendix E). Using this set of codes, three faculty colleagues with experience in pharmacy practice and education sorted the codes from the transcripts and reflections to see if similar categories emerged. From this process, a final set of five themes and sub-themes were developed (Appendix F). This set was then reapplied to the full data set to ensure consistency, then modified to produce the final set of themes and sub-themes shown in Table 5 below (Merriam, 1998; Miles et al., 2014; Morse, 1994).

Table 5

Final Set of Themes and Sub-Themes

Themes	Sub-Themes
Relational Factors	Patient relationships Physician relationships Collaboration Roles and boundaries Experiences with physicians Autonomy
Teaching and Learning	Formal education Knowledge and competency Didactic learning and assessment Practice skills and simulation learning

	Using the patient care process
	Experiential learning
	Learning in the real world
	Role modelling and mentorship
	Disconnect between school and practice
	Work environment

Degree of Certainty	Patient complexity
	Weighing risks and benefits
	Comfort with ambiguity
	Lack of information

Personal Characteristics	Life experiences outside of pharmacy education
	Confidence
	Leadership

Enactment of the Decision	Willingness to make a decision
	Referral
	Taking responsibility
	Unwillingness to make a decision

Outcomes of the Patient Interaction

The patient case (interaction) was structured so that the participant would need to stop the current medication the patient was taking, as it was causing a significant side effect, and then determine whether the patient would need alternative drug therapy (Appendix A). In the ideal

scenario, the participant would stop the medication, then start a new medication, or stop the medication and offer to call the doctor to recommend a reasonable alternative medication. Given that pharmacy practice is complex, and decisions are based on many different elements, a wide variety of participant responses was anticipated.

As shown in Table 6, Caitlin and Aaron felt it prudent to continue current therapy, although they both recognized a problem with the medication. They asked the patient to follow up with the prescribing doctor. Caitlin stated, “I don’t think this patient should stay on perindopril. . . . I feel like if the doctor prescribed perindopril he would have set up some kind of follow-up.” As Aaron described it, “I know there is a problem and I know there’s a solution, I just have to look into it further,” noting his rationale during the interview: “Maybe we can talk about some other therapy with your doctor . . . then I’m a little bit more comfortable.”

Andrew added a new medication to the existing one to improve the efficacy of the original medication, without recognizing the urgency of stopping the current medication. Commenting on his rationale he said, “It’s a pretty common, I would say, a combination I had seen . . . and it seemed like it’s a perfectly good option for the patient.”

Luke and Jessica both stopped the current medication and were going to call the prescribing doctor to offer a recommendation on a change to therapy. Luke recounted his plan: “Yeah, two options . . . [first] stop the medication and refer. And then the second option was, I was thinking . . . I’m going to prescribe like a CCB [calcium channel blocker].” On further consideration, Luke decided to call the doctor as he felt there was a need for additional lab work, noting, “I don’t think the pharmacist should be the one [ordering lab work].” Jessica described her considerations: “Is it going to be too excessive to discontinue the perindopril for a risk of

acute kidney injury or is it, you know, something that might normalize?” She then stated, “I’m not going to refill it today, I’m going to contact the doctor, look into it more.”

Julia recognized the problem but wanted to lower the dose of the medication first, get some additional lab work, then have the patient see their doctor to determine if there was anything more serious. She stated, “I didn’t have a full picture history of what was causing the renal issues. So, again, like, I think more lab work needed to be done in general.” Discussing her reasons for not changing the medication immediately, Julia said, “If you didn’t need to change it . . . because this was a transient effect, then decreasing the dose would be more appropriate because we were seeing that there were changes happening.” Julia did take responsibility for following up with the patient after the lab work.

Finally, Lauren stopped the problematic medication and prescribed a new medication as she was concerned about the acuity of the situation. She recounted her thought process for her final decision: “I didn’t find any guidance on what to do . . . I was debating whether to stop it or send them to the doctor to decrease the dose, or to just change it.” Of her ultimate decision to prescribe a new medication, she said, “I just decided, since I have APA, he doesn’t have comorbidities, his kidneys were okay before . . . so I figured, let’s just change it.”

As demonstrated in the above responses, while each participant recognized there was a problem, how they interpreted the urgency, the patient factors, and their relationship with the doctor and the patient, all seemed to be initial considerations in how they came to their decisions. This complexity was reflected in the types of questions they asked the patient during the interaction to clarify these factors. On further questioning in the interview, other elements, such as confidence and teaching and learning factors, were uncovered as being influencers in the students’ CDM.

Table 6*Types of Decisions Made by Participants*

Participant	Outcome of the Interaction				
	Refilled medication	Stopped offending medication	Deferred patient to doctor	Referred patient to doctor	Prescribed
Caitlin	X		X		
Aaron	X ^a		X		
Andrew					X
Luke		X		X ^b	
Lauren		X			X
Jessica		X		X ^b	
Julia					X ^c

Note.

^a Wanted to lower dose but was not clear to what dose; stated needed more information.

^b Was going to call doctor with specific recommendations for a new medication.

^c Adapted dose of current medication plus ordered additional lab work; undertook to follow up with patient after lab work.

As anticipated, the participants enacted a wide range of outcomes to help the simulated patient. The primary research question focuses our analysis on issues of uncertainty in the participants' clinical decision making. Related themes are presented below.

Relational Factors

Relational factors is the first theme related to hesitancy in CDM. This theme includes how relationships with others who are part of the decision-making process influence a student's ability to make decisions. The most notable relationships discussed were with patients and doctors. Codes developed from analysis that are associated with relational factors include patient experience, patient expectations, patient population, "stepping on toes," physician expectations, trust, and collaboration. These relational factors included experiences and interactions with physicians and patients. Relational factors also included the constant negotiation of the roles and boundaries of pharmacist care which is influenced by physician experiences. Finally, relational factors also related to how autonomous the participants felt in making decisions. Participants talked about how they needed to consider all of these relational factors as part of the decision-making process; for example, the risk of making the doctor angry, the patient being comfortable with the pharmacist prescribing, whether colleagues were supportive of their autonomy.

Patient Relationships

Participants placed patient relationships at the centre of the decision-making process. Understanding the patient's wants and expectations was integral to the participants' considerations of whether to prescribe or not. Caitlin, for example, discussed how she would be more likely to prescribe for a patient who came into the store regularly, and was someone with whom she was able to chat.

[S]ometimes you have . . . the patients who come. . . once every five months and they get refills for everything and then you never see them again, and they're really elusive and hard to track down; and then you have your patients that just talk to you forever 'cause they know you. And so I feel like if you have the patients that talk to you and know you very well and trust you, it's really easy for me to implement and change and know that I'd be able to follow up.

Caitlin was reflecting on the development of relationships with patients, where trust is built and fostered. Participants described how these relationships were more comfortable to build in community pharmacies that were smaller and less busy, as they had more time to devote to building relationships. Patient relationships were also influenced by the pharmacy's location and the type of patient population served. For example, Jessica described working in a community pharmacy in the inner city where there are always concerns about patient safety, noting that if pharmacists referred the patient back to the doctor, the patient might be completely lost to follow-up: “[On] my rotation now, every single pharmacist has their APA and they use it pretty much every day for mostly every patient, because this [is an] inner-city population so they're almost never going to see a doctor.” Concern about patients suffering adverse outcomes due to lack of follow-up pushed this participant to be more decisive.

Included in the sub-theme of patient relationships is a concern over what is easier and more convenient for the patient. Referring a patient back to the doctor when a participant felt the pharmacist could take care of the situation seemed duplicative. Julia described this: “I feel it's redundant personally to send him to the doctor to get lab work for something that the doctor might not have to assess anything new at this point – it could have been an error in the lab.”

Lauren linked this convenience for patients to her confidence in her decision making: “This is just more convenient for the patient and I’m confident.”

The autonomy of the patient was also discussed as part of the patient relationship. Participants recognized that the final decision is truly up to the patient; pharmacists can make suggestions, but the patient actually gets to decide if they agree, will take the medication, go for the lab work, or prefer the doctor to deal with it. As Caitlin noted, “Patients sometimes don’t believe in the pharmacist changing things.” Andrew explained how patient autonomy and decision making is integral in enacting the decision because, even if you want to make a decision, “the patient still has to agree to it. Like I could pull up all the guidelines, all the recommendations, but it’s really up to them.”

Physician Relationships

Included in the sub-theme of physician relationships are collaboration, roles and boundaries, and experiences with physicians. Given the traditional health-care model, where the physician is often seen as the primary decision maker, the relationships participants have created or observed with physicians become integral in developing their decision-making strategies. Through work experiences and ExEd, participants have the opportunity to see positive and negative relationships with physicians and the negotiation of these relationships that pharmacists navigate daily to provide patient care. The politics of these relationships are complicated and influenced by the individuals as well as the health-care system.

Collaboration. When working through the interaction, participants were keen to know when the patient had scheduled a follow-up appointment with the physician, as they wanted to work collaboratively and not duplicate workload. When describing why she had asked about the simulated patient’s follow-up plan with the physician, Julia stated,

I wanted to see if there was a plan with the doctor . . . making sure that I'm collaborating with the right people; like, there's no point in two people doing all the work if one person already kind of assessed it.

Participants felt that collaborative relationships were the ideal, where pharmacists were appreciated for their knowledge and contribution to patient care. Aaron described this: "If it is collaborative, my opinion will be valued, but at the same time we need to work together."

Roles and Boundaries. Negotiation of the boundaries of the pharmacist's role was something participants struggled with understanding, having observed these boundaries to be dependent on the work environment and the pharmacists they worked with in practice. Three participants described the overarching fear of overstepping boundaries as a reason why they chose not to make clinical decisions. As stated by Luke: "I don't want to step on the doctor's toes."

An example raised by all participants was the role of ordering lab work as part of follow-up for patients to get more information that might help them make a clear decision. Alberta pharmacists can apply for a designation to order lab work. A requirement in ordering lab work is that the pharmacist is responsible for the result and, if it is a critical result, the ordering pharmacist must be available to handle it. Three participants described not fully understanding how they should deal with ordering lab work, given this implied responsibility. Andrew stated this quite clearly: "I have a hard time figuring out where as a pharmacist, where our role is in terms of the lab ordering. . . . I don't know how it fits into my workflow." This feeling was echoed by Caitlin, who was uncomfortable taking responsibility for lab work results: "I think I'd rather a physician [order lab work] . . . 'cause then it's attached to a physician's name." When asked about her uncertainty around next steps, Caitlin said, "Yeah, who should follow up on that

lab?” The complicated understanding of these roles was described by Andrew as “trying to decide whose role is it going to be so that’s shared, like, [a] shared collaborative role. I don’t want to be overstepping . . . or taking over their autonomy.”

How we teach students about their role in patient care is also linked to this relationship with physicians. Luke wrote in his reflection:

The role of the pharmacists is often unclear to students and not formally explored in the pharmacy curriculum as we are left to find this out via work or ExEd. I feel that there is inconsistency between different practice areas as well as inconsistency within practice areas.

Both Caitlin and Luke explicitly stated that knowing their boundaries as a pharmacist is essential, as they do not want to “step on the toes” of physicians. Julia, who was very decisive in her plan with the simulated patient and in adapting new drug therapy, also felt these boundaries were hard to negotiate, stating, “Your job is your job, so you don’t want to push boundaries.” Much of the boundary negotiation is related to the pharmacists and students wanting to cultivate and maintain positive working relationships with physicians, while also providing excellent care to their patients; it is a balancing act of factors, patients, and physicians.

Experiences with Physicians. The negotiation of these boundaries and roles, of who is going to do what for the patient, is interlinked with previous experiences with physicians. Caitlin described having negative experiences that led her to feel that “In the real world, . . . doctors don’t always like you changing things.” Four participants, however, described positive past experiences with physicians that increased their confidence in making decisions for patients. Lauren, speaking about a previous ExEd rotation, said, “When I thought of anything that I thought was appropriate for my patient in terms of medication, I would just let the doctors know

and they were always fine with changing it for me, if they agree with me, which is all the time.” This experience was definitely impactful in Lauren’s confidence building (described below in the section on personal characteristics).

The development of these relationships was also crucial to how participants felt they were valued and used on the health-care team. The feeling of being a trusted member of the team was important. Jessica suggested that knowing “a physician is responsive” to the pharmacist was also integral when deciding on the most appropriate care for the patient. Aaron also felt that building these relationships, and a good understanding of where you stand in the relationship, were important. He noted it was helpful in developing these relationships to “pick and choose where I want to be very vocal.”

Autonomy

Four participants described the feeling of being autonomous as essential for them in developing confidence with CDM, and this was related to their relationships with others on the health-care team. Luke illuminated this interrelationship between autonomy and collaborative care: “I stepped into fourth-year placements with confidence, having practised in these multidisciplinary settings where pharmacists practise to their fullest scope but were also autonomous and key players in drug-therapy decisions.” This belief that pharmacists can make autonomous decisions within a collaborative environment was important to the participants in their decision making. Luke also stated: “I realized I was truly spoiled with my experiences working in settings that embraced the pharmacists’ skill set and provided pharmacists with autonomy to think like prescribers.” This sentiment was echoed by Lauren, who described her experience on rotations with a nurse as a preceptor instead of a pharmacist. The nurse provided the participant with the autonomy to make her recommendations to the health-care team,

acknowledging the participant's role-specific knowledge. This experience was foundational in Lauren's learning about the role of the pharmacist, and the responsibility for decision making that comes with that role – one she embraced willingly. This also illuminated for Lauren that learning from a non-pharmacist preceptor allowed her to develop autonomy as a decision maker:

[On] my last rotation . . . I was working primarily with stroke patients, and a lot of them had hypertensive strokes. And my preceptor being a nurse and the nurse saying, 'I don't know anything about pharmacy, don't ask me questions,' made me have to be really self-directed . . . I feel like that could also contribute [to confidence], just like the amount of, even as a student, self-directedness I needed and the ability to assess a patient on my own. Not 'on my own,' but without a direct preceptor.

