The use of Information and Communication Technologies for Knowledge Translation in a Mentoring Network of Physicians to Optimize Roles in the management of Chronic Pain

by

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A thesis submitted in conformity with the requirements for the degree of Master of Science
Institute of Health Policy, Management and Evaluation
University of Toronto

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Abstract

This study seeks to understand how collaborative information communication technologies (cICT) are used to support knowledge translation and optimize physician’s roles in chronic pain management. A survey was developed and distributed to 170 physicians in two chronic pain mentoring networks in Ontario and Nova Scotia. With a response rate of 74.1% the study identified the use of a broad variety of cICTs; with email as the most used. A majority of respondents (85.0%) used email to support discussions and 69.8% found it to be valuable in learning about chronic pain management. A higher frequency of email (adjusted OR=10.70, 95% CI: 2.84-40.33) and number of cICTs (adjusted OR=2.93, 95% CI: 1.19-7.21) used to communicate in the networks were associated with more interactions. These results highlight how cICTs can support the interactions and learning that are part of the knowledge translation process in optimizing the roles of physicians in chronic pain management.
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Chapter 1: Introduction

1.1 Research problem

It is estimated that in Canada chronic pain affects approximately 29% of the population and imposes a substantial burden on the individuals suffering with it and society as a whole\(^1\text{-}^4\). Unfortunately access to appropriate chronic pain management in Canada can be characterized as inadequate and is primarily associated with insufficient human resources with adequate training. As a result we see that in some areas of Canada wait times to see an adequately trained health professional can reach up to 5 years\(^5\).

1.2 Rationale

There are a number of efforts under way across Canada to improve both the quality and access to chronic pain management\(^6\). One approach to this issue is to optimize the roles of health care professionals. Role optimization is a process in which health care professionals can be supported by knowledge translation activities to expand the scope of their roles in managing chronic pain. Examples of the role optimization process are seen in two programs in Nova Scotia and Ontario of a mentoring network of physicians. The members of these networks are distributed across both provinces and use various forms of information and communication technologies (ICT) to communicate with each other.

1.3 Purpose

The primary purpose of this thesis was to explore the following research question: **How are collaborative ICTs used in a community of practice of physicians involved in the management of chronic pain in Ontario and Nova Scotia to promote knowledge translation in a mentoring network for the purposes of role optimization?**
The specific research objectives were as follows;

1. Characterize the members of the two mentoring networks in Ontario and Nova Scotia
2. Characterize the types of collaborative ICTs that members are using and the collaborative ICTs they may be interested in using
3. Characterize the purposes for which collaborative ICTs are being used
4. Explore the effects of collaborative ICT use on interactions with the group
5. Explore the effects of collaborative ICT use on sharing and learning in the group

The primary data collection for this study was a cross sectional survey that was developed and administered to the members of both programs. A secondary purpose of this thesis was to explore and describe the concepts of role optimization and mentoring networks.

1.4 Overview

Chapter 2
This chapter begins by describing some of the challenges around the management of chronic pain in Canada. This is followed by an exploration of the concept of role optimization as a process to address some of the challenges to accessing chronic pain management. The concept of role optimization has no formal definition in the literature and so a preliminary conceptualization is presented. To help refine and appropriately position this conceptualization related concepts from the literature will be reviewed. Finally two program examples of role optimization from Ontario and Nova Scotia are described.

Chapter 3
This chapter describes the rationale for selecting Communities of Practice as the theoretical framework and also presents a conceptual framework that guided how the study explored the role of collaborative ICTs in supporting role optimization processes. With this as a base the research question and objectives are defined as well as the selection of survey methods as the primary data gathering method. Finally the research protocol and the survey development are described.
Chapter 4

In this chapter the results of the study are presented using both descriptive statistics and regression analyses. Descriptive statistics are used to characterize the respondents from both programs as well as the types, frequency and purpose of collaborative ICT use. Both descriptive statistics and logistic regression models are used to describe the effect that collaborative ICTs are having on the networks.

Chapter 5

The key concepts and findings of this study are summarized in this chapter. We use a micro, meso and macro framework to describe the implications of our findings. The potential limitations of our study are discussed along with the challenges that were encountered. Finally we also present some future directions for our work and a set of conclusions.
Chapter 2 : Background

2.1 The burden of chronic pain

Chronic pain represents a group of disorders whose burden upon society has yet to be fully appreciated. The International Association for the Study of Pain (IASP) defines chronic pain as ‘pain without apparent biological value that has persisted beyond the normal tissue healing time (usually taken to be 3 months)’\(^7\). Depending on sampling, study design and varying definitions of chronic pain, published prevalence rates for chronic pain vary from 11% to 44% in Canada\(^8\).

Chronic pain is reported more often by women and more often with increasing age\(^7\)\(^8\). There is also some evidence that there is an inverse relationship between the prevalence of chronic pain and income quintiles\(^9\). It is expected that the effect of an aging demographic will increase the prevalence of chronic pain making it a significant and growing public health challenge\(^3\)\(^10\).

Leaving aside the substantial prevalence numbers, the impact of chronic pain on its sufferer’s is even more worrisome. Chronic pain has been linked to higher rates of depression, insomnia, anxiety and a doubling of the rates of suicide\(^11\)\(^12\). Beyond the psychological effects, pain impacts individuals’ functionality in day to day life, regardless of age group\(^13\). This in turn has a socio-economic effect by reducing their ability to work, interact with their families and can lead to impoverishment\(^1\)\(^2\)\(^4\).

In understanding the widespread nature of chronic pain and its impact on individuals a study by the IASP determined that chronic pain’s economic impact on communities is on par with that of cardiovascular disease or cancer\(^14\). In Canada it is estimated to cost around $37 billion per year in lost jobs and sick days\(^3\)\(^4\). The cost to health care systems is substantial with a US based study reporting that chronic pain patients are five times more likely to utilize health care services\(^3\)\(^15\). It is estimated that the health care costs of chronic pain is $6 billion in Canada and $7 billion in Australia where it is the third most costly condition eclipsing injuries, cancer and diabetes\(^3\).
2.2 Challenges in managing chronic pain

The dominant point of care for patients suffering from chronic pain, in Canada, is with their primary care physician (PCP). The number of patients turning to their PCPs can be gauged by a study which found that up to one third of PCP appointments deal with chronic pain issues. Unfortunately PCPs have indicated that they are both uncomfortable with managing chronic pain and are unhappy with the level of care they are providing for their chronic pain patients. This view of poor PCP management is shared by patients and was reflected in an American Pain Society survey where nearly half of chronic pain patients interviewed in the United States had switched physicians in their search for relief. Much of the PCPs discomfort with managing chronic pain can be attributed to being under trained in managing chronic pain. To further characterize this discomfort a study of Ontario primary care physicians identified a number of barriers to chronic pain management which are listed in Table 2.1.

Table 2.1: Barriers to primary care management of chronic pain in Ontario

<table>
<thead>
<tr>
<th></th>
<th>Barriers to chronic pain management</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lack of clear guidelines on the use of opiates in chronic pain</td>
</tr>
<tr>
<td>2</td>
<td>Lack of a provincial prescription monitoring service</td>
</tr>
<tr>
<td>3</td>
<td>Need for improved continuing professional development resources around chronic pain management</td>
</tr>
<tr>
<td>4</td>
<td>Need for a Royal College Pain Specialist designation</td>
</tr>
<tr>
<td>5</td>
<td>Lack of practice guidelines around chronic pain management in emergency rooms and walk-in clinics</td>
</tr>
<tr>
<td>6</td>
<td>The lack of access to a local mentor or mentorship programs</td>
</tr>
<tr>
<td>7</td>
<td>Inadequate fee codes that reflect the time required to manage chronic pain</td>
</tr>
<tr>
<td>8</td>
<td>Need for improved access to pain centre and specialty care</td>
</tr>
<tr>
<td>9</td>
<td>Lack of information about patient support groups and local resources</td>
</tr>
<tr>
<td>10</td>
<td>Need for improved undergraduate and postgraduate medical curriculum around chronic pain management</td>
</tr>
</tbody>
</table>

Faced with these various barriers to delivering chronic pain management, PCPs often seek assistance from multidisciplinary pain treatment facilities. These facilities focus on providing multidisciplinary care and often employ at least three different health disciplines. These disciplines can include; physicians (neurologist, psychiatrist, physiatrist, primary care physician with a focused practice in pain and anesthesiologists), psychologists, nurses, physiotherapists,
occupational and massage therapists\textsuperscript{22}. Multidisciplinary facilities are often based in secondary and tertiary care centers and tend to be clustered in urban centres\textsuperscript{22}. Based on their multidisciplinary approach these facilities are regarded by groups such as the IASP, provincial licensing bodies and current research, as the optimal model for the management of chronic pain\textsuperscript{5, 22-24}.

In looking to these multidisciplinary pain treatment facilities to help manage chronic pain a significant issue in Canada has been timely access to its resources for patients. As of 2006 it was estimated that there was one clinic for 258 000 Canadians and one for 305 000 Ontario residents\textsuperscript{5}. The wait times for these clinics could range from 1 week to 5 years across Canada. In Ontario, the majority of multidisciplinary clinics are in urban centres and as such wait times range from 1 week (mostly in urban centres) to 4 years (mostly in rural centres)\textsuperscript{22}. In response to this, the Canadian Pain Society formed a task force that reviewed the literature and determined that a wait time of beyond 6 months is associated with a significant decrease in quality of life measures for patients with CP \textsuperscript{25}. It should be noted that this review was done in 2006 shortly after the Chaouilli V Quebec verdict that highlighted the need for immediate attention in providing appropriate wait times for access to health care, in response to this the 1\textsuperscript{st} Minister’s Conference and the 10 year Plan\textsuperscript{26} allocated additional health care funding to address this issue. In this context the Canadian Pain Society review was hoping to bring further attention and funding to address the extraordinary wait times in this area.

2.3 Role Optimization as a solution

In response to the challenges that have been described for access to care at both the primary and specialized levels of care, there has been much interest to identify and address some the barriers\textsuperscript{6}. One of the barriers that has been identified is a lack of adequately trained and educated human health resources\textsuperscript{6, 22}. Currently there are a number of efforts across Canada to increase the competency of primary healthcare professionals and patients as part of a solution to this shortage. In this thesis it is proposed that a process of role optimization can be a solution to build human health resource capacity in managing chronic pain.
Role optimization has not been well defined in the literature and so this thesis will provide a preliminary conceptualization. It is proposed that role optimization can most simply be described as a process in which the roles of a health care actor are altered by changing a task or a set of tasks associated with that role, with the goal of improving a particular outcome. To illustrate this consider the example of community based primary care nurses who optimize their roles in the management of chronic pain by developing a competency in cognitive behavioural therapies that can be delivered in a group format. This optimization can make cognitive behavioural therapies both more financially affordable and geographically accessible to patients. Another example of this would be patients engaging in online support networks to develop better self management skills in managing their pain. In this conceptualization a health care actor can refer to any health care professional (e.g. nurses, pharmacists and physicians), a patient, or a health care intermediary. An intermediary is an individual who provides health care but is not a professional; this could refer to care givers as well. Each of these health care actors has multiple roles to play in the management of a given healthcare concern for a patient. These roles in turn have tasks that are associated with them. The boundaries of these roles and tasks are in part determined based on the competency of the individual, the cultural expectations, regulatory policies (e.g. scope of practice for professionals) and legal frameworks.

2.4 Literature review concerning role optimization

Given the lack of a clear definition of role optimization, a review of the literature around related concepts was undertaken to provide some clarity to the simplified conceptualization that was proposed and to ensure that ongoing work in this area would not promote unnecessary duplication of effort. The preliminary description of role optimization included the following core concepts: roles, task, health care actors/professionals and scope of practice. These concepts emerged from reviewing an unstructured literature search around the term role optimization. Using these concepts an initial broad literature review identified analogous terms to role optimization such as workforce optimization, task shifting and extended roles. In addition the authors of several key publications were contacted and helped to identify other analogous concepts such as job redesign, role redesign, role enrichment and work redesign. The terms from this initial search were used to construct a second, more rigorous and systematic search in
Medline, Embase, ERIC and ABI Inform (see Appendix A). The identified citations from this second search were screened and selected based on their ability to provide a better understanding of workforce optimization, task shifting, role/job/work redesign, extended roles and role optimization. In addition, citations were also reviewed to identify additional analogous ideas to role optimization that had not been identified in the initial literature search. A detailed review of the selected citations was grouped into job/work/role redesign, workforce optimization, task shifting and extended roles and is summarized below.

2.4.1 Role redesign

The first concept to be reviewed is one where the terms job, work and role redesign are often interchangeably used, implying that they represent the same concept. However one publication links work and job by defining work as constituting a number of different jobs and each job is itself constituted by a number of different tasks. Additional terms such as business process re-engineering and competency alignment were also found but appear to be either predecessor concepts or sub concepts to job redesign. In this review it was noted that the terms of job/work/role redesign are found in the literature of a diverse number of fields such as; engineering, management, economics, healthcare, psychology and sociology and some of this literature dates to the 1980s. Though the terms job and work redesign are seen across all of the fields noted above, the definition and use of the term role redesign appears only in the health care literature and is used primarily in publications related to the UK based National Health Services (NHS). Going forward in this section the term role redesign will be used to also refer to work and job redesign. Having gained a sense of the broad number of fields that have contributed to this concept the next step is to develop a better sense of how it has been described.

2.4.1.1 Conceptualization of Role Redesign

Despite the use of different terms like job, work and role the descriptions of these concepts in the literature all share a focus on how the tasks that are associated with a role, job or work can be restructured. These conceptualizations note that a given role is often associated with a set of tasks. Tasks have been classified into the following non exhaustive categories; routine tasks,
troubleshooting tasks, project tasks and negotiable tasks\textsuperscript{28}. To illustrate this the following are examples of types of tasks in different fields; welding on an automobile assembly line\textsuperscript{32}, product promotion as part of sales\textsuperscript{33}, tracking and reporting on the progress of a project as a project manager or assessing side effects of a given treatment and considering alternatives as a physician.

The impetus for redesigning a \textit{role} has been described as being related to a number of elements such as; new technologies, new \textit{tasks} that add value, new services and \textit{roles}, new regulations (e.g. new privacy legislation), new accreditation or certification standards, new bylaws and new institutional procedures (e.g. new security protocols)\textsuperscript{28}.

The conceptualizations in the literature suggest that the redesign of a \textit{role} is accomplished in part by restructuring the \textit{tasks} associated with them. The literature describes the following ways in which tasks can be restructured\textsuperscript{28}:

1. Enlargement or widening\textsuperscript{28,31}: the addition of new tasks to a job/work/role at the same level of skill and responsibility (see Figure 2.1).
2. Enrichment\textsuperscript{28} or deepening: the addition of new tasks to a job/work/role at a higher level of skill, responsibility and accountability (see Figure 2.2).
3. Rotation: the rotation of tasks associated with a job/work/role that is at the same level of skill and responsibility\textsuperscript{28}.
4. New role creation: combined new and/or existing roles\textsuperscript{31}.

Figure 2.1: Role widening
Figure 2.1 Legend: This figure illustrates an example of two separate individuals (Role 1 and Role 2) and the different types of tasks (as denoted by the circles and squares) that make up their roles. The arrow indicates the movement of a Task $R_2^2$ from the role of the first individual to the role of the second. This shift represents role widening for Role 2 as the task is at the same level of skill and responsibility of the second individual.

Figure 2.2: Role deepening

Figure 2.2 Legend: This figure describes an example of two individuals (Role 1 and Role 2) and the different types of tasks (as denoted by the circles and squares) that make up their roles. The arrow again illustrates the movement of a task (Task $R_1^1$) from the role of the first individual to the role of the second. In this case the shift represents role deepening, as the task requires a higher level of skill, responsibility and accountability of the second individual.

2.4.1.2 The goals of Role Redesign

The goals of redesigning a role are often complex and inter-dependent. One goal may be to address a change within a sector that can be related to economic or regulatory changes. For example, role redesign can be used as a tool to enlarge and enrich the task sets of nursing assistants to deal with the shortage of nursing staff within the health sector$^{34,35}$, or to shift some of the tasks from physicians to nurses and midwives for economic reasons and to address a growing focus on patient care access issues$^{36}$. 
Another goal is often related to the realigning of roles and jobs to match the current size of an organization. In this context role redesign \(^{31}\) has been used as a tool to downsize organizations, whereby the staff who are retained take on the task sets from the roles that have been eliminated\(^{37-39}\).

Increasing the effectiveness and the efficiency of an organization is another goal. An example of this is seen in the sales industry through the use of assistants to sales staff\(^ {33}\). Another example is the changing workforce program in the NHS which redesigned over 150 roles involving physicians, nurses, pharmacists, allied health care workers, administrative staff and patients to improve service delivery and reduce costs\(^ {31}\). There are also examples of using role redesign to achieve the goals of efficiency in the public sector\(^ {40}\) and of older workers in a Japanese manufacturing plant\(^ {41}\). The evidence regarding the improvements in efficiency through role redesign seems to be mixed. There have been some empirical studies in nursing\(^ {42}\), in sales\(^ {43}\) and in the public services sector\(^ {40}\) that support the increase in productivity. A study in nursing\(^ {42}\) used both retrospective chart audits and prospective patient surveys and found that nurse led services (role widening) in a genitourinary medicine service in the UK was able to achieve a valuable increase of 10% in the capacity of the centre to see new patients and also allow physicians to concentrate on medically complex cases. The nurse led services were able to match national clinical outcomes and were also able to deliver a service that patients were satisfied with.

However a review from 1985 that looked at empirical trials in areas such as manufacturing, finance, telecommunications, human resources and the services sector found that 32 studies reported a mixed picture of effects on productivity ranging from -11% to 108% improvement (median of 6.4%)\(^ {44}\). Similarly another review from 1981 of over 20 different public sector role redesign projects also painted a picture of mixed benefit on productivity\(^ {40}\).

The last type of goal is the use of role redesign to improve morale, satisfaction and retention of the workforce\(^ {28}\). This notion is based on job design theories, where it is proposed that providing the autonomy and the opportunity to expand roles to maximally utilize an individual’s competency helps to improve job satisfaction, overall sense of well being and the likelihood of retaining an individual within an organization. Examples of focusing on this goal are seen in the public sector\(^ {40}\), the nursing sector\(^ {45}\), amongst white collar workers\(^ {46}\) and the health insurance industry\(^ {47}\). One empirical study of white collar workers in Sweden found that when workers had a part in redesigning their roles it lowered their levels of illness (vs. those who had not input in
role redesign) in 11 of 12 health indicators, such as coronary artery disease (5.2%, p < 0.05), depression (14.1%, p = 0.001) and absenteeism (5.7% p < 0.01). However when looking at a larger number of studies, it appears that the evidence of benefit is more mixed⁴⁸.

2.4.1.3 The process of redesigning roles

Having gained a better understanding of how roles can be redesigned and the goals of doing so the next step is to understand a little more about the process of redesigning roles. The moving of tasks between roles or even creating new roles is a complex process. Part of this complexity is related to how roles in an organization are inter-related. Consider an example in an NHS role redesign project where extended practice nurses were used to staff walk in clinics to manage minor health concerns³⁴. In order to free up the nurses to engage in the widening of their task sets it required that the roles of health care assistants be widened as well. In some cases it is not enough to redesign related roles but it is also necessary to redesign the entire job process in an organization³¹.

Another dimension of complexity is that redesign projects cannot be a one size fits all process but rather needs to be tailored to each organization’s context²⁸ ³¹. The structural elements of an organization such as hierarchy and accountability can be adversely affected by redesign projects. To illustrate this consider how a role redesign project that shifts tasks from one role to another could potentially have a given role accountable to multiple managers due to the addition of new tasks. This can create confusion when managers are providing conflicting directions²⁸. Often this necessitates an evaluation of whether a redesigned role fits within its original department or needs to be moved to another department. Beyond the structural elements the culture of an organization is also an important part of context and needs to be considered in role redesign projects. Culture is defined as “a pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, therefore, (sic) to be taught to new members of the correct way to perceive, think, and feel in relation to those problems”⁴⁹. These examples help us to understand that context varies from region to region and so the process of redesign is often most successful when involving individuals from the local context.
In addition to considering an organization’s context a process of role redesign also has to consider and balance against some of the negative effects of redesign. An example of this balance is around how much control is exerted on a new role from management versus how much autonomy is necessary for a role in a given organizational context. A NHS project found that open and dynamic changing of tasks increased the uptake of the new roles\textsuperscript{31}. Similarly balance also has to be considered in how the cognitive load or demand of a role is affected by adding or deepening tasks in a role. Role ambiguity or confusion is a possible negative outcome of redesign and can be mitigated by making an individual more aware of the outcome of executing a task. Finally it is also important to consider whether role redesign can increase interpersonal or inter-professional conflicts with the shifting of tasks which can be reduced with increased group socializations\textsuperscript{28}.

Given the complexity of redesign and the impacts at the level of the role, department and the organization it is apparent that redesign efforts are often a top down venture that involves mid level to upper management. The involvement of upper management or even government agencies often helps to overcome the jurisdictional wrangling and limitations of scope of practice that can derail redesign efforts\textsuperscript{34}. Jurisdictional wrangling is a particularly difficult issue when it involves professional resistance to the erosion of their roles, the loss of control and the blurring of professional boundaries through redesign projects\textsuperscript{34,50,51}. This resistance is seen in examples where role redesign projects have focused on moving tasks from a highly skilled role to individuals in roles who are less skilled and is also referred to as the de-skilling of jobs\textsuperscript{34,48}. The importance of having management involved is seen in the need for an appropriate reward system, often monetary, to encourage the adoption of redesigned roles\textsuperscript{28,31}. Having identified the important role of management in this process it is also important to point out that the engagement of the individuals involved in the roles has also been found to be valuable in improving both the uptake and satisfaction of the new roles\textsuperscript{46}.

From this review it is apparent that the conceptualization of role redesign aligns with the proposed role optimization concept in that roles are changed in part by affecting the associated tasks. It also provides a deeper understanding of the process and the challenges with changing the set of tasks that fall within a role. However one area that role redesign has not focused on substantively is the process of developing the needed competency to achieve the widening and deepening of roles.
2.4.2 Workforce Optimization

The next concept that was identified from the literature is workforce optimization. Most of the literature around this topic is from the business and management literature in particular from the service industry and customer contact services. However there are also some examples of the application of this concept in the fields of nursing\textsuperscript{52} and power plant operations\textsuperscript{53}. The relevant papers from the literature were primarily opinion pieces and the description of different ICT based tools to achieve workforce optimization. There were few papers that explored the theoretical elements or empirical studies on the effects or effectiveness of workforce optimization.

From the literature there are varied conceptions of how to achieve workforce optimization\textsuperscript{54}. However the papers are fairly uniform in describing the core concept underpinning workforce optimization as matching “the right employee to the right task at the right time”\textsuperscript{55}. The notion of the right employee can be interpreted to mean that the individual possesses the appropriate competency for a given task. However another perspective focuses on using knowledge management processes to train an individual to gain the competency to execute the task\textsuperscript{56}. The idea of the right time implies that when a task needs to be accomplished along with who is available will dictate which individual is assigned a task.

One of the effects of this dynamic task matching is that an individual’s task list becomes more fluid and it is often defined by what tasks need to be accomplished and the availability of the individuals who have the competency to execute a task. An example of this is seen in a nursing workforce optimization project in Alberta where nurses and registered practicing nurses dynamically allocate tasks to the individual who is available and has the competency to execute them\textsuperscript{52}. In this case tasks are not rigidly divided amongst individual based on professional designation alone. It has been theorized that workforce optimization helps to build a more knowledgeable, engaged and satisfied workforce who in turn also provide a better customer experience.

The reasons to employ a workforce optimization strategy are similar to those seen in role redesign and include: cost reduction or containment for an organization, a strategy for employee
retention though improved job satisfaction, and as a strategy to address human resource shortages and to improve efficiency and quality (e.g. customer satisfaction)

The process of workforce optimization focuses on increasing the capacity of an organization by maximally utilizing the competencies of their employees in a timely manner. Critical to this process is the ability to be able to identify and track what competencies each individual in an organization possesses. In addition to this one also has to be able to identify which competencies are required for a given task. The process of optimization involves combining the information from these elements along with the following areas; scheduling and forecasting, time and attendance tools, quality or performance management, and learning or training products.

Scheduling is focused on matching the availability of the individual with the competency to when a task needs to be executed. Forecasting looks to be able to predict the demands on the workforce and plan accordingly. Time and attendance tools help to ensure that there is compliance with the assignment of tasks. Quality management focuses on measuring the quality of the task execution by an individual. Learning products are utilized to gain new competencies or to improve competency if the quality of task execution is not at the required levels. Finally, as was described in role redesign, involvement by the individuals being optimized and by lower levels of management is important for successful implementation of workforce optimization strategies.

The process of optimization is heavily dependent on analytics to gauge how successful the organization has been at task scheduling and execution. The literature around workforce optimization is heavily weighted on the utilization of various ICT based tools to provide data for analytics around task execution and scheduling effectiveness. An example of this type of ICT tool is found in the customer call centres where voice recordings and speech analytics are used as a quality measure of task execution.

In summary, the concept of workforce optimization reflects many of the same ideas as role redesign but it also brings to light a different approach to the changing of roles. Workforce optimization describes task allocation between roles that is dynamically done based on competency, time and the availability of the individual.
2.4.2.1 Task Shifting

Task shifting is the third analogous concept that was identified in the literature. This concept was first put forth jointly by the World Health Organization (WHO) and the United States AIDS Coordinator in 2006-07. Task shifting was brought forth as part of the WHO’s Treat, Train and Retain strategy to improve the delivery of HIV treatment in the developing world by strengthening and expanding the health workforce.

Task shifting is outlined as “a process of delegation whereby tasks are moved, where appropriate, to less specialized health workers”. As a part of this conceptualization task shifting is described as taking place at any of the following four levels:

1. Task shift 1: from physicians to non physician clinicians (physicians assistants, medical technicians)
2. Task shift 2: from non physician clinicians to nurses
3. Task shift 3: from nurses to nursing assistants and community health workers
4. Task shift 4: from nursing assistants and community health workers to people living with HIV and AIDS.

The core goal of task shifting is to increase the available human health resources, particularly in the developing world where there is a scarcity. Other goals are also to decrease the time demands of simpler tasks on more specialized health care personnel so that they may focus on more complex cases or tasks. Combined, both of these effects can help to improve access to care and health outcomes.

The task shifting programs that have been studied, primarily in Africa, range from HIV and AIDS care to male circumcision, mental health, family planning, tuberculosis care and obstetrical care. Task shifting to community health workers has been used in all of these areas and for a variety of different task types such as the following: delivering group therapy and screening for maternal health services, delivery and compliance with antibiotics for tuberculosis and antiretroviral treatments for HIV/AIDS. Most of the studies of task shifting to non physician clinicians have focused on procedural tasks like performing male circumcision, providing abortion services and performing caesarean sections. The area of antiretroviral therapy
delivery and compliance is the only one that has looked task shifting involving all four levels of task shifting.

The evidence base around task shifting has focused on demonstrating cost effectiveness, non-inferiority of care and improved outcomes over the existing standard of care. One systematic review of ten studies focusing on the safety of non physician clinician delivery of male circumcision services found that there was no significant increase in complication rates; with the pooled proportion of such complications being 2.31% (1.46%-3.16%) p < 0.001 with a pooled relative risk of 1.18 (0.78-1.78). A systematic review in 2010 by Callaghan et al. looked at 85 studies of non physicians delivering antiretroviral treatment for HIV/AIDS and identified 9 studies that showed equal or better quality of care versus the standard physician focused model. This point was echoed in our literature search conducted in 2012 around task shifting, which found studies reporting equal quality of care in the delivery of antiretroviral therapies by nurses and people living with HIV/AIDS, delivery and compliance of antibiotics for tuberculosis and non physician clinicians performing caesarean sections.

The Callaghan review also noted two studies that reported improved cost effectiveness, and our review also identified a new study reporting improved cost effectiveness with pharmacist delivered antiretroviral treatments. The Callaghan review found five studies with increased access to care and four studies with reduced waiting times and loss to follow up. The comprehensive review that was conducted for this section identified three other studies of community health worker delivery of services that improved patient access to antibiotics for tuberculosis, improved antenatal care and improved patient satisfaction with delivery of contraception.

Finally, the review of the literature around task shifting identified important issues that are similar to what has been also reported in the literature around role redesign and workforce optimization. One such issue is the resistance to task shifting amongst professionals and the significant tensions that can arise between individuals as a result of this. Another issue is centered around how task shifting can cause confusion about who is responsible for tasks. These role conflicts lead to frustration and raise further issues around positions of individuals within organizational hierarchies. A suggestion to address these role conflicts is to use precise
redefinitions of roles and task shifting procedures, along with managed workloads and good remuneration\textsuperscript{62,69}.

In considering the above description of task shifting it would appear to be a form of role redesign that has been applied in a specific health environment for the specific goal of increasing capacity. However the literature around task shifting brings more of an empirical emphasis than was seen in either role redesign or workforce optimization. The findings from this literature help to provide some evidence that the shifting of tasks can have the intended positive effects on improving access to appropriate quality care and also being cost effective. However it also highlights some of the issues around role confusion, professional resistance and the consequent tensions that may arise out of shifting tasks that have been identified in the literature around role redesign and workforce optimization.

2.4.3 Extending Roles

In exploring the concept of extended roles a number of analogous terms such as extended, scope, role extension and role revision were found. In reviewing the literature the common conceptualization of these terms is a process where the roles of non physician health professionals are extended to take on new tasks. There has been substantial interest in the application and study of this concept which is evidenced by over 30 systematic reviews in the literature\textsuperscript{75}. Most of these programs and studies have been conducted in the UK and the US. The drivers underlying the interest in extending roles have been identified as: improving the quality of care provided, improving access to quality care by increasing the capacity of the system, reducing the costs of the systems by utilizing cheaper human resource options and to a lesser extent improving the satisfaction of human health resources\textsuperscript{75,76}. Understanding the drivers for the interest in extending roles it is not surprising that the overwhelming use of this concept has been to extend the roles of non physician health professionals to take on tasks that have been typically within the domain of physicians. Most of the focus has been on extending the roles of nurses, physiotherapists and pharmacists. However there are also studies looking at radiographers, dental assistants and even caregivers\textsuperscript{77-79}. 
In the extending of roles, four types of extension have been identified: role enhancement, role substitution, role delegation and innovation. Role enhancement refers to extending the skills of a professional group and is similar to the concept of role enlargement. Role substitution refers to the exchanging of one type of professional for another and this is similar to role enrichment (see section 2.4.1.1) particularly in the context of transferred responsibilities. Role delegation is the shifting of care from a senior to a more junior position within the same profession. Innovation refers to the introduction of an entirely new role which is similar to new role creation. An example of this in the role extension literature is the establishment of the nurse practitioner role.

In implementing a program of role extension the following have been identified as factors for success; clear definition of function, level of autonomy, accountability, training programs, revision of regulations around scope of practice, change management to overcome professional resistance and appropriate remuneration. To support the successful implementation of role extension programs the UK has instituted policy changes that have reduced or eliminated professional scope of practice barriers. In conjunction educational programs have also been used to help develop the necessary competencies to take on these new tasks. These programs range from accredited programs that build competencies to engage in new roles such as the nurse practitioner to accredited programs to take on a particular task like nurse prescribing to ad hoc local programs to learn the local nuances of how tasks need to be executed.

The literature around nursing extended roles programs have described the use of nurses taking on tasks that involve them ordering diagnostics, in some case performing technical diagnostic tests, making a diagnosis and managing the patient. In all of these programs the stated expectation is for the nurse to identify and focus on the simpler cases and refer the more complex cases on to the physician. The following examples provide a sample of the breadth of technical skills that nurses have taken on; sigmoidoscopy, cystoscopy, hysteroscopy, suprapubic catheterization, intraoperative dialysis, bone marrow biopsies and minor surgery in ophthalmic care. Additional examples include nurses take on prescribing roles, as well as running follow up oncology clinics, rheumatology clinics, vestibular rehabilitation in primary care clinics, stroke management programs. Nurse practitioners in specific have also taken on roles in emergency departments and walk in clinics where they provide services in an enhancement or substitution fashion managing a variety of general low acuity conditions (e.g. fractures, laceration management, ophthalmic care). A review of reviews by Laurant et al. that looked at
over 30 systematic reviews found that regardless of the type of nursing role extension or which part of the healthcare system (primary vs tertiary) it occurred in nurses were able to provide the same quality of care with similar patient health outcomes. There is some evidence to support that they are able to improve access and provide more information and advice to patients. However there is also some evidence to support the notion that their resource use was higher, consultation are longer and this may offset any cost savings. The issue of higher resource use was reflected in a review not included in Laurant et al. in which the authors found that nurse practitioners in emergency rooms had a higher rate of unplanned primary care follow ups.

A few programs have been instituted in extending the scope of physiotherapists, and radiographers. Physiotherapist role extension has looked at role substitution to assess, diagnose and treat in orthopedics, rheumatology, emergency departments, outpatient spinal clinics and in a primary care pre-consultation clinic. Extended role programs for radiographers have focused on role substitution and enhancement in image interpretation. The Laurant et al. review found very little evidence around the extension of roles for allied health workers (physiotherapists, radiographer and speech therapists). Their evidence summary found that in a hospital environment there is some evidence that the quality of care provided was similar to physicians.

Role extension programs for pharmacists have looked at prescribing roles as well as providing medication reviews and counseling. Studies around pharmacist role extension have been based mostly in the UK. The number of studies reported in the Laurant et al. review is limited but does indicate that they can reduce inappropriate prescribing, provide cost savings and improve outcomes. However more research is needed to better support these conclusions.

Despite the depth of quantitative literature in this area there still are a few gaps. One such gap was identified by the Laurant et al review is the lack of evaluation studies on the effects of role extension programs on the health care system. Another gap is that the duration of follow up of most studies are limited, often to a few months. Highlighting this concern a study that looking at the performance of nurse delivered ophthalmic care in an emergency department initially found they were effective in diagnosis and management but their effectiveness waned over a five year follow up period.
Beyond evidence looking at quality of care, outcomes and cost effectiveness there is also a significant body of qualitative research that has looked at both the benefits and problems that have arisen in association with role extension programs. One issue that has been expressed in the nursing literature identifies that nurses and physicians both have concerns about the blurring of professional boundaries. Nurse are concerned that role extension diminishes their roles as nurses and that their nursing roles are being taken up by other professional groups.\(^{86,99,100}\) In some cases nurses viewed role extension as taking on the work that doctors did not want to do.\(^{100}\) The blurring of roles has created professional tensions not only between nursing and medicine but also within nursing. In one qualitative study tensions were identified when role extended nurses asked non extended nurses to carry out treatments for patients.\(^ {82}\) Another concern that was raised by a systematic review and meta-synthesis in 2006 was the general lack of literature to describe training programs to develop competency or evaluate their effectiveness.\(^ {98}\) Highlighting the concern about training programs, two studies of nurse prescribing found that despite completion of a training program many nurses were not engaging in their prescribing roles.\(^ {81,101}\) Finally an important issue that has not been addressed is around whether nursing human resource levels can support the level of role extension\(^ {102}\) that would achieve adequate the levels of physician substitution.

The moving of tasks from one role to another in the extended role concept reflects many of the same themes that have seen in both role redesign and task shifting. These similarities are also seen in the definitions of the terms enhancement, substitution and innovation as well as in the factors for successful implementation of role extension programs. This literature provides us with a deep body of knowledge around some of the effects of implementing these programs. However it highlights the work that needs to be done in terms of looking at other health care provider groups beyond nurses as well as cost and resource efficiencies. The programs described in this literature only focus on the movement of tasks from physicians to non physician health care professionals. There is almost no literature examining the offloading of tasks from non physician health care professional that are extending their roles to other non physician health care professionals. This raises the concern that extending roles could overload these professionals. Finally given the importance of training programs to extending roles there are a number of training programs that are in place. However these programs are often poorly described and rarely evaluated.
2.4.4 Conceptualizing Role Optimization

Having developed a better sense of the related concepts that are already in the literature this section focuses on better positioning the concept of role optimization in relation to role redesign, workforce optimization, task shifting, and extended roles. To begin with these four concepts share the following common features:

1. Focus on shifting of tasks from one role to another
2. The goals for this shift are often centred on increasing capacity and efficiency
3. The shifting of tasks is a complex process that requires significant organizational support to be successful

These common features are very similar to the initial description that was proposed for role optimization: a process in which the roles of a health care actor are altered by changing the tasks that are associated with that role, towards the goal of optimizing a particular outcome. This raises the question of why should one bother to coin yet another term to describe a process of reallocating tasks between roles.

It is proposed that role optimization should be positioned to focus attention on how competencies can be changed to support the widening and deepening of roles. The literature search that was conducted identified that a critical element of being able to widen, deepen or rotate tasks is based on ensuring that an individual has the necessary knowledge and competency to be able to execute the modified or new task\textsuperscript{31}. Despite the importance of adapting competencies to support task changes there is virtually nothing published about what tools and processes have been used or their effectiveness and this represents a significant gap in the literature. One manner to address this gap is by turning to existing bodies of literature that study the processes around how to alter competencies, which can be viewed as an exercise in the translation of knowledge often from one group to another. When framed in this manner it is clear that one should look to knowledge translation and the related fields of knowledge management or knowledge transfer and exchange to identify tools and processes for the changing of competencies in the context of role optimization. Knowledge translation is formally defined as “a dynamic and iterative process that
includes synthesis, dissemination, exchange and ethically-sound application of knowledge to improve the health of Canadians, provide more effective health services and products and strengthen the health care system.\textsuperscript{103}

With this in mind the following refining of the concept of role optimization is proposed;

\textbf{A process in which knowledge translation tools are used to alter the competencies of a health care actor and support the use of these altered competencies in the process of widening or deepening of the set of tasks associated with that role. The purpose of changing the role is towards the goal of optimizing a particular outcome.}

This more refined conception of role optimization draws substantially from role redesign particularly around the process of changing roles and the goals of redesign. It also encompasses both static task reallocation seen in role redesign and task shifting and the dynamic task reallocation in workforce optimization. This definition of role optimization also looks at the movement of tasks between any health actor, whether that be from health professionals to patients, or between non physician health professional or even between physicians. Finally it is also subject to all of the organizational challenges and professional resistance/tension that have been described in all four related concepts when it comes to changing roles.

This conceptualization of role optimization places an emphasis on the use of knowledge translation tools to support the widening, deepening or rotation of tasks in a role. A value of this emphasis is that it can simplify the design of competency development programs for optimizing roles by allowing one to select from a set of knowledge translation tools (e.g. guidelines, facilitators) that have been studied as to their effectiveness in knowledge movement and in changing behaviour in different environments. Another value is that it can enable formal evaluation of the types of tools that are being used to adapt competencies, which has been highlighted as a stated need in the literature around extended roles\textsuperscript{98}.

In looking at role optimization and the related concepts from the literature one can see a set of processes that can be of benefit in helping to address the significant access issues to chronic pain management care in Canada. The benefit as has been described would seek to increase the capacity of the system by reallocating tasks to different roles and building the competency to take on these tasks. The review of the literature has provided a wealth of evidence of the
theoretical and empirical effectiveness of this approach in a few different health care environments as well as the challenges. However there are no studies about role optimization and related concepts in the area of chronic pain management, which is a gap this thesis will venture to address. The next section will focus on identifying and describing examples of role optimization programs focused on chronic pain in Canada.

2.5 Program examples of Role Optimization

Having positioned role optimization and its relation to other concepts, this section will focus on how program examples were selected. In addition a detailed exploration of the goals, structure, future plans of each program will also be provided. Finally arguments for why these programs can be considered as examples of Role Optimization that can be studied will also be presented.

The process of identifying program examples of role optimization began in 2008 by exploring the environment in Ontario and engaging with individuals working on health care projects focused on chronic pain management. A number of programs for potential study were identified but only those fulfilling the following criteria were selected:

1. Attempting to optimize roles in the area of chronic pain through knowledge translation
2. Allowing for the study of how ICTs could support the optimization process

Through this process the Medical Mentoring for Addictions and Pain (MMAP) program was identified and selected. Once MMAP had been identified they were approached in 2009 to establish a relationship to allow for the study of their program as a part of the proposed thesis work. Through discussion with MMAP another program was identified in 2010 that is utilizing a similar mentoring program to MMAP. This program is based in Nova Scotia and is referred to as the Nova Scotia Chronic Pain Collaborative Network (NSCPCCN). The NSCPCCN was approached in 2010 and a relationship was established to allow for the study of their group as well. Both MMAP and NSCPCCN represent unique programs in Canada in the area of chronic pain but have not been reported in any substantive manner in the research or grey literatures. Given the significant importance of both these groups to this thesis and the relative paucity of literature sections 2.5.1 and 2.5.2 will focus on providing a rich description of both MMAP and
NSCPCCN. The process for developing this description centered on a structured set of questions [see Appendix B] that were explored through a review of documents related to the programs, attendance at multiple meetings for both groups and informal discussion with multiple members of the administration of both programs, over a span of two years.

2.5.1 Medical Mentoring for Addictions and Pain

2.5.1.1 Background and Purpose

MMAP is based in Ontario and was launched by the Ontario College of Family Physicians (OCFP) at the end of 2007 as a pilot project. MMAP focuses on the utilization of mentoring to help primary care physicians optimize their roles in the management of pain and addictions in the primary care environment. A major driver in the establishment of MMAP was the interest of the College of Physicians and Surgeons of Ontario’s (CPSO) to create capacity amongst primary care physicians to provide methadone for patients suffering with addictions as part of an expanded harm reduction strategy. Though addictions was given prominence in the establishment of MMAP it was also acknowledged that there was a significant level of interest and need for such a program to address issues affecting chronic pain management in Ontario\textsuperscript{21}. The term capacity is used in this instance to describe the concept of increasing the potential pool of primary care physicians who are capable and willing to provide methadone maintenance therapy.

The pilot phase for MMAP ran for 12 months from the end of 2008. It was designed to provide a proof of concept that a mentoring network could be successfully developed and have a positive impact for the participating physicians in managing issues around addictions and chronic pain. During the pilot phase MMAP received funding from the CPSO. A formal evaluation of the pilot program found that it was successful in generating interest with over 200 physicians signing up to a waiting list to join the network\textsuperscript{104}. It also found that the program was able to fulfill the goals of increased confidence and comfort in managing both addictions and chronic pain patients and creating a supportive network\textsuperscript{104}.\textsuperscript{104}
Based on the success of the pilot project, MMAP was moved out of the pilot phase into a network that has secured funding until 2016 to continue to expand. The funding for MMAP is administered through the OCFP, allowing MMAP to maintain an arms-length relationship from their funders. Currently pharmaceutical corporations are the sole providers of both open and directed funds to MMAP. Directed funds are primarily to support mentoring or conference activities. Funds are also used to support mentorship stipends, conferences, small group meetings and a communications portal. As a formal network the core goals of MMAP are as follows:

1. Increase the knowledge and comfort of participating primary care physicians in managing addictions and chronic pain
2. Improve the experience for those participants that are engaging in managing addictions and chronic pain
3. Expand the potential reach of the specialists to a broader number of patients
4. Develop a network of support for practitioners engaging in addictions and chronic pain management

The premise of the first goal is that with increased knowledge and comfort, participating physicians will manage more patients with addictions and chronic pain at the primary care level. This could help to improve the quality of care that is available at the primary care level and reduce consultations to specialized chronic pain clinics. The second goal is focused on improving the satisfaction of primary care practitioners primarily by enabling them to engage in the management of complex clinical issues. This draws upon the literature around job design, which identifies that enabling an individual to more completely utilize their skill set in successfully managing complex tasks can help to increase their satisfaction with their jobs. The third goal of expanding the potential reach of the specialist will be advanced by shifting the model of care from a referral/consultation framework to a mentorship model. This shift may help the specialist to be involved in the care of a greater number of patients and may also reduce the wait times for specialized chronic pain clinics. The fourth goal focuses on providing support through “positive and supporting relationships” in the network for those physicians who may be dealing with the stigma of managing patients suffering from addictions and chronic pain issues.
2.5.1.2 Structure and function

MMAP began with a membership of 50 physicians in the pilot phase and currently consists of approximately 142 members based on their last census in August 2011. However it is important to keep in mind that the census is a floating target as members join and become inactive throughout the year. As of mid-2011 the membership was composed of 26 physician-mentors who collectively possess a varied set of expertise in managing chronic pain and addictions and 116 mentees comprised of primary care physicians from across Ontario. The term mentee refers to the participants who are being mentored. The goal of current recruitment strategies is to expand the total membership to about 250. Mentor recruitment focuses on selecting members in geographic locations where access to pain management is limited. Mentors are recruited through a peer or self-identification process or by nominating mentees who would be good candidates. Candidates are selected based on having both a level of expertise in chronic pain and addictions management as well as having the qualities of being open, approachable and supportive. The mentees recruitment strategy has in the past focused on family physicians but is now aiming to include other health disciplines (e.g. pharmacists, nurses, physiotherapists) though as of early 2012 no allied providers had joined MMAP. Currently outreach lectures, provincial pain conferences, email blasts to OCFP members and registration forms on the OCFP web site are used to identify interested individuals to be mentees. The administration and day to day operations of MMAP consists of a Chair, an Executive Director, and an Educational Coordinator all of whom operate within the OCFP and work on this network part time. Supplementing these three positions is an additional 18 member steering committee.

The current setup of MMAP consists of 8 geographic regions covering all of Ontario (Figure 2.3). Each geographic region is a cell that is composed of multiple mentors and mentees working within it. As of mid-2011 the regions ranged from two to six mentors and 6–40 mentees. The mentor to mentee ratio is below 1:12, which MMAP believes is important to avoid overburdening the mentors. The proposed value of using geographic based cells is to foster an identity with the network more quickly and effectively.
Within these geographic cells the mentees are not matched to a single mentor but rather can draw upon the varied expertise of any or all of the mentors in their cell. In addition members in a cell are also encouraged to engage and learn both with and from the other mentees whenever it is appropriate (Figure 2.4). Where traditional mentoring focuses on the one to one relationship the conception of mentoring in this ‘network’ supports that one to one relationship but also encourages a many to many dynamic. To illustrate the types of interactions possible in the MMAP network consider the following examples:

1. Mentees can choose to ask questions and discuss cases with one or multiple mentors.
2. Mentees can seek the input of any or all members in their cell around a particular case or question.
3. Similarly mentors can share and encourage dialogue around a case and/or provide teaching around a topic for all the members of a cell.
In addition to interaction within a geographic cell MMAP also encourages members to interact and learn from other members in other cells as well. The value here is that any member (mentor and mentee included) can draw upon the varied expertise and support of individuals from all members of MMAP (Figure 2.5).

The interactions that take place between MMAP members can happen through a number of different mediums as listed below:

1. Face to Face meetings
   a. Small group meetings: voluntary meeting of the members of a cell that occur once to twice a year at least.
   b. Annual conference and seminars organized by MMAP have now been replaced with regional meetings and online group learning.
   c. Meetings for the mentors only to discuss mentoring issues

2. Telephone to support one to one communication within or across cells

3. Email to support communication within a cell or across cells

4. Portal: an online multi-medium learning and communications hub

The portal represents MMAP’s most recent venture to integrate computer based collaborative tools to support the mentoring process for its members\(^1\). Previous attempts to utilize collaborative technologies have included Google and Facebook© groups but concerns about

\(^1\) Web address of portal: http://mmap.machealth.ca
privacy resulted in developing a MMAP portal. The portal was launched in October 2010 and is hosted within the secure environment of Machealth an online communication and collaboration platform primarily for health professions that is run by the division of e-Learning Innovation at the Michael G. DeGroote School of Medicine, McMaster University. The portal utilizes blogs, message boards (for group communication), one to one messaging, calendars, wikis, as well as educational videos developed by MMAP to enable and support communication and learning across the entire network. As of October, 2011 the portal had 52 MMAP members who had signed up (23/26 mentors and 29/116 mentees). The MMAP administration plans to make the portal the main communication and learning hub for the entire network. Towards that end the MMAP administration has been encouraging mentors to move discussions to the portal and is developing online learning activities and video seminars. MMAP believes that the portal can help to further support the learning activities of the network as well as make the process more convenient for all its members.

Figure 2.5: Inter-cell interactions

![Cell 1](image1.png) ![Cell 2](image2.png)

Figure 2.5 Legend: This figure illustrates some of the potential interactions that can take place between members of two cells.

Informal discussions with MMAP administration has identified that membership activity is likely primarily driven by a provider’s inherent interest to better manage patients with chronic pain and/or to draw on supportive relations amongst practitioners who are concerned about unexpected or unanticipated outcomes in managing patients with chronic pain and addictions. Beyond this primary driver the availability of continuing medical education credits through
MMAP and mentor stipends for providing mentorship services play a theoretical role but it has been observed that few of the mentees or mentors claim them.

Though not formally studied it has been observed by the MMAP administration that mentees who initially join the program often seem to start at the periphery of the network in terms of participation and the nature of their interactions. The administration goes on to note that these new MMAP mentees often observe the discussions and when they do participate their questions are frequently confined to identify a specific point of information, e.g. which medication or what dose should be used. Over time some mentees do move from the periphery towards the core of the network, where most of the mentors reside. It has also been noted by the administration that some mentees moving to the core also make the transition to mentors. In moving to the core the types of interactions move away from specific information acquisition to a dialogue that is focused on decision support. Though the descriptions of these phenomena are based on the observation of the administration similar observations have also been made in the Collaborative Mental Health Care Network105

2.5.1.3 The future

The future vision for MMAP is to become a network that has a free flow of information and support between members. The administration also plans to create a different model of continuing professional development that is based on learning in a collaborative environment and access to information on demand. It is envisioned that both of these future plans for MMAP will be supported by the integration of social networking and collaborative technologies to enhance the interaction between members. The administration for MMAP believes that the growth and future size of MMAP will in part be naturally limited by the number of practitioners interested to participate. However there may also be a need to limit the size of the network based on observation from an older program called the Collaborative Mental Health Care Network in Ontario, which has identified optimal cohesion of the group at about 250 members. Network size limits could also be affected with the use of social networking technologies as they may enable cohesiveness of these groups even at larger sizes. Finally it is expected that the lessons learned from MMAP will also help to start similar networks for other chronic disease conditions. This
has already begun with the recent establishment of networks for asthma and women’s health in Ontario.

2.5.2 Nova Scotia Chronic Pain Collaborative Care Network

2.5.2.1 Background and Purpose

The NSCPCCN began as a pilot mentoring network in Nova Scotia that was launched in 2008. The pilot was designed as an experimental study and ran in the South Shore health district of Nova Scotia. The development of the pilot was undertaken by a research team in the department of Anaesthesia at Dalhousie University with financial support from the Nova Scotia Department of Health and Wellness and the Canadian Anaesthesia Society. The provincial funding is a part of a chronic pain initiative which is an action plan to increase integration and coordination of services with the goal of improving both the quality and access to chronic pain management services\textsuperscript{106}. Hence, the focus of the network has and continues to be on managing patients with chronic pain and addictions in the primary care environment. Its primary interest is to address significant delays in access to chronic pain management related to a lack of health care personnel with the needed expertise at the tertiary care referral centres. Related to this issue is also a lack of available services at the primary care level which is attributed to a paucity of knowledge about how to manage chronic pain and opiate prescribing in this context. The second aim for the NSCPCCN is thus to build capacity at the primary care level by translating knowledge to support the increased management of chronic pain patients by primary care health providers. This in turn would help to reduce the burden on the limited resources at the tertiary care level.

Evaluation of the 8 month pilot phase of the project ending in early 2009 found that the program was able to achieve one of its objectives; to have a significant and positive effect in aligning member’s practice with best practices. In addition a trend was noted in another objective of improved physician comfort in managing patients with chronic pain. From mid-2009 onwards the pilot was transitioned into a formal network and expanded to all of Nova Scotia with the following core goals:
1. To build capacity in the management of chronic pain at the primary care level
2. To develop a mentorship network as a tool for capacity development
3. Promote the relationship between providers of chronic pain management

In considering the first goal the NSCPCCN understood that any focus on chronic pain would also need to include issues around addictions. Capacity in the NSCPCCN is conceived of as the ability or perceived ability of the provider to provide care that is expected to be within their proficiency. The focus on the primary care level is in part a vision of the networks founders as well as a directive from the provincial funding that it is receiving. As a part of the second goal it is expected that the NSCPCCN will help to improve capacity by providing its members access to a mentorship network which will act as an interactive clinical resource and support structure. In addition capacity would be enhanced through NSCPCCN sponsored continuing professional activities that would take place in the context of workshops, seminars and small group meetings amongst members. The expected effect of increasing capacity at the primary care level is to partially address the issues of limited access and quality of chronic pain management in Nova Scotia. As a part of the third goal, the NSCPCCN seeks to foster supportive relations between primary care providers in the network to improve the experience of managing chronic pain patients. Furthermore, it is expected that relations formed within the network foster exchanges that help to bridge the inter-professional gap and can have a beneficial effect on improving the quality of care.

The NSCPCCN is currently receiving ongoing provincial funding from the Department of Health and Wellness of Nova Scotia as part of their chronic pain initiative. In addition to this they also receive funding from the QEII hospital foundation that holds and administers grants that have been provided by a number of pharmaceutical corporations for the NSCPCCN. Some of the grants that have been provided are open and some are directed towards expansion of the network both in terms of general membership but also to specifically expand inter-professional membership. Funding is currently being used to support mentorship payments, conferences, administration salaries and small group meetings.
2.5.2.2 Structure

In the pilot phase the NSCPCCN began with one cell consisting of 1 mentor and 21 mentees all of whom were physicians. As of October 2011 the NSCPCCN is made up of 6 cells with 63 members, with plans to expand the number of cells as membership continues to grow. Much like MMAP, the NSCPCCN’s membership is also a floating target as members are recruited or become inactive throughout the year. The current membership is composed of 8 mentors and 55 mentees. The mentors are physicians with expertise in multiple areas of chronic pain and addictions management. Mentors are recruited from within the network, based on interest and activity. After selection they are provided education and support about mentoring. Currently the mentees are composed of both physicians and other primary health care professionals such as; pharmacists, physiotherapists, nurses and nurse practitioners. There are 43 physicians in the program as mentees and 20 non-physician primary health care professionals. The expansion into inter-professional mentoring by including other care providers in the network was undertaken in 2011. In conjunction with their planned expansion into other Atlantic provinces (Newfoundland and New Brunswick), NSCPCCN is the first network to engage in inter-provincial and inter-professional mentoring in Canada. The introduction of non-physician health care providers as mentees has brought in a wealth of knowledge and expertise particularly in the non-pharmacologic management of pain. In 2012 mentors will also be expanded to include members from non-physician disciplines.

The administration of NSCPCCN consists of a 7 member steering committee, a Network Director, a full time Project Manager, and a Financial Manager. As a part of their funding requirements the administration is looking to expand its membership both within Nova Scotia and to the other Atlantic provinces. In addition they are also looking to recruit new members who provide any form of primary health care services to patients with chronic pain such as physicians, physiotherapists, occupational therapists, pharmacists, nurses, nurse practitioners, social workers and psychologists. Members are currently being identified by contacting those individuals who have indicated their interest in the network at conferences, or NSCPCCN outreach lectures and through the Nova Scotia prescription monitoring program.
The structure of the NSCPCCN consists of mentor-mentee cells that are organized around geographic regions in much the same way that MMAP is. The geographic organization facilitates members to convene for small group meetings and also respects regional practice variations. To date NSCPCCN covers 4/9 provincial designated health regions (Figure 2.6). Each cell consists of 1-2 mentors and anywhere from 2-15 mentees. The NSCPCCN tries to maintain what they have identified as an optimal ratio of 6 mentors: 1 mentee. Much like MMAP all members are encouraged to learn with and from each other both within a cell as well as across cells as illustrated in Figures 2.4 & 2.5.

Figure 2.6: NSCPCCN regional map

The structure of the NSCPCCN borrows substantially from both MMAP and the Collaborative Mental Health Care Network with respect to geographic based cells for mentoring and encouraging cross cell interaction. MMAP has also helped to support the development of mentors. Both MMAP and the NSCPCCN have forged an ongoing collaborative relationship with MMAP assisting with mentor development. Both groups have made one mentor from their network available to the other networks’ mentees. The interactions that take place within the NSCPCCN utilize many of the same mediums as MMAP and are as follows:
1. Face to Face meetings
   a. Formal annual meeting of the entire NSCPCCN membership
   b. Meetings for all the mentors in the network
   c. Small group meetings between members of a given cell
   d. Informal semi-annual meeting for the membership
2. Email to support communication within or across cells
3. Telephone to support one to one communication within or across cells
4. Portal, currently in the planning phase.

Email lists are used by the administration to disseminate interesting cases, or particular questions to the group at large. Based on the ongoing relationship with MMAP and their use of a portal, the NSCPCCN has recently also been exploring the use of a portal to support the communications between members. Discussions are proceeding as to whether to have MMAP and NSCPCCN reside within the same portal space and utilize the same tools that MMAP is currently using.

The NSCPCCN administration has observed that the activity of members seems to be driven by two main incentives. The first incentive is the opportunity to access free CME by participating in discussions in the network (e.g. small group meetings) and attending seminars. The other major driver for participation appears to be the sense of support and ‘not being alone’ gained by members while managing patients with chronic pain, which comes from being a part of a community.

The future of the NSCPCCN as envisioned by the administration is to help foster partnerships with similar networks from across Canada. Through these partnerships the NSCPCCN hopes to be a part of a larger network of practitioners to engage in dialogue, discuss novel treatments and support each other. It is also expected that the experiences gained from the NSCPCCN network can also be applied to create similar networks to address other chronic diseases. It is envisioned where possible that most health care practitioners will be a member of at least one or possibly more networks. The growth of the NSCPCCN will ultimately be limited by the interest in the community for it and will eventually achieve equilibrium of members leaving and joining the network. It is expected that the NSCPCCN will improve patient care and this in part will be mediated by the members directly to the patients they care for or through their support of other
primary care practitioners in the community. Finally the NSCPCCN sees the network as being an important part of the strategy in place in Nova Scotia to improve access to chronic pain management. At the primary care level the care that is provided by the members and support to other providers may help to reduce the need for consultations. The members of the NSCPCCN can also help to reduce wait times to the tiered chronic pain referral centres in Nova Scotia, as they will help to increase the pool of available consultants to provide services at these centres.

2.6 Justifying MMAP and NSCPCCN as examples of Role Optimization

This section puts forth arguments for why MMAP and NSCPCCN are examples of role optimization by first looking at how the goals and the expected benefits of the programs align with the conceptualization of role optimization that has been outlined in section 2.4.4. The second step will look at how mentoring in these programs is a tool for knowledge translation.

2.6.1 Role optimization in MMAP and NSCPCCN

In optimizing the roles of members neither program specifies which tasks should be widened or deepened, rather this is left up to each member to determine. However both programs are explicit about focusing on altering the competencies of the members around the management of chronic pain. The primary goal for optimization in both programs is to enable their own members to deliver better care to patients with chronic pain. Currently MMAP is focusing on optimizing only physicians and NSCPCCN includes all health care practitioners.

Both programs also have a number of secondary goals that align with role optimization. For example MMAP and NSCPCCN expect that they can affect the capacity of primary care providers beyond the programs by their members optimizing other providers they work with. Both programs also postulate that role optimization of specialists outside of the program can happen through optimized primary care practitioners taking on more of the tasks that overlap
between them. For example, optimized primary care physicians may take on a more full exploration of various medication options which can help to decrease the frequency and number of consultations to specialists around these tasks. In a similar fashion, it is expected that the optimization of non-physician primary care practitioners will help to further optimize the roles of primary care physicians and specialist physicians as well. Ultimately both programs hope that by achieving these primary and secondary goals it will help to improve both the access and the quality of care that is available to patients in Ontario and Nova Scotia.

The following example helps to illustrate how role optimization through these programs can have an effect at the level of the health care system. The Nova Scotia Department of Health and Wellness has taken the steps to restructure the delivery of care in chronic pain management to take advantage of the benefits of the optimized health practitioners in the NSCPCCN. The restructuring of care in this province has involved the implementation of tiered referral centres where patients with chronic pain can be referred from primary care. There are three tiers of referral centres to which patients are sent, based on a province wide common triage system. There are six primary tier referral centres that involve primary care physicians working in conjunction with an occupational therapist, a physical therapist, and a pain self-management group. There are four secondary tier centres that have all of the elements of the primary tier and in addition have an anaesthetist with the competency to carry out hospital-based interventions like nerve blocks. The two tertiary level referral centres have all of the elements of the secondary centres along with access to either neurosurgical or paediatric expertise. Currently, the staffing of primary care physicians in all three tiers is covered by members of the NSCPCCN and it is expected that the non-physician practitioners in these centres will also be staffed by NSCPCCN members in the near future.

2.6.2 Knowledge translation in MMAP and NSCPCCN

When making the case for both MMAP and NSCPCCN being examples of role optimization it is important to look at the process of knowledge translation in the programs. Upon review of both programs, it is clear that the primary mechanism for knowledge translation is through mentoring.
activities. However within the literature that is specific to knowledge translation there is little to support the use of mentoring as one of its tools.

2.6.2.1 Mentoring conceptualizations

In order to better explore the arguments for why mentoring can be considered a tool of knowledge translation it is valuable to explore the concept of mentoring first. Mentoring is a difficult concept to define and much of that difficulty could be rooted in the fact that mentoring is defined based on the purpose it is intended to serve. In examining some of the varied definitions for mentoring from a broad variety of disciplines (see Appendix C) what emerges is that there is controversy centered on what the structure of the mentoring relationship is and what the goals of this relationship are; however, there is agreement that mentoring entails some form of a relationship and a bidirectional exchange between a mentor and a mentee (or protégé).

2.6.2.2 Conception of mentoring in MMAP and NSCPCCN

Both MMAP and NSCPCCN describe the form of mentoring in their programs as being a mentoring network. In a comprehensive search of the literature around mentoring the term mentoring networks was rarely encountered and a formal definition was not found. However the types of mentoring relationships ranging from one mentee to one mentor to any number of combinations of mentors and mentees that are seen in MMAP and NSCPCCN does align with the term ‘group mentoring’ which is well referenced in the literature (See Appendix C).

2.6.2.3 Arguments to support mentoring as a tool for knowledge translation

2.6.2.3.1 Multidisciplinary conceptualizations and uses of mentoring

Although there is little literature around the use of mentoring as a tool for knowledge translation there is substantial literature for its use in the fields of education and management.
**Education**

Within the education literature particular attention has focused on mentoring as a strategy to train teachers. In this context mentoring has been conceived of as a means to acquire skills. With the focus on skills acquisition the mentoring literature in education describes the different types of knowledge that are exchanged in the context of mentoring.

The following definitions help to understand how mentoring can enable the transfer of different types of knowledge in education. Practical knowledge can be equated to *experiential knowledge* and consists of *declarative* and procedural knowledge along with beliefs and values\textsuperscript{109}. Declarative knowledge is *explicit* and reflects the content that needs to be mastered by teachers in training or those engaging in professional development. Procedural knowledge is the knowledge of how to carry out day to day activities in a classroom\textsuperscript{109}. It can be both explicit and *implicit (also referred to as tacit)*. Explicit knowledge can be defined as “codified knowledge that is transmissible in formal systematic language”\textsuperscript{110,111}. Tacit or implicit knowledge can be defined as “having a personal quality which is hard to formalize and communicate; it is deeply rooted in action, commitment, and involvement in a specific context”\textsuperscript{110,111}.

It is felt that mentors can be effective at enabling the acquisition of practical knowledge through processes of observational learning and encouraging mentees to engage in reflective practice\textsuperscript{109}. *Observational learning* implies that knowledge is gained by observing the practice of another practitioner and can be an effective means for transferring tacit forms of knowledge. *Reflective practice* is when practice is “problematised for the practitioner. It is often stimulated by an adverse or positive outcome and for some reason it encourages a practitioner to analyze what about their practice style has generated a success or a failure”\textsuperscript{108}. Reflective practice when used by the mentor (reflective mentoring) helps him or her to make more explicit those elements of their practice that are tacit and as such can help to impart this knowledge to the mentees. By engaging in reflective mentoring the mentor is also learning, which is one aspect of the bidirectional exchange of knowledge in mentoring. Reflective practice for the mentee helps to integrate the tacit and explicit knowledge that mentees are exposed to\textsuperscript{112}; in other words it helps to put into context how, when and whether to use explicit knowledge. A critical point to take from this overview is that the focus of the use of mentoring is as a method to transfer skills from the mentor to the mentee.
The management literature regarding mentoring is extensive and describes the use of mentoring as a tool to preserve organizational and managerial knowledge also referred to as knowledge management\textsuperscript{113-115}. This literature provides some insights about how mentoring can preserve organizational/managerial knowledge. The particular value of mentoring is seen in its ability to help transfer managerial knowledge from one staff to another\textsuperscript{114}. By enabling this process mentoring can help to retain this knowledge within an organization’s staff even if individual staff members leave the organization\textsuperscript{113}. In order to understand how mentoring can achieve this one should start with a better understanding of managerial knowledge. Managerial knowledge can be described as “knowledge that is acquired by managers regarding the working of an organization its goals, strategies, policies, intricacies of the interface of people and units and the inherent aspects of workflow”\textsuperscript{113 116}.

From this definition it can be seen that there is a significant overlap with practical knowledge as defined in the education literature. However this definition of managerial knowledge is also more explicit about including an understanding of the culture of an organization and the values and beliefs that are embedded within it. Managerial knowledge is made up of both explicit and tacit knowledge but is mostly composed of tacit knowledge\textsuperscript{110 117}. This tacit knowledge is difficult to communicate and needs a variety of mediums including observation, text and spoken language to do so\textsuperscript{110}. Mentoring is particularly adept at communicating tacit knowledge for two reasons. The first is that mentoring utilizes multiple communication mediums to teach skills\textsuperscript{113}. Secondly mentoring also helps to make explicit, elements of tacit knowledge through a process called meta-cognition and self monitoring which is analogous to reflective practice. By making tacit elements more explicit, knowledge can be easier to communicate\textsuperscript{114}. It is interesting to note that the process of converting tacit to explicit knowledge can be referred to as knowledge creation\textsuperscript{117}.

As a summary it is important to note that mentoring is being conceived of in terms of skills acquisition or knowledge transfer.
2.6.2.3.2 Comparisons of mentoring to other tools of knowledge translation

Another argument that can be made for considering mentoring as a tool of knowledge translation is based on apparent similarities to established tools such as facilitation, educational influentials and opinion leaders. Though this discussion can be extended to concepts such as change agents, for the purposes of brevity the focus will remain on the aforementioned tools. Facilitation has been defined by Kitson et al\textsuperscript{118} as “one person who helps make things easier for others. It is the type of help to get people to change attitudes, behaviours and work habits”. Harvey et al\textsuperscript{119} go on to describe the use of facilitation to serve two purposes. The first is to achieve specific tasks that are required. The second is to develop processes to enable effective teamwork by helping individuals to analyze and reflect to change their attitudes, behaviours and methods of working. It should be noted that the uses of facilitation and mentoring are both categorized into task versus development oriented groups. In addition it can also be noted that in facilitation the use of reflection and analysis to change behaviours and attitudes is analogous to conceptions of reflective practice in mentoring.

Another comparison to mentoring is how Harvey et al\textsuperscript{119} classify facilitators as being internally situated versus external facilitators in the context of an organization. Based on this distinction one can conceive of mentors as a form of internal facilitators provided that we can substitute organizations for communities of practice. Conversely one can conceive of facilitation as a formal, peer to peer, skills or developmentally oriented form of mentoring. Mentoring also shares a number of similarities with both educational influentials and opinion leaders. For the purpose of this research educational influentials will be equated with opinion leaders\textsuperscript{120}. Both Harvey et al\textsuperscript{119} and Curran et al.\textsuperscript{121} have described opinion leaders as individuals who can exert influence on their colleague’s decision making. The process by which they exert influence is related to their peer’s trust and respect for them as sources of information, which can include content information, values, beliefs and behaviour\textsuperscript{121,122}. Opinion leaders have been used as a tool to try and change their peer’s behaviour through education, setting examples and creating new norms\textsuperscript{119}. This concept of influencing behaviour through observed social norms has been studied in diffusion theory, social learning and motivational theories\textsuperscript{122,123}. In this context one can see that opinion leaders and mentoring share similar elements. The concept of opinion leaders setting
an example to change behaviour is analogous to learning through observation in mentoring, in that both require trust to be able to influence behaviour\textsuperscript{124-126}. The notion of opinion leaders as a source of information about values, beliefs and norms brings to mind the roles of mentoring to transfer this type of information to their mentees. What emerges from these examples is that mentoring does overlap with existing established knowledge tools and begins to form the case for mentoring as a tool or mode of knowledge translation.

2.6.2.3.3 The potential value of mentoring to address challenges in knowledge translation

The final argument focuses on how mentoring can address some of the identified barriers to behaviour change among individuals in the knowledge translation literature. The focus is placed on behaviour change as much of the uses of mentoring in the other disciplines have looked at changing mentee behaviour. One of the described elements of mentoring has been to enable the integration of tacit and explicit knowledge for a specific setting\textsuperscript{112}. Within the knowledge translation literature there have been many concerns about how to socially embed research knowledge (or contextualize explicit knowledge) so that it is understandable, usable, credible and trustworthy\textsuperscript{124 127-129}. Mentors can enable contextualization of research knowledge through processes such as reflective practice and observational learning. These processes help in the transfer of tacit knowledge. Tacit knowledge can then be used to understand how to apply the research knowledge to new cases\textsuperscript{130}. Another element of mentoring that can help with contextualization is observational learning. Observational learning is similar to the concept of informal influence exerted by an opinion leader in that trust underpins both concepts. If the mentor is viewed as a form of opinion leader they can leverage the trust inherent in this relationship to make translated knowledge trustworthy and credible for the mentee. Another concern that has been expressed in the knowledge translation literature has been the misconception of what constitutes knowledge\textsuperscript{127 129 131 132}. It is postulated that a narrow definition of knowledge as being explicit and quantitative will be a barrier to this knowledge achieving behaviour change. The value of mentoring here is that it is not focused on explicit knowledge alone but also accords value and use for tacit knowledge. Systematic reviews of the medical literature have identified various barriers to physician adoption of knowledge and a consequent
change in behaviour.\textsuperscript{133}\textsuperscript{134} Mentoring can help address identified barriers such as attitudes and external barriers. Attitudes towards translated knowledge can be modified through the impact of mentors on social norms. Mentoring could also help to adapt the translated knowledge to the environmental constraints and patient preferences by reflective practice and application of tacit knowledge. This process of adapting the knowledge to local contexts is analogous to the communication channel and the process of reinvention as described by Rogers’ Diffusion of Innovations\textsuperscript{122}.

2.7 Summary

The burden of chronic pain in Canada at an individual and societal level poses a significant public health issue. The ability of patients to access timely and appropriate chronic pain management is limited by a number of barriers one of which is a lack of human health resources. Role optimization has been defined and proposed as a possible solution to this issue through the use of knowledge translation tools to increase the capacity of primary care practitioners to manage chronic pain. In exploring the health care environment two program examples of role optimization in Ontario and Nova Scotia are utilizing mentoring as a tool for knowledge translation. These programs are ideal study candidates for this thesis to better understand how collaborative information and communication technologies can be of value in role optimization.
Chapter 3 : Methods

This chapter details the development of the research question, research objectives and research methods. It starts by first describing the theoretical and conceptual framework that will help to provide the context for the proposed research questions and objectives and proposed analysis. With an understanding of the frameworks the next step will be to describe the development of the study itself.

3.1 Theoretical Framework

The primary interest is in studying what role ICTs play in supporting knowledge translation in role optimization programs like the mentorship networks in Ontario and Nova Scotia. The previous chapter provided a conceptualization of role optimization that is focused on using knowledge translation tools to build competencies (see section 2.4.4). These tools emphasize the importance of relationships, trust and social norms in both the movement and use of implicit and explicit forms of knowledge. This emphasis on relationships and trust was used as an important criterion in selecting a theoretical framework to guide the development of the study.

There are a broad range of theoretical models from organizational theories to decision theories to social and interpersonal theories that have been applied in studying and evaluating knowledge translation\(^{135}\). As such the first step involved a preliminary search looking for any frameworks that had been used in the context of ICTs and knowledge translation. The work that was found in this area primarily focused on the use of ICTs as a tool to store and more effectively disseminate knowledge\(^{136}\). This approach lacked the exploration of the role of ICTs to support the development of relationships and trust. With this in mind a further search was made to identify frameworks around social and interpersonal theories and identified that the theory of Communities of Practice (CoP) supported the study of ICTs as tools for developing social capital and disseminating knowledge.
CoP is a social theory of learning that has been defined by Wenger as “groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly”. The fundamental basis is that learning is a product of social participation. The following excerpt helps to better describe what a CoP is;

“These people don’t necessarily work together every day, but they meet because they find value in their interactions. As they spend time together, they typically share information, insight, and advice. They help each other solve problems. They discuss their situations, their aspirations, and their needs. They ponder common issues, explore ideas, and act as sounding boards. They may create tools, standards, generic designs, manuals, and other documents—or they may simply develop a tacit understanding that they share. However they accumulate knowledge, they become informally bound by the value that they find in learning together. This value is not merely instrumental for their work. It also accrues in the personal satisfaction of knowing colleagues who understand each other’s perspectives and of belonging to an interesting group of people. Over time, they develop a unique perspective on their topic as well as a body of common knowledge, practices, and approaches. They also develop personal relationships and established ways of interacting. They may even develop a common sense of identity. They become a community of practice.”

The original description of CoPs was as a naturally occurring form of social learning that is informal and widely pervasive. Everyone belongs to a CoP though we may not formally recognize them as such. In fact individuals likely belong to many CoPs; such as working together in a family to negotiate the daily tasks of a household, or as students negotiating the rules and regulations of an institution, or as workmates solving issues or in the hobbies like being a member of a band. Members of a CoP typically focus their interactions on helping each other solve problems. There is evidence of the existence of CoPs in the recorded histories of ancient Rome as craftsmen’s guilds. Even today the apprenticeship model of learning is ascribed to CoPs. However with the emergence of the knowledge economy there has been increasing interest into how to form and cultivate CoPs to serve purposes such as knowledge management, knowledge translation and innovation labs in corporations, educational environments and healthcare. It should be noted that these notions of collaborating, learning in practice, interactions and apprenticeship can also be found in mentoring as well.

In order to more clearly define what constitutes a CoP, Wenger has put forth three dimensions that characterize them;
1. Domain  
2. Community  
3. Practice

Wenger identifies that the members of a CoP share a particular domain of interest and that membership implies a shared competence. A relevant example of a domain is the management of chronic pain. Community is described as members interacting with one another and in doing so learn from each other. Participation in these communities is often informal, social and collaborative. Wenger defines the final dimension of practice as; “the people involved are practitioners in their domain of interest. They interact and develop a shared repertoire of resources.”

Bartunek et al note that the learning and sharing in a CoP is communicated in three ways;

1. Language tropes, such as metaphors and analogies, stories and genres.  
2. Sharing of stories of practice to build on contextual details.  
3. Socialization process that echoes typical master-apprentices relations.

It is important to highlight that the dimensions of community and practice are intimately linked. To understand this relationship better, Wenger draws attention to the concept of negotiated meaning which is the process by which practice and shared repertoires are created. Negotiated meaning is a complex interplay between participation and reification. Participation in this context is the act of taking part in and sharing with others within a social community. It not only includes collaboration but can also include adversarial relationships. Participating in social communities not only shapes individuals but shapes the community that they are engaging in as well. The actions in relation to these communities remain social even when members are not interacting with others. Participation need not be frequent nor does an individual have to be a core member to participate; peripheral participation is acceptable and has value. In fact most new comers to a CoP begin in the periphery and through participating in the community their contributions are legitimated and some will move from the periphery to the core. Reification refers to the products (artefacts) of negotiated meaning through participation. Artefacts include
any product that records the negotiated meaning such as documents (paper and electronic), as well as audio or video documentation. Reification is a process where a person tries to bring concreteness to abstract concepts. At times this can be a challenging process especially when integrating complex knowledge into a local context. CoPs can be valuable in aiding this process though the exchange of anecdotes, advice and supportive relationships.

Despite the efforts to better delineate what constitutes a CoP there is a great deal of contention around the dimension of community. Compared to the looser criteria about what constitutes a community, Brown & Duguid argued that in order to be a community in a CoP, members had to develop a strong set of relationships that required geographic proximity in order to meet regularly. They proposed another concept known as Networks of Practice where people link to others whom they may never get to know but who work on similar practices. Collectively networks of practice do not take action and produce little knowledge, but they can share information relating to the members common practices quite efficiently. This concept was proposed to account for those learning units that did not meet the strict criteria as it pertained to the development of strong relationships in a community. This difficulty in being able to clearly identify what constitutes a community is a significant challenge in being able to measure the value of CoPs as a tool for knowledge translation.

Having explored CoPs it was selected as an appropriate theoretical framework for this thesis for two reasons. The first centres on how the theory supports the study of the role of ICTs not just in dissemination but also in the building of relationships and trust within a community. The second reason is that the mentoring networks in MMAP and NSCPCCN can be described as a community of practice. To defend this second assertion, it is proposed that both programs share the management of chronic pain as a common domain of interest. In terms of community both programs encourage and support interactions between members to socialize, learn and share with each other. In addition there is also literature that supports the notion that mentoring can be viewed as a form of CoP. In terms of practice, both of these programs are focused on mentors and mentees developing a shared conception of how to manage chronic pain. Finally the structure and interactions that have been described in MMAP and NSCPCCN are similar to the structures described in online/virtual CoPs.
3.2 Conceptual Framework

This section describes how a CoP framework was used to construct a conceptual framework of how ICTs could support the process of knowledge translation in MMAP and NSCPCCN. In outlining the conceptual framework it is important to start by illustrating how the concepts of role optimization, mentoring networks and communities of practice might fit together. Starting with role optimization it has been highlighted that knowledge translation is an important component of the process (Figure 3.1).

Figure 3.1: Conceptual framework: The relation between role optimization and knowledge translation

Further MMAP and NSCPCCN have been identified as program examples of role optimization. Both of these programs are using a form of mentoring called a mentoring network that has been described as a tool for knowledge translation (Figure 3.2).

Figure 3.2: Conceptual framework: The relation between role optimization, knowledge translation and mentoring networks
It has also been proposed that the mentoring networks that are being used in these programs can be viewed as a CoP (Figure 3.3).

Figure 3.3: Conceptual framework: The relationship between role optimization, knowledge translation, mentoring networks and communities of practice

The final element is describing the roles that collaborative ICTs can have in supporting the concepts of community and practice in both MMAP and NSCPCCN (Figure 3.4). It is proposed that in supporting both community and practice in a CoP, ICTs are also supporting the translation of knowledge. The concept of domain of interest is not being considered as both these programs have clearly established chronic pain management as their domain and limits membership to those who are interested in that domain.

Figure 3.4: The final conceptual framework
3.2.1 Outlining ICTs of interest

ICT is a label that refers to any form of technology that enables the collection, storage, manipulation and communication of information in any form\textsuperscript{151}. This umbrella term can include technologies such as telephones, mobile communication devices, computer mediated communication, electronic medical records, radio, television, teleconferencing to name just a few\textsuperscript{147,156}. Unstated but implicit in this definition is the idea that technology refers to tools that are electronic in nature.

The ICTs that are of interest are collaborative communication technologies such as telephone, email, message boards, forums, instant messaging, chat rooms, voice over internet protocol conversations, network based videoconferencing, social networking platforms, virtual learning environments and wikis. For the purposes of this thesis this group of technologies will be referred to as collaborative information and communication technologies (cICTs). The interest in these technologies was based on their value in supporting collaboration among individuals in mentoring networks like MMAP and NSCPCCN. These tools help to support collaboration in a one to one or group fashion and allow communications to take place in a synchronous or asynchronous manner using mediums ranging from text to video formats\textsuperscript{157}. Though the traditional role of ICTs in collaboration has been as a tool to enable the exchange of information\textsuperscript{147}, the emergence of Web 2.0 and social networking technologies has sparked an interest to look at the effect that cICTs can have on building relationships in online communities\textsuperscript{148,158}. The literature from online/virtual CoP has shown that cICTs can be successfully used to establish online communities\textsuperscript{153}.

3.2.2 Proposed mechanism by which cICTs support CoPs

A necessary foundation for a CoP is the process of participation. It is only through participation that members can develop a sense of community and a shared practice. In Wenger’s descriptions of community he highlights the importance of interactions as a basis for participation in a CoP\textsuperscript{138}. cICTs have been shown to be valuable in providing an environment in which the social interactions that are necessary to build relationships and a sense of community can take place\textsuperscript{148,159}. In supporting these virtual social relationships cICTs from rich media (video) to thin
media (text) have been found to be effective in transmitting the social cues that are an important part of the social interactions that relationships are built on\textsuperscript{160 159}. Additionally cICTs appear to improve participation in part due to the convenience of selecting different modes of interaction (synchronous vs. asynchronous) and by making these communities accessible across geographic barriers\textsuperscript{153 161}.

In the context of practice, cICTs are capable of supporting interactions around simple information queries and responses and can also support interactions involving the sharing of experiential/tacit knowledge such as anecdotes and stories of practice that are important elements in helping to translate complex knowledge into local contexts\textsuperscript{149 148 150 155 162-164}. The movement of tacit and explicit elements can be transmitted in text, image, audio or video forms, with even email being a rich enough medium to do so\textsuperscript{147 165 166}.

In summary cICTs can play a role in supporting the different elements of interactions that are a necessary part of community and shared practice. In supporting both community and practice in a CoP, cICTs can also enable knowledge translation in the context of optimizing roles.

### 3.3 Research Question and Objectives

The previous sections identified and described a theoretical and conceptual framework that will guide the proposed study to explore the role of cICTs in MMAP and NSCPCCN. Building on this the following research question was constructed to guide the study;

**How are collaborative ICTs used in a community of practice of physicians involved in the management of chronic pain in Ontario and Nova Scotia to promote knowledge translation in a mentoring network for the purposes of role optimization?**

Taking into consideration the research question, the frameworks and by involving the administrations of both MMAP and NSCPCCN to gather their input on what would be of value to them the following is a an outline of the proposed research objectives;

1. Characterize the members of MMAP and NSCPCCN
2. Characterize the types of cICTs that members are using and the cICTs they may be interested in using
3. Characterize the purposes for which cICTs are being used
4. Explore the effects of cICT use on sharing and learning in the group
5. Explore the effects of cICT use on interactions with the group

The first three objectives were used to provide a rich description of the members, the cICTs that members are using and how they are using them to collaborate. The exploration of the purpose for use helped to shed light on understanding which cICTs are supporting the process of knowledge translation within these networks. Developing a more detailed understanding of the types of cICTs that are being used and which technologies members are interested in could be valuable to both programs in planning and evaluating their communications and education strategies.

The final two objectives helped to understand how cICTs may be supporting a community of practice. As has been described in the conceptual framework (section 3.2) the value of cICTs in CoPs can be evaluated in terms of the impacts that it has on both the sense of community and the development of a shared practice. In these objectives the focus on interactions is related to the difficulties around measuring the concept of community due to the lack of a clear and cohesive conceptualization of community within the CoP literature. Even simply asking about perceived effects that cICTs are having on community would be problematic as there will be concerns about how respondents may be interpreting this concept. Studies in the literature that have looked to explore learning in online communities have used a mixed methods approach of surveys and interviews to manage this issue. However for this study there were concerns about participation by the membership of MMAP and NSCPCCN in research methods such as interviews; which is a topic that will be explored in more detail in the research methods section (section 3.4). Given these constraints and based on the idea that interactions are a necessary element in developing a sense of community it was proposed that an examination of the effects of cICTs on interactions could provide a preliminary notion of the effect cICTs have on community. Supporting this proposition evidence from the literature around virtual/online CoP and learning suggests that ICTs can foster a sense of community and that an increased sense of community is in part related to a member’s level of participation or interaction with other members. However it is important to make note that the act of interacting with other members does not imply that community is formed and that increased levels of interactions are only valuable to a point after which they can be detrimental to the community.
3.4 Research Methods

3.4.1 Selecting a research method

The nature of the population that is being studied is one of the most important factors in selecting a research method. An important feature about the population in both programs is that they are geographically distributed across two provinces making face to face contact with individuals challenging. Another feature of this population is that they are physicians, most of who are in primary care. The literature around recruiting primary care physicians for research has identified significant difficulties related to professional demands and limited time to participate in research\textsuperscript{172}. Generally primary care physicians are less inclined to participate in studies that utilize methods such as interviews and observations due to the demands on time and efforts to organize their schedule to accommodate participation, unless there is significant compensation\textsuperscript{172}. As such, study methods that place a low demand on time and effort to organize schedules to participate tend to have an easier time recruiting physicians. This idea was echoed by the administration of both programs and they encouraged the use of research methods that would place a lower demand on their membership.

Given these considerations about the population, the preferences of the MMAP and NSCPCCN administration and financial limitations it was decided that the use of survey research methods would be the most appropriate single method to explore the research objectives. Consideration was given to using qualitative methods in a mixed method study but there were concerns that interviews, focus groups and ethnography could not be accommodated within the identified constraints. Descriptive statistics and content analysis of communications (e.g. email) between members and social network mapping to characterize relationships was considered but concerns about privacy, effect on member participation, and accessibility of data from the members precluded the use of these methods at the time of the study design. However with the implementation of the communications portal some of the concerns around the use of these methods are mitigated and could be considered for future studies. Experimental methods were also considered but the ubiquity and importance of many cICTs for both programs eliminated this option. The selection of survey methods despite its appropriate fit with the constraints of this study has a number of important limitations. Physician participation in surveys is a significant
issue. A literature review on this topic identified that the average response rate to surveys is around 60%\textsuperscript{173}. Another limitation is around measurement validity, particularly when the survey has limited prior use. Finally as with most survey methods non responder bias also poses a significant limitation. All of these limitations were taken into consideration when designing the research protocol and the questionnaire, which are described in the following sections.

### 3.4.2 Study Variables

This section provides more detail around the research objectives by describing which variables were studied (Table 3.1). For the first objective of characterizing the members in both programs, demographic data such as age, gender, physician type, role in the program (mentor vs. mentee), duration in the program, practice location (e.g. rural, urban) and practice setting (e.g. private clinic, hospital) were collected. This data was valuable to not only characterize the population for the study but also because there is evidence that elements such as age, gender, practice location and setting can have an impact on physician ICT use\textsuperscript{174-176}. Beyond the value to this study the demographic data was also important for both programs as neither had collected detailed information about their members. Finally this data would also add to the literature as there is limited information currently published about members in these types of mentoring networks\textsuperscript{177}.

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Type</th>
<th>Response options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Continuous</td>
<td>Year of birth</td>
</tr>
<tr>
<td>Gender</td>
<td>Categorical</td>
<td>Male</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Female</td>
</tr>
<tr>
<td>Physician Type</td>
<td>Categorical</td>
<td>Family physician</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Family physician with a focus</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medical/Surgical</td>
</tr>
<tr>
<td>Role</td>
<td>Categorical</td>
<td>Mentor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mentee</td>
</tr>
<tr>
<td>Duration in Program</td>
<td>Categorical</td>
<td>&lt; 1 year</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1-2 years</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-3 years</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3-4 years</td>
</tr>
<tr>
<td></td>
<td></td>
<td>≥ 4 years</td>
</tr>
</tbody>
</table>

Table 3.1: List and details of study variables collected on the survey
Table 3.1: continued

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Type</th>
<th>Response options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practice location</td>
<td>Categorical</td>
<td>Inner city</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Urban/Suburban</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Small Town</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rural</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Geographically isolated</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cannot identify</td>
</tr>
<tr>
<td>Practice Setting</td>
<td>Categorical</td>
<td>Private office/clinic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Community Hospital</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nursing home</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Research unit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Academic centre</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Emergency department</td>
</tr>
<tr>
<td></td>
<td></td>
<td>University faculty</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Community clinic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other</td>
</tr>
<tr>
<td>Network affiliation</td>
<td>Categorical</td>
<td>MMAP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NSCPCCN</td>
</tr>
<tr>
<td>Type of cICT used</td>
<td>Categorical (see Table 2 for list)</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Area in which cICT used</td>
<td>Categorical</td>
<td>Personal use</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Non-network professional collaboration</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Network collaboration</td>
</tr>
<tr>
<td>Frequency of cICT used</td>
<td>Categorical</td>
<td>Several times a day</td>
</tr>
<tr>
<td></td>
<td></td>
<td>About once a day</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3-5 days a week</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1-2 days a week</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Every few weeks</td>
</tr>
<tr>
<td>Device on which cICT is used</td>
<td>Categorical</td>
<td>Desktop/laptop</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mobile hand held device</td>
</tr>
<tr>
<td>Purpose of cICT use</td>
<td>Categorical</td>
<td>Communicate to organize meetings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Discuss chronic pain related issues</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Communicate with network administration</td>
</tr>
<tr>
<td></td>
<td></td>
<td>To build relationships</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other</td>
</tr>
</tbody>
</table>
Table 3.1: continued

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Type</th>
<th>Response options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perception of cICT value in organizing face to face meetings</td>
<td>Categorical</td>
<td>Strongly agree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unsure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Disagree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Strongly disagree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not applicable</td>
</tr>
<tr>
<td>Perception of cICT value in sharing and learning</td>
<td>Categorical</td>
<td>Strongly agree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unsure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Disagree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Strongly disagree</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not applicable</td>
</tr>
<tr>
<td>Interest in cICT use in the networks</td>
<td>Categorical</td>
<td>Already using</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Interested</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not interested</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Need more information</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Type</th>
<th>Response options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of Interactions</td>
<td>Categorical</td>
<td>Once a day or more often</td>
</tr>
<tr>
<td></td>
<td></td>
<td>One a week up to once a day</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1-3 times per month</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Less often</td>
</tr>
<tr>
<td></td>
<td></td>
<td>None</td>
</tr>
</tbody>
</table>

3.4.3 Characterizing types of cICT use

In order to better explore the cICTs that members are using and may be interested in using a list of cICT categories was created (Table 3.2). The list in Table 3.2 was used as an alternative to an exhaustive listing of all the cICT services that are available to members. It was felt that the length of an exhaustive list would be too onerous in a survey of physicians with limited time. In addition certain services like Skype™ have more than one type of communication option (e.g. video conferencing or voice chat); as such a simple list of services would make it difficult to determine which option a member was using. The process of creating this list was a difficult task due to the near constant change in the types of cICTs that are available and the similarly evolving combination of communication options. To illustrate this consider a service such as Skype™ that began by offering text and voice chat services but over time added options like
voice over internet phone services (VOIP) and video conferencing. This type of dynamic environment does not lend itself well to the types of rigid categories seen in Table 3.2 and will always be open to criticism around how the categories are constructed and which services fit where. Despite these potential criticisms it was decided that the benefits outlined above make the use of a categorized list the best choice for this study.

In structuring these cICT categories the following dimensions were considered: synchronous vs. asynchronous and text vs. audio vs. video vs. multi-modal platforms. However categories based on these dimensions alone would be difficult to translate into a survey to make it tangible to the participants.

Table 3.2: Categories of cICTs

<table>
<thead>
<tr>
<th>cICT Type</th>
<th>Description and examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telephone</td>
<td>Conventional land lines and cell phones</td>
</tr>
<tr>
<td>Messaging</td>
<td>Mobile messaging services e.g. text messaging, SMS, Blackberry Messaging™, iMessage™</td>
</tr>
<tr>
<td>Email/email lists</td>
<td>Email mailing lists e.g. LISTSERV™</td>
</tr>
<tr>
<td>Internet based voice calls</td>
<td>Voice calls made over the internet e.g. VOIP services, Skype™, Google Talk™</td>
</tr>
<tr>
<td>Message boards</td>
<td>Web pages to list questions and view answers</td>
</tr>
<tr>
<td>Chat services</td>
<td>Synchronous online messaging e.g. MSN messenger™, Google Talk™</td>
</tr>
<tr>
<td>Social Networking Sites</td>
<td>Sites that enable online social networking e.g. Facebook©, MySpace©</td>
</tr>
<tr>
<td>Blogs &amp; microblogs</td>
<td>Blog web pages and microblogs like Twitter®</td>
</tr>
<tr>
<td>Video Sharing</td>
<td>Services to share video files, e.g. YouTube®</td>
</tr>
<tr>
<td>Web and Video conferencing</td>
<td>Conferencing through shared audio and video e.g. Skype™</td>
</tr>
<tr>
<td>Wikis</td>
<td>Websites that allow users to view and edit content e.g. Wikipedia®</td>
</tr>
</tbody>
</table>

In addition these broad categories would provide little insight into the specific types of tools that members are using. A specific understanding of the cICT tools being used would be of value to
the programs in planning communication strategies. As such the next step to further refine these categories was to look at the types of tools that MMAP and NSPCCN had been experimenting with. In discussions with the programs it was noted that efforts were made to use tools such as social networking sites (e.g. Facebook©, Google Groups™), Skype™, short message service (SMS), telephone and email lists. Using this as a base, categories were constructed to differentiate between the combinations of synchronous/asynchronous and text/audio/video features. The literature was also used help identify possible categories and their definitions.

The finalized version of the cICT category list included separate categories for telephone and email/email lists, which the programs thought were the most commonly used tools in the networks. Based on the reports of SMS use by the programs a category called text messaging was created. This title was borrowed from the similarly titled category of text messaging which is used in the surveys that are a part of Pew Research Center’s Internet and American Life Project. However it was felt that it would also be valuable to expand the definition of this category to include other types of mobile asynchronous text based messaging tools such as Blackberry Messenger™ and iMessage™. The next category that was created was internet based voice calls to capture voice calls on services like Skype™. Surveys from the Internet and American Life Project used a category called Internet Phone calls to include Skype™ and Vonage; however the title of this category was adjusted for this study to make it clearer for participants based on feedback in the pilot study. The message board category refers to those tools that enable asynchronous group text communication such as question and answer forums. This category was included based on the use of such forums on the communication portal and the reported value of these tools in online learning. The chat category was created to describe synchronous text based messaging tools which differentiates it from the messaging category.

Given the attempts by the programs to use services like Facebook© the category of social networking sites (SNS) was created. This is a category used by Pew that includes Facebook©, MySpace© and LinkedIn© as examples of a multi-modal communication services for social interactions. In looking at the tools on the proposed portal the category of blogs and microblogs was created to capture those tools that refer to asynchronous text, video and audio tools to create online long and short journals. This category was created by merging the categories of blogs (online journals) and microblogs which are short blogs (e.g. Twitter©) that were used in Pew’s Internet & American Life Project. The category of video sharing was adopted from the Pew
project to describe asynchronous video communications as seen in YouTube©. The category of video and web conferencing was created to capture the use of those tools such as Skype™ that was reportedly being used by members in the programs. Finally the wiki category was created to explore the member’s use of wikis, which are defined for this study as asynchronous user generated/edited text and video content tools. The interest in this category is based on their potential to support collaborative learning activities in the group\textsuperscript{180}.

3.4.4 Platforms and purpose of cICT use

Within each of the categories of cICTs it was explored whether these technologies are being used on a desktop/laptop computer versus a mobile handheld device such as a smart phone or a tablet/slate device. The interest in this dimension of use is based on the significant penetration rate (72%) of smart phone use amongst US physicians and a dearth of published literature around the types of cICTs that are being used on these mobile devices\textsuperscript{174}. Finally a better understanding of the use of mobile based tools is valuable to both programs in developing communications strategies for the network. Another dimension of cICT use that was explored is the frequency of use by members. Exploring this dimension can provide a better understanding of which cICTs are most often used by members in the program and can also be valuable in exploring what effects these cICTs may be having on interactions and sharing/learning within the network. The final dimension that was explored looked at the member’s use of cICTs in three areas; their personal lives, in professional collaboration outside of the networks and finally within the networks. Examining their personal and non-network professional was helpful to provide a better understanding of elements that might influence their use of cICTs within the network. The primary interest of looking at the member’s use of cICTs in the professional setting (both within and outside the network) is to better understand their purposes of interacting to collaborate with other professionals or members. In this context collaboration is being conceptualized as a process of working and/or learning with other individuals to achieve a task, this can include activities like organizing meetings and building relationships.

The third objective focused on learning about the different purposes behind the cICTs that members have reported using to interact in the networks. To support exploration four categories of possible uses were defined based on discussions with both networks. Those categories are;
communication between members to organize face to face meetings, to discuss chronic pain related issues, to communicate with members, to build relationships with other members and an option of other.

3.4.5 Effect of cICT use

The exploration of the final two objectives looked at the effects that cICT use can have on both the interactions and the sharing/learning between members. Interactions were measured as the reported frequency by the members. Other options were explored to gather data on interactions between members from the programs themselves. Unfortunately the mentor submitted logs of the interactions between themselves and members could not be reliably used for these purposes and provided no insight on mentee to mentee interactions. As such it was decided to use self-reported frequency of interactions based on studies that have used self-report for interactions in online virtual communities of practice\textsuperscript{181}. This data would enable both networks to gather a better sense of the level of activity of their membership. This in turn would be helpful for evaluation and resource planning. In terms of measuring the effects of cICTs on sharing/learning, the members were asked about the perceived value of cICTs in supporting this exchange. It was also decided to look at mentor log data, which though limited could help to provide some validation evidence for the data collected from the survey.

3.5 Research Protocol

The focus of the research protocol was on the delivery of the surveys to collect data from the members in both MMAP and NSCPCCN. Keeping in mind the significant difficulties in recruiting physicians to participate in research studies\textsuperscript{172} the literature was used to ensure that the protocol’s design included as many relevant elements to maximize participation. The first component that was looked at was to deliver the survey in multiple modes as this could help to increase response rates\textsuperscript{182,183}. However it is also important to point out that there are some concerns that the survey mode can affect responses but this remains a controversial topic\textsuperscript{184}. After consultation with both programs it was decided that the potential benefits of increased responses by utilizing different modes outweighed the unclear risks around responses. As such
the survey modes included email delivered electronic copies of the survey, faxing the surveys, an online version through SurveyMonkey® and paper copies to be distributed at annual and semi-annual meetings. In addition to the survey, information and consent documents were also included in all the modes used to contact members. The primary focus was on distributing the surveys in person at various network meetings as there is significant attendance and response rates in these settings would be higher. However follow up was also planned for those non-attending and non-responding members with the other modes. The SurveyMonkey® version of the questionnaire was not available to the members of NSCPCCN due to concerns around privacy of data being housed in the United States by the Capital Health Research Ethics Board. Attempts were made to find an alternative cost effective Canadian based option but none were found in a timely manner.

An important element that was undertaken to maximize response rates was to not only secure the support of both programs but to also ensure that the members were aware of the program’s support for this study\textsuperscript{172 182}. Towards that end the administration in both programs sent out emails introducing this study along with their support. Similarly they also introduced this study and their support for it at their meetings. Another strategy to improve response rates was the addition of a cover letter to each survey indicating that this study was for an educational purpose and was being conducted by a peer\textsuperscript{172 182}.

Once the surveys were delivered, multiple modes of reminding the members to complete the surveys were also used. With the assistance and support of both programs a maximum of five reminders were sent to each physician using a combination of phone calls and emails. Members in the NSCPCCN were contacted in conjunction with their administration; however the MMAP group requested that all contact with their members be through only their organization. It was estimated that approximately 3-4 months would be necessary for data collection for each group.

In order to collect mentor log data, mentors from both programs were provided an information and consent package at their respective annual mentors meetings, to obtain consent to review the mentor logs from MMAP and NSCPCCN.
3.6 Survey Design

The design of the survey made every effort to balance the need to collect the necessary data to answer the outlined objectives and at the same time place the least burden on the members in completing the survey. This survey was designed to be a cross-sectional survey that employed primarily closed-ended questions to reduce the demand that completion of the survey would place on the participants. In addition, focus was placed on making the survey as concise and simple as possible to reduce the demands on the members in responding. Wherever possible, established questionnaires were used to design the questions and response categories of the survey. The survey was divided into three sections: demographics, cICT use and measuring cICT effects and interest. In the process of developing the surveys, two versions were created, with the second version being the final data collecting questionnaire (see Appendix E). The rest of this section describes the design of version one of the survey along with a planned and unplanned pilot and the changes to create the second version as a result of pilot testing.

3.6.1 Developing survey version 1

Beginning with the section on demographics, seven questions were created to gather data for each of the following variables: age, gender, physician type, role, duration in the program, practice location, and practice setting. The 2010 NPS was used to guide how the questions and the possible answer options for age, gender, practice location and practice setting were structured. An advantage of structuring the questions and response categories in a similar fashion to the NPS is that it allowed for comparisons between the respondents in the networks and the family physician data from the 2010 NPS. For the remaining variables of duration in the program and role, both MMAP and NSCPCCN were consulted to create the response categories for both.

The section studying the use of cICTs in the network included questions to characterize the member’s use of cICTs in the following categories: their personal lives, for professional non-network collaboration and for collaboration within MMAP and NSCPCCN. This section consisted of 4 questions; the first two questions explored cICT use from the categories in Table 3.2 for personal and non-network professional collaborations on both desktop/laptop and mobile device. A time frame of 6 months was used to limit elements of recall bias in these two
questions. The last two of the four questions in this section explored the cICT use within the network. In addition each question also looked at which device each cICT was used on. In these two questions the time frame was limited two months to minimize recall bias. In developing this section no published surveys were found that explored physician use of the various cICTs listed in Table 3.1. However surveys were found from 2007-2010 that were a part of the Pew Internet and American Life project which utilized response categories to gauge the frequency of use of various technologies. The categories from the Pew surveys were vetted with both programs to confirm the appropriateness of the response categories to measure the frequency of cICT use in the program. As a result of this consultation the less often category was removed because in a two month time frame with options for frequency of weekly, every few weeks and never, it appeared to provide little additional value and also helped to simplify the survey.

The last section of the survey in version 1 consists of 5 questions with each exploring the following; the purpose of use of cICTs in the program, the frequency of interaction amongst members, the perceived value of cICTs to organize meetings, the perceived value of cICTs on learning and sharing between members and which cICTs members would be interested in using in the program. Again in the development of this section no published surveys were found that could inform the design of the questions and response options. As such categories for the purpose of communication that a cICT could be used for were formulated based on the discussions from various meetings with both programs (response categories are listed in Table 3.1). The question characterizing the frequency of interaction was limited to a two month time frame to minimize recall bias. A different set of response options was used for this question versus the options to characterize cICT use to highlight the differences between the questions. For the two questions around perceived value a standard Likert scale was used to indicate the respondent’s level of agreement that the use of cICTs was valuable. Finally to determine interest in various cICTs the categories from Table 3.2 were as a list of the cICTs along with the response options of interested, not interested and do not know enough about this tool.

With 16 questions in version 1 of the questionnaire completed the next step involved conducting a pilot test. However a significant challenge in designing a pilot was a concern that engaging members in the pilot would significantly reduce the members who would be willing to complete the survey. With this in mind it was decided that the pilot study would involve five physicians not in the network along with the chairs of both MMAP and NSCPCCN to review the survey for
face and content validity looking particularly at the structure, the framing of the questions and 
the response options provided. None of the feedback or comments from either group focused on 
the structure of survey or on the response categories. The primary feedback for change was 
mostly around providing examples for each of the categories of cICTs to make it more tangible 
and some changes to cICT category names to make them clearer. With these changes 
incorporated the next step was in to implement the survey.

3.6.2 Unintended pilot

The outlined protocol version 1 of the survey was distributed to the NSCPCCN group in March 
2011 and to the MMAP group in June 2011. From the NSCPCCN 31 responses were received 
(73% of the physician membership at the time) and from MMAP 26 responses was received 
(23% of the membership at the time). Two issues were encountered with the NSCPCCN data: the 
first was that 17/31 (55%) of respondents had joined the program on the day of the meeting and 
as such were unable to provide any responses to the questions around their interactions and use 
of cICTs in the network. The second issue was that 11/14 (78%) NSCPCCN respondents who 
were able to answer the questions about interaction and cICT use had discordant answers. The 
issue was that members identified the use of a cICT to collaborate in question 10 and in question 
12 when they were to indicate the purpose of use many would indicate they were not using the 
cICT. In looking at the responses from the MMAP group we found that 15/26 (58%) respondents 
had a similar issue with discordant responses. To explore this issue feedback was sought from 
both of the programs and a potential explanation was that that the respondents had not read the 
questions closely enough. Cronbach’s alpha statistic was not calculated as one item looked at the 
frequency of cICT use and the other item looked at the purpose of use of a cICT. In addition a 
survey design expert was consulted, who identified that the structure and grouping of the 
questions was placing a significant burden on the respondents to remember and recall a number 
of elements simultaneously which was a likely explanation for the discordant responses. At this 
point it was decided to use this experience and data collected as an unintended pilot.
3.6.3 Developing survey version 2

After the consultation with the survey design expert it was decided to redesign the second and third sections of the survey and review the design with two members in each network before administering the second version of the survey to both networks. Before proceeding, the appropriate approvals from both research ethics boards were secured for the proposed amendments. The redesign began by eliminating questions 10-12 from version 1 and replacing it with questions 10 to 19 in version 2 (see surveys in Appendix E). The core changes were to group into one question which cICT was being used in the network, which device it was used on, the frequency of use and the purpose of its use. Another response category was added to question 23 in version 2 to reduce confusion in responses. Finally question 24 was added with an open ended response to explore what factors influenced members to utilize cICTs in the networks. This question was put in place to potentially capture the bias that version 1 of the survey may have had on the use of cICTs