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Implementing a technology-based chronic care model: A case study

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Graduate Program in Health and Rehabilitation Sciences
A thesis submitted in partial fulfillment of the requirements for the degree in Master of Science
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Abstract

It is currently estimated that three in five Canadians suffer from some form of chronic disease with recent trends showing rates of such conditions still rising. Moreover, in Canada, the cost of treating chronic illness is increasing faster than national economic growth. In response to this growing concern, various programs and initiatives have been implemented to mitigate the personal, social and economic effects of chronic disease. The objective of this study is to identify factors influencing the implementation of technology-based chronic care model within the team-based, primary care setting. Data for this single-embedded case study was collected using a variety of methods including; observation, semi-structured interviews, and document analysis. Coding of data was conducted using a deductive code list based on the Consolidated Framework for Implementation Research. Coder reliability was tested with the assistance of two additional coders. The findings from this study provide a case-specific glance into various factors contributing to the implementation of a chronic care model in the team-based, primary care setting. While each healthcare team is unique in composition and is influenced by different environmental and contextual factors, the aim of this study is to identify elements of program implementation that could be improved in future efforts.

Keywords

mHealth, Implementation Science, Primary Care, Chronic Disease, Evidence-Based Medicine

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Chapter 1

1 Introduction

1.1 Chronic Disease in Canada

It is well acknowledged in current literature that rates of chronic diseases are reaching staggering levels (Barr et al., 2003; Kadu & Stolee, 2015). In fact, it is estimated that two in five of all Canadians, and 88 percent of adults over the age of 65, have at least one chronic disease (Bodenheimer, Wagner, & Grumbach, 2002; Kadu & Stolee, 2015). Additionally, as national life expectancy increases, it is also more common for individuals to develop multiple chronic diseases (Noël, Frueh, Larme, & Pugh, 2005). Currently in Canada the cost of treating chronic disease is increasing faster than national economic growth (Benady, 2010). Thus, as rates of chronic disease increase, provincial health systems struggle to keep up with the demand for chronic care solutions (Hutchison, Levesque, Strumpf, & Coyle, 2011). In response, many programs and initiatives have been implemented nationally and globally to mitigate the personal, social and economic effects of chronic disease (Kruis et al., 2014; Martínez-González, Berchtold, Ullman, Busato, & Egger, 2014).

1.2 mHealth

More recently, it has become common to integrate technology into chronic disease management practices (Gammon, Berntsen, Koricho, Sygna, & Ruland, 2015). A common approach to integrating technology into chronic disease management has been the use of personal mobile devices or smart phones, also known as mobile-health or mHealth (Silva, Rodrigues, de la Torre Díez, López-Coronado, & Saleem, 2015). While the growing body of literature surrounding mHealth approaches and chronic disease management suggest that it is possible to improve chronic care using mobile technologies, program outcomes are still demonstrating mixed results (Gammon et al., 2015; Hall, Cole-Lewis, & Bernhardt, 2015; Varshney, 2014). Although research surrounding mHealth approaches is expanding, more exploration is required to better understand the facilitators and barriers to program success.

1.3 Research Purpose and Questions

Recently, an mHealth based pilot study was implemented in the primary care setting in Southwestern Ontario with the aim of improving chronic disease management for patients diagnosed with COPD and CHF. Building off a preexisting mHealth platform, the program was designed by a group of clinical and academic experts and was implemented in two family health teams in the primary care setting. For the purpose of deidentification, this mHealth initiative will be referred to as the Primary Care Chronic Care Model or (PCCCM).

The current study aims to answer the follow research question: How was the PCCCM program implemented in these two primary health care settings? This question is answered by meeting the following three research objectives:

- 1) Describe the implementation of the program,
- 2) Identify contextual factors affecting the implementation,
- 3) Highlight the facilitators and barriers that aided or impeded the success of the program.

1.4 Significance of Research

As rates of chronic disease increase, so too does the burden on our health system (Rosella et al., 2014). Literature surrounding mHealth approaches as a chronic care management tool currently demonstrates mixed outcomes (Free, Phillips, Galli, et al., 2013; Hall et al., 2015; Hamine, Gerth-Guyette, Faulx, Green, & Ginsburg, 2015). Despite these mixed outcomes, much of the literature asserts that with further research on mHealth program development and implementation, mHealth approaches have strong potential to improve care for individuals with chronic diseases (Free, Phillips, Galli, et al., 2013; Hall et al., 2015; Horner, Agboola, Jethwani, Tan-McGrory, & Lopez, 2017; Steven & Steinhubl, 2013). This study aims to contribute to this growing body of literature by describing the implementation of an mHealth initiative for COPD and CHF in two primary care settings.

1.5 Structure of Thesis

Chapter 1, the current chapter, has provided a brief introduction to the study at hand. Chapter 2 aims to set the context of the initiative and outline relevant topics such as the state of Chronic Obstructive Pulmonary Disease and Congestive Heart Failure, describe chronic care in the primary care setting, outline topics relevant to implementation research as well as describe the current state of the mHealth movement. Chapter 3 provides an overview of the research methodology and methods used to conduct this study. Chapter 4 provides an outline of the research findings while chapter 5 provides a discussion of how these findings relate to current literature. Lastly, chapter 6 provides a brief summary and conclusion of the findings.

Chapter 2

2 Literature Review

The purpose of this review is to provide an overview of key areas of interest and literature relevant to the current study. This literature review explores the current state of Chronic Obstructive Pulmonary Disease (COPD) and Congestive Heart Failure (CHF) in Canada. After which, information is provided regarding chronic care management, evidence-based medicine and mHealth programs. After which, implementation research and primary health care delivery in Ontario is also be discussed. Lastly, this chapter briefly discuss evidence-based medicine and implementation research. The content of this chapter is provided to assist readers in understanding the impact of intervention characteristics and the implementation processes on the success of a technology-based chronic care model for the management of chronic disease (COPD and CHF) in a team-based, primary care setting.

2.1 Chronic Obstructive Pulmonary Disease (COPD)

COPD is the leading cause of morbidity and mortality nationwide and is the only chronic disease in which mortality rates are still climbing (Canadian Thoracic Society, 2010). COPD is defined by the American Thoracic Society as; "...a respiratory disorder, largely caused by smoking, characterized by progressive, partially reversible airway obstruction and lung hyperinflation, systemic manifestations, and increasing frequency and severity of exacerbations" (Nici & ZuWallack, 2012, p. 1). COPD is a highly debilitating condition being faced by an increasing number of Canadians. It is currently estimated that 2.4 million Ontarian's suffer from chronic respiratory illness and this is believed to be widely underestimated (The Lung Association, 2016; Evans et al. 2014). According to the Canadian Thoracic Society, COPD hospital admissions for lung exacerbations average a cost of ten thousand dollars per stay amounting to an overall total of 1.5 billion dollars per year (Canadian Thoracic Society, 2010).

Coordinating care for patients with COPD is challenging as they require a wide variety of health services from a diverse range of clinicians. The American Thoracic Society explains;

“COPD is a chronic, complex illness with multiple systematic effects and co-morbidities and requires an integrated approach for its optimal management” (Nici & ZuWallack, 2012, p. 10).

2.2 Congestive Heart Failure (CHF)

In Canada, three out of five adults above age twenty suffer from chronic disease while four of five remain at risk for developing chronic illness (Public Health Agency of Canada, 2013). One such chronic disease is Congestive Heart Failure (CHF). CHF is a common chronic, cardiac disorder that results in reduced cardiac output and is said to affect between 200,000 and 300,000 Canadians (Figueroa & Faarc, 2006; Weil & Tu, 2001). CHF is linked to high rates of morbidity and mortality and is one of the leading causes of hospital admissions among individuals 65 years or over (Roy et al., 2009). Moreover, CHF is associated with a two year mortality rate of 45-50 percent and a five year mortality rate of 62 percent (Weil & Tu, 2001). Recurring hospital admissions due to CFH place substantial strain on health systems by consuming financial and human resources (Andrews, Mutter, & Moy, 2012). As a response, various evidence-based chronic care models have been developed to manage illnesses such as COPD and CHF (Adams et al., 2007).

2.3 Primary Health Care Delivery in Ontario

As health systems become more complex and healthcare utilization increases, it is difficult for health professionals to provide optimized patient care (Mitchell et al., 2012; Ouwens & Wollersheim, 2005). Patient care has shifted from the traditional ‘siloes’ model to a multi-professional teamwork or ‘integrated care’ model (Ouwens & Wollersheim, 2005). Integrated care is defined by the World Health Organization as;

“...health services that are managed and delivered so that people receive a continuum of health promotion, disease prevention, diagnosis, treatment, disease-management, rehabilitation and palliative care services, coordinated across the different levels and sites of care within and beyond the health sector, and according to their needs throughout the life course” (World Health Organization, 2016 p.2).

Integrated care is now recognized as crucial in providing high-quality, patient centered care, especially in the case of chronic disease (Chavannes et al., 2009; Martínez-González et al., 2014). For example, literature on integrated care and COPD outcomes suggests that integrated patient care improves quality of life, acute exacerbations and hospitalizations (Casas et al., 2006; Chavannes et al., 2009; Roca, Alonso, & Hernandez, 2008). Additionally, without high-quality coordination and integration between health team members, there is a potential for waste of resources, increased cost as well as increased risk to patient safety (Mitchell et al., 2012). To better integrate care through interprofessional collaboration, primary health care in Ontario has shifted to the Family Health Team Model (Goldman, Meuser, Rogers, Lawrie, & Reeves, 2010). The Family Health Team Model is founded on providing flexible, patient centered care via a multidisciplinary care team (Rosser, Colwill, Kasperski, & Wilson, 2011).

2.4 Chronic Care Management

Managing chronic illness such as COPD and CHF is difficult as individuals with chronic disease require care from a diverse range of providers across the care spectrum such as pulmonary physicians, nurses, respiratory therapists and pharmacists (Gammon et al., 2015; Rosella et al., 2014; Saunier, 2017; Wodchis, 2015). To mitigate issues of care delivery for this complex patient population, the Chronic Care Model (CCM) was developed in 1996 by Wagner, Austin and Von Korff (Wagner, Austin, Korff, Wagner, & Austin, 1996). This model of care outlines several elements essential to improving outcomes for patients with chronic disease, including:

1. Use of evidence to develop explicit plans and protocols for patient care,
2. Redesign of provider roles to meet patient needs,
3. Focused attention to patient education and behavioural change needs,
4. Provider education and decision support,
5. Supportive information systems (such as patient reminders, feedback and care planning) (Wagner et al., 1996).

Since the original 1996 publication, the CCM has been expanded and incorporated into many chronic care settings (Barr et al., 2003; Davy et al., 2015a; Gammon et al., 2015; Woltmann et

al., 2012). Systematic reviews and meta-analyses on the use of the CCM have demonstrated positive patient outcomes including reduced emergency visits and hospitalizations, improved clinical outcomes as well as improved processes of care (Adams et al., 2007; Stellefson, Dipnarine, & Stopka, 2013; Tsai, Morton, Mangione, & Keeler, 2005).

In addition to positive outcomes, Kadu and Stolee outline several facilitators and barriers identified throughout the implementation of the CCM (Kadu & Stolee, 2015). Some facilitators of CCM implementation identified by these authors include enhanced communication facilitated by regular team meetings, data sharing facilitated by computerized platforms as well as a multidisciplinary organizational culture which aided the uptake of the CCM (Kadu & Stolee, 2015). Some barriers identified in the same study include added responsibility created by the implementation of the CCM, staff turn-over, lack of a formal champion, and lack of provider buy-in (Kadu & Stolee, 2015).

2.5 Evidence Based Medicine and Implementation Science

The term ‘evidence-based medicine’ refers to the notion that health interventions and programs should be based, to the highest degree possible, on research findings and evidence (Eddy, 2005; Naylor, 2002). Evidence-based medicine has quickly become the new standard of practice across health sectors (Claridge & Fabian, 2005). Prior to the evidence-based movement, health care relied on traditional education and physician competency to make decisions for their respective patients (Eddy, 2005). This type of clinical decision making centered on the notion that the solo practitioner would collect pertinent information about the patient, review relevant research and with medical teachings and professional experience, the physician would determine the best care path (Eddy, 2005). However, researchers began to realize that some common assumptions in clinical practice did not correspond to the available research basis (Helfrich et al., 2010; Kitson, Harvey, & McCormack, 1998). Moreover, a substantial gap between research findings and what was occurring in clinical care began to emerge (Helfrich et al., 2010). To close this research to practice gap, a noted shift toward evidence-based medicine began during the 1990’s (Claridge & Fabian, 2005; Naylor, 2002). Since, incorporating research findings into program and intervention development has become a norm across health sectors (Kilbourne,

Neumann, Pincus, Bauer, & Stall, 2007). However, the implementation of evidence-based interventions into clinical practice does not always result in expected patient outcomes (Kilbourne et al., 2007). This variance in patient outcomes can often be a result of the implementation process itself.

Eccles and Mittman define implementation research as the study of methods to promote the uptake of research findings and evidence-based practices, improving the quality and effectiveness of health services and care” (Eccles & Mittman, 2006 p.1). Examining how the uptake of evidence-based practice occurs in routine patient care, and documenting facilitators and barriers to success, the implementation process can be tweaked and improved for future efforts. Thus by conducting focused research to understand the implementation of evidence-based interventions, we can improve implementation processes and the likelihood of positive patient outcomes.

Implementing complex interventions such as the CCM to improve care for chronically ill patients requires careful planning and can be impacted by a variety of factors including team composition or environmental context (Davy et al., 2015b). The implementation process can be further complicated as the CCM does not include a clear framework for implementation (Kadu & Stolee, 2015). In fact, currently, relatively little is known about experiences in implementing chronic care interventions in the primary care setting (Kadu & Stolee, 2015).

2.6 mHealth and mHealth Implementation

Due to a combination of increasing rates of chronic disease and an aging population, healthcare delivery systems are facing rising levels of strain (Barrett, O’Connell, & Wyatt, 2012). In order to lessen this strain, the use of technology in healthcare delivery is becoming a common approach to promote self-care as well as provide more efficient, patient-centered care from a distance (Barrett et al., 2012). This type of technology, referred to as information communication technology (ICT) has been increasingly used over the last twenty years as a means of improving patient access to healthcare and healthcare providers without overdrawing from an already resource limited system (Fatehi, Menon, reports, & 2018, 2018). During this time, several ICT tools and approaches have emerged including telemedicine, telehealth, ehealth

and mHealth (Fatehi et al., 2018). Definitions for these ICT approaches are listed below (Table 1).

Table 1: ICT Approaches

ICT Approach	Definition
Telemedicine	Telemedicine is defined as the use of telecommunications tools to support the provision of clinical services from a distance such as diagnosis, consultation and or medical treatment (Stowe & Harding, 2010).
Telehealth	Telehealth is defined as the use of communications systems to support health promotion and administration (Fatehi et al., 2018). This ICT approach is often used to monitor and respond to changes in long-term conditions over time (Barrett et al., 2012).
Ehealth	Ehealth, also known as web-based health are defined as healthcare delivery that is operationalized via the internet (Eysenbach & CONSORT-EHEALTH Group, 2011).
mHealth	mHealth, a subcategory of ehealth, refers to the delivery of health services through the use of mobile devices (Fatehi et al., 2018).

As the current study examines the use of mobile devices to facilitate chronic care delivery between patients and primary care providers, mHealth literature has been further reviewed.

mHealth approaches utilize mobile communication devices to improve health care delivery and facilitate direct communication between patients and health care providers (Free, Phillips, Watson, et al., 2013). This approach is currently recognized across the literature as having great potential to improve patient-centered care (Ag Ahmed, Gagnon, Hamelin-Brabant, Mbemba, & Alami, 2017); (Silva et al., 2015); (Steven & Steinhubl, 2013). For example, Hamine et al. explain that mHealth approaches have a strong potential to positively impact health outcomes of

individuals with chronic disease through improvement of treatment adherence (Hamine et al., 2015). Steinghubl, Muse and Topol (2013) outline the primary reasons for the emerging excitement surrounding mHealth approaches. They explain,

“This level of exuberance for mHealth is driven by the convergence of 3 powerful forces. First is the unsustainability of current health care spending and the recognition of the need for disruptive solutions. Second is the rapid and ongoing growth in wireless connectivity—there now are more than 3.2 billion unique mobile users worldwide—and the remarkable capability this brings for the bidirectional instantaneous transfer of information. Third is the need for more precise and individualized medicine; a refinement in phenotypes that mandates novel, personal data streams well beyond the occasional vital sign or laboratory data available through intermittent clinic visits (Steven & Steinhubl, 2013).

While current literature recognises the great potential mHealth initiatives have in reducing healthcare costs and promoting improved patient outcomes, a variety of limitations and barriers are also gaining attention (Free, Phillips, Watson, et al., 2013; Hamine et al., 2015). A 2015 systematic review explains that while popularity for mHealth programs has experienced a substantial increase, the impact of such programs are not well understood (Hamine et al., 2015).

2.7 Purpose of Research

While the growing body of literature surrounding mHealth approaches and chronic disease management suggest that it is possible to improve chronic care using mobile technologies, program outcomes are still demonstrating mixed results (Gammon et al., 2015; Hall et al., 2015; Varshney, 2014). Although research surrounding mHealth approaches is expanding, more exploration is required to better understand the facilitators and barriers to program success. Recently, an mHealth based pilot study for aimed to improve chronic disease management for patients with COPD and CHF management was implemented in the primary care setting in Southwestern Ontario region. This initiative targeted individuals diagnosed with Chronic Obstructive Pulmonary Disease or Congestive Heart Failure and comorbid depression and/or anxiety. By describing the implementation of this initiative, this study aims to contribute to the body of literature surrounding implementation of chronic care initiatives. Outlining areas of

success and areas in need of improvement, this research provides support for future implementation efforts.

2.8 Research Objective

The current study aims to answer the follow research question: How was the PCCCM program implemented in these two primary health care settings? This question is answered by meeting the following three research objectives:

- 4) Describe the implementation of the program,
- 5) Identify contextual factors affecting the implementation,
- 6) Highlight the facilitators and barriers that aided or impeded the success of the program.

Chapter 3

3 Methods

The current study aims to describe how the PCCCM program was implemented in two primary health care settings. This question is answered by meeting the following three research objectives, 1) describe the implementation of the program, 2) identify contextual factors affecting the implementation, and, 3) highlight the facilitators and barriers that aided or impeded the success of the program. This chapter provides an overview of the methods used to conduct this study.

3.1 Introduction to Case Study

The evolution of case study as a research methodology has been primarily guided by two authors, Robert Yin and Robert E. Stake (Stake, 2006a; Yin, 2012). There are notable differences in both authors' approaches to case study design, and structure and research paradigms (Yin, 2018a). The guiding approach for this case study was selected based on overarching paradigm and available data. While Stake's interpretivist approach to case study is frequently used in health research, Yin's post-positivist approach best suits the structured, objective data collected for the current study (Crowe et al., 2011; Hyett, Kenny, & Dickson-swift, 2014).

Case study as a research method is used to develop in-depth understandings of highly complex phenomena within the real-world or natural setting (Crowe et al., 2011; Anderson, Crabtree, Steele, & McDaniel, 2005). Yin defines case study as; "...an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when boundaries between phenomenon and context are not clearly evident" (1994, p.13). Case study methodology is beneficial in circumstances where the phenomenon of interest is particularly complex or when the phenomenon cannot be removed from the context wherein it occurs (Dubé & Paré, 2003; Anderson et al., 2005). Case study methodology is commonly described as a highly flexible and versatile mode of qualitative study (Harrison, Birks, Franklin, & Mills, 2017; Luck, Jackson, & Usher, 2006). This type of versatile research is meant to contribute to meaningful understandings

of real-world interactions and behavior (Noor, 2008). Additionally, Yin offers a second, more technical component to his definition. He explains;

“The case study inquiry; 1) copes with the technically distinctive situation in which there will be many more variables of interest than data points, and as one result; 2) relies on multiple sources of evidence, with data needing to converge in a triangulating fashion, and as another result; 3) benefits from prior development of theoretical propositions to guide data collection and analysis” (Yin R. , 2009, p. 18).

As the aim of the current study is to gain an in-depth understanding of the site-specific implementation of an mHealth initiative, the case study method lends the necessary narrow focus and versatile process to properly answer the research question. Moreover, the various methods of data collection common to case study research aligns well with the methods utilized in this study.

3.2 Study Design

Yin (2012) argues that when conducting a case study initial steps or components are crucial in developing a well-designed study;

1. Outline case selection,
2. Define the case,
3. Describe the case study design,
4. Describe the case study strategy, and
5. Incorporate theory in design.

3.2.1 Case Selection

When employing case study as a research methodology, it is important to provide explanation or justification for the case(s) selected for investigation (Seawright & Gerring, 2008). Yin asserts that the case selection process is dependent on circumstance. For example, he explains, “Sometimes, case selection is straightforward because you have chosen to study a unique case whose identity has been known from the outset of your inquiry. Or, you already may know the case you wish to study because of some special arrangement or access that you have”

(Yin, 2012 p. 91). He also asserts that researchers studying single cases should screen for the case that will yield the most data (Yin, 2012).

Case selection for the current study adheres to the above criteria as this study focuses on a unique case identified prior to the development of the research question. The PCCCM was chosen for further investigation as it presented a unique opportunity to analyze an emerging chronic care program based on trending topics and approaches to chronic disease management in primary care. By Studying the implementation of the PCCCM program in two primary care teams, this study aims to provide additional insights into the implementation of mHealth initiatives for chronic care management.

3.2.2 Define the Case

The PCCCM model was developed by an interdisciplinary research team with the aim of improving care for patients diagnosed with COPD or CHF and at least one of two commonly occurring comorbidities, depression and/or anxiety.

The PCCCM is was developed with three primary objectives;

1. Develop a chronic care model for patients in the primary care setting in the South-Western Ontario region,
2. Provide interdisciplinary management of chronic disease by using customized health information and interactive tools, and,
3. Generate outcomes that suggest integrated or team-based care models improve patient outcomes, increase quality of life and decrease readmission and emergency department visits.

The PCCCM model was developed using the expanded Chronic Care Model developed by Bodenheimer, Wagner and Grumbach which centered around six key elements; (Bodenheimer et al., 2002; Bodenheimer, Wagner, & Grumbach, 2014) 1) linkage with community resources, 2) buy-in by health care organizations, 3) self-management support, 4) structured practice teams for chronic care management, 5) decision support and 6) clinical information systems that ensure reminders.

The PCCCM aims to improve interdisciplinary chronic care management by increasing patient access to primary health care professionals using mobile devices and patient/provider communication portals. With this model, patients are provided with mobile devices to facilitate direct patient-provider communication via text messages and are reminded of key aspects of their health care through reminder notifications (Table 1).

Table 2: PCCCM Text Message Examples

Example PCCCM Text Messages

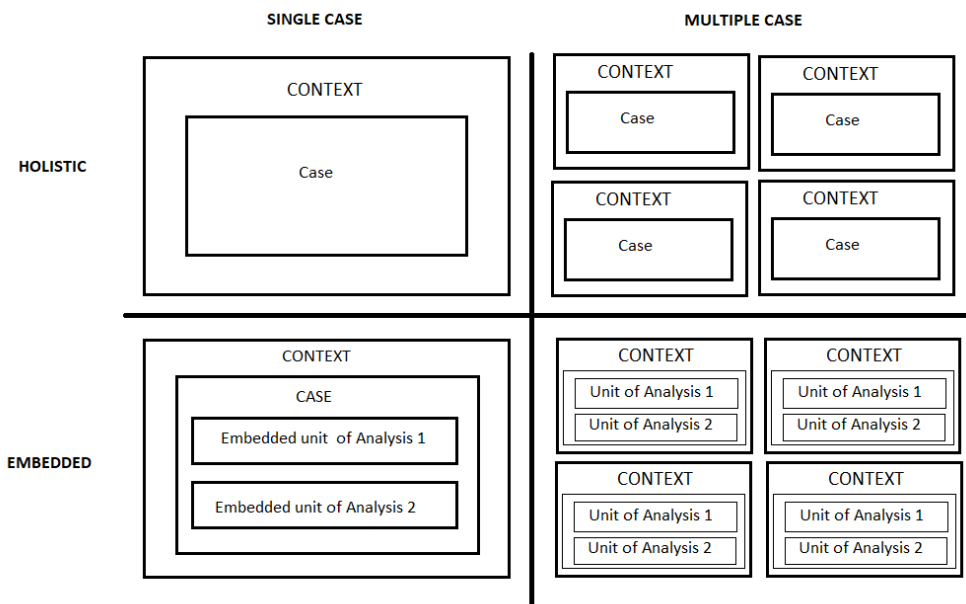
1. Are you taking your pills as prescribed?
2. Have you started the “X” activity (goal of the week)?
3. Did you feel the sense of accomplishment doing “X” activity?
 - a. How did you feel doing “X” activity?
 - b. How easy was it?
 - c. On the scale of 1 to 10, how difficult the “X” activity was for you? 1 being the least difficult and 10 being the most difficult.
4. Are you feeling anxious today?
 - a. How anxious are you feeling today on the scale of 1-10? 1 being not anxious whereas 10 being extremely anxious.
5. Have you taken your beta-blocker today?
 - a. Have you taken your stress blocker pill today?
 - b. Have you taken your carvedilol/..... today?
 - c. Have you taken your (drop down,... colors) pill today?
 - d. Have you taken your (drop down,... shapes) pill today?
6. Prepared meats, breads and tomatoes are high sodium containing foods that should be avoided.
 - a. Please avoid high sodium containing foods such as prepared meats, breads, tomatoes, popcorn, French fries, and pizza.
7. Take medications as prescribed by your doctor.

- a. Take your medications as ordered by your doctor
- b. Please do NOT skip doses or double up if you forget to take your pills.

3.2.3 Case Study Design

Yin identifies four types of case study designs; single, multiple, embedded and holistic (Figure 1) (Yin, 2012). Choosing between a single or multiple case study depends on how many units of analysis will be analyzed (Yin, 2012). Units of analysis generally refer to the number of cases included in the study, however, a study can also contain nested units of analysis. This type of nested study is referred to as an ‘embedded’ study. On the other hand, a holistic study is used if the research is studying the global or whole nature of a case (Yin, 1994).

Figure 1: Yin Case Study Design



For this study, a single-embedded design is utilized as the case is the PCCCM implementation, with the two participating sites functioning as the embedded sub-units of analysis.

3.2.4 Case Study Strategy

In addition to the four variations of study designs noted above, it is also important to select the case study strategy best to answer the research question. Yin outlines three varieties of case study strategies: descriptive case study, exploratory case study and explanatory case study (Yin, 2012). While he identifies these three strategies as separate approaches to the methodology, he also explains that boundaries between the strategies can often be vague or blurred (Yin, 1994). The following text boxes (Text Box 1, 2, and 3) outline the three varieties of case study strategies as well as the scenarios in which they are most properly suited.

Text Box 1: Descriptive Case Study

Descriptive Case Study

Descriptive case studies are the most common form of case study. The focused nature of descriptive studies allows researchers to develop rich and in-depth insights into the workings of a particular scenario or unit of analysis. Yin explains that descriptive case studies should be guided by descriptive theory (2012). Descriptive theories should outline the scope and depth of the study at hand from the outset (Yin, 2012). Yin (2012) provides an example of such a theory, stating “An initial theoretical perspective about school principals might claim that successful principals are those who perform as ‘instructional leaders’ (p. 9). To validly use this as a guiding descriptive theory, relevant literature would have to support this claim.

Text Box 2: Explanatory Case Study

Explanatory Case Study

Explanatory case studies have been identified as the most difficult form of case study to execute as the explanatory approach aims to explain how and why situations occur in complex, real-world scenarios (Yin, 2012). While it is often argued that

explanatory case studies do not provide proof relationships to the level of controlled experiments, the explanatory approach is used to gain deeper, meaningful insights into complex cause and effect relationships. This deep insight can often provide information beyond what can be discovered by using experiments alone. Thus, explanatory case studies are sometimes used in mixed methods studies to complement experimental methods of data collection and analysis. The strength or quality of explanatory studies can be improved by testing for opposing or rival explanations for findings (Yin, 2012).

Text Box 3: Exploratory Case Study

Exploratory Case Study

In this case, data collection and field work are completed before the final research question is developed. Exploratory case study research can be conducted following the researcher's intuitive assumptions with the aim of discovering through focused study of a phenomenon (Yin, 2012). As a result of this intuitive process, the final outcome of an exploratory case study may not result in a case study at all, rather it may take the form of some other research structure. It is for this reason that exploratory case studies have developed the reputation of being a prelude to further investigation (Yin, 2012). An exploratory case study is best suited in instances where the researcher is initially uncertain about some component of the study at hand. Taking an exploratory approach to case study allows for further investigation and proper development of research questions and study structure in situations where researchers do not have enough information to build these items in the early phases of an investigation (Yin 2012).

3.2.5 Incorporating Descriptive Theory in Case Study

According to Yin's approach to descriptive case studies, carefully considering theory development is an important part of designing the structure of the study (Yin, 2012). 'Theory' in this application refers to field-relevant propositions, commonly agreed upon assumptions, or fully developed theories (Yin, 2012). The guiding framework and theoretical assumptions for the current study are outlined in the following paragraphs.

The Consolidated Framework for Implementation Research (CFIR) is a meta-theoretical framework developed by exploring and combining constructs from other frameworks and models associated with effective implementation. The CFIR is used widely in implementation research to identify factors affecting implementation and to organize results across studies (Damschroder et al., 2013; Kirk et al., 2016; Lowery, 2015). The framework is also commonly used to identify various facilitators and barriers to implementation success (Wood, Ohlsen, & Ricketts, 2017). CFIR authors organized constructs in five sections, which, the authors argue, reflect a professional consensus and encompass the values, beliefs and techniques shared within the implementation science community (Damschroder et al., 2009). The five constructs included in CFIR include: process of implementation, characteristics of individuals involved, inner setting, outer setting and intervention characteristics (Table 4). These five constructs are thoroughly defined in the CFIR and contain several sub-categories to further aid in the understanding and evaluation of the implementation process. CFIR authors used these constructs and sub-categories to develop a deductive codebook, often used in conjunction with an inductive approach to data collection and analysis (Breland, Asch, Slightam, Wong, & Zulman, 2016; Damschroder et al., 2013; Martinez et al., 2017). The CFIR framework also contains a wide variety of publicly accessible tools and templates for data collection and data analysis; of these, the CFIR interview guide was utilized to inform both patient and provider semi-structured interview guides while the CFIR codebook was used to assist in the deductive coding of transcripts and field notes.

Table 3: CFIR Constructs

CFIR Constructs	Definition
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Innovation Characteristics	Characteristics of the intervention being implemented into a particular organization.
Outer Setting	Outer setting includes the economic, political, and social context within which an organization resides. Changes in the outer setting can influence implementation, often mediated through changes in the inner setting.
Inner Setting	Includes features of structural, political, and cultural contexts through which the implementation process will proceed.
Characteristics of Individuals	Individuals involved with the intervention and/or implementation process.
Process	Activities aimed to achieve individual and organizational level use of the intervention as designed. Process may be an interrelated series of sub-processes that do not necessarily occur sequentially. These sub-processes may be formally planned or spontaneous; conscious or subconscious; linear or nonlinear.

Based on CFIR, the guiding descriptive theory for this study is as follows: Adhering to major principles outlined in the CFIR framework, implementation will succeed when the five CFIR constructs are thoroughly considered and accounted for throughout program development and implementation, 1) process of implementation, 2) characteristics of individuals involved, 3) inner setting, 4) outer setting and 5) intervention characteristics. The CFIR codebook, which is based on the five subconstructs and corresponding sub-constructs, were used to code the data sets for this study. Coding data according to CFIR constructs allows for organization of key themes, facilitators and barriers that contributed to the implementation outcome of the PCCCM program.

3.3 Ethics

Approval for this research was granted by the Health Science Research and Ethics Board (REB # 108416). Participants provided consent at the beginning of each interview based on the

Letter of Information which outlined details about the study and key items to be aware of such as consenting to audio recordings.

3.4 Data Collection

In case study literature there is a consensus that multiple methods of data collection should be employed to gain a well-rounded understanding of the case of interest (Harder, 2010; Hyett et al., 2014; Yin, 2018a). Data was collected by employing a variety of methods including observation, requesting procedural/process documents and semi-structured interviews informed by the CFIR interview guide. This study collected data from a patient and provider group from two separate primary care teams located in Southwestern Ontario (Text Box 4).

Text Box 4: PCCCM Participants

- 2 Patient Participants
- Provider Participants (2 physicians, 2 nurses)
- 1 PCCCM Staff Member

3.4.1 Semi-Structured Interviews

Two versions of semi-structured interview guides informed by CFIR were developed, one for patients and one for providers (Appendix 2). These semi-structured interview guides explored the providers experience implementing the PCCCM program as well as the patient experience in participating in PCCCM. Additionally, an informal key informant interview was conducted with the PCCCM staff member in attempt to better understand that implementation process. Interviews were conducted only once with each participant.

3.4.2 Procedural/Process Documents

In addition to semi-structured interviews, procedural and process documents were requested from the PCCCM team via the PCCCM staff member noted above. The purpose of collecting procedural/process documents was to enrich our understanding of program

development and implementation by reviewing process flows, meeting agendas and minutes and training materials. Collective this type of data allowed for an objective view of project structure, process and execution. A list of documents collected from the PCCCM staff member is listed below (Table 5).

Table 4: Document List

Document Type	Quantity
Meeting Agenda	6
Meeting Minutes	7
Research Proposal	1
Research Summary	1
Flowchart	1
Clinical Outcome Measures	2
Patient Emergency Handout	1
Sample Text Messages	3
PCCCM User Manual	1
Smart Phone Privacy Document	1
PCCCM Web Portal Training	1

3.4.3 Observation

While the initial intention was to utilize observation as a major method of data collection, coordinating schedules limited the ability to do so. However, one PCCCM meeting was observed after which a field note was written and included in the cumulative data.

3.5 Data Analysis

In keeping with a post-positivist approach within this study, analysis and interpretation of collected data adhered to an objective approach. According to DeCuir-Gunby, Marshall, &

McCulloch (2011), codes can be developed in three ways; 1) theory-driven code development, when codes are developed a priori from existing theory or concepts, 2) data-driven code development, when codes are developed inductively as they emerge from raw data, and 3) structural code development, when codes are developed from specific research goals and questions. Coding of data sets (interview transcripts, meeting minutes and agendas, and observation notes) were conducted using a deductive or theory driven approach guided by the CFIR codebook. Although a deductive approach was utilized, an additional ‘parking lot’ was utilized to code items that did not align with the CFIR constructs (Breland et al., 2016; Garg et al., 2015; Martinez et al., 2017). Additionally, a preliminary coding consensus meeting was held between the primary researcher and adjunct research team to confirm that all were in agreement regarding the coding of PCCCM data.

The analysis of project and procedural documents occurred through a document analysis. Document analysis is a growing systematic qualitative research method used to review and assess various forms of electronic and print materials (Owen, 2014). Document analysis is used to triangulate findings and is often used within the case study methodology (Bowen, 2009; Goddard, 2012). This qualitative method requires the systematic examination and interpretation of materials to elicit meaning and advance empirical knowledge (Bowen, 2009). Document types common to document analysis include (but are not limited to); meeting minutes, attendance forms, memoranda, organizational charts, procedural documents, program proposals, public records, and institutional reports (Bowen, 2009). This process has been applied using Excel software. This software was selected based on the body of literature which supports the use of excel in qualitative research as a way to simplify the organization and visualization of data (Kang, 2015; Meyer & Avery, 2009; Ose, 2016).

3.6 Validation of Findings: Triangulation and Member Checking

In post-positive, qualitative research, it is highly recommended to use triangulation as an approach to validating research findings. Another author in the field of case study explains that triangulation aims to, “...systematically check the information collected from one source against at least one and preferably several other sources” (Gagnon, 2010 p. 41). Yin also describes

triangulation as an important process in the 6th edition of his *Case Study Research and Applications: Design and Methods*. He explains;

Using multiple sources of evidence permits going beyond appreciating the breadth of a case study's scope. You also will have an opportunity to pursue a critical methodological practice—to develop converging lines of inquiry. The desired triangulation follows from the principle in navigation, whereby the intersection of lines from different reference points is used to calculate the precise location of an object (Yardley, 2009). Thus, any case study finding or conclusion is likely to be more convincing and accurate if it is based on several different sources of information, following a similar convergence (Yin, 2018 p. 130).

In keeping with Yin's case study approach, multiple sources of data (noted above) were collected and analyzed to sure triangulation of findings could occur. In addition to triangulation, member-checking is also commonly used in qualitative research to ensure the accuracy or validity of research findings. While not specifically discussed in Yin's works, member checking is often used in qualitative research to ensure that study participants agree that findings align with their knowledge of the phenomenon (Baillie, 2015; Houghton, Casey, Shaw, & Murphy, 2013; Stake, 2006b). Baillie defines member checking as when, "The researcher returns to research participants to check that the transcripts represent what the participants feel they said and/or to check findings at different stages of analysis" (Baillie, 2015 p. 39). To add to the rigour and quality of this study's findings, we conducted member checks on two different occasions to ensure that study participants agreed with research findings. The first member check occurred at the half-way point in the research process wherein a 'preliminary results summary' was provided. We received feedback from some participants which indicated that were in agreeance with the information stated on the document. At the end of this study, a second and more complete member checking document was provided wherein little feedback was received. Although little feedback was provided about the final research findings, disseminating the document allowed participants the opportunity to provide feedback or state concerns.

3.7 Rigour and Quality

While the value of qualitative research is increasingly recognized, the issue of ensuring rigour or quality is also increasingly discussed (Houghton et al., 2013). Baillie describes quality or rigour in qualitative research in the following excerpt. “Use of the term ‘rigour’ infers that the research was conducted systematically and to a high standard (2015 p. 36). However, this author also explain that “...the preoccupation with rigour in qualitative research has been challenged on the grounds that it may stifle creativity if applied rigidly (Baillie, 2015 p. 36). This approach to flexible, rigorous qualitative research aligns with Yin’s approach as he explains that to ensure case studies are conducted with rigour and quality, the research must effectively report the methods used as well as minimize research biases as much as possible. He explains, “When doing a research case study, you need to overcome this confusion by highlighting your methodic procedures, especially the reporting of all evidence fairly. You also need to be transparent and explicit about limiting or eliminating any biases” (Yin, 2018 p. 41). Thus, to ensure quality and rigour in this qualitative case-study, an in-depth explanation of the methodology and methods used to conduct this research has been provided.

Chapter 4

4 Results

The current study aims to answer the follow research question: how was the PCCCM program implemented in two primary health care settings? This question is answered by meeting the following three research objectives:

- 1) Describe the implementation of the program,
- 2) Identify contextual factors affecting the implementation,
- 3) Highlight the facilitators and barriers that aided or impeded the success of the program.

The following results were gleaned from the deductive analysis of interview transcripts, observation notes and a document analysis of a variety of PCCCM meeting minutes, evaluation tools as well as other supporting documents. These data sources were used to triangulate themes and understandings. Data analysis provided key insights into the implementation process of the PCCCM program. Data were collected from two participant populations (patients and providers) from two separate interdisciplinary, primary care teams. As the PCCCM program had minimal patient participation, data were collected from two patient participants, four health care providers and one PCCCM staff member.

The deductive approach to data analysis was guided by the codebook for the CFIR which is organized into five central constructs. Each construct contains a number of sub-codes which were used as coding ‘nodes’ (Table 3). Using the CFIR codebook to code and analyse data allowed for the identification of patterns and themes relevant to the implementation of the PCCCM project. Although primarily a deductive approach was utilized, a ‘parking lot’ was used for emerging data that did not fit within the bounds of the CFIR codebook.

Due to low recruitment rates, the PCCCM program enrolled two patients, one patient from each health participating site (n=2). Both patients consented to participate in the current study and partook in semi-structured interviews. One physician and one nurse or nurse practitioner at each of the two sites assumed the responsibility of implementing the PCCCM program, all four of which consented and participated in the current study (n=4). Additionally, one staff member from the PCCCM research team participated (N=1). Thus, the total number of participants for the current study is N=7 (Text Box 5).

Text Box 5: PCCCM Participants

- 2 Patient Participants
- Provider Participants (2 physicians, 2 nurses)
- 1 PCCCM Staff Member

4.1 Innovation Characteristics

The CFIR characterises the construct of innovation characteristics as, “characteristics of the intervention being implemented into a particular organization” (Damschroder et al., 2009).

Sub-codes under the Innovation Characteristics construct include;

- | | | |
|---------------------------------|----------------------|--------------------------------|
| ▪ Innovation source | ▪ Relative advantage | ▪ Design quality and packaging |
| ▪ Evidence strength and quality | ▪ Adaptability | ▪ Cost |
| | ▪ Trialability | |
| | ▪ Complexity | |

Throughout the data analysis process, it became clear that data for this study most related to the following sub-constructs, a) innovation source, b) complexity, and c) design quality and packaging.

4.1.1 Innovation Source

According to the CFIR, the sub-construct ‘Innovation Source’ is defined as;

“Perception of key stakeholders about whether the intervention is externally or internally developed. An intervention may be internally developed as a good idea, solution to a problem, or other grass-roots effort, or may be developed by an external entity (e.g., vendor or research group). The legitimacy of the source may also influence implementation” (Damschroder et al., 2009 p.6).

Regarding the source of the innovation, PCCCM program appears to have emerged as a reaction or response to a funding opportunity. It appears that the development of the PCCCM was sparked by this initial opportunity for funding.

“I’ve been working for the last eight years and in particular in Western since five years, so we were already part of team and then there was a call for, you know, the chair person grant and then [PCCCM PI 1] thought to apply. So he collaborated with Department of Medicine, Department of Family Medicine, Health Sciences and then they all came together and discussed how the project should look like and how to do a collaborative project. That is what was required at that time to get this grant...” (PCCCM Staff Member1).

It also appears that some key aspects seen as favourable to obtaining funding were built into PCCCM to help secure financing. For example, the PCCCM staff member indicated that programs containing components of team integration and mobile technology are commonly funded, building them into the PCCCM program would be beneficial and may help secure a grant.

I don’t know how much experience you have but most of the project that is getting approved those thing is very common. One is like a collaboration so one person, and group of people coming together. And second if you have technology on top of that, that is a plus. So people wanted to do something to make sure that they receive the grant and I feel like the incorporating technology was a smart decision at that time and even now I feel it is a good decision (PCCCM Staff Member).

After this funding opportunity was identified, the program was built in conjunction with local experts by leveraging proximity of expert peers as well as a previously implemented mHealth program. The mHealth platform for PCCCM including the provider web portal was

extracted from this pre-existing mHealth initiative, allowing PCCCM to build on previous tools and experience.

While it appears that particular aspects of the PCCCM program were built into the project to secure funding, the 11 local experts listed as co-investigators indicated that substantial academic support was provided throughout the project development process. Moreover, co-investigators were consulted during the development of pre-scripted patient text messages to ensure a consensus was achieved regarding the quality of message content.

4.1.2 Complexity

The sub-construct complexity is defined by the CFIR as,

“Perceived intricacy or difficulty of the innovation, reflected by duration, scope, radicalness, disruptiveness, centrality, and intricacy and number of steps required to implement. Radical interventions require significant reorientation and non-routine processes to produce fundamental changes in the organization's activities and reflects a clear departure from existing practices. One way to determine complexity is by assessing 'length' (the number of sequential sub-processes or steps for using or implementing an intervention) and 'breadth' (number of choices presented at decision points). Complexity is also increased with higher numbers of potential target organizational units (teams, clinics, departments) or types of people (providers, patients, managers) targeted by the intervention, and the degree to which the intervention will alter central work processes” (Damschroder et al., 2009 p.6).

Regarding the complexity of the intervention, providers reported that the PCCCM web portal was straight forward and easy to use. They also reported that using the portal to manage one patient participant was achievable, however, participants at both sites explained that recruiting more than one patient would be tedious and would increase workload for providers.

... then I'm thinking okay, workload-wise, thanks [Facilitator] for starting it and me trying to continue with it, but then having to do ... if we had to do it for a lot more I think there'd be a lot of tedious work (Provider 1).

Additionally, provider participants articulated that with additional patients, the increased workload would likely interfere with daily functioning and disrupt the flow of patient care.

Providers also expressed concern that patients may use the web portal rather than contacting respective clinics or visiting emergency departments for acute exacerbations or other serious health issues. One provider articulated concerns regarding the logistics of portal monitoring during on-call shifts and whether legal liability could result from a lack of planning for such inevitabilities.

Provider 2 Site A: ...I mean on-call is an issue too so on-call this would go off and I'd be looking at it. I mean was there any medical-legal issues if I didn't attend to these calls? So there was a lot of these questions that weren't answered.

Of the two patient participants, one reported experiencing issues in operating the technology while the other reported issues with the quality of the technology made available to them through the PCCCM program.

Patient 1: ...Well, it, it didn't work and I found it, I found these things to be uh, a devilish thing. For example, I can't get this thing to ring.

Patient 2: ...You can't get anything on it. When the battery runs out, you have to physically take this off, switch the battery around before the phone will work. And it might stop at any time, and it could take you a half an hour just to send one text.

4.1.3 Design Quality and Packaging

CFIR defines this sub-construct as, “The perceived excellence in how the intervention is bundled, presented, and assembled” (Damschroder et al., 2009).

In terms of the design and quality of the intervention, providers reported that portal questions were often not specific or relevant enough for the communications necessary. More specifically, a common response among providers was that the portal questions were too repetitive and did not allow for proper monitoring of commonly comorbid psychiatric concerns. One provider indicated that to bypass this issue they often developed questions or phrases, which they felt was an issue for additional workload.

Provider 1 site A: ...And then on the other side, the implementation of it was me going into the website, seeing if there was any communications, and then sending out these pre-scripted messages. “How are you feeling today? Have you made your

appointment with the doctor,” which is a silly question, so I would pick out things to do and then most of the time I ended up just doing my own script on it.

In other cases, providers sent feedback to PCCCM staff wherein several issues were corrected and adapted to allow for improved question selection. Despite the corrective adaptations, one patient and one provider reported issues with the narrow selection or repetitiveness of available questions or phrases.

Throughout the coding and analysis process, ‘role definition’ also emerged as a theme impacting PCCCM implementation. The PCCCM program was built with the intention of providing interdisciplinary, collaborative care for chronic disease patients diagnosed with COPD or CHF and associated mental health comorbidities, depression and/or anxiety.

‘The overarching goal of this study is to create a model of care for patients with chronic diseases targeting CHF, COPD, and depression/anxiety. The aim is to improve the care of these patients and their quality of life by delivering an innovative, interdisciplinary, efficacious and cost-effective model of care using smart technologies’ (PCCCM project description).

The document analysis process suggested that program development was highly interdisciplinary and collaborative. Interview transcripts also supported this notion of highly interdisciplinary and collaborative project development.

“We had a number of people representing different departments and it was required to keep that way because the project involved participation from psychiatry, medicine because the patients were coming from medical background and family medicine. So we had to involve all those people as a lead and other than that we have at least ten more research personnel listed in our LOI as co-investigators” (PCCCM Staff Member).

The document analysis also revealed that while program development was collaborative and interdisciplinary, the plan for implementation and continued execution was not. While interview transcripts demonstrated that apart from the interdisciplinary co-investigators contributing to project development, one PCCCM staff member acted as the sole facilitator for PCCCM start up and implementation. This lack of interdisciplinary chronic disease management

is further evidenced by the lack of role definition present in PCCCM project proposals, protocols and process documents. For example, only one role (the patient navigator) was defined within PCCCM documents.

The patient-care navigator role will involve assessing and monitoring the patient's depression and anxiety and COPD and/or CHF symptoms; monitoring the patient's adherence to medications and follow up appointments; teaching behavioral activation to motivate patients, enhance activities and increase social contacts and pleasurable activities; and teach motivation interviewing to monitor and activate the patient's progress with their personal goals (PCCCM project proposal).

As demonstrated by the excerpt above, the patient navigator role encompasses all patient facing PCCCM activities. At each site location, the nurse filled the patient navigator role. There is no indication that any other professional is required to monitor the patient portal and patient messages. This notion of the patient navigator as the sole PCCCM site operator is also supported by interview transcripts.

Provider 1 Site A: And then on the other side, the implementation of it was me going into the website, seeing if there was any communications, and then sending out these pre-scripted messages. "How are you feeling today? Have you made your appointment with the doctor," which is a silly question, so I would pick out things to do and then most of the time I ended up just doing my own script on it. "Hope you're doing okay, let me know if there's any issues. Call me because I want to make sure you got this message" or, "Text me because I want to make sure you got this message." Which most of the time he didn't do, and so I would often find that would be more useful.

With one health care provider communicating with and monitoring patients, the PCCCM program was unable to provide the interdisciplinary chronic care that was intended.

4.2 Outer Setting

The construct of outer setting is composed of the four sub-constructs listed below.

- Needs and resources of patients
- Peer pressure
- Cosmopolitanism
- External policy and incentives

Data for this study related to two of these four sub-constructs, 1) patient needs and resources, and 2) peer pressure.

4.2.1 Patient Needs and Resources

Patient needs and resources is defined within CFIR as,

“The extent to which patient needs, as well as barriers and facilitators to meet those needs are accurately known and prioritized by the organization” (Damschroder et al., 2009).

In terms of needs and resources of the patient, three providers and one patient noted that PCCCM portal questions were not suitably geared toward the individual patient.

Patient 2 Site B: Well, they’ve been sending messages and I’ve replied to it. They could get a little bit more creative ... than the same questions over and over again.

After some discussion with PCCM staff, changes were made to the communication portal to allow providers to more specifically target patient needs. Additionally, both patients complained that the technology used in the PCCCM project were unusable to them either due to lack of computer literacy or poor quality of equipment.

Peer Pressure

In terms of incentive for participation in PCCCM, the co-investigators or local experts involved in the development of the PCCCM program were very engaged and appeared to have high-levels of buy-in. PCCCM participants did not demonstrate the same level program buy-in. One provider explained that despite their concerns about the PCCCM project, they decided to participate because of professional connections with investigators associated with the project.

So I did this mostly because I certainly know [PCCCM PI 1] and these other individuals I think involved as well with this project with the department or their family docs and so I thought we’d give it a try (Provider 4).

While it is possible that this professional connection caused a feeling of pressure to participate, data is insufficient to make any direct causal assertions.

4.3 Inner Setting

The inner setting construct is composed of the following subconstructs;

- Structural characteristics
- Networks and communications
- Culture
- Implementation climate
- Tension for change
- Compatibility
- Relative priority
- Organizational incentives and rewards
- Goals and feedback
- Learning climate
- Readiness for implementation
- Leadership engagement
- Available resources
- Access to knowledge and information

Definitions of sub-constructs were used to guide data analysis. In accordance with CFIR sub-construct definitions, data for this study related primarily to one of the 14 sub-constructs under the inner setting construct, tension for change.

4.3.1 Tension for Change

Tension for change is describes within CFIR as, “The degree to which stakeholders perceive the current situation as intolerable or needing change” (Damschroder et al., 2009).

In terms of how the PCCCM program was viewed prior to implementation, all four providers at both sites reported feeling hesitation prior to agreeing to participate in the implementation of PCCCM. This sentiment was reportedly due to lack of interest in PCCCM or concerns regarding the quality of the program itself. After participating in the initial phase of implementation, all providers reported feeling no need for the intervention as in their opinion, PCCCM was not providing any service or convenience to patients that was not already provided.

No, everyone ... no, no one really wanted to step forward with this, so I don't really know that anyone really, kind of, felt the need of having this. It was good to trial it, don't get me wrong, but I think that there was not a lot of people that really wanted to pursue it (Provider 3).

So the context with PCCCM is that there's poor communication already, and that the patients would not be able to pick up the phone and call us if they had any concerns and that there was difficulty in communicating about their issues. And so that was I think – you know, we're trying to fix something that wasn't broken as such (Provider 1).

In fact, three of the four providers interviewed noted that they felt PCCCM duplicated or created more work for them.

Provider 3: If this is a valuable thing. I think [Nurse 1] and I both questioned the value of it, to be very honest, even though I'm very much involved in the project. I –

Provider 2: No, exactly, but we have so many multitudes of programs that not ... I wouldn't say multitude but that's connected to homecare.

Provider 3: Yes. Yeah, there are –

Provider 2: You know there's things that are duplicating, you know, so it feels like I'm, you know ... oh, should this person be on this program or should they stay in this program? You know, so there's a few patients that are on the connected homecare and –

One provider verbalized concerns with the quality of the PCCCM program itself.

I did the project with my nurse practitioner because nobody else wanted to do it because there was just so many holes in it and with all sorts of other things we were concerned with. We voiced it back. He finally got it to a point where it was potentially useable but still a lot of issues with it (Provider 4).

Lastly, one provider repeatedly expressed their opinion that a needs assessment should have been conducted prior to the development and implementation of the PCCCM program.

Provider 1 Site A: There was a huge assumption and I still can't get my head around why the psychiatry department is worrying about chronic disease management communication when they haven't been involved to know what we do for that. So it was just a bizarre study in my opinion, you know? So the context is very important because they didn't look at the big picture at all to see what the needs were. There was no needs assessment at all that I'm aware of. Not for us, anyway.

4.3.2 Characteristics of individuals

The 'characteristics of individuals' construct is composed of the five sub-constructs listed below.

- Knowledge and beliefs about the innovation
- Self-efficacy
- Individual state of change

- Individual identification with the organization
- Other personal attributes

Data for this study was coded primarily under the sub-construct of ‘knowledge and beliefs about the intervention’.

4.3.3 Knowledge and Beliefs about the Intervention

This sub-construct is defined by CFIR as, “Individuals’ attitudes toward and value placed on the intervention as well as familiarity with facts, truths, and principles related to the intervention” (Damschroder et al., 2009 p.9).

In terms of individual knowledge and beliefs about the PCCCM intervention, there seemed to be a disconnect between provider participants and the PCCCM team member that impacted implementation. While providers from both sites indicated that they questioned the value of PCCCM or did not see a need for it, the PCCCM team member expressed the belief that progress and satisfaction at Site B remained positive.

I think [Provider 2] and I both questioned the value of it, to be very honest (Provider 3).

PCCCM Staff Member: Like one team I know they’re still on it, they like it, they like the idea, they participated in the discussion when we were developing the project and they’re referring patient and they’re doing everything that was everything that was required to, you know? They’re very happy with the interface that we have and they’re moving forward with this.

While the PCCCM Team member did note that progress and satisfaction with the PCCCM project was poor in Site A, continued confusion was expressed by one provider at this Site.

Provider 1 Site A: There was a huge assumption and I still can’t get my head around why the psychiatry department is worrying about chronic disease management communication when they haven’t been involved to know what we do for that. So it was just a bizarre study in my opinion, you know?

Through analysis of data it was also apparent that three of the four participating health providers felt concerned about the additional workload PCCCM creates for providers filling the patient navigator role. These providers also noted that continuing the PCCCM program with additional patients would be very difficult as this increased workload could interrupt the flow of patient care. Finally, one provider repeatedly expressed their opinion that a needs assessment should have been conducted prior to the development and implementation of the PCCCM program.

There was a huge assumption and I still can't get my head around why the psychiatry department is worrying about chronic disease management communication when they haven't been involved to know what we do for that. So it was just a bizarre study in my opinion, you know? So the context is very important because they didn't look at the big picture at all to see what the needs were. There was no needs assessment at all that I'm aware of. Not for us, anyway (Provider 1).

4.4 Process

Sub-codes categorized under the larger umbrella of 'process' are listed below.

- Planning
- Engaging
- Opinion leaders
- Formally appointed internal implementation leaders
- Champions
- External change agents
- Key stakeholders
- Innovation participants
- Executing
- Reflecting and evaluating

Data pertaining to the process construct fell into two primary sub-constructs, 1) Planning and 2) engaging.

4.4.1 Planning

CFIR describes the sub-construct of planning as; "The degree to which a scheme or method of behavior and tasks for implementing an intervention are developed in advance and the quality of those schemes or methods" (Damschroder et al., 2009 p. 9).

Data from observation notes as well as the document analysis demonstrate that the planning component of the PCCCM program was collaborative and aligned with current literature. As the PCCCM aims and objectives align with current assertions regarding integrated

care, mHealth approaches and collaborative chronic disease and mental health literature, it is clear that PCCCM was planned in accordance to the current evidence base. This is demonstrated in the project proposal, meeting minutes and process flows included in the procedural/process documents.

4.4.2 Executing

Executing is defined within CFIR as, *“Carrying out or accomplishing the implementation according to plan”*

While one of the central aims of the PCCCM program was to develop an integrated team-based model of care, only one health provider was truly responsible for the implementation and management of the program at each respective site. This lack of interdisciplinary patient engagement and chronic disease management was further evidenced by the lack of role definition present in PCCCM project proposals, protocols and process documents.

Chapter 5

5 Discussion

This single-embedded, descriptive case study used CFIR to describe the implementation of a technology-based chronic care model for COPD and CHF in the primary care setting. To do this, the study had two primary research objectives, 1) describe the implementation of the program, 2) identify contextual factors affecting the implementation, 3) highlight the facilitators and barriers that aided or impeded the success of the program.

In this chapter, key findings are summarized and compared to the literature. The study aims as they relate to the literature is first presented, after which, key findings are compared to the literature supporting CFIR constructs/sub-constructs. This is followed by recommendations for moving forward. Lastly, limitations of this study are addressed.

5.1.1 Positive Aspects of PCCCM as they Relate to the Literature

While reviewing the literature, it became apparent that PCCCM objectives aligned positively with research relating to chronic disease management, coordinated care and mobile health initiatives. For example, the first objective of the PCCCM aimed to create a model of care for patients with chronic obstructive pulmonary disease (COPD) or congestive heart failure (CHF) with concurrent depression or anxiety in the primary care setting. This objective is supported by current literature which states that supporting patients with chronic disease by integrating care is recognized as important in improving quality of life as well as reducing health service gaps, hospital readmissions and acute exacerbations (COPD) (Angus & Greenberg, 2014; Casas et al., 2006; Koff, Jones, Cashman, Voelkel, & Vandivier, 2009; Larsson, Back-Pettersson, Kylen, Marklund, & Carlstrom, 2017; Warren, Beliakov, Noone, & Frankel, 1999). Additionally, current literature states facilitating connections between mental health services and primary care is important in establishing more efficient use of resources and improving patient outcomes (Group, 2009; Kates et al., 2011; Kates, McPherson-Doe, & George, 2011; Woltmann et al., 2012).

The second PCCCM objective aimed to utilize customized health information and interactive tools to provide ongoing management and support within the community for multiple

chronic disease states the interdisciplinary care team. This objective aligned with recent literature which highlights the potential mobile health technologies has to improve behavioral change outcomes and adherence to chronic disease management as well as reduce barriers to access such as geography or lack of physical mobility (Free et al., 2013; Gammon, Berntsen, Koricho, Sygna, & Ruland, 2015; Hamine, Gerth-Guyette, Faulx, Green, & Ginsburg, 2015; Silva, Rodrigues, de la Torre Díez, López-Coronado, & Saleem, 2015).

The third PCCCM objective aimed to demonstrate that integrated team-based models of care lead to decreased readmission rates and emergency department presentations, improved outcomes across all disease states, improved life quality and facilitate activities of daily living. This objective also align with several recently published studies which do in fact indicate that integrated care for patients with COPD improve quality of life as well as reduce length of hospital stays and overall concurrent costs (Garner et al., 2017; Kruis et al., 2014; Norrie et al., 2016).

While recently literature supports the primary objectives of the PCCCM initiative, results of the current study indicate that the PCCCM implementation did not result in the positive outcomes proposed within the literature. The following sections provide a summary of the results based on the CFIR constructs. These results are also be contrasted to relevant literature.

5.2 Innovation Characteristics

The majority of findings under the innovation characteristics construct fell into three of the eight sub-constructs, a) innovation source, b) complexity, and c) design quality and packaging.

5.2.1 Innovation Source

Based on the works of Van de Ven et al. and Greenhalgh et al., this sub-construct explores the internal vs. external involvement in innovation development. While neither work argues one is necessarily better than the other, they do explain that internal vs. external innovation development can greatly impact the implementation success depending on the outer context (Ven et al. 1999; Greenhalgh et al. 2004).

In the case of the PCCCM program, the intervention was developed by a collaborative group of researchers led by a psychiatric specialist based external to the primary care setting in

which it was implemented. While one primary health care provider involved in site level implementation participated in the program development, PCCCM was created mostly external to its implementation setting. It also appears that the concerns expressed by Provider 3 during the interview, were not communicated or expressed during PCCCM team meetings. This is further discussed under the ‘Outer Settings’ construct.

Beyond internal vs. external development, the PCCCM intervention design involved interdisciplinary health professionals only. This is against a growing body of literature which suggests that patient engagement in health system/innovation design is paramount to ensuring interventions are sufficiently patient-centered (Carman, Dardess, Maurer, 2013; Sharma, Knox, Mleczko, & Olayiwola, 2017; Sitzia, Cotterell, & Richardson, 2006). While the small body of data collected for this study does not allow for the identification of causal relationships, the lack of patient input in the intervention design could be a contributing factor to the lack of PCCCM implementation success.

5.2.2 Complexity

Supported by the works of Van de Ven et al. (1999), Greenhalgh et al. (2004) and Kochevar and Yano (2006) the subconstruct ‘complexity’ reflects the perceived difficulty or intricacy of the intervention.

In terms of PCCCM program complexity, the number of process steps required of health providers was relatively few as data suggests that providers found the PCCCM web portal straight forward and easy to use. Despite the user friendliness of the web portal, providers also reported that using the PCCCM model to care for large patient loads would be unmanageable and would disrupt the flow of care onsite. Several other publications regarding mHealth initiatives echo this sentiment by noting the potential increase in provider workload (Hamine et al., 2015; Steven & Steinhubl, 2013). A potential contributing factor to feelings of increased workloads is the portal questions themselves. As outlined in the results chapter, both providers and patients reported that portal questions were often not specific or relevant enough for the communications necessary. More specifically, a common response among providers was that the portal questions were too repetitive and did not allow for proper monitoring of patient specific items. A similar smartphone based study by Horner, Agboola, Jethwani, Tan-McGrory, & Lopez aimed to increase physical exercise for patients with type 2 diabetes also reported feelings of

frustration among patients and providers regarding the repetition of messages (2017). This theme was also noted in a systematic review of text based interventions by Hall, Cole-Lewis, & Bernhardt (2015). This study explained that while 18 of the 29 studies included the review showed statistically significant improvements in behaviours and outcomes while 11 of the 29 studies did not (Hall et al., 2015). The authors state that the 11 studies with statistically poor outcomes consisted of simple and repetitive messaging content. They explain, “The authors note that many of these 11 nonsignificant studies used basic and repetitive SMS content compared to more varied and motivational content in the studies with positive outcomes” (Hall et al., 2015 p. 407). Further research should be conducted to better chronicle these facilitators and barriers to successful messaging applications. Additionally, more research is needed to understand whether the PCCCM program is creating more workload than other similar mHealth initiatives and how these programs implement or integrate the intervention into everyday workflows.

5.2.3 Design Quality and Packaging

According to CFIR, the sub-construct ‘design, quality and packaging’ refers to the “...perceived excellence in how the intervention is bundled, presented, and assembled” (Damschroder et al., 2009).

In terms of packaging, the PCCCM program was presented as a collaborative approach to addressing both chronic disease management and comorbid mental illness using customized health information and interactive, technology based tool. Document analysis supported the notion of collaboration by demonstrating that program development was highly interdisciplinary and collaborative. Interview transcripts also supported this notion of highly interdisciplinary and collaborative program development. However, interview transcripts also revealed that while project development was collaborative, one PCCCM staff member acted as the sole provider involved in PCCCM start up and implementation. Results of this study also demonstrate that this role was limited in terms of patient engagement and chronic disease management due to the messaging and workload concerns noted above. While similar studies have been conducted, there is little information within the literature regarding who, or how many providers assisted with the sending or reviewing of patient messages. This absence of available information limits the ability to discern if this case is unique and whether or not this lack of team participation in message monitoring acts as a barrier.

5.3 Outer Setting

The majority of data placed under the ‘outer setting’ construct fell into two of the four sub-constructs, 1) patient needs and resources, and 2) peer pressure.

5.3.1 Patient Needs and Resources

Patient needs and resources is defined within CFIR as, “The extent to which patient needs, as well as barriers and facilitators to meet those needs are accurately known and prioritized by the organization.”

Three providers and one patient noted that PCCCM portal questions were not suitably geared toward the individual patient. Data demonstrated that after some discussion between providers and PCCCM staff, changes were made to the communication portal to allow providers to more specifically target patient needs. While implementation research suggests that ensuring interventions respond to local contexts and populations through appropriate adaptations, the adaptations taken to adapt PCCCM appeared not to be effective as providers continued to feel concerned about the work load created by PCCCM (Aarons et al., 2012; Kilbourne et al., 2007; Wiltsey Stirman et al., 2012). Stirman et al. outline intervention adaptation in the following passage; “Adaptations, partial continuation of a program or intervention, or integration of new practices may occur in response to new evidence, changes in priorities or resource availability, or other contextual influences” (Wiltsey Stirman et al., 2012 p 2). Providers adapted the PCCCM program on the ground by writing in personalized messages rather than using the predeveloped messages, they appeared to improve patient/provider communication however this also increased workload. As this workload increased, data has shown that providers felt the workload was increasingly unsustainable.

5.3.2 Peer Pressure

CFIR defines the sub-construct of peer pressure as, “Mimetic or competitive pressure to implement an intervention; typically because most or other key peer or competing organizations have already implemented or in a bid for a competitive edge” (L. J. Damschroder et al., 2009 p.7)

While this definition does not specifically apply to the PCCCM context, the following paragraphs highlight areas where peer pressure or external incentives could have influenced the PCCCM implementation.

In terms of incentive for participation in PCCCM, one provider explained that despite their concerns about the PCCCM project, they decided to participate because of professional connections with investigators associated with the project. Moreover, the analysis of observation notes, documents and transcripts, demonstrated that one provider involved in implementing PCCCM at the site level was also involved in the development of program itself. While data indicated that provider 3 questioned the value of the PCCCM program, there was no indication in meeting minutes or agendas that this provider brought these concerns before the PCCCM team.

5.4 Inner Setting

5.4.1 Tension for Change

Tension for change within the family health teams participating in the PCCCM program was quite low. As noted above, interview transcript data as well as observation notes demonstrated that providers at both sites felt hesitant to consent to participation in PCCCM. Additionally, providers and patients at both sites also expressed the belief that they were very successful in providing quality patient care and high levels of patient access. In fact, three of the four providers interviewed noted that they felt PCCCM duplicated or created more work for them. These sentiments demonstrate that the care for these chronically ill patients may have been sufficient and was not in need of change. Implementation literature suggests that there are various pre-implementation tools that could have been used to better understand if a need existed for such a program (Kochevar & Yano, 2006). For example, Kochevar and Yano explain,

“The basic questions to be answered by diagnosis/needs assessment (D/NA) are ‘what is causing the performance gaps? and what can we do to fix it?’ We find answers through methods such as ethnographic observation, systems analysis, key informant interviews, surveys, and analysis of administrative data. We can characterize this approach as need-driven and, in fact, within these disciplines, such foundational work is considered a necessary first step (Kochevar & Yano, 2006 p.25).

It is possible that by not taking the initial steps to identify performance gaps or understanding whether or not a need for the PCCCM existed within the context of these two particular family health teams, the PCCCM model failed to fill the correct performance gaps.

5.5 Characteristics of Individuals

Data for this study related to one of five sub-constructs under the umbrella construct of ‘characteristics of individuals’, knowledge and beliefs about the intervention.

5.5.1 Knowledge and Beliefs about the Intervention

As noted in sections above, providers explained that their opinion of the PCCCM program prior to implementation was quite negative overall. All four providers at both sites reported feeling hesitation prior the implementation of PCCCM. This sentiment was reportedly due to lack of interest in PCCCM or concerns regarding the quality of the program itself. After participating in the initial phase of implementation, all providers reported feeling no need for the intervention as in their opinion, PCCCM was not providing any service or convenience to patients that was not already provided. This relates to the concept of ‘buy-in’, often discussed within implementation literature. Implementation literature suggests that buy-in is one of the most essential contributors to implementation success. For example, Pfadenhauer et al explain that, “The success of implementation is highly dependent on the buy-in of individuals who become key stakeholders in both the intervention and the implementation effort” (2017 p. 10). Moreover, it is common within implementation research to find lack of buy-in as a barrier to implementation success (Kadu & Stolee, 2015; Lau et al., 2016; Pfadenhauer et al., 2017; Rycroft-Malone et al., 2013). As data from interview transcripts demonstrate that providers implementing the PCCCM program felt hesitant to implement or carried negative sentiments toward the program, it is clear that there was insufficient buy-in to drive implementation success.

5.6 Process

Data for this study most related to two of the eight sub constructs presented under the final umbrella construct of ‘process’. These sub constructs include planning and executing.

5.6.1 Planning

CFIR describes the sub-construct of planning as; “The degree to which a scheme or method of behavior and tasks for implementing an intervention are developed in advance and the quality of those schemes or methods.”

As previously discussed, data from interview transcripts, observation notes as well as the document analysis demonstrate that the planning component of the PCCCM program was collaborative and aligned with current literature. For example, the objectives of the PCCCM program demonstrated that the program developers understood that firstly, supporting patients with chronic disease by integrating care is recognized as important in improving quality of life as well as reducing health service gaps, hospital readmissions and acute exacerbations (COPD) (Angus & Greenberg, 2014; Casas et al., 2006; Koff, Jones, Cashman, Voelkel, & Vandivier, 2009; Larsson, Back-Pettersson, Kylan, Marklund, & Carlstrom, 2017; Warren, Beliakov, Noone, & Frankel, 1999). Secondly facilitating the PCCCM team acknowledged that connecting mental health services and primary care is important in establishing more efficient use of resources and improving patient outcomes (Group, 2009; Kates et al., 2011; Kates, McPherson-Doe, & George, 2011; Woltmann et al., 2012). And lastly, mobile health technologies have shown strong potential to improve behavioral change outcomes and adherence to chronic disease management as well as reduce barriers to access such as geography or lack of physical mobility (Free et al., 2013; Gammon, Berntsen, Koricho, Sygna, & Ruland, 2015; Hamine, Gerth-Guyette, Faulx, Green, & Ginsburg, 2015; Silva, Rodrigues, de la Torre Díez, López-Coronado, & Saleem, 2015). While these evidence-based assumptions were built into PCCCM objectives, the program was not entirely implemented in accordance with the literature that originally supported the program development.

5.6.2 Executing

Executing is defined as, “carrying out or accomplishing the implementation according to plan.”

While one of the central aims of the PCCCM program was to develop an integrated team-based model of care, only one health provider was truly responsible for the implementation and management of the program at each respective site. This lack of interdisciplinary patient

engagement and chronic disease management was further evidenced by the lack of role definition present in PCCCM project proposals, protocols and process documents. For example, only one role (the patient navigator) was defined within PCCCM documents. Implementation literature often suggests it is important to find a balance between implementation fidelity and adapting to local contexts (Hasson, 2010; Kilbourne et al., 2007; Perrin et al., 2006). However, it is not clear in this case why only one health care provider was responsible for monitoring patients at each site as it demonstrates a deviation from the aim to implement a team-based model of care.

5.7 Limitations

The scope of the study was impacted by several limiting factors. As the PCCCM team experienced difficulty recruiting patients, and only two patients participated in the study, the patient perspective was difficult to fully realize. Additionally, as both patients were diagnosed with COPD, one patient struggled completing the full interview. Similarly, co-investigators initially intended to implement the PCCCM program in three site locations, however, the third site withdrew due to lack of patient enrollment in sites A and B. Lastly, limited access to the PCCCM study team also reduced the window of knowledge as only one PCCCM team member was represented in the data. Further investigation may reveal additional facilitators and barriers not uncovered in the current study.

Chapter 6

6 Conclusion

The current study sought to better understand the implementation of a technology based, chronic care intervention in the primary care setting by identifying factors influencing the implementation of the program. This was accomplished by conducting semi-structured interviews, collecting procedural documents and taking field/observational notes. Using the Consolidated Framework for Implementation Research (CFIR), a deductive approach to data analysis was taken wherein data was analyzed using a predeveloped codebook. In addition to this deductive approach to data analysis, the researcher remained open to emerging inductive themes that did not align with the CFIR codebook. Quality for this study was ensured by following Yin's criteria of rigour by fully presenting research methods. In addition to following Yin's instructions to ensure rigour in case-study research, member-checking was also conducted to ensure participants had no issues with research findings derived from interview transcripts.

Findings of this study revealed the following major themes; 1) the original PCCCM aims and objectives were supported by evidence-based literature, although the program was not executed with fidelity to all of these aims or objectives, 2) while the web portal was easy to use, both patients and providers felt fatigued by the repetitiveness of the text messages/questions, 3) while program aims sought to develop a team-based collaborative program for the management of COPD/CHF, only one health provider was changed with implementing the program at each site which impeded daily workflow and created unsustainable workloads, 4) despite the influence of academic peers involved with PCCCM development, provider buy-in was very low from the outset, 5) low levels of provider buy in may be a result of both health care teams feeling like they already provide above average care for their chronically ill populations, and lastly, 6) a needs assessment conducted prior to PCCCM implementation may have revealed that such a program was not required in the context of these two primary care teams.

6.1 Further Research

While beyond the scope of this thesis, two primary action items are recommended if the PCCCM program was pushed forward; 1) conduct a systematic review of mHealth programs targeting chronically ill patients. As indicated in the discussion chapter, there is a body of

available literature that outlines facilitators and barriers common to a variety of such programs. A review of this manner may help PCCCM developers design a more effective and patient-centered approach to text messages, and 2) conduct a needs assessment across a spread of family health teams in the Southwestern Ontario region to identify primary care teams in need of chronic care improvement. By identifying teams already in need of assistance in the area of chronic care, the PCCCM development team may obtain increased levels of provider buy-in, possibly increasing the likelihood of program uptake and success.

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Appendices

CFIR Codebook

Note: This template provides inclusion and exclusion criteria for most constructs. Please post additional inclusion and exclusion criteria, guidance, or questions to the [CFIR Wiki](#) discussion tab in order to help improve the CFIR.

This template only includes CFIR definitions and coding criteria; codebooks may include other information, such as examples of coded text, rating guidelines, and related interview questions.

Innovation Characteristics

A. Innovation Source Definition: Perception of key stakeholders about whether the innovation is externally or internally developed.

Inclusion Criteria: Include statements about the source of the innovation and the extent to which interviewees view the change as internal to the organization, e.g., an internally developed program, or external to the organization, e.g., a program coming from the outside. Note: May code and rate as "I" for internal or "E" for external.

Exclusion Criteria: Exclude or double code statements related to who participated in the decision process to implement the innovation to [Engaging](#), as an indication of early (or late) engagement. Participation in decision-making is an effective engagement strategy to help people feel ownership of the innovation.

**B. Evidence Strength
& Quality** Definition: Stakeholders' perceptions of the quality and validity of evidence supporting the belief that the innovation will have desired outcomes.

Inclusion Criteria: Include statements regarding awareness of evidence and the strength and quality of evidence, as well as the absence of evidence or a desire for different types of evidence, such as pilot results instead of evidence from the literature.

Exclusion Criteria: Exclude or double code statements regarding the receipt of evidence as an engagement strategy to [Engaging](#): Key Stakeholders.

Exclude or double code descriptions of use of results from local or regional pilots to [Triability](#).

C. Relative Advantage	<p><u>Definition:</u> Stakeholders' perception of the advantage of implementing the innovation versus an alternative solution.</p> <p><u>Inclusion Criteria:</u> Include statements that demonstrate the innovation is better (or worse) than existing programs.</p> <p><u>Exclusion Criteria:</u> Exclude statements that demonstrate a strong need for the innovation and/or that the current situation is untenable and code to Tension for Change.</p>
D. Adaptability	<p><u>Definition:</u> The degree to which an innovation can be adapted, tailored, refined, or reinvented to meet local needs.</p> <p><u>Inclusion Criteria:</u> Include statements regarding the (in)ability to adapt the innovation to their context, e.g., complaints about the rigidity of the protocol. Suggestions for improvement can be captured in this code but should not be included in the rating process, unless it is clear that the participant feels the change is needed but that the program cannot be adapted. However, it may be possible to infer that a large number of suggestions for improvement demonstrates lack of compatibility, see exclusion criteria below.</p> <p><u>Exclusion Criteria:</u> Exclude or double code statements that the innovation did or did not need to be adapted to Compatibility.</p>
E. Trialability	<p><u>Definition:</u> The ability to test the innovation on a small scale in the organization, and to be able to reverse course (undo implementation) if warranted.</p> <p><u>Inclusion Criteria:</u> Include statements related to whether the site piloted the innovation in the past or has plans to in the future, and comments about whether they believe it is (im)possible to conduct a pilot.</p> <p><u>Exclusion Criteria:</u> Exclude or double code descriptions of use of results from local or regional pilots to Evidence Strength & Quality.</p>
F. Complexity	<p><u>Definition:</u> Perceived difficulty of the innovation, reflected by duration, scope, radicalness, disruptiveness, centrality, and intricacy and number of steps required to implement.</p> <p><u>Inclusion Criteria:</u> Code statements regarding the complexity of the innovation itself.</p>

Exclusion Criteria: Exclude statements regarding the complexity of implementation and code to the appropriate CFIR code, e.g., difficulties related to space are coded to Available Resources and difficulties related to engaging participants in a new program are coded to [Engaging: Innovation Participants](#).

G. Design Quality & Packaging

Definition: Perceived excellence in how the innovation is bundled, presented, and assembled.

Inclusion Criteria: Include statements regarding the quality of the materials and packaging.

Exclusion Criteria: Exclude statements regarding the presence or absence of materials and code to [Available Resources](#).

Exclude statements regarding the receipt of materials as an engagement strategy and code to [Engaging](#).

H. Cost

Definition: Costs of the innovation and costs associated with implementing the innovation including investment, supply, and opportunity costs.

Inclusion Criteria: Include statements related to the cost of the innovation and its implementation.

Exclusion Criteria: Exclude statements related to physical space and time, and code to [Available Resources](#). In a research study, exclude statements related to costs of conducting the research components (e.g., funding for research staff, participant incentives).

II. Outer Setting

A. Needs & Resources of Those Served by the Organization

Definition: The extent to which the needs of those served by the organization (e.g., patients), as well as barriers and facilitators to meet those needs, are accurately known and prioritized by the organization.

Inclusion Criteria: Include statements demonstrating (lack of) awareness of the needs and resources of those served by the organization. Analysts may be able to infer the level of awareness based on statements about: 1. Perceived need for the innovation based on the needs of those served by the organization and if the innovation will meet those needs; 2. Barriers and facilitators of those served by the organization to participating in the innovation; 3.

Participant feedback on the innovation, i.e., satisfaction and success in a program. In addition, include statements that capture whether or not awareness of the needs and resources of those served by the organization influenced the implementation or adaptation of the innovation.

Exclusion Criteria: Exclude statements that demonstrate a strong need for the innovation and/or that the current situation is untenable and code to [Tension for Change](#).

Exclude statements related to engagement strategies and outcomes, e.g., how innovation participants became engaged with the innovation, and code to [Engaging: Innovation Participants](#).

B. Cosmopolitanism

Definition: The degree to which an organization is networked with other external organizations.

Inclusion Criteria: Include descriptions of outside group memberships and networking done outside the organization.

Exclusion Criteria: Exclude statements about general networking, communication, and relationships in the organization, such as descriptions of meetings, email groups, or other methods of keeping people connected and informed, and statements related to team formation, quality, and functioning, and code to [Networks & Communications](#).

C. Peer Pressure

Definition: Mimetic or competitive pressure to implement an innovation, typically because most or other key peer or competing organizations have already implemented or are in a bid for a competitive edge.

Inclusion Criteria: Include statements about perceived pressure or motivation from other entities or organizations in the local geographic area or system to implement the innovation.

Exclusion Criteria:

D. External Policy & Incentives

Definition: A broad construct that includes external strategies to spread innovations including policy and regulations (governmental or other central entity), external mandates, recommendations and guidelines, pay-for-performance, collaboratives, and public or benchmark reporting.

Inclusion Criteria: Include descriptions of external performance measures from the system.

Exclusion Criteria:

III. Inner Setting

A. Structural Characteristics

Definition: The social architecture, age, maturity, and size of an organization.

Inclusion Criteria:

Exclusion Criteria:

B. Networks & Communications

Definition: The nature and quality of webs of social networks, and the nature and quality of formal and informal communications within an organization.

Inclusion Criteria: Include statements about general networking, communication, and relationships in the organization, such as descriptions of meetings, email groups, or other methods of keeping people connected and informed, and statements related to team formation, quality, and functioning.

Exclusion Criteria: Exclude statements related to implementation leaders' and users' access to knowledge and information regarding using the program, i.e., training on the mechanics of the program and code to [Access to Knowledge & Information](#).

Exclude statements related to engagement strategies and outcomes, e.g., how key stakeholders became engaged with the innovation and what their role is in implementation, and code to [Engaging: Key Stakeholders](#).

Exclude descriptions of outside group memberships and networking done outside the organization and code to [Cosmopolitanism](#).

C. Culture

Definition: Norms, values, and basic assumptions of a given organization.

Inclusion Criteria: Inclusion criteria, and potential sub-codes, will depend on the framework or definition used for “culture.” For

example, if using the [Competing Values Framework](#) (CVF), you may include four sub-codes related to the four dimensions of the CVF and code statements regarding one or more of the four dimension in an organization.

Exclusion Criteria:

D. Implementation
Climate

Definition: The absorptive capacity for change, shared receptivity of involved individuals to an innovation, and the extent to which use of that innovation will be rewarded, supported, and expected within their organization.

Inclusion Criteria: Include statements regarding the general level of receptivity to implementing the innovation.

Exclusion Criteria: Exclude statements regarding the general level of receptivity that are captured in the sub-codes.

1. Tension for
Change

Definition: The degree to which stakeholders perceive the current situation as intolerable or needing change.

Inclusion Criteria: Include statements that (do not) demonstrate a strong need for the innovation and/or that the current situation is untenable, e.g., statements that the innovation is absolutely necessary or that the innovation is redundant with other programs. Note: If a participant states that the innovation is redundant with a preferred existing program, (double) code lack of [Relative Advantage](#), see exclusion criteria below.

Exclusion Criteria: Exclude statements regarding specific needs of individuals that demonstrate a need for the innovation, but do not necessarily represent a strong need or an untenable status quo, and code to [Needs and Resources of Those Served by the Organization](#).

Exclude statements that demonstrate the innovation is better (or worse) than existing programs and code to [Relative Advantage](#).

2. Compatibility

Definition: The degree of tangible fit between meaning and values attached to the innovation by involved individuals, how those align with individuals' own norms, values, and perceived risks and needs, and how the innovation fits with existing workflows and systems.

Inclusion Criteria: Include statements that demonstrate the level of compatibility the innovation has with organizational values and work processes. Include statements that the innovation did or did not need to be adapted as evidence of compatibility or lack of compatibility.

Exclusion Criteria: Exclude or double code statements regarding the priority of the innovation based on compatibility with organizational values to [Relative Priority](#), e.g., if an innovation is not prioritized because it is not compatible with organizational values.

3. Relative Priority Definition: Individuals' shared perception of the importance of the implementation within the organization.

Inclusion Criteria: Include statements that reflect the relative priority of the innovation, e.g., statements related to change fatigue in the organization due to implementation of many other programs.

Exclusion Criteria: Exclude or double code statements regarding the priority of the innovation based on compatibility with organizational values to [Compatibility](#), e.g., if an innovation is not prioritized because it is not compatible with organizational values.

4. Organizational Incentives & Rewards Definition: Extrinsic incentives such as goal-sharing, awards, performance reviews, promotions, and raises in salary, and less tangible incentives such as increased stature or respect.

Inclusion Criteria: Include statements related to whether organizational incentive systems are in place to foster (or hinder) implementation, e.g., rewards or disincentives for staff engaging in the innovation.

Exclusion Criteria:

5. Goals & Feedback Definition: The degree to which goals are clearly communicated, acted upon, and fed back to staff, and alignment of that feedback with goals.

Inclusion Criteria: Include statements related to the (lack of) alignment of implementation and innovation goals with larger organizational goals, as well as feedback to staff regarding those

goals, e.g., regular audit and feedback showing any gaps between the current organizational status and the goal. Goals and Feedback include organizational processes and supporting structures independent of the implementation process. Evidence of the integration of evaluation components used as part of “Reflecting and Evaluating” into **on-going or sustained** organizational structures and processes may be (double) coded to Goals and Feedback.

Exclusion Criteria: Exclude statements that refer to the implementation team’s (lack of) assessment of the progress toward and impact of implementation, as well as the interpretation of outcomes related to implementation, and code to [Reflecting & Evaluating](#). Reflecting and Evaluating is part of the implementation process; it likely ends when implementation activities end. It does not require goals be explicitly articulated; it can focus on descriptions of the current state with real-time judgment, though there may be an implied goal (e.g., we need to implement the innovation) when the implementation team discusses feedback in terms of adjustments needed to complete implementation.

6. Learning
Climate

Definition: A climate in which: 1. Leaders express their own fallibility and need for team members’ assistance and input; 2. Team members feel that they are essential, valued, and knowledgeable partners in the change process; 3. Individuals feel psychologically safe to try new methods; and 4. There is sufficient time and space for reflective thinking and evaluation.

Inclusion Criteria: Include statements that support (or refute) the degree to which key components of an organization exhibit a “learning climate.”

Exclusion Criteria:

E. Readiness for
Implementation

Definition: Tangible and immediate indicators of organizational commitment to its decision to implement an innovation.

Inclusion Criteria: Include statements regarding the general level of readiness for implementation.

Exclusion Criteria: Exclude statements regarding the general level of readiness for implementation that are captured in the sub-codes.

1. Leadership Engagement	<p><u>Definition:</u> Commitment, involvement, and accountability of leaders and managers with the implementation of the innovation.</p> <p><u>Inclusion Criteria:</u> Include statements regarding the level of engagement of organizational leadership.</p> <p><u>Exclusion Criteria:</u> Exclude or double code statements regarding leadership engagement to Engaging: Formally Appointed Internal Implementation Leaders or Champions if an organizational leader is also an implementation leader, e.g., if a director of primary care takes the lead in implementing a new treatment guideline. Note that a key characteristic of this Implementation Leader/Champion is that s/he is also an Organizational Leader.</p>
2. Available Resources	<p><u>Definition:</u> The level of resources organizational dedicated for implementation and on-going operations including physical space and time.</p> <p><u>Inclusion Criteria:</u> Include statements related to the presence or absence of resources specific to the innovation that is being implemented.</p> <p><u>Exclusion Criteria:</u> Exclude statements related to training and education and code to Access to Knowledge & Information.</p> <p>Exclude statements related to the quality of materials and code to Design Quality & Packaging.</p> <p>In a research study, exclude statements related to resources needed for conducting the research components (e.g., time to complete research tasks, such as IRB applications, consenting patients).</p>
3. Access to Knowledge & Information	<p><u>Definition:</u> Ease of access to digestible information and knowledge about the innovation and how to incorporate it into work tasks.</p> <p><u>Inclusion Criteria:</u> Include statements related to implementation leaders' and users' access to knowledge and information regarding use of the program, i.e., training on the mechanics of the program.</p>

Exclusion Criteria: Exclude statements related to engagement strategies and outcomes, e.g., how key stakeholders became engaged with the innovation and what their role is in implementation, and code to [Engaging: Key Stakeholders](#).

Exclude statements about general networking, communication, and relationships in the organization, such as descriptions of meetings, email groups, or other methods of keeping people connected and informed, and statements related to team formation, quality, and functioning, and code to [Networks & Communications](#).

IV. Characteristics of Individuals

- | | |
|---|---|
| 1. Knowledge & Beliefs about the Innovation | <u>Definition:</u> Individuals' attitudes toward and value placed on the innovation, as well as familiarity with facts, truths, and principles related to the innovation. |
|---|---|

Inclusion Criteria:

Exclusion Criteria: Exclude statements related to familiarity with evidence about the innovation and code to [Evidence Strength & Quality](#).

- | | |
|------------------|--|
| 2. Self-efficacy | <u>Definition:</u> Individual belief in their own capabilities to execute courses of action to achieve implementation goals. |
|------------------|--|

Inclusion Criteria:

Exclusion Criteria:

- | | |
|-------------------------------|---|
| 3. Individual Stage of Change | <u>Definition:</u> Characterization of the phase an individual is in, as s/he progresses toward skilled, enthusiastic, and sustained use of the innovation. |
|-------------------------------|---|

Inclusion Criteria:

Exclusion Criteria:

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|--|--|
| 4. Individual Identification with Organization | <u>Definition:</u> A broad construct related to how individuals perceive the organization, and their relationship and degree of commitment with that organization. |
|--|--|
-

Inclusion Criteria:

Exclusion Criteria:

5. Other Personal
Attributes

Definition: A broad construct to include other personal traits such as tolerance of ambiguity, intellectual ability, motivation, values, competence, capacity, and learning style.

Inclusion Criteria:

Exclusion Criteria:

V. Process

A. Planning

Definition: The degree to which a scheme or method of behavior and tasks for implementing an innovation are developed in advance, and the quality of those schemes or methods.

Inclusion Criteria: Include evidence of pre-implementation diagnostic assessments and planning, as well as refinements to the plan.

Exclusion Criteria:

B. Engaging

Definition: Attracting and involving appropriate individuals in the implementation and use of the innovation through a combined strategy of social marketing, education, role modeling, training, and other similar activities.

Inclusion Criteria: Include statements related to engagement strategies and outcomes, i.e., if and how staff and innovation participants became engaged with the innovation and what their role is in implementation. Note: Although both strategies and outcomes are coded here, the outcome of engagement efforts determines the rating, i.e., if there are repeated attempts to engage staff that are unsuccessful, or if a role is vacant, the construct receives a negative rating. In addition, you may also want to code the "quality" of staff - their capabilities, motivation, and skills, i.e., how good they are at their job, and this data affects the rating as well.

Exclusion Criteria: Exclude statements related to specific sub constructs, e.g., [Champions](#) or [Opinion Leaders](#).

Exclude or double code statements related to who participated in the decision process to implement the innovation to [Innovation Source](#), as an indicator of internal or external innovation source.

1. Opinion
Leaders

Definition: Individuals in an organization that have formal or informal influence on the attitudes and beliefs of their colleagues with respect to implementing the innovation.

Inclusion Criteria: Include statements related to engagement strategies and outcomes, e.g., how the opinion leader became engaged with the innovation and what their role is in implementation. Note: Although both strategies and outcomes are coded here, the outcome of efforts to engage staff determines the rating, i.e., if there are repeated attempts to engage an opinion leader that are unsuccessful, or if the opinion leader leaves the organization and this role is vacant, the construct receives a negative rating. In addition, you may also want to code the "quality" of the opinion leader here - their capabilities, motivation, and skills, i.e., how good they are at their job, and this data affects the rating as well.

Exclusion Criteria:

2. Formally
Appointed
Internal
Implementation
Leaders

Definition: Individuals from within the organization who have been formally appointed with responsibility for implementing an innovation as coordinator, project manager, team leader, or other similar role.

Inclusion Criteria: Include statements related to engagement strategies and outcomes, e.g., how the formally appointed internal implementation leader became engaged with the innovation and what their role is in implementation. Note: Although both strategies and outcomes are coded here, the outcome of efforts to engage staff determines the rating, i.e., if there are repeated attempts to engage an implementation leader that are unsuccessful, or if the implementation leader leaves the organization and this role is vacant, the construct receives a negative rating. In addition, you may also want to code the "quality" of the implementation leader here - their capabilities, motivation, and skills, i.e., how good they are at their job, and this data affects the rating as well.

Exclusion Criteria: Exclude or double code statements regarding leadership engagement to [Leadership Engagement](#) if an implementation leader is also an organizational leader, e.g., if a director of primary care takes the lead in implementing a new treatment guideline.

3. Champions

Definition: “Individuals who dedicate themselves to supporting, marketing, and ‘driving through’ an [implementation]”, overcoming indifference or resistance that the innovation may provoke in an organization.

Inclusion Criteria: Include statements related to engagement strategies and outcomes, e.g., how the champion became engaged with the innovation and what their role is in implementation. Note: Although both strategies and outcomes are coded here, the outcome of efforts to engage staff determines the rating, i.e., if there are repeated attempts to engage a champion that are unsuccessful, or if the champion leaves the organization and this role is vacant, the construct receives a negative rating. In addition, you may also want to code the "quality" of the champion here - their capabilities, motivation, and skills, i.e., how good they are at their job, and this data affects the rating as well.

Exclusion Criteria: Exclude or double code statements regarding leadership engagement to [Leadership Engagement](#) if a champion is also an organizational leader, e.g., if a director of primary care takes the lead in implementing a new treatment guideline.

4. External
Change Agents

Definition: Individuals who are affiliated with an outside entity who formally influence or facilitate innovation decisions in a desirable direction.

Inclusion Criteria: Include statements related to engagement strategies and outcomes, e.g., how the external change agent (entities outside the organization that facilitate change) became engaged with the innovation and what their role is in implementation, e.g., how they supported implementation efforts. Note: Although both strategies and outcomes are coded here, the outcome of efforts to engage staff determines the rating, i.e., if there are repeated attempts to engage an external change agent that are unsuccessful, or if the external change agent leaves their

organization and this role is vacant, the construct receives a negative rating. In addition, you may also want to code the "quality" of the external change agent here - their capabilities, motivation, and skills, i.e., how good they are at their job, and this data affects the rating as well.

Exclusion Criteria: Note: It is important to clearly define what roles are external and internal to the organization. Exclude statements regarding facilitating activities, such as training in the mechanics of the program, and code to [Access to Knowledge & Information](#) if the change agent is considered internal to the study, e.g., a staff member at the national office. If the study considers this staff member internal to the organization, it should be coded to [Access to Knowledge & Information](#), even though their support may overlap with what would be expected from an External Change Agent.

5. Key Stakeholders

Definition: Individuals from within the organization that are directly impacted by the innovation, e.g., staff responsible for making referrals to a new program or using a new work process.

Inclusion Criteria: Include statements related to engagement strategies and outcomes, e.g., how key stakeholders became engaged with the innovation and what their role is in implementation. Note: Although both strategies and outcomes are coded here, the outcome of efforts to engage staff determines the rating, i.e., if there are repeated attempts to engage key stakeholders that are unsuccessful, the construct receives a negative rating.

Exclusion Criteria: Exclude statements related to implementation leaders' and users' access to knowledge and information regarding using the program, i.e., training on the mechanics of the program, and code to [Access to Knowledge & Information](#).

Exclude statements about general networking, communication, and relationships in the organization, such as descriptions of meetings, email groups, or other methods of keeping people connected and informed, and statements related to team formation, quality, and functioning, and code to [Networks & Communications](#).

6. Innovation Participants	<p><u>Definition:</u> Individuals served by the organization that participate in the innovation, e.g., patients in a prevention program in a hospital.</p> <p><u>Inclusion Criteria:</u> Include statements related to engagement strategies and outcomes, e.g., how innovation participants became engaged with the innovation. Note: Although both strategies and outcomes are coded here, the outcome of efforts to engage participants determines the rating, i.e., if there are repeated attempts to engage participants that are unsuccessful, the construct receives a negative rating.</p> <p><u>Exclusion Criteria:</u> Exclude statements demonstrating (lack of) awareness of the needs and resources of those served by the organization and whether or not that awareness influenced the implementation or adaptation of the innovation and code to Needs & Resources of Those Served by the Organization.</p>
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C. Executing	<p><u>Definition:</u> Carrying out or accomplishing the implementation according to plan.</p> <p><u>Inclusion Criteria:</u> Include statements that demonstrate how implementation occurred with respect to the implementation plan. Note: Executing is coded very infrequently due to a lack of planning. However, some studies have used fidelity measures to assess executing, as an indication of the degree to which implementation was accomplished according to plan.</p> <p><u>Exclusion Criteria:</u></p>
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D. Reflecting & Evaluating	<p><u>Definition:</u> Quantitative and qualitative feedback about the progress and quality of implementation accompanied with regular personal and team debriefing about progress and experience.</p> <p><u>Inclusion Criteria:</u> Include statements that refer to the implementation team's (lack of) assessment of the progress toward and impact of implementation, as well as the interpretation of outcomes related to implementation. Reflecting and Evaluating is part of the implementation process; it likely ends when implementation activities end. It does not require goals be explicitly articulated; it can focus on descriptions of the current state with real-time judgment, though there may be an implied goal (e.g., we need</p>
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to implement the innovation) when the implementation team discusses feedback in terms of adjustments needed to complete implementation.

Exclusion Criteria: Exclude statements related to the (lack of) alignment of implementation and innovation goals with larger organizational goals, as well as feedback to staff regarding those goals, e.g., regular audit and feedback showing any gaps between the current organizational status and the goal, and code to [Goals & Feedback](#). Goals and Feedback include organizational processes and supporting structures independent of the implementation process. Evidence of the integration of evaluation components used as part of “Reflecting and Evaluating” into **on-going or sustained** organizational structures and processes may be (double) coded to Goals and Feedback.

Exclude statements that capture reflecting and evaluating that participants may do during the interview, for example, related to the success of the implementation, and code to [Knowledge & Beliefs about the Innovation](#).

VI. Additional Codes

A. Code Name

Definition:

Inclusion Criteria:

Exclusion Criteria:

B. Code Name

Definition:

Inclusion Criteria:

Exclusion Criteria:

Appendix 1: CFIR Codebook

General Coding Rules:

When two codes are in question for a passage, consider the primary meaning of the passage to assign code; consider what the participant is truly saying. Analysts may wish to err on the side of inclusion or double coding.

PCCCM Patient Interview Guide

- 1) Did you receive training on the smart phone and the associate applications?
Yes No
- 2) Did you feel comfortable using the devise for the purposes of engaging with your healthcare team?
Yes No
- 3) How frequently did you receive text messages?
 - a. Never
 - b. Daily
 - c. Weekly
 - d. monthly
- 4) How frequently did you reply or send text messages?
 - a. Never
 - b. Daily (every day, or more than 1x a week)
 - c. Weekly (at least 1x a week)
 - d. Monthly (between 1-2x a month)

- 5) What were your hopes and expectations for the CDHPMM?

- 6) Have you hopes and expectations have been met? Why? Why not?

[Or, if the participant didn't have any hopes and expectations at the start, we can skip this question]

- 7) Is there anything that could have been done to help you be better prepared to manage your COPD?

- 8) Please think back over the last 6 months and think about the care you (or your loved one has) have received for your COPD. Please rate your experience with the programs or services you have received over the past 6 months. Overall, did you find the programs/services to be:

Very Unhelpful	Somewhat Unhelpful	Neither Helpful nor Unhelpful	Somewhat Helpful	Very Helpful
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Appendix 2: PCCCM Patient Interview Guide

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4

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- 1) What do you think made it (helpful/unhelpful) for you? What do you think is missing or would improve the program? Is there anything we can do to make the program more helpful in the future?

- 2) Describe your healthcare team. What was your role on that team? Could it have been different or better?

PCCCM Provider Interview Guide

1. Define a successful team.

3. How would you know if a team is successful?
 - a. What other factors facilitate or stifle success?
 - b. How might you formally measure/monitor/evaluate this success?
 - c. How might you take steps to improve the likelihood of success?

4. What role does context play in your team?
 - a. Specifically related to CDMI
 - b. Has there been a shift or change from the beginning (developing) until now?

5. Let's talk specifically about the CDMI intervention. Tell me about your experience with the intervention and implementation.
 - a. Who was involved in the implementation of the intervention?
 - b. Who lead the implementation?
 - c. How is it integrated or adapted?
 - d. How do providers perceive this service integration?
 - e. How do patients and families perceive this service integration?

6. Is there a strong need for this intervention? Why or why not? Do others see a need for the intervention?

7. How complicated is the intervention? (Example; duration, scope, intricacy, and/or process)

Curriculum Vitae

EDUCATION

Master's of Science Western University, London On Health and Rehabilitation Science Rehabilitation Science	2018
Bachelor of Arts Western University, London On Honors Specialization Political Science Minor Spanish Language and Hispanic Culture	2016
Liberal Arts Certificate Niagara College, Niagara-on-the-Lake On	2010

ACADEMIC AND RESEARCH INTERESTS

- Primary Health Care, Team-Based Care
- Knowledge Translation and Implementation Science
- Health Policy, Health Ethics, Social Policy

ACADEMIC AWARDS AND BURSARIES

Western Graduate Research Scholarship
 \$10,000 Bursary

Student Excellence Award
 Niagara College, Niagara-on-the-Lake On

PUBLICATIONS

Maskell, R., Cleary, C., Sibbald, S., & Selkirk, K. (2017). The current state of health links. *The University of Western Ontario Medical Journal*. 86(2)

Maskell, R., Rudkovska, A., Kfrerer, M., Sibbald, S. (2017). *Collaborative Care Models for Integrating Mental Health and Primary Care: A Policy Overview*. *University of Western Ontario Medical Journal*. 86(2)

ACADEMIC CONFERENCES

Maskell, R., Schouten, K, & Sibbald, S. (2017, January). *Understanding Interdisciplinary Care: A Perspective on Functionality and the Patient Role*. Presented at the Health and Rehabilitation Science Graduate Research Conference 2017, Western University. London, On.

Kang, H., Maskelle, R., Sandoval, C., & Sibbald, S. (2018, February). *Systematic overview of reviews of instruments measuring teamwork in healthcare settings*. Oral Presentation at Health and Rehabilitation Sciences Graduate Research Conference. London, Ontario.

TEACHING AND RESEARCH EXPERIENCE

<i>Teaching Assistant</i> Introduction to Health Ethics, Health Science Western University	2017
<i>Teaching Assistant</i> Professional Identity, Schulich Medicine and Dentistry Western University	2017
<i>Research Assistant</i>	2016-2017

Faculty of Health Science
Western University

Research Assistant

Faculty of Political Science
Western University

2012-2013

CERTIFICATES

TEFL Certificate, Manuel Antonio Costa Rica

February 2009– March 2009

TEFL International

- Completed a 120 hour TEFL course over four weeks (Teaching English as a Foreign Language)
- Participated in various lessons as well as teaching practice and assessments
- Engaged with the local community through complementary English lessons and community events

Team Leading BTEC Level 2 Certificate, Peru/Ecuador

September 2010 – May 2011

Business and Technology Education Council

- Completed the BTEC level two certificate in team leading over six months in both Ecuador and Peru
- Key principals of the course focused on team leading, personal development, working relationships, decision making and risk assessment

INTERSHIPS AND VOLUNTEER EXPERIENCE

Western University, London On

2017

Canadian Medical Hall of Fame Discovery Days in Health Sciences

Team Lead

McGarrell Place, London On

June 2016 – Present

Long-Term Care Home

Volunteer

- Aid in routine feeding of disabled residents
- Participate and aid in weekly recreational activities
- Provide one-on one companionship for residents

Centro de Estudios Económicos Tomillo, Madrid Spain

June 2014 – August 2014

Applied Economics Consulting Firm

Intern

- Participated in research and consultancy projects for both the Tomillo foundation and the European Commission
- Research topics primarily based on the European labour market, labour shortages and gender inequalities
- Edited quarterly reports for the European Parliament outlining changes in the Spanish labour market
- Employed the use of quantitative software such as SPSS and Excel to organize data
- Created PowerPoint presentations for senior staff to present findings
- Organized and implemented an internal English program for non-English speaking staff

T2CM Fundraising Committee, Woodstock On

March 2013 – Present

Local Mental Health Fundraiser

Organizer

- Contribute to the organization and execution of the Time 2 Change Minds Annual Walk-a-thon
- Raised over \$70,000 toward mental health initiatives in Oxford County in the last three years
- Participate in monthly partnership meetings with representatives from the Woodstock Hospital and Woodstock Canadian Mental Health Association

Global Vision International, Perú/ Ecuador

September 2010 – May 2011

International NGO

Intern

- Obtained the BTEC level two certificate in team leading
- Organized and delivered lesson plans at a primary level to native children in rural communities
- Supervised the purchase and distribution of supplies to various rural schools
- Participated in local community events and Spanish language classes

Community Service Learning, Holguin Cuba

February 2014

International Exchange

Student Volunteer

- Participated in an international cultural exchange and volunteer program through UWO in Cuba
- Visited a variety of public institutions including long-term care facilities and an educational facility for children with disabilities
- Developed a fuller understanding of Cuban policy, economics and health care from a local perspective

LANGUAGES

- English - Native
- Spanish - Proficient

WORK EXPERIENCE

Robarts Clinical Trials

March 2018-Present

Project Coordinator

The Keg Steakhouse, London On

September 2012 – April 2018

Server

CAMI Automotive, Ingersoll On

May 2011 – August 2013

Production Worker

Maidstone Bakeries, Brantford On

May 2010 – August 2010

Production Worker

Primetime Living, St. Catharines On

May 2009 – August 2009
September 2009 – April 2010

Dietary Aid

The Elmhurst Inn and Spa, Ingersoll On

November 2007 – January 2009

Banquet Server

Caressant Care, Woodstock On

September 2005 – January 2009

Dietary Aid/Environmental Worker