Teaching and Learning

The second key theme of teaching and learning includes formal and informal curricular experiences. As per the sampling frame, participants were selected based on various levels and contexts of pharmacy-related work experience. It is clear these experiences were impactful in their learning and related to the underlying adult learning concept that adults come to learning with experiences that affect how they create knowledge; they are not blank slates (Merriam, Caffarella, & Baumgartner, 2007).

Formal Education

Participants discussed which elements of the pharmacy curriculum's formal educational experiences were influential in their growth as clinical decision makers. From the data analysis, codes associated with this sub-theme include simulations, curriculum, practise, assessments, and education level. The formal curriculum does not always prepare participants fully for what they might experience in their paid work environments and placement experiences. For example, in

the formal curriculum they are often expected to make right or wrong decisions, in the way of selecting the “correct” answer in summative assessments. In practice, however, this rarely occurs; practice is often much more ambiguous. Notably, the biggest influence on the participants’ CDM in their formal education was their ExEd rotations, which provided them an opportunity to practise what they learned, watch decision making enacted by practitioners, and see actual consequences to decisions. This will be discussed later in the section on comfort with ambiguity, as these two themes are interrelated.

Knowledge and Competency. Participants related their knowledge and competency to their confidence in making decisions. Luke, for example, stated, “I’ve realized the most important aspect in making clinical decisions is competency – that your recommendation and action plan is clinically sound and that you have adequately assessed the patient.” Lauren reiterated this sentiment: “It is important to ensure that clinical decisions are only made in areas [in] which I am competent as a professional.” Participants recognized the importance of identifying their areas of competence for practice and decision making, and that referral in this context is often the most reasonable decision, as exemplified by Lauren who stated, “When issues arise that are outside my competency, the decision that has to be made is referral to an appropriate health-care professional.”

All participants stated they were comfortable for the most part with chronic conditions such as diabetes and hypertension, and less comfortable with any areas they viewed as more unclear, such as psychiatric conditions in the case of Caitlin and Jessica. As Caitlin specified in her interview:

Interviewer: What about comfort with the topic – so being comfortable with the topic of hypertension?

Caitlin: No, like, if it was an antipsychotic, it would have been for sure doctor [referral]. The students had already set up personal boundaries for prescribing within specific therapeutic areas. These personal boundaries were different among participants.

Participants also noted that competency in relation to additional diagnostic tests, follow-up and monitoring, was an area where referral back to the primary care physician was important. Luke stated, “We should also kind of defer back to the prescriber at times . . . if there was additional monitoring; like, in terms of my competency, I wouldn’t even know if we had to do more imaging or ordering urea or something that would lend more follow-up.” He added that he did not feel “like I want people to take that on at a community pharmacy level.” Recognizing the limitations of one’s knowledge is an important part of being comfortable in decision making. However, these boundaries are often mediated not just by knowledge and competency, but also by work environment, physician relationships, personal characteristics, and role modelling.

Didactic Learning and Assessment. This sub-theme relates to the formal, traditional, lecture-based teaching in the undergraduate pharmacy program. This part of the program focuses on the scientific basis of pharmacy and the therapeutics of disease states. Students often view this portion of the curriculum as the most critical, as it is seen as the area that increases their drug knowledge. This belief was elucidated by Andrew who stated, “Throughout pharmacy school I [had] always assumed that by the end of my didactic training I would have acquired the necessary clinical knowledge to approach any clinical scenarios.” He subsequently changed his perspective as he came to understand that while “didactic training provided me the important fundamental therapeutic knowledge to practise pharmacy, it does not prepare me for every clinical situation.” This realization often comes to participants after they start their ExEd

rotations, where ambiguity in practice is more apparent (see the section below on experiential learning).

Participants also expressed their concern that the didactic learning in the program does not prepare them well for CDM, as learning and assessments are presented as dichotomous, as opposed to reflecting the ambiguity they see in practice. Andrew directly linked this feeling to the types of assessments students experience in pharmacy school: “Students are often expected to pick the correct option on a multiple-choice exam. I find this may further constrict students’ ability to make clinical decisions in clinically ambiguous situations where there may not be a correct answer at all.” This feeling was echoed by Julia: “How differently we could be graded for these clinical decisions [than] being examined using multiple-choice questions where there is no ability to provide a rationale for the clinical decision you have made.” Andrew offered this suggestion for improvement: “I feel the curriculum could challenge students further by presenting students with unfamiliar clinical situations consistent with scenarios commonly encountered during practicums or practice.” Caitlin also offered advice on what helps to illuminate the realities of practice: “When we have professors who give us real-life examples of how they practise, and medication change examples they would do in real life, this helps set a standard for me, which is helpful in making clinical decisions.”

Traditional didactic learning that is assessed in a black-and-white manner may contribute to participants’ hesitancy in decision making and lead them to believe that there are right and wrong answers in practice. Didactic learning, viewed as providing primarily knowledge-based competence, does not appear to be linked to the participants’ understanding of the nuances of clinical practice and direct patient care. This type of learning also does not consider students’ existing knowledge and past experiences (Merriam et al., 2007).

Practice Skills and Simulation Learning. In contrast to the didactic portion of the program, participants suggested that the learning in practice skills often better prepared them for the art of CDM by showing the ambiguity of practice. Jessica stated, “I think lab helped me prepare most for CDM.” Julia concurred, noting that “being forced to make clinical decisions in lab experiences” helped prepare her for ExEd rotations. In addition, participants’ indecisiveness in labs was commented on by practice skills instructors and helped the participants further their learning. As discussed by Lauren:

The professor who taught skills seminars often emphasized the importance of making a decision rather than being on the fence or unclear with a decision in lab . . . It made me strive to be clear and decisive in labs, which I have been able to translate to clinical practice as a student.

Jessica said, “Lab actually helped me to prepare for uncertainty.” Practice skills lab learning was also linked to practising the PCP, as Andrew explained:

One thing is about getting the right data; I think that’s been a big focus for me through the last few years in skills lab, being able to have that solid process and getting all the information before making a decision.

Practice skills learning, seen by the participants as a way to practise skills in order to prepare for ExEd, is in keeping with experiential learning tenets (Merriam et al., 2007).

Practice skills experiences, however, sometimes contributed to a disconnect for participants. As Andrew explained, “I think because of my simulated interactions, I got [so] comfortable having that ability [to prescribe] that sometimes I forget that pharmacists can’t [always] prescribe when you go into actual work.” Participants recognized this was due to the

nature of simulation learning; that although it is meant to simulate authentic practice, it is not always realistic.

Participants viewed practice skills labs as being integral in developing their PCP, practising decision making, and better understanding the ambiguity of patient care decisions. This active, simulated learning is linked to better preparation of participants for practice, compared to didactic learning which is more linked to increasing drug knowledge. Clearly, both elements are required as part of the students' curriculum as they serve very different purposes.

Using the Patient Care Process. The patient care process is a formal approach to the assessment and care of patients by pharmacists (Charrois, 2019; Cipolle et al., 2012). Codes associated with this sub-theme included structure, assessing, monitoring, and follow-up. This process is taught to students in their first year of the curriculum, then practised using simulated experiences in the practice skills lab. The PCP is akin to the decision-making process. Students are taught to follow these steps:

- (1) Patient assessment – Information gathering in the CDM process
- (2) Patient assessment with drug therapy assessment – Assessment of the problem and clinical reasoning in the CDM process
- (3) Developing a care plan, including weighing alternatives – Clinical judgment in the CDM process, and
- (4) Implementing the care plan, which includes deciding to recommend therapy, adapt therapy, prescribe therapy, refer the patient and/or educate the patient – The decision in the CDM process (Charrois, 2019).

All participants used the PCP, a transparent, structured process that helps to concretely assess the patient, as the mechanism to come to a decision. It helped them to collect relevant data they

needed to engage in CDM. In particular, a deciding factor for participants in using the PCP in CDM was the follow-up and monitoring aspect. If it was unclear who should follow up with and monitor the patient, there was often hesitancy in deciding, and participants noted that in school there is no real way that can be simulated to enforce follow-up and monitoring as practice before going out on ExEd rotations. For example, Caitlin stated, “In school we always do theoretical monitoring and follow-up . . . but we never actually practise it. We say we are going to do it, but there isn’t anything holding us down to what we said.”

Aaron described using the PCP as a structured process “not just to eliminate uncertainty but [to] make sure I’m doing a holistic job.” The PCP was seen by participants as a clear way to reduce uncertainty surrounding the problem a patient is presenting with. As Andrew stated, “Being able to follow a structured process has helped me increase my confidence when making clinical decisions.” Andrew also described overcoming uncertainty by using the PCP in this way: “For me to overcome this uncertainty, I recognize the need to break down complex clinical situations into the basics of the PCP.”

The participants linked their use of the PCP to the work they do in the skills lab. According to Lauren, “Skills labs often focused on having a consistent process when assessing a patient . . . which also increased my confidence in managing any clinical situation.” Practising the PCP was continually reinforced in the skills lab, as described by Luke: “Practising the PCP through cases, integrated cases, care plans, experiential learning – all [of] which builds on a foundation of assessing for drug-related problems and exercising the thought process between pros/cons between drug therapies.” Using the PCP was linked with increasing a participant’s confidence in problem-finding in particular, as evidenced by Caitlin: “I feel like I can find, like, if there is a drug-related problem, I can . . . for the most part, find it. I’m not concerned about

that.” Guided by a clear process, all participants had no hesitancy working through their patient assessments. Yet, while the PCP gave participants confidence in finding the problem, it did not always give them confidence in knowing what to do about the problem.

Experiential Learning. Experiential learning is an integral part of the undergraduate curriculum, with students completing 40 weeks of placement throughout their four years in the program. The participants perceived ExEd as being critical to their development as pharmacists and care providers. Jessica stated, “As I reflect on my CDM growth as a pharmacy student, the most influential factor would be my experiential education experiences.” Being able to practise what they learned in school in a safe environment with preceptor support helped them develop their skills to a higher level. Julia described this:

Being in practice, where I am able to follow up with these patients and see for myself that no harm was caused by my preceptor or myself making the clinical decision, adds to the positive reinforcement that my gut feeling regarding clinical decisions, backed up by the evidence I have available to me and that I have exhausted, is on the right track.

This type of learning also contributed to the participants’ varied experiences in different settings where clinical decision making could be modelled and enacted in different ways. Lauren said, “Having a huge variety of pharmacy practices, . . . I have been exposed to how engaged pharmacists can be in the circle of care.” She added, “Seeing how different pharmacists practise their DM processes has given me a good idea of how I plan on making clinical decisions when I am a pharmacist in the same situation.” This was also described by Andrew, who said: “Through my clinical experiences acquired through simulated patient interaction and experiential learning practicums, I have become more adaptable and confident with feeling uncertain.”

As evidenced by the quotations above, experiential learning is a critical element in the development of participants' decision-making skills. All participants discussed the vital role ExEd plays in their skill development, as a way to apply their learning to actual patient care in a highly structured and supervised model.

Learning in the Real World

All participants described trying to reconcile what they were taught in school about the practical application of knowledge with the CDM and prescribing they saw practised in placements. Learning in the real world, a type of workplace learning, occurred in ExEd and in paid work environments (Billet, 2004). In paid employment, participants saw the role of the work environment itself, including workload, workflow, and support from colleagues, as having an impact on the contextual factors related to decision making. Codes linked to this sub-theme that were generated through data analysis, include reality versus school, work experience, frustration, pressure, workflow, remuneration, logistics, resources, and the people you work with.

Role Modelling and Mentorship. Role modelling seemed to have a considerable influence on participants' decision making, in both positive and negative ways. Participants described observing situations in which they felt a clinical decision could have been made given the case, the patient and the therapeutic condition, but they would often see a pharmacist defer that decision. As Caitlin explained, "Some pharmacists I work with don't want to do things . . . and I guess that kind of influences me too." She continued, "It's happened to me where I would have made a change but the pharmacist didn't want to." This influence of role modelling in decision making is critical to participants' decision-making development. Caitlin further explained:

Oftentimes where I see an opportunity for a clinical decision, . . . after consulting with the pharmacist on shift the opportunity fades away, and we usually fax the doctor or do not proceed with the clinical decision. I believe that, whether I want it or not, this does influence me as a student when it is time to make a clinical decision.

Lauren described seeing similar actions by pharmacists in her work environment; however, she stated that while observing pharmacists not making decisions at work was frustrating, it did not influence her decision-making ability:

Sometimes I'm frustrated at my community pharmacy that I work at, because, you know, for example, there's a patient with seasonal allergies who wants an allergy eye drop and the one OTC [over-the-counter] sodium cromolyn was shorted, and so she could have prescribed the prescription one, and he's had it before or he knows that it's seasonal allergies. But she's like, no, go to a doctor. And so, to me, as long as the patient has kind of had that experience before, I think I would be willing to prescribe that, but she prefers to not.

Even though Lauren sees this deferral in practice, she does not consider it a model for her future practice. Luke described this disconnect as confusing:

Pharmacists were very hesitant in embracing the expanded scope of practice

Pharmacists would be hesitant to extend drug therapy of chronic medications for more than one week, even if a patient had been stable on a medication for years. This confused me.

Julia also saw this happen in hospital practice:

I've had other placements where I have pharmacists who I know have APA, . . . where they still do work quite closely with the doctors, but everything still goes under the

doctor's name, and I don't know if that's just, like, the protocol of where I'm working or if it's . . . just, like, more comfortable with it being under somebody else's name as opposed to [their own].

This disconnect for participants made it hard for them to determine their roles, boundaries, and how they should embrace their decision-making responsibility, and is explored further below in the section on disconnect between school and practice.

Participants also described seeing pharmacists they work with making appropriate clinical decisions as being a positive influence on how they construct and enact decision making. Julia talked about a preceptor she felt had had a significant influence on the development of Julia's decision making in ambiguous situations: "She was always comfortable in making a decision and saying, like, . . . 'Let's try this and see how it works,' as long as she knew it wasn't causing harm." Jessica also described watching a preceptor make a decision and how that helped her to develop her own decision making: "Seeing my preceptors embrace the grey area and really weigh the risk and benefits of prescribing have developed my own judgment."

Disconnect Between School and Practice. Participants described trying to understand the differences they saw in practice, as pharmacy students and assistants, and to reconcile those with the expectations placed upon them in the skills lab. Caitlin explained:

It's kind of obvious in lab [that] the goal is to get us to do the change. But then you go [into] practice and you realize a lot of times that you fax a doctor first, depending [on] if the pharmacist feels comfortable doing the change or not. And then it's kind of like, yeah, that's the real world versus lab."

This feeling was reiterated by Luke:

What we are encouraged or taught to do in class may often not be reinforced where we work or have experiential placements. We are either (a) not supported to exercise CDM or (b) do not have the necessary means of time and compensation to practise to our fullest scope.”

This disconnect was not necessarily seen as unfavourable, but as something participants had to negotiate in envisioning what their role was to be. This was exemplified by Caitlin, who directly related uncertainty to a lack of real-life scenarios that simulated what was done in lab: “My uncertainty mostly stems from not having a lot of practice and learning from instances in community, where clinical decisions are not implemented as much.” It was hard for the participants to understand the disconnect, but it definitely impacted how they viewed CDM in real life versus how they practised it in skills labs.

Julia described how she would do more decision-making in the lab, knowing it would benefit her grade, though this was not done in actual practice experiences:

I was acutely aware in lab situations or assignments that when I made a clinical decision, it was not a real patient and that there were no real consequences that could come of making a clinical decision aside from potentially a different grade.

This perception was further elaborated by Jessica, who clearly felt the stakes were different in real practice. She said, “It’s hard to theorize risk versus benefit situations without actually being in it,” noting that the difference in a practice context “was having actual people in front of you, like someone’s life matters.” In the reality of working with patients, the consequences of decisions were real; this made the participants more aware of the potential benefits or harm of their actions and decision making. This disconnect between school and practice seemed to be

lessened when participants had mentors and/or preceptors who practised to a high level aligned with what the participants experienced in practice skills labs.

Work Environment. Some of the codes associated with this sub-theme include workflow, logistics of the workplace, co-workers, pressure to complete dispensing tasks, and access to resources. Participants found that having to negotiate around these work-related factors made CDM more challenging in a real-life work environment, even when they were confident in the correct course of action for a patient. Luke described some less-than-ideal work situations that did not allow him to practise to the extent he wanted to: “I was not equipped with an environment or team that supported me to provide suggestions or apply skills I had learned in school.” Furthering this sentiment, Luke asked, “Why have the added pressure of prescribing when I’m still getting \$50 per hour just to check prescriptions and counsel?” Caitlin stated that she often saw her work as being less than what she had expected based on her school experiences: “I work part-time in a pharmacy as a pharmacy student . . . I sometimes see the other side of practice, the less idealistic one.” These workplace environments are an additional learning opportunity above and beyond what students are offered in school. Andrew stated that he would manage expectations by being particular in his future job search: “I don’t want to be in an environment where I don’t get to do that [patient care].” Participants also recognized that the conduciveness of an environment to responsible decision making was often related to having “the resources and also even having enough staff to allow the pharmacists to do this clinical work” (Andrew).

Degree of Certainty

The third theme, the degree of certainty with which the participants made decisions, is influenced by patient complexity, dealing with an actual or perceived lack of information,

weighing the risks and benefits of therapeutic alternatives, and being comfortable with decision making in ambiguous situations. Weighing risks and benefits was an integral part of the participants' decision-making process to determine the safest outcome for a patient, and sometimes the safest decision was referring the patient back to the original prescriber. However, participants also considered the patient's time and convenience when weighing risks and benefits. For example, if referring back to the physician was seen as duplicative, then participants were more likely to lean towards changing drug therapy themselves, as noted above in the section on patient factors. Participants described a fear of not having enough information, of potentially missing an important piece of the puzzle, which caused them hesitancy in decision making. As Andrew wrote in his reflection, "Clinical evidence evolves constantly and it is almost impossible to know everything." Pharmacists in Alberta have access to all diagnostic and lab data for patients through a provincial electronic record; however, participants still felt there might be information missing. Participants also said they would try to find answers in their drug information resources, but if they could not find a clear-cut answer to a query, they would not feel comfortable making a decision. This was described by Julia who said, "I didn't find any guidance on what to do." Alternatively, participants who had observed pharmacists comfortably making decisions in the absence of full information or clear clinical guidelines, said they found it beneficial in developing their own comfort with ambiguity. This observation of pharmacists in practice who make decisions in ambiguity seemed critical to the participants' development of decision-making comfort. The complexity and acuity of the patient case was also a consideration in decision making. If the patient was deemed to be at imminent risk, participants felt more pressure to make a prescribing decision instead of a referral or deferral.

Patient Complexity

Participants often referred to the complexity of the patient and their medical conditions as factors impacting certainty in decision making. Codes linked to this sub-theme include acuteness, red flags, and urgency. They relate mainly to the acuity of a patient's situation and how quickly a decision needs to be made. Participants felt that more acute situations pushed them into making a decision, as this was the most important thing to do for patient care at that time. Jessica felt that "the variety of acute situations . . . have forced me to make a decision." By putting the patient first, participants recognized the potentially negative consequences of inaction. Caitlin also related this call to action in the face of urgency to the environment where care was being provided: "I do like the acuteness, 'cause I find in hospitals it's a lot easier to make a decision." This sub-theme is interrelated with a lack of information, as the more complex the patient case, the higher the potential for a participant to feel information is being missed, which may make them feel it is harder to make a decision and that the patient should be referred. Julia described this uncertainty: "This might be something that's much larger than what we're looking at, or there's something else, then by all means I would say I want you to go see your doctor."

Overall, the tension between being comfortable with decision making in the face of acute presentations, and the challenges inherent in decision making with patients who are medically complex, is something pharmacy students have to work through as part of the decision-making process. This weighing of acuity and complexity is part of clinical judgment, which precedes the final step of decision making. This is closely linked to the sub-theme below on weighing risks and benefits.

Weighing Risks and Benefits

In CDM, the step of weighing risks and benefits represents the clinical judgment step of the decision-making process (Higgs et al., 2018). This sub-theme was mainly evident when participants were describing the rationale for their decision-making for the patient. During their rationalization, they would share what elements they had considered as risks, then what they had considered as benefits. Caitlin rationalized her decision to provide the patient with some treatment instead of immediately changing therapy as follows:

I didn't feel like giving him another month was harmful. I think, like, giving him 90 days . . . without assessing would have been bad. But I think a month – just enough time to see if he actually does see his doctor and see if the doctor does anything, and then if he does nothing . . . I would have done something.

Lauren also rationalized her decision making by explaining how she considered the patient's risks and benefits, stating, "I feel like I was making the safest decision for the patient." All participants rationalized their final decision for the patient, whether it was a deferral, a referral, or a change in therapy, by weighing the risks versus the benefits. Interestingly, even though they all followed this process, what they considered riskier or of more benefit for the patient differed among participants. For example, some participants deferred to a physician on the grounds that it was the safest decision, whereas other participants who changed therapy themselves also did so on the grounds that it was the safest decision for the patient. Part of this difference may be related to what each participant considered risky and their tolerance of risk. Each participant clearly was working from a different definition of risk in order to arrive at all the different outcomes seen in the simulation interaction (see Table 5). This uncertainty in decision making based on risks and benefits is exemplified in a quote from Jessica: "I know there was an action I

had to take, I just didn't know the seriousness or, like, what my action should be. So it was, like, at what point I should take action, not . . . what point I should notice there's a problem."

Jessica's process of weighing risks and benefits was influenced by a pharmacist role model at her placement site. She recounted, "One pharmacist at my location summed it up as weighing the risks versus benefits of starting therapy, and then do the same for *not* starting therapy, and you'll then be able to make a decision." Jessica felt this process helped her in deciding the best and safest options for her patients.

Comfort with Ambiguity

The participants discussed their comfort levels in making decisions in different situations where there were no clear-cut answers. This sub-theme includes codes such as grey zone, flexible, and hesitancy in role models, and relates to the mentorship sub-theme in that participants described seeing a mentor or preceptor making a decision in ambiguity as providing them context that this is part of routine practice (see above section on role modelling and mentorship). In observing pharmacists in ambiguous situations, Jessica stated, "I just realized for some of these grey areas you just try something, and if it doesn't work, you change it as long as it's safe." Participants felt they grew more comfortable as they normalized these feelings of ambiguity and uncertainty. Andrew, for example, felt that his "lack of confidence is not due to having limited clinical experience, but rather it is a lack of awareness that it is normal to feel uncertain or lost at times." Seeing preceptors and mentors feel uncertain helped participants learn it was normal to be uncertain. Andrew said initially that he was "surprised to hear my preceptors reaffirming my feelings of uncertainty on a daily basis throughout their clinical practice." He concluded that, "Collectively, these experiences taught me that being an effective pharmacist means being comfortable with being uncertain." By showing students it is a normal

part of the decision-making process to be uncertain of the best plan of action, we can better prepare students for these ambiguous situations. This relates back to participants' earlier observations about how certain assessments were geared towards black-and-white answers (see section on didactic learning and assessment), whereas in actual practice this is not the case.

Of note, the more decisive participants, who took responsibility for decision-making with a willingness to decide upon next steps for the patient, were more likely to comment on their comfort with ambiguity. Andrew, Lauren, Jessica, and Julia all specifically discussed learning to develop an understanding and appreciation for ambiguity. Julia described how “working under preceptors who are comfortable making clinical judgments – walking me through their rationale and them being open about how there were many potential options they could have chosen – has taught me how to be more comfortable making clinical decisions.” This openness to the process of clinical judgment and the realization that in almost any clinical situation there are multiple options available that could be correct, helps participants develop this decision-making capacity.

Lack of Information

Lack of information relates to participants feeling they may need more information to come to a decision. Participants cited lack of information as a hindrance to their ability to make a decision, connecting it to multiple factors, such as unknown patient information, the intent and follow-up plan of the prescribing physician, and lack of access to information resources. Sometimes this lack of information was perceived, representing a participant's self-assessment of their knowledge on a particular topic. For example, Julia stated, “I was looking for clear-cut guidelines but I guess I kind of knew in the back of my mind the options.” At other times, this lack of information was related directly to the specific care plan for the patient. Lack of information was also sometimes related to a lack of understanding of diagnostics, as that is out

of the scope of practice of pharmacists. In rationalizing her decision, for example, Julia noted, “I didn’t have a full-picture history of what was causing the renal issues.”

Lack of information was not always linked to a lack of responsibility in decision making. As Jessica said, “There is still a lot I don’t know but that doesn’t make me less confident or able to handle difficult situations.” Searching for information was a common thread in every interaction, as all participants consulted online information sources to help in their decision making during the simulation.

Personal Characteristics

Personal characteristics, such as confidence, leadership skills, and motivation to make decisions, were the fourth factor recognized by some participants as important in their decision making. Other codes associated with this theme are motivation, flexibility, and self-directedness. Julia described being raised in an environment where she was tasked with making decisions from a young age, making her comfortable with decision making in general. Lauren felt she had leadership skills that led to her confident decision making. Clearly, life experiences outside of pharmacy seemed to impact participants’ ability to make decisions, leading some to be more confident clinical decision makers. For other participants, lack of confidence in their knowledge of certain conditions and their experience were also personal factors that influenced decision making, as noted in Caitlin’s response (refer to page 92 for quote) when discussing areas in which she was comfortable making decisions, and that psychiatric conditions was an area she was not comfortable with. Lauren also discussed areas of knowledge with which she felt less confident:

I'm really comfortable with any cardiovascular disease. If it was, for example, infectious disease, I am not comfortable with that yet; if it wasn't very clear-cut on Bugs & Drugs [infectious disease reference], I would have sent him back to the doctor.

Life Experiences

Three participants described experiences unrelated to patient care, including how they were raised, as affecting their ability to make decisions. Aaron discussed a leadership rotation where decisions were being made about contracts and drug prices, and how these types of discussions also impacted his patient care decisions. As noted above, Julia's upbringing provided the life experience "of having to make decisions and being forced to," that helped her develop decisiveness. Furthering this thought, she related it to also being comfortable with making wrong decisions: "Through my whole life, even when I've made wrong decisions and there's been consequences, but then you learn from them, and you're much more confident in your decision the next time."

Confidence

The participants often referred to their "comfort" with a decision; however, when probed, this was actually related to how confident they were with their decisions. Three participants (Lauren, Jessica, and Julia) labelled themselves as having high personal confidence, which they believe impacted their ability to make responsible decisions. Jessica stated, "It's merely my confidence in being able to decide what's best for my patient and for me."

Confidence in making decisions was also closely linked to having confident mentors. As Luke explained: "When you see other people take initiative and prescribe and with the confidence and assess thoroughly, I think I become more comfortable too." Personal and professional confidence, therefore, were linked with decisive, responsible decision making.

Leadership

Participants also named leadership characteristics as influencing their decision-making capacity. Lauren and Julia, in particular, self-identified as having leadership abilities. Lauren was the only participant who definitively stopped the offending medication for the patient and then confidently prescribed a new medication. When I asked her why she thought this may have differed from other participants' decisions, she said "Yeah, it's a little bit of personality; maybe it's just the experience I have in pharmacy." When asked specifically what element of her personality she thought made her different, she stated, "I think I have some leadership qualities." Lauren did not explicitly link leadership skills to her confidence, but felt it was a separate characteristic linked to her decisiveness.

Enactment of a Decision

The previous four themes influence enactment of the decision. After the participants considered relational factors, teaching and learning, the degree of certainty, and personal characteristics, they had to choose how they would enact the final decision. This theme relates to the final step of decision making and how participants arrive at that point in their decision-making process. The endpoint of the decision-making process offered two options: willingness to take responsibility for a decision, including prescribing or referring to the physician for further assessment, with the pharmacy student initiating that interaction with the physician, or an unwillingness to make a decision by deferring decision making to the patient and doctor.

Some participants demonstrated their willingness to make a clear clinical decision and take responsibility for it, alternately stopping drug therapy, ordering lab work for follow-up, adjusting doses, and prescribing new therapy in two cases. These decisions often included referring the patient back to their physician in a collaborative way. Aaron described this: "I've

come to really understand that it's a collaborative care environment," where both the physician and pharmacist are taking responsibility for the patient's care. This type of referral differs from deferral of decision making to someone else, as when participants recognized there was a problem but would only deal with the acute situation and not responsibly manage the follow-up and further monitoring of the patient (including lab work and alternate drug therapy, whether as a change initiated in collaboration with the original prescriber or prescribed themselves). Participants also recognized that not feeling comfortable with taking responsibility for decisions impacted their decision-making ability and led them to defer the decision making to someone else.

It is apparent that all of the previous themes impact the enactment of the decision. No decision is made without consideration of relational factors, teaching and learning, personal characteristics, and degree of certainty.

Willingness to Make a Decision

Participants who definitively came to a decision in the case presented to them (see Table 5), felt accountable for that decision and the subsequent follow-up that would be required to ensure the change in therapy was safe and effective for the patient. They appeared to be more assured that a decision needed to be made in order to best help the patient. They laid out their plans in clear steps for the patient, ensuring the patient knew what to expect.

Referral. When deciding to refer, participants were comfortable with their clinical decision, but also wanted the patient to connect back to their family physician for elements of care outside their scope of practice, such as ordering additional diagnostic or laboratory tests. For example, Julia described how she did not feel there was enough information provided in the

case to know exactly what was going on clinically with the patient, and thought “more lab work needed to be done in general, just to, like, figure out what was actually happening.”

This differs from the deferral outcome, where the participant did not make a clear decision to do anything for the patient, such as stopping the medication. In the referral cases, the participant’s offer to follow up with the physician themselves was a responsibility-taking measure distinct from simply sending the patient back to see the doctor on their own. This is an important and relevant distinction as, in the former case, the participant knew there was a problem and took responsibility for it. In the latter instance, when the participant sent the patient back to their physician without follow-up, the participant also knew there was a problem but did not take responsibility for managing the issue. This was exemplified by Luke who stated, “We have the doctor so why not just let them do the job?” and “In the community level, I think there’s only so much that – I think there’s a lot we can do but we should also kind of defer back to the prescriber at times.” As pharmacists are often unwilling to make decisions for fear of losing their licences or other consequences, it is important to note that in these deferral situations they are actually at more risk, as they themselves have identified a problem but are not taking responsibility for it (Foong et al., 2018). No participant mentioned fear of liability as being a factor in their decision making.

Taking Responsibility. Four participants in particular (Andrew, Jessica, Julia, and Lauren) were clear in their decisions and in taking responsibility for those decisions. These participants have varied backgrounds – they have had quite different ExEd and work experiences, for example (Table 4) – but were the participants who identified themselves as confident people. As noted above, the apparent difference in the decisions these participants made was their willingness to take full responsibility for all aspects of their decisions. This

willingness is evidenced by Lauren, who stated: “I believe accountability is one of the most important things about being a professional, so I feel that it is vital to be able to take responsibility for my clinical decisions.” These participants’ observed interactions were different from the others; the confidence and assurance in their decision making was apparent. Once their decision was made, they did not change it; they stayed the course. The uncertainty of the other participants was evident in their vacillation in determining precisely what the plan should be for the patient. Caitlin described how responsibility taking was a negative influence on her decision making: “I also feel that taking responsibility for clinical decisions in practice may hinder my ability to make clinical decisions.” Luke also felt troubled by responsibility taking and asked, “Why take on that responsibility?” These students would recommend something to the patient, then stop, take some time, change the decision, then modify the plan.

Unwillingness to Make a Decision

In these instances, the participants determined, for various reasons, that they could not make a decision for the patient, and deferred any treatment decision back to the physician.

Caitlin discussed this deferral in rationalizing her decision:

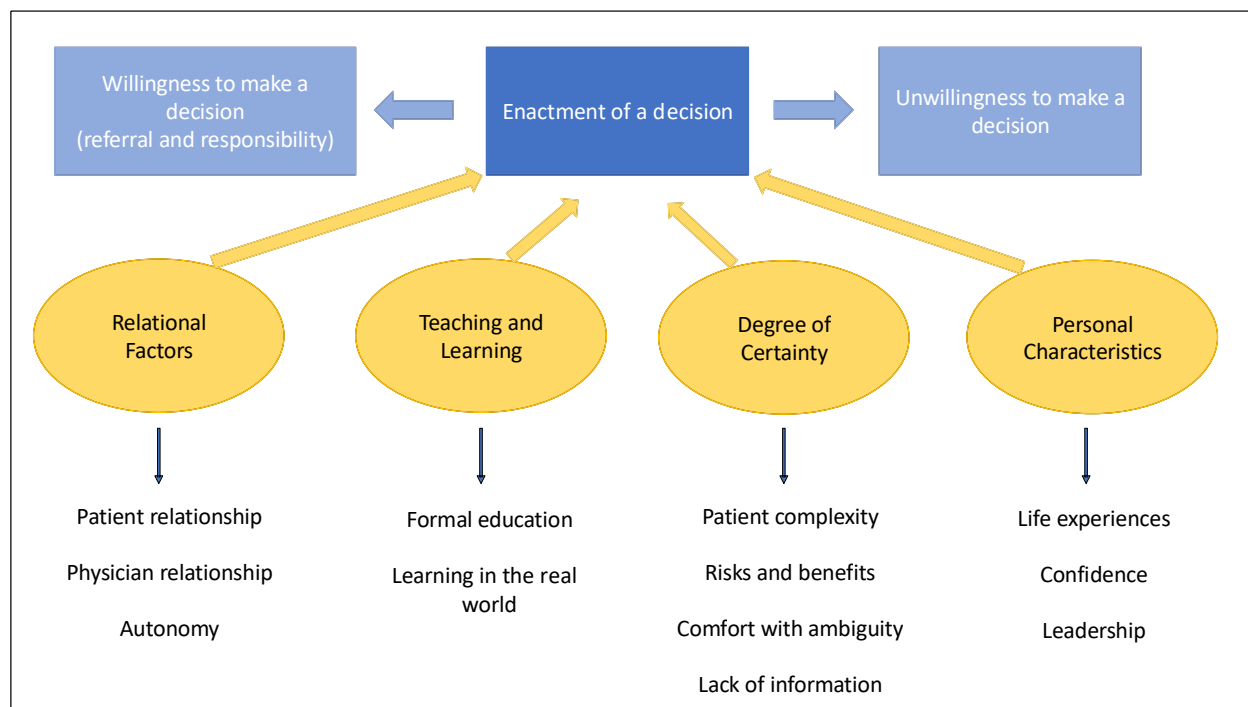
I was kind of juggling between faxing the doctor and just giving a refill, but no more than 30 days, and making clear with the patient that I would not give him more than 30 days, so if he came back in 30 days and hadn’t seen his doctor, I don’t know if I made that clear, but my plan was to not give him perindopril past his 30 days.

This is an example of unwillingness to take responsibility for dealing with a problem that the participant herself found, and deferring responsibility to the patient and decision making to the prescriber.

The participants rationalized their decisions using many strategies, with reference to the many themes discussed, but most commonly referred to such factors as lack of information or the boundaries of their scope of practice. Participants also used previous experiences as a filter for interpretation of the scenario; for example, in assuming they would not have time for further assessment or follow-up as the pharmacy would be too busy. During the interviews, all participants referred to previous experiences in rationalizing their decision making. Interestingly, while the participants could all recall negative and positive situations where they saw uncertainty in practice, they used these experiences differently to rationalize their decisions. Some participants related back to negative experiences, whereas others recalled their positive experiences of willingness to prescribe in practice. Which filter from previous experiences was operative and how that pushed them to a willingness versus an unwillingness to prescribe, is not fully understood by the participants and is likely mediated by all of the previous themes. This will be further discussed in Chapter Five.

Summary of Findings

As shown throughout this section, the influencers of student decision making are multifaceted and interrelated. Participants all mediate their decision-making influences differently, and how much a factor influences them varies from person to person. The enactment of clinical decisions is underpinned by relational factors, teaching and learning, degree of certainty, and personal characteristics. These themes and their sub-themes, discussed in this chapter, are depicted diagrammatically below (Figure 7).

Figure 7*Themes Related to Hesitancy in Clinical Decision-Making by Pharmacy Students*

Overall, the findings suggest that even though there was variability in the types of decisions made, the influences on how participants came to these differing decisions were similar, and demonstrated through the themes. The interpretations of similar influences will be explored further in Chapter Five. Every participant reflected that they used the PCP as a clear way of understanding the process and attempting to come to a decision. They were all comfortable with and confident in the process itself, even when they were not particularly confident in their decision. The other theme discussed by every participant was the ambiguity they identified in the patient case. How they dealt with or addressed that ambiguity differed, but they all recognized there was no clear-cut solution to the problem they found, as demonstrated in the types of decisions made (Table 5). While all participants experienced uncertainty in the

decision-making process at times, they differed in the level of responsibility they assumed for ultimately making a decision for the patient.

The main factors found to be influencing decision making in this study can be linked to other work in understanding influences of CDM (Higgs et al., 2018), but the issue of responsibility taking is different for pharmacy students given the traditional roles and boundaries of pharmacy work. The hierarchical nature of health care influences how pharmacy students take up decision making, and how their key mentors and role models demonstrate CDM in practice. Observing mentors and role models being comfortable with ambiguity was one of the key ways participants developed their own comfort with uncertainty in pharmacy care. The next chapter will interpret these findings in the context of research questions.

CHAPTER FIVE: DISCUSSION

The purpose of this study was to understand how pharmacy students make clinical decisions and to explore factors that influence their CDM uncertainty. The multifactorial elements of CDM were found in the data collected from the interviews and reflections, and these themes were similar to the research of CDM in other health-care professions (Higgs et al., 2018; McIntosh et al., 2016). By developing a deeper understanding of these factors, this research intended to inform curriculum development, specifically in the practice skills courses at the University of Alberta Faculty of Pharmacy and Pharmaceutical Sciences. In this chapter, I discuss the primary research findings, important interrelations between themes, and how they relate to adult learning. The discussion will answer the research questions posed in Chapter Three and further interpret the findings presented in Chapter Four.

Researcher Positionality

I came to this research from a desire to improve CDM teaching in the practice skills courses of the University of Alberta's Faculty of Pharmacy and Pharmaceutical Sciences. My initial hypothesis was that if we can improve how we prepare students to make decisions in practice, we can develop practitioners who are accountable, responsible, and willing to make decisions. All participants felt the practice skills curriculum was one of the positives in developing their CDM. Participants repeatedly discussed how the skills labs allowed for practise, development of processes, and an understanding that management decisions are rarely clear-cut in clinical practice. However, as I interviewed participants, read their reflections, observed them during their interactions, and reflected on my own experiences, it is apparent that the way to develop confident decision makers is not entirely rooted in improving our practice skills

curriculum. This has impacted my beliefs around how CDM teaching and learning should progress within the curriculum, and in pharmacy education in general.

Factors that Influence Clinical Decision Making

The primary research question was: What factors contribute to issues in clinical decision making in pharmacy students? The factors that contribute to the *issues* students have are specifically related to the primary research question. The four themes that underlie the final enactment of the decision include relational factors, teaching and learning, degree of certainty, and personal characteristics. In Table 7, I provide examples from the data relating to these four underlying themes and how they led to hesitancy in enacting a decision.

Table 7*Examples of Issues in Clinical Decision Making Based on Theme*

Theme	Example Issue in CDM	Exemplar Quote
Relational factors	Being concerned that they are overstepping the socially constructed boundaries of their scope of practice	“I’m trying to decide whose role is it going to be so that’s shared, like, [a] shared collaborative role. I don’t want to be overstepping . . . or taking over their autonomy.” (Andrew)
Teaching and Learning	Having assessments that force students to think that there are right and wrong answers in clinical practice	“Students are often expected to pick the correct option on a multiple-choice exam. I think this may further constrict students’ ability to make clinical decisions in clinically ambiguous situations where there may not be a correct answer at all.” (Andrew)
	Preceptors not making decisions in practice	“Pharmacists would be hesitant to extend drug therapy of chronic medications for more than one week, even if a patient had been stable on a medication for years. This confused me.” (Luke)

Degree of Certainty	The patient is complex with multiple medical conditions and it is difficult to make a decision that will not impact all the other medical conditions	“This might be something that’s much larger than what we’re looking at ... I would say, ‘I want you to go see your doctor.’” (Julia)
<hr/>		
Personal Characteristics	Lack of confidence in the clinical area in which the decision needs to be made	“...’cause I wasn’t sure if it was, ’cause I thought about, ’cause I wasn’t sure, ’cause I was like okay, I’m not sure, like, I didn’t feel comfortable.” (Caitlin)

Relational Factors that Hinder Decision Making

Participants discussed how building good relationships with patients and physicians helped to push them into decision making. However, in situations where they did not know the patient or thought the doctor would not approve of them making a decision, they avoided CDM and chose to defer a decision.

With patients, this deferral was often related to the environment. Participants noted that it was harder to take the time to get to know patients in busy workplaces, where conversations with patients were limited. Some participants described work environments where patients typically came in to drop off one-time prescriptions. This type of work environment also limited relationship building. These high-turnover situations limited participants’ CDM comfort.

In discussing difficult relationships with physicians, participants related to pharmacists’ concerns over defined roles and a fear of “stepping on toes.” The fear of upsetting physicians has

been found in previous work to be a limiting factor in CDM by non-physician prescribers (Abuzour et al., 2018; Maddox et al., 2016). Underlying this is a belief that physicians can define the boundaries of pharmacists' roles. Professional bodies define pharmacists' roles in the standards of practice and corresponding legislation (Alberta College of Pharmacy, 2020). However, research has shown that defining roles is an integral part of collaborative care, and in community pharmacies, for example, where physicians are not in physical proximity, these conversations may be difficult to have (Schindel et al., 2017). It is clear that while professional roles are defined by the provincial college and in law, the boundaries of these roles are socially constructed in the CDM environment.

CDM is an act that involves social interactions and, therefore, even when a pharmacist is working independently to help a patient, decisions require engaging with the primary prescriber. Pharmacists must inform the primary prescriber of any changes they make to drug therapy (Alberta College of Pharmacy, 2020). In exploring community pharmacists' decision making, Gregory et al. (2016) found that pharmacists desired "confrontation-free conclusions" (p. 90). The reality is that when pharmacists question or look to improve a patient's therapy, there are going to be times when this leads to confrontation with a primary prescriber. Pharmacists may choose to defer the decision back to the primary prescriber to avoid this confrontation, thus abdicating responsibility for decision making (Frankel & Austin, 2013; Gregory et al., 2016). This deferral pattern was seen in the data and was part of the rationalization participants gave for their decision making. Participants' hesitancy to take responsibility for clinical decisions emerged in both their interviews and in their reflective writing as well. Gregory et al. (2016) also discussed the dissonance pharmacists felt in being both business practitioners and health-care professionals. It was often the business part of that conundrum that drove the rationale for not

wanting to make decisions. Although only one participant briefly mentioned remuneration being a factor in their CDM, all participants may see business uncertainty modelled in their work environments.

The Role of Teaching and Learning Factors in Decision-Making Difficulty

Traditional didactic learning assessed in a black-and-white manner may contribute to participants' hesitancy in decision making. It leads students to believe that in practice there are right and wrong answers. Didactic learning, viewed as providing students primarily with knowledge-based competencies, does not appear to be linked to the students' understanding of clinical practice nuances. In the literature, learning that enhances CDM includes reflective practice and the use of simulation (Edelen & Bell, 2011; Farnan et al., 2008; Macauley et al., 2017; Menezes et al., 2015; Vyas et al., 2011).

Consistent with that literature, participants in the current study felt that simulation learning increased their CDM capacity (Farnan et al., 2008; Macauley et al., 2017). Participants noted that the teaching and learning environment in the skills lab was one of the strongest elements of in-class learning that prepared them for CDM. Alternatively, assessments that forced students to pick one best answer were not conducive to their learning about CDM, and that should be considered in the development of curricula specific to CDM. Assessments that allow for a sense of ambiguity may help students better understand how CDM occurs in practice. Higgs et al. (2018) found that multiple-choice question assessments do not get at the clinical reasoning element of the CDM process and, therefore, do not capture the full picture.

Another factor that contributed to hesitancy and uncertainty in CDM was the disconnect between what participants learned in school and how that was enacted in practice. This disconnect has been discussed in the literature and has been linked to struggles new practitioners

face in developing their professional identity (Noble et al., 2014; Noble et al., 2019).

Understanding that knowledge can be learned in formal and non-formal settings is a central tenet of adult learning (Merriam et al., 2007). Acknowledging that students are building knowledge in their paid pharmacy work environments, outside of their formal education, and ensuring students recognize how these experiences influence their learning, is essential (Merriam et al., 2007).

This informal learning can also contribute positively to students' growth.

Participants discussed the expectations in skills labs to make a prescribing decision, yet also relayed stories of seeing pharmacists who avoided prescribing, adapting, or any higher-level practice. The students had difficulty trying to recall a work-related scenario where they were practising to a high level without causing issues with other pharmacists in their practice site, or angering physicians who have views on the limits of pharmacists' roles. In these and other instances, participants struggled to reconcile what they had learned about their roles and responsibilities in the curriculum with the roles and responsibilities they saw modelled in practice.

Low Degree of Certainty in CDM

Patient safety was a large contributor to issues in CDM, including the participants' varying perceptions of what was "safe" for patients. Participants' level of comfort with a decision was strongly influenced by their fear of risks for a patient. Assessing patient risk is an essential part of CDM, but pharmacists are highly risk-averse (Higgs et al., 2018; Rosenthal et al., 2010; Wright et al., 2019).

Maddox et al. (2016) have also shown that decision making by non-medical prescribers is underpinned by cautiousness and the level of perceived risk. They found that whenever a prescriber felt the level of risk was too high, a decision was deferred to the attending physician.

What is interesting is how different participants defined and measured the patients' levels of risk. Maddox et al. (2018) found that the influencers on risk determination were prescribing outside of guidelines, off-label use, high-risk medications, or insufficient patient information. In the current study, insufficient patient information seemed to be the most significant factor in determining risk. The participants often felt they might be missing something in the scenario due to knowledge gaps or lack of provided information.

Every participant used online resources during the interaction to confirm or find answers to the drug-related problem. Even after finding helpful information, all participants remained uncertain about an exact solution to the problem. Yet even with this uncertainty, some participants felt comfortable and willing to make a decision.

Rationalizations for their inability to find an answer were also mediated by the participants' perceived knowledge. All study participants had been taught the same curriculum and the simulated case was co-written by the professor who taught them this content. Yet despite near identical teaching, what they learned about the simulated clinical situation was mediated by their experiences both inside and outside the formal curriculum. These informal learning experiences are contributors to the student's knowledge building. Moreover, what differed among participants was their comfort levels with the unknowns in the context of having to make a decision for the patient.

Personal Factors and Issues with Decision Making

Research shows that the extent to which a factor influences decision making depends on the capability of the decision maker and the task complexity (Higgs et al., 2018). All participants in the current study would be considered novice decision makers since they are still students and have not yet had the opportunity to make decisions autonomously, where they are solely or

legally responsible. It has been noted in novice decision makers that as task complexity increases their reasoning capacity may be limited, given both insufficient knowledge and experience (Higgs et al., p. 447).

The task complexity in the simulation exercise was interpreted differently by each participant. This may relate to the participants' inherent knowledge levels as well as their experiences in ExEd and work environments. Some participants may have considered the scenario therapeutically challenging. Other participants, such as Lauren, who had had a placement where she managed patients with hypertension daily, found the scenario more straightforward, which may have led to her increased confidence in making a decision. Hypertension was purposefully selected as it was meant to depict a commonly occurring chronic condition.

Personal confidence also seemed to impact CDM. Maddox et al. (2016) found that nurse and pharmacist prescribers had a self-perceived low status and thus low confidence in their decision making. Cope et al. (2020) pointed to two primary factors related to a willingness to make a decision: self-efficacy and role definition. Increased self-efficacy in prescribing was associated with more years in practice, more years as a prescriber, and the frequency of prescribing (Cope et al., 2020). Interestingly, pharmacists in that study felt more responsible for prescribing associated with extending a treatment course or adjusting a prescribed drug (Cope et al., 2020); in other words, they accepted partial and shared responsibility. This finding reflects the clinical decisions made in the current study in that students experienced increased comfort when they were not solely responsible for the decision. In Cope et al. (2020), the lower degree of responsibility was only seen in cases of pharmacist prescribing, not in nurse or physiotherapist prescribing, and was postulated to be linked to self-efficacy. This conclusion aligns with the

findings herein that a willingness to prescribe is tied to confidence. Cope et al. (2020) propose that prescribing courses should focus on this lack of confidence to address these issues.

Unwillingness to Make Decisions and Take Responsibility

When deciding what to do for a patient, there are actually two decisions being made. First, a practitioner decides whether they should take responsibility for a decision and, second, the practitioner makes a clinical decision (Maddox et al., 2016). As shown in Figure 7, there is either a willingness or unwillingness to make a decision before the enactment of the decision. Cope et al. (2020) found that significantly fewer pharmacists took responsibility for their prescribing decisions than nurse practitioners or physiotherapists. When pharmacists were asked how often they took responsibility for decisions, on a scale of rarely to every time, most pharmacist respondents stated they rarely took responsibility for decision making. In that context, it is not surprising that this was also seen among the participants in this study.

Interrelatedness of Factors and How that Contributes to Issues in CDM

It is important to note that no one factor led to uncertainty in decision making for any participant, which is consistent with the literature (Gregory et al., 2016; Higgs et al., 2018). Each participant named several factors that hindered their decision-making capacity. Their hesitancy was complicated by multiple, interrelated factors. Ordering of lab tests was brought up by many participants as an issue in CDM, offering a prime example of the complex and multifactorial nature of CDM hesitancy. Pharmacists in Alberta have a unique ability to order lab tests; this example is therefore specific to the context in which the students have learned about the roles and responsibilities of pharmacists. Yet it is evident from the findings that students struggle with this role.

Relational Factors in Ordering Lab Tests

Relational factors in ordering lab tests involve deciding who would follow up on lab work. Participants were confused as to whether this was their responsibility or the physician's responsibility. Some participants expressed hesitation in ordering lab tests as they felt they might be overstepping the boundaries of pharmacist care. As mentioned earlier, these boundaries were always socially constructed. Legally, ordering lab tests has been part of a pharmacist's scope of practice for many years. Participants had difficulty reconciling that they could order lab tests because they felt it should be the responsibility of physicians to follow up with lab test results. The issue was made more complex by the participants' sense that patients expected only physicians should order lab tests.

Teaching and Learning Related to Ordering Lab Tests

Participants noted that in the skills lab they were expected to order lab tests for simulated patients, and they were taught how to monitor drug therapy through lab tests. Yet participants described observing pharmacists not ordering lab work in practice. Here too students experienced a disconnect between school and practice. Participants knew they could order whatever lab tests they deemed necessary in the skills lab, but could not envision this happening seamlessly in practice. This disconnect led to confusion over their role in ordering lab tests.

Degree of Certainty Related to Ordering Lab Tests

In interpreting lab work participants questioned their knowledge and felt they might be missing something that a doctor would know. This was considered a lack of information. Even though pharmacists in Alberta have access to all the same lab reports that physicians do, some participants described that they might not understand all of the complexities in how the lab work related to the patient's status. In these cases they deferred decision making to the physician. In

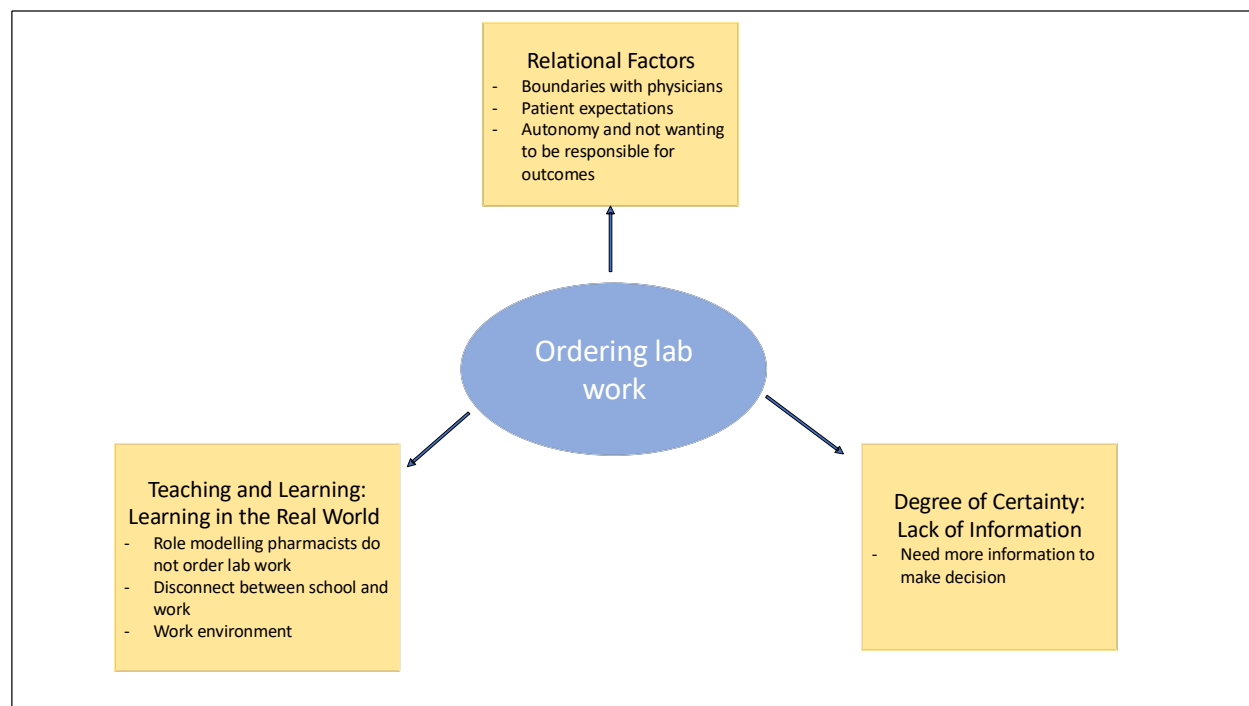
the simulated case the participants completed, the lab work they were provided was meant to lead them to be concerned about the recently prescribed medication. However, participants questioned their knowledge and understanding of lab work interpretation, and therefore hesitated to make a decision.

Multifactorial Hesitancy in Ordering Lab Work

Although participants talked on the surface about the difficulty in lab work ordering and follow-up as a single factor that hindered their CDM, the issue was much more complicated. This is one example of how CDM issues are much more complex than any one factor itself. Concerns associated with ordering lab tests are depicted in Figure 8 and demonstrate the interrelatedness of themes.

Figure 8

Example of Issues Leading to Hesitancy in Ordering Lab Work



How Students Construct Clinical Decisions

The first secondary objective of the study was to explore how students construct their decision making. Many models of CDM have been described in the literature, yet whether or not pharmacy students at the University of Alberta follow this same process was unknown (Anakin, Cuthbert, et al., 2020; Tiffen et al., 2014; Wright et al., 2019).

Patient Care Process

All participants discussed their comfort and confidence in using the PCP in constructing decision making (Charrois, 2019; Cipolle et al., 2012). The PCP is a systematic approach that provides students with a framework to assess patients, find drug-related problems, and determine a list of suitable alternatives. Participants found that this structured process gave them confidence in ascertaining problems in a patient's drug therapy and developing alternatives to solve the problem for the patient. However, this did not always translate to confidence in the final decision.

Participants rationalized their final decisions by weighing each alternative's risks and benefits before arriving at a decision. This process is similar to how other health-care professionals construct CDM (Higgs et al., 2018; Tiffen et al., 2014; Wright et al., 2019). The uncertainty of the pharmacy participants seemed to come at the final decision-making step, where participants had a hard time reconciling multiple different elements that may impact themselves or their patients. Each student weighed these other factors differently, as evidenced by the multiple different decisions that the participants came to (Table 6). For the participants who were willing to prescribe and take ownership for their decision, there was a clear acceptance that they were responsible decision makers. They knew they had to be accountable for this decision, and they were comfortable with that. They were confident in their assessment, use of

the data provided, and ultimately the final decision. These participants also were not focused on making the “right” decision, but rather on making the best decision for this particular patient based on the information and evidence at hand. They knew their decision could result in unpredictable adverse outcomes but were comfortable in accepting that possibility. The PCP was an essential facilitator in getting to the final decision-making step.

Practising Decision Making

Participants’ experiences in the skills lab, practising the PCP and ultimately decision making, were factors that facilitated the development of their CDM. In the skills lab at the University of Alberta, learning is structured in two primary ways: (1) in individual patient interactions where students receive immediate one-on-one feedback from a practitioner and a peer, and (2) in small-group settings where students work through problems together. Both of these activities are highly social and based on the belief that student learning is constructed from year to year in the program. From an adult learning perspective, the curriculum in the practice skills lab is created from a constructivist orientation (Merriam et al., 2007). “Individuals are understood to actively construct their own knowledge, not passively absorb already existing concepts” (Fenwick, 2003, p. 23). By actively practising decision making in skills labs through social interactions, students acquire learning that can be fostered and built on through experiential placements.

The next step in this scaffolded learning process is to have students practise what they have learned in a real-world environment on their ExEd rotations. Some of the major differences students find when they go on their rotations is that they have more time to practise, have real patients (and therefore real consequences), and have one-on-one preceptor support.

Participants discussed that both practice skills and ExEd were key to the development of CDM. Some participants commented that early in their pharmacy education, they thought obtaining knowledge was enough to decrease hesitancy in CDM; that uncertainty in practice could be rationally resolved with knowledge (Engebretsen et al., 2016). However, through practice skills and ExEd placements, they realized this was not true. The practice of CDM in skills labs and ExEd rotations is fundamental in developing decision-making capacity.

In summary, students construct decision making by using the PCP in practice contexts to hone their decision-making skills. The experiential aspects of their education, rooted in central adult learning tenets, are critical factors for student development as they progress through the program and into practice.

Observing and Modelling Practitioners

Another way participants in this study developed decision-making capacity was by observing their preceptors in practice, especially by observing their preceptors make clinical decisions in ambiguity. Interestingly, participants described this as observational learning, which would be a lower level of learning than having the autonomy to work through things themselves; yet it was still meaningful to them. This learning is akin to reflective observation in Kolb's learning cycle (Kolb, 1984). Participants actively observed their preceptors and internalized those experiences. Then they reflected on how they would model or not model that behaviour as part of their own practice of CDM. This type of experience highlights the importance of reflection in this process. Reflection is an essential method in adult learning through experience (Merriam et al., 2007). Reflective practice is likely key to students developing strong CDM skills and abilities, and should perhaps be focused on during ExEd placements through directed questioning (Edelen & Bell, 2011; Tsingos et al., 2014).

These findings are consistent with the results from Anakin, Duffull, et al. (2020). That study investigated how advanced practitioners construct decision making using the established decision-making process of information gathering, reasoning, judgment, and enactment of the decision. The authors noted that one of the critical steps during the judgment phase is learning to accept uncertainty. They determined that it was in the enactment of the decision that relational factors played a significant role, during the communication of decisions to other members of the health-care team (Anakin, Duffull, et al., 2020). Some of the authors' conclusions were that teaching and learning around CDM need to be further elucidated, and that even advanced practitioners have difficulty dealing with uncertainty in decision making (Anakin, Duffull, et al., 2020). Therefore, the goal in undergraduate education should not be to eliminate uncertainty in decision making, as that uncertainty may be a safety check for the pharmacist or pharmacy student (Ilgen et al., 2019). Rather, having experiences in which students encounter ambiguity may better prepare them for practice.

Mentorship and role modelling appear to be highly influential in how participants develop and perceive their roles and boundaries as pharmacists. Seeing pharmacists not take responsibility in decision making has both positive and negative impacts on participants, which then link to perceptions of roles and boundaries and how participants envision their role in the care of patients. Participants experienced the mismatch in messaging as dissonance between what they are taught in pharmacy school versus how they see pharmacy practised in real life. These factors are related to their development of professional identity (Noble et al., 2019).

The experiences these participants had with mentors and role models in both formal and informal curricular experiences seem to have had the most significant influence on how they made decisions in the simulated scenario. The role of educators in ExEd from an adult learning

perspective can include being facilitators of reflection and coaches (Merriam et al., 2003).

Having preceptors approach their role of mentor and coach so as to move students forward even when they “become stuck or immobilized” would be key in supporting students to work through the final step of decision making (Merriam et al., 2007, p. 170).

Participants’ views of how their role models took up their roles and responsibilities had an influence on how the participants perceived their profession and reconciled identities and roles as part of their professional identity development (Noble et al., 2014; Noble et al., 2019). In particular, seeing role models normalizing difficult, ambiguous situations led participants to feel comfortable with ambiguity and improved their confidence. The theme of role modelling and mentorship is inextricably linked with many other factors that influence how students take up CDM in practice, including how students build confidence in decision making. These are important factors in workplace learning generally (Merriam et al., 2007).

What Facilitates Students’ Clinical Decision Making

The second of the three secondary research questions investigated factors that facilitate CDM in pharmacy students. These include positive relational factors, practice in the formal curriculum, and developing comfort in ambiguity.

Positive Relational Factors

Patient Relationships

The development of relationships with patients was seen as facilitating clinical decision making. These relationships are in part influenced by the pharmacy’s context and clientele. Participants talked about how prescription volume was a factor in building relationships, as well as how CDM was facilitated in pharmacies that have a reasonably regular clientele with whom students became familiar. Participants discussed too how keeping the patient at the centre of the

decision was also influential in facilitating their CDM. In addition, having patients who understand the role of pharmacists in prescribing, and who are comfortable with a pharmacist making decisions in their care, helped facilitate participants' comfort with CDM (Tonna et al., 2008).

Physician Relationships

Previous literature has shown that when nurse and pharmacist prescribers feel they have peer support from physicians, the relationships are facilitators to prescribing (McIntosh et al., 2016). Participants in this study also relayed that prescribing decisions were more comfortable when they had strong relationships with physicians. Older research in the area of physician views on pharmacist prescribing showed that role encroachment and a lack of diagnostic skills were concerns raised by physicians (Tonna et al., 2007). However, given that pharmacists have been prescribing for over 10 years in Alberta, this research may not reflect current physicians' views of pharmacist prescribing in this province. One of the themes found in the study by Faruquee et al. (2020) was that physicians felt solely responsible for their patients. Interestingly, this feeling that the physician is primarily responsible for the patient, and therefore it is acceptable to defer decision making to them, was shared by some participants in the current study. If the health care system cannot change the underlying belief that physicians are solely responsible for patient care decisions, actual practice change, including improved pharmacist responsibility for CDM, may not be possible.

Close proximity among physicians and pharmacists may be a factor in developing the trust and communication that allows for a better understanding of pharmacist roles and responsibilities (Faruquee et al., 2020). This notion was echoed by study participants, who described situations in which they could talk to doctors directly and environments in which they

had closer contact with physicians, such as on a ward in a hospital or in a pharmacist practice in a primary care network, as supporting more collaborative CDM.

Practising Autonomy

Participants viewed situations in which they had opportunities to see preceptors practise autonomously, or were themselves allowed to practise autonomously, as important in developing their own understanding of how to enact CDM in practice. Autonomy in practice has been linked to pharmacists who are successful in implementing expanded practice (Ward et al., 2018). This feeling of autonomy seemed to allow participants the freedom to develop responsibility in CDM.

Practising CDM in Formal Education and Practice

All participants emphasized the importance of practising CDM in the safe environment of the practice skills lab, noting it was a critical facilitator in their decision-making development. This aligns with experiential education theories of adult learning (Merriam et al., 2007). By providing participants experiences in skills lab, they felt better prepared for their ExEd placements.

In investigating the learning needs of pharmacists to help facilitate expanded scope of practice, Schindel et al. (2019) showed that the most preferred methods for learning were related to peer learning and team learning. These are types of experiential learning and workplace learning (Merriam et al., 2007). Participants described their experiences on ExEd rotations as integral to the development of their decision-making skills. Simulation learning has been described elsewhere as an important learning strategy for the development of CDM (Farnan et al., 2008; Menezes et al., 2015; Vyas et al., 2011).

Developing Comfort in Ambiguity

Participants discussed how seeing preceptors and role models make clinical decisions in ambiguity helped them to see the consequences of these types of decisions in practice. This was more formative to their learning about CDM in practice than was their experience with ambiguity in skills labs, where it is hard to simulate consequences.

In a critical review of the literature on developing comfort with ambiguity, Ilgen et al. (2019) stated, “To act with confidence while simultaneously remaining uncertain is a paradox that epitomizes expert practice” (p. 798). By having students observe expert practitioners, they come to see that comfort in ambiguity can be developed through practise, and that ambiguity is not problematic. They propose that comfort in ambiguity can be developed by honing forward planning skills; that is, determining the possible downstream effects of a decision to help plan for possible outcomes (Ilgen et al., 2019). Ilgen et al. (2019) describe this as modelling forward planning and vigilant monitoring. Showing students that uncertainty is not a negative experience, but can “serve as a catalyst for ongoing skepticism about working hypotheses” that require close monitoring and follow-up, may assist in developing this comfort (Ilgen et al., 2019, p. 804). Setting students up to understand that to “consciously remain uncertain,” as described by Ilgen (p. 801), allows for ongoing vigilance in the management of the patient, may increase their comfort with ambiguous situations, .

Summary of Facilitators to Student CDM

Participants suggested that the critical facilitators to their decision making were positive relational factors, practising CDM, and developing comfort in ambiguity. As with factors that cause hesitancy in decision making, multiple, often overlapping constructs are at play in facilitating CDM.

Strategies Students Use to Take Responsibility for CDM

The third of the three secondary research questions explored the strategies students use to develop responsibility taking. Participants noted that observing and modelling mentors dealing with ambiguity as a normal part of decision making in practice was the primary way they learned to take responsibility for decisions. The participants did not discuss any further strategies, invariably referring back to their observation of their preceptors' strategies as critical in their development. This research question was the most difficult one for participants to communicate definitively, but clearly relates to student observations of their mentors' sense of their roles and the boundaries of pharmacist care.

Some study participants were actively willing to take responsibility for CDM, while others were clearly unwilling to take responsibility, owing to a number of personal and environmental factors previously discussed. An unwillingness to take responsibility for the enactment of the decision was evidenced when Lauren and Aaron deferred the patient back to the physician (Table 2). While their unwillingness to take responsibility for decision making obviates any discussion of strategies used to take responsibility, they did discuss factors they felt would make them more comfortable in assuming responsibility for decisions, such as knowing that the doctor was comfortable with them prescribing and that they had a strong relationship with the patient. It is uncertain, however, whether their view of responsibility would truly change in these situations.

As discussed in previous sections, seeing preceptors and role models take responsibility for CDM helped participants develop confidence in decision making, and played an integral role in their professional identity development, including their view of their role on the health-care team. This is supported by other literature which showed that pharmacists undertaking a

prescribing course found that being paired with a mentor who was prescribing successfully in practice was a key factor in their own sense of success as prescribers (Bowskill et al., 2014).

A perceived lack of control over outcomes and a lack of understanding surrounding pharmacists' roles in drug therapy decisions within the profession itself remain ongoing issues related to taking responsibility for drug therapy decisions (Cope et al., 2020; Planas et al., 2005). When practising pharmacists have a lack of clarity over their role in patient care, it is not surprising students will see this in practice, even if the curriculum attempts to clarify roles and boundaries (Noble et al., 2014). In a study by Elvey et al. (2013), pharmacists felt they were "unremarkable" (p. 328) and indistinguishable from other members of the team. The participants in that study also viewed themselves as scientists instead of health-care providers (Elvey et al., 2013).

When students in the University of Alberta pharmacy program observe a lack of clarity in a pharmacist's role in practice, whether directly from a preceptor or from other staff pharmacists around them, it runs counter to what they have been taught about a pharmacist's professional roles and responsibilities. This points to the importance of ensuring that the goal of students' undergraduate education is not viewed solely as competency, but also as forming a strong identity as a health-care professional who is autonomous and responsible for decisions and patients outcomes (Ilgen et al., 2019; Jarvis-Salinger et al., 2013). It is hard for students to develop responsibility-taking strategies if they do not see this role modelled in their work experiences.

The findings from this study also relate to an earlier study by Maddox (2016) that assessed prescribers who failed to take responsibility for decision making during critical incidents. One theme in that study related to the roles of prescribers: if a prescriber felt the

prescribing fell “outside their role,” then they would not take responsibility for it (Maddox, 2016, p. 46). When considered in the context of the data from the current research, it is evident that pharmacy students cannot always determine their role and hence have difficulty in taking responsibility for patient care decisions.

In the study by Maddox et al. (2016), the definition of “role” went beyond the non-medical prescribers’ area of expertise to encompass the boundaries on their professional roles as well. Consistent with the data presented in that study, the findings and previous discussion of the current research demonstrate that other health-care professionals, namely physicians, have a perceived role in defining the boundaries of pharmacist practice.

Further exploration is required to help determine why pharmacists seem less willing than other non-medical prescribers to take responsibility for clinical decisions (Cope et al., 2020). How to support students through undergraduate education in developing strategies for responsibility taking is not well understood, but findings from this inquiry suggest it may relate to developing foundations for a strong professional identity that corresponds to a clear understanding of the pharmacist’s role in practice.

Summary of Discussion

This chapter interpreted the findings of this study in the context of the research questions. The factors found to influence student CDM were discussed, including relational factors, issues in teaching and learning, developing a degree of certainty, personal factors, and responsibility taking. The example of ordering lab work was offered to demonstrate the interrelatedness of many of these themes in a student’s CDM process. Students constructed their CDM through use of the PCP, practising, and observing role models. Facilitators of student CDM are related to positive relational factors, practice, and developing comfort in ambiguity. Students had a

difficult time articulating what strategies they used to develop responsibility taking; however, they cited examples of observing preceptors and role models who are responsible decision makers as an important factor. Chapter Six presents a summary of the findings with critical reflections, and discusses the implications of the study, contributions to the adult learning literature, and recommendations for future research.

CHAPTER SIX: IMPLICATIONS AND CONCLUSIONS

This dissertation has explored how and why pharmacy students hesitate to make clinical decisions. The research problem was framed through previous work which identified that pharmacists struggle to make clinical decisions in practice (Abuzour et al., 2017; Cope et al., 2020; Gregory et al., 2016; Maddox et al., 2016). The purpose of undertaking this inquiry was to improve the teaching and learning of CDM in the practice skills lab at the University of Alberta Faculty of Pharmacy and Pharmaceutical Sciences. A case study was conducted using a social constructivist methodology, which included having student participants engage in a clinical scenario followed by a stimulated recall interview and written reflection. Throughout this work, my understanding of pharmacy students' CDM processes and hesitancy has deepened. In particular, I learned of the critical importance of experiential education in the development of student learning in pharmacy practice, in addition to the foundational aspects of learning in the practice skills lab.

This chapter presents an overview of the primary findings, followed by a critical reflection on these findings from my position as an educator and pharmacist. The implications of the research are discussed, along with how it can contribute to adult learning in the Faculty of Pharmacy and Pharmaceutical Sciences and beyond. Finally, specific recommendations for future research are explored.

Summary of Findings

Pharmacy students hesitate to make clinical decisions for several reasons related to relational factors, teaching and learning, degree of certainty, and personal characteristics. The final step of the decision-making process includes a point at which students decide they are

willing or unwilling to enact a decision. At this critical stage, the pharmacy student determines if they are going to take responsibility for their decision.

Several factors were found to lead to hesitancy in CDM, including negotiating and managing expectations with patients and physicians. Certain elements of the undergraduate curriculum, such as didactic learning assessed through multiple-choice assessments, led to a belief that there should always be a correct answer, which does not prepare students for the practicalities of clinical practice. Personal factors, such as a low sense of confidence on the part of the decision maker, may lead to hesitancy in decision-making. A low degree of certainty related to a perception of a high-risk decision, or a lack of information found in drug information resources, impacted decision making as well. Finally, an unwillingness to take responsibility for the decision led participants to be more hesitant to make a final care decision for the patient. Students struggled with responsibility taking throughout the curriculum and as they progressed through their placements, and this responsibility taking is inextricably linked to their willingness to make a decision. Notably, the development of a strong professional identity, through positive role modelling and mentorship, by which students come to believe they have an essential role in patient care and decision making, is something that needs to be strongly considered in future work on strategies to cultivate responsible decision making.

I have learned through my research that pharmacy students construct their decision making primarily by using the PCP, through repeated practice, and by observing role models. Students felt facilitated in their decision making when they had opportunities to build positive relationships with patients and physicians, to practise decision making in the skills lab, and to develop comfort in ambiguity. Finally, students discussed that strategies for responsible decision making were complex and related to many of the previously discussed themes. The essential role

of modelling preceptor practice in ambiguous situations was noted by participants as a way in which they can develop strategies for responsible decision making.

Critical Reflections from the Research

As a reflexive researcher, I need to consider the personal learnings I take away from this research project. I have built knowledge in the areas of CDM and adult learning, and, most importantly, developed a deeper understanding of the issues faced by pharmacy students when making clinical decisions. Some of these issues are unique to students, such as the disconnect between school and practice. Other issues are similar to what we have seen in prescribing pharmacists, nurses, and residents, such as collaboration with physicians and understanding of professional roles and boundaries (Abuzour et al., 2017; Abuzour et al., 2018; Farnan et al. 2008; Frankel & Austin, 2013; Schindel et al., 2017). Below I highlight two elements of my learning that will continue to influence my practice as an educator and pharmacist.

Practice Skills Curriculum

An important learning from this study for myself was that the participants felt the practice skills lab was a strong facilitator in their decision-making development. This result was unexpected, given that my primary reason for embarking on this research project was a sense that the practice skills lab could be significantly improved. My research corroborates that many of the approaches we use in the lab are impactful to our students, setting them up for success on their ExEd rotations. The findings point to other curricular elements that warrant further assessment, providing opportunities for the future development of CDM teaching and learning within our program.

The practice skills curriculum focuses on simulation learning as well as learning in a social environment. Participants in this research found that the way this teaching was constructed

in the lab environment was fundamental to their development of CDM skills. Participants acknowledged certain disconnects between lab and practice but did not think this was problematic. They felt the level of practice expected in the lab was appropriate. The findings reinforce current practices in skills labs that provide students with opportunities to make difficult clinical decisions and to prescribe for simulated patients. Maintaining and strengthening these aspects is important for future curriculum development and renewal.

Cultural Factors

Thinking beyond the impacts of teaching and learning in the faculty, the findings demonstrate that many of the factors leading to CDM issues are cultural. These cultural factors are difficult to change. It would be simple for me to believe that I have no responsibility as an educator for changing patient and physician views of the pharmacist role. I could defer this function to professional advocacy bodies. However, raising the level of practice of our future pharmacists may help to elevate the expectations of the public and other health-care professionals. I see this as an opportunity for our students to evoke practice change towards ensuring they gain through their undergraduate years a strong professional identity and a clear understanding of the importance of their role as decision makers in practice. It is vital to ensure our students are placed in pharmacy settings where enhanced care is being practised and where the culture reinforces a strong role for pharmacists. Offering students experiential opportunities that encapsulate these values will help them build comfort in ambiguity and a strong professional identity.

Professional identity development and responsibility taking are critical components relating CDM to the development of the pharmacy student's role in patient care, and the development of these components relates to culture. The pharmacists our students interact with,

as part of our curriculum and through work experiences, frame much of our students' learning. As we engage members of the broader community in our students' teaching and learning, it is essential to be thoughtful about how we can benefit students through development of their teachers, mentors, and preceptors.

Implications and Contributions to Adult Learning

This section explores opportunities to utilize the findings of this research to improve teaching and learning at the Faculty of Pharmacy and Pharmaceutical Sciences. Implications include the consideration of curricular changes to help students develop comfort in ambiguity, strategies to assist students in developing a strong professional identity, and preceptor development. I will also discuss how these findings start to fill some of the gaps in the literature related to an understanding of pharmacy student decision-making.

Curricular Implications

In keeping with adult learning concepts, the experiences students bring with them impact how they construct CDM (Merriam et al., 2007). To think that the pharmacy curriculum is the only factor impacting student CDM skill development would be naive and short-sighted. It is clear in the data that previous and ongoing pharmacy experiences impact how students interpret different scenarios, and how they come to make decisions and define themselves as professionals. While previous experiences clearly informed participants' decision-making processes, no direct link is apparent between students having more experience and being more confident decision makers. This may be because all of the students were novice decision makers, no matter the amount of time previously spent working in pharmacy, as opposed to comparing advanced practitioners to students.

One of the key findings of this inquiry is that the practice skills curriculum should continue to reinforce practising the PCP and decision making in a variety of simulated settings. Curricular changes that could be implemented relate primarily to the assessment of students and the development of preceptors. The suggestions in this section are framed within the context of pharmacy education but are applicable to other health professions programs where clinicians make treatment decisions.

Assessments that Capture Ambiguity

A potential starting point would be to move away from multiple-choice assessments that promote the idea that there is one correct answer. This could also be achieved by reworking assessments that imply correct answers to clinical scenarios, to present students with more case-based learning that features clinical ambiguity. Developing comfort in ambiguity has been identified as an essential curricular component (Anakin, Dufful, et al., 2020; Ilgen et al., 2019), which was echoed by students in the current study. Participants offered insights into what teaching practices they felt helped to develop this comfort, including being pushed to make decisions in skills lab, assessments that are not focused on right and wrong answers, and having pharmacist preceptors who model comfort in ambiguity.

Increasing the number of assessments that focus on ambiguity in practice should be considered within the curriculum. Many courses focus on summative assessments with multiple-choice questions (MCQs). The data shows that this type of assessment led students to expect there are always right and wrong answers to patient care questions. Students felt this was a hindrance to their CDM development. Complicated cases that include patient and/or contextual factors for the student's consideration would help frame that uncertainty can come from places other than just gaps in knowledge or therapeutic information. As discussed, uncertainty and

hesitation cannot be overcome solely by acquiring more knowledge (Engebretsen et al., 2016; Hall, 2002; Ilgen et al., 2020).

Rather than strict knowledge assessment, a movement to competence assessment has become the norm in health-care programs (Association of Faculties of Pharmacy in Canada, 2017). This approach is a pivot from a previous focus on knowledge attainment and, therefore, requires different assessment practices. Competencies can be seen as a set of skills and abilities students need upon program completion to be competent professionals (Palomba & Banta, 2001). Assessment of these competencies needs to move beyond simple MCQs to incorporate observation of skills and higher-order thinking.

Developing a Strong Professional Identity

Although students did not explicitly use the term “professional identity” in their interviews or reflections, they did discuss experiencing confusion about their role in patient care. They had engaged for over three years in a curriculum that led them to believe they should enact patient care through building patient relationships and making decisions for their patients’ care. Framing pharmacy practice at this high level led to subsequent confusion in work environments and placements, where students would observe pharmacists not taking on these roles. Often students were left feeling uncertain about what they should be doing as pharmacists. Establishing professional identity formation as a clear objective in student learning is a first step to highlighting the importance of this construct. Fundamentally, role models and mentors are the primary influencers of professional identity formation in medicine (Cruess et al., 2019). There is emerging research in pharmacy education that could be used to inform the development of teaching and learning strategies for professional identity formation (Gregory & Austin, 2019; Kellar et al., 2020; Noble et al., 2019). This previous research, along with the findings from the

current study, could be used to inform curriculum development that specifically focuses on professional identity formation. This work is applicable to other pharmacy schools and other professional programs where identity development has not been emphasized in the curriculum.

Preceptor Development

Based on the data collected from student interactions, interviews, and reflections, a key finding is that experiential learning with strong mentors and role models seems to influence students positively in developing their decision-making capacity. Mentorship has been discussed in the literature as a critical element of professional learning in medical sciences generally, including in the advancement of the pharmacy profession (Frankel et al., 2014; Nieuwstraten et al., 2011). Mentorship in pharmacy has often been explored in academic and research settings; less work has been done in the area of mentorship in advancing practice (Nieuwstraten et al., 2011; Schindel et al., 2019).

The current study points to the value of developing a strong group of preceptors to guide students' practicum experiences. These preceptors should have a deep understanding of role modelling in their preceptorship situated in adult learning concepts. Ilgen et al. (2019) posit that having clinical preceptors who can model forward planning skills, and help students learn to anticipate what events can occur, will help develop comfort in ambiguity. Engaging with our current preceptors on how to model conversations around "possible downstream scenarios" will help our students develop in their decision-making capabilities (Ilgen et al., 2019, p. 805).

Supporting preceptors in developing a coaching approach may also help better prepare them for their role in developing students' CDM skills. In a research study conducted by O'Sullivan et al. (2015), coaching was a key skill of preceptors in teaching students about CDM. These authors specifically separated the teacher-coach role from that of a role model or a

facilitator. The concept of coaching has also been linked to foundations of adult learning in ExEd (Fenwick, 2003; Merriam et al., 2007).

Participants in this inquiry recounted many stories of observing preceptors in which the observation alone was the source of increased confidence in CDM. The development of educational activities around coaching methods for preceptors may assist student learning. Ensuring preceptors are high-level practitioners who espouse values similar to what is taught in practice skills would also be critical.

Preceptor Development to Promote Comfort in Ambiguity. Supporting the development of preceptors, with a focus on helping them model reflective practice, would be beneficial for student learning. More specifically, preceptor development should help frame discussions between preceptors and students around how preceptors manage uncertainty in practice. This includes how they develop comfort in ambiguity, with a focus on forward-planning and consideration of potential outcomes of decisions and how those might be handled (Ilgen et al., 2019). These types of discussions with preceptors would help to normalize ambiguity in practice, rather than problematize it as an issue that needs to be resolved. Developing comfort in ambiguity is a concept that is transferrable to other health-care professions (Higgs et al., 2018).

Contributions to Pharmacy Education

This study is unique in its focus on how students undertake CDM and what curricular elements could be influenced to improve CDM. Previous research in the area of CDM in pharmacy has focused on practitioners (Abuzour et al., 2018; Anakin, Duffull et al., 2020; Gregory et al., 2016; Maddox et al., 2016). The intent of this inquiry was different in that the purpose was to improve teaching and learning in undergraduate pharmacy education. It has been

acknowledged that CDM development in pharmacy students is necessary to improve CDM in practitioners (Anakin, Dufful, et al., 2020; Wright et al., 2019). The findings from the current research start to fill that gap, in that it was found that students develop confidence in CDM by practising a structured process. The PCP provides students with a step-wise approach to assessing patients and developing alternatives to resolve any issues that are uncovered (Charrois et al., 2019; Cipolle et al., 2012). The usefulness of this approach is apparent.

Another unique aspect of this research is that pharmacy students at the University of Alberta Faculty of Pharmacy and Pharmaceutical Sciences have experiences with prescribing pharmacists throughout their education – in didactic lectures, practice skills labs, and ExEd placements. Being in a province where almost half of pharmacists hold a prescribing designation means that most of our students will interact with a prescribing pharmacist at some point. This experience differs from other jurisdictions where pharmacy students cannot experience CDM role modelled by pharmacist prescribers. The setting offers a novel aspect to this inquiry. Students did feel that observing the pharmacists they work with prescribe confidently helped develop CDM skills.

Future Research

Based on the research findings, my first interest would be to further investigate the role of preceptorship in developing CDM in pharmacy students. Working with the ExEd team in the University of Alberta's pharmacy program, a preceptor training module could be developed based on the findings from this study. Using adult and workplace learning concepts related to mentorship and coaching, the module would focus on the development of comfort in ambiguity (Fenwick, 2003; Ilgen et al., 2019; Merriam et al., 2007). Once developed, it could be tested with a cohort of preceptors (Billett, 2004; Merriam et al., 2007). This inquiry could be designed using

an action research methodology, with the training module modified based on data collected from both preceptors and students over several cycles connected to precepting blocks. This could lead to preceptors who are more comfortable teaching about ambiguity and students who have benefitted from this type of preceptorship. The cohort of students could be followed longitudinally to investigate the implementation of prescribing in their practice and, potentially, patient outcomes. This work would be transferrable to preceptor training in other health professions given that CDM is part of diverse health-care practices (Higgs et al., 2018).

A second area of interest would be to compare the findings to other jurisdictions where pharmacist prescribing has not been approved, to see if differences exist based on location alone. This could be accomplished using multiple case study methodology. If the factors that non-Albertan students felt contributed to hesitancy were similar to those observed by Alberta pharmacy students, then the issue could be related to more significant cultural factors that are hard to interpret. Other jurisdictions where prescribing may be coming soon may see this work as beneficial in the early development of a CDM curriculum for undergraduate students and in the development of preceptors. Also, if it was concluded that precepting by a prescribing pharmacist improves CDM in students, we could develop more stringent requirements for precepting, especially in the more advanced years of the program.

An exciting part of this research has been discovering the many ways these findings can be used for future research in many areas of teaching and learning. The findings are transferable both outside of the Alberta setting and outside of undergraduate pharmacy education. This research could also be applied to the continuing education of practitioners in various health-care disciplines.

Conclusion

In developing this inquiry, engaging in the research process, and analyzing the findings, I have acquired a deeper understanding of pharmacy student CDM and hesitancy in making clinical decisions. Future research projects can be developed to further this inquiry that will advance the profession in a meaningful way. Developing students' CDM by further developing the ExEd component of the curriculum, particularly through preceptor role-modelling of comfort in ambiguity, is one aspect that I look forward to investigating further. I believe this could help develop students' understanding that hesitancy is a normal part of CDM.

Although my initial purpose in conducting this research was to improve the practice skills curriculum, I believe the findings should be applied beyond the scope of curricular development in the skills lab. The key learning for me from this research has been that while students' CDM hesitancy is similar to pharmacists' hesitancy, it differs in that students have a relatively unformed professional identity that is heavily influenced by their early experiences. In helping to provide them with positive, foundational relationships with mentors, we may be able to better prepare them for the practice challenges they will face as pharmacists. In moving forward, these findings will help foster future research related to ExEd, professional identity development, and comfort with ambiguity in health profession education and beyond.

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Appendix A: Script for Patient Case for Simulation

Standardized Patient Script

Topic: Prescribing decision making

Patient Name: Alex Maronovic

Interaction Duration: 10 min

1. BACKGROUND

You have high blood pressure and were just started on a new medication. You are coming back in for a refill and just had blood work done.

Chief Complaint (today): Coming in for a refill.

Main Drug-Related Problem (for the student to determine through the course of the patient interaction): Your blood work shows that your kidney function has gone down (gotten worse) due to the new drug you started. The pharmacist needs to change it to something else.

2. SCENARIO

Location: Community pharmacy

Type of Encounter: Coming in for a refill

Opening Line: "Hi, I just need to get my prescription refilled"

3. DESCRIPTION OF THE PATIENT

Name: Alex Maronovic

Age: 55 years old (Jan 1, 1964)

Gender: M/F

Marital Status: Married

Height/Weight: 5'8" and 190 lbs

Socioeconomic Status: Middle-class

Education: University

Language: English

Appearance/Dress: Well dressed

Other Family Members: Partner, 2 kids at home

4. PATIENT HISTORY

Current Medical Problems:

High blood pressure

Relevant Past Medical History:

Seasonal allergies

Medications:

Prescribed Medication	How you ACTUALLY use it (DISCLOSE THIS INFO)
-----------------------	--

	ONLY IF PROBED BY STUDENT, do not volunteer this unless asked)
Perindopril 4mg daily	Take every day in the morning - just started 1 month ago. You take it every day - you never forget
OTC Medication	
Tylenol	Take 2 extra-strength tabs about 3-4 times a month for headaches
Natural Health Products (Do not disclose these unless student asks)	
Vitamin B complex "for your health"	1 tablet a day

History of Present Illness:

You were diagnosed with high blood pressure a month ago when you went in to see your family doctor for your annual check-up. Your blood pressure at that time was 165/105 and your doctor immediately started you on a medication called Perindopril.

Relevant Social History:

Non-smoker

Casual drinker - have 3-4 drinks on a weekend

Casual user of recreational cannabis (about once a month)

Relevant Family History:

Father died of a heart attack at age 65

Allergies:

Penicillin - developed a rash (happened as a child)

5. PATIENT PRESENTATION

Attitude/Agenda	<ul style="list-style-type: none"> In a good mood, easygoing
Mannerisms/Non-verbal Behaviours	<ul style="list-style-type: none"> Nothing of importance
Physical Symptoms	<ul style="list-style-type: none"> No physical symptoms associated with high blood pressure and no side effects you've noticed from your new medication
Psychological Symptoms	<ul style="list-style-type: none"> You are concerned about developing heart disease and having a heart attack like your father, so are committed to taking your medications

Responses to be delivered ONLY IF STUDENT ASKS:**“Do you monitor your BP at home?”**

Yeah, I’ve been doing a lot since I started this medication (at least 15 times per week). Its usually around 145/95. I’m glad you taught me how to use my machine properly.

Anything related to exercise

Trying to walk more. Getting out about 3-4 times a week for 20-30min

Do you ever use anything like ibuprofen or Advil?

No

Anything about diet

Well, I stopped adding salt to everything, it’s no fun but I’m trying.

Any side effects on the perindopril? Have you developed a cough? Dizziness?

Nothing you noticed. No cough.

“Have you noticed any edema?”

Nope

“Do you have an upcoming appointment with your doctor”

Nothing planned

“Have you had trouble going to the bathroom?” (Something around low urine output?)

Nope

“Do you remember what the Cipro was for?”

I had a bladder infection

Appendix B: Data Collection Form – Observation of Interaction

Participant Pseudonym:

Date:

Time:

Time of interaction	Observed decision making OR hesitancy in decision making	Potential questions for interview	Reflective notes

Additional Notes:

Appendix C: Reflection Prompt

Thank you for your participation in this study. In addition to your interaction and interview, we would like you to consider the following points as you write a reflection on your experiences of decision making as a pharmacy student:

- What elements of the curriculum do you feel helped you to learn how to make clinical decisions?
- What elements of the curriculum hindered your ability to make decisions?
- What experiences, both in school and outside of school, influenced your ability to make clinical decisions?
- How do you feel about taking responsibility for clinical decisions in practice?
- Do you feel prepared to do this in your future practice?

Appendix D: First-Round Coding

First round coding (Jan 31, 2020)

In Vivo	Descriptive	Process
Process	patient experience	practising
structure	patient factors	prescribing
decision	roles	assessing
red flag	site factors, work flow, script volume	ordering lab work
guidelines	physician expectations	monitoring
comfortable	patient relationship	information gathering
experience	physician relationship/collaboration	assessing safety and efficacy
stepping on toes	responsibility	referring
grey zone	need more information	following up
trust	safety	
acuteness	acuity of the patient	
uncertain	disconnect school and practice	
puzzle	patient expectations	
confident	mentorship	
protect myself	role modelling	
self-directed	site/environment	
roles	work experience	
overstepping	type of doctor (family/specialist)	
“depends on where you work”	collaborative care	
logistics	lack of information	
practice lab	“picking your battles”	
adaptive	other perspectives	
“getting all the information”	site factors	
general assessment	resources (Staff, drug information)	
competency	workflow	
more investigation (more information)	referral	
risk to patient	confident in problem, not in solution	

no role definition	deferral	
proactive	patient population	
“people who work around you”	fear of repercussions	
intrinsic motivation	remuneration/reward	
responsibility	role clarification	
pressure	education level	
risk vs. benefit	formal training	
urgency	looking for a clear answer	
autonomy	convenience	
“thinking like a prescriber”	boundaries	
“beyond our scope”	minimal experience with negative experience	
flexible		
safety		
“clear cut”		
personality		
knowledge area		
leadership qualities		

Appendix E: Second-Round Coding

Barriers	Education/ Pedagogy	Patient Care Process	The Patient	Knowledge and Competencies	Internal Factors	School and Practice	Role Definitions	Work Factors/Environmental Factors
unclear expectations	ok to be uncertain	structure	red flag	guidelines	comfortable	experience	stepping on toes	“depends on where you work”, site factors, environment
compensation	experience in ambiguity	“getting all the information”	acuteness, urgency	grey zone	adaptive	practice lab	“beyond our scope”	logistics, workflow
hesitancy in mentors/role models	assessments	prescribing	risk vs. benefit, safety	competency	intrinsic motivation	reality vs. school, disconnect	roles	“people who work around you”
frustration	simulations-pt interactions	assessing	convenience	“thinking like a prescriber”	autonomy		physician expectations	resources (Staff, information)
	curriculum	ordering lab work	patient population	“clear cut,” looking for clear answer	flexible		physician relationship/collaboration	workflow
	supported in learning	monitoring	patient expectations	need more information	personality		type of doctor (family/specialist)	pressure
	multidisciplinary practice	information gathering	patient relationship	education level	leadership qualities		collaborative care	remuneration /reward
	mentorship	referring	patientexperience	formal training	self-directed		“picking your battles”	
	role modelling	following up	patient factors	therapeutic area	proactive		referral	

	other perspectives	patient care process			influencers		deferral	
		documentation			responsibility		fear of repercussions	
					uncertainty		role clarification, boundaries	
					experience level			
					confidence			
					accountability			

Appendix F: First Draft of Themes

Relational Factors	Formal Education	Learning in the Real World	Degree of Certainty	Personal Characteristics
Patient relationship	Knowledge and competency	Role modelling	Patient complexity	Life experiences (outside of pharmacy)
Collaboration	Didactic learning and assessment	Disconnect between school and practice	Weighing risks and benefits	Confidence
Roles and boundaries	Practice skills labs/simulation learning	Work environment	Comfort with Ambiguity	Motivation
Experiences with physicians	Using the patient care process		Lack of information	Leadership
Mentorship	Follow-up, monitoring			
Autonomy	Experiential education			
Referral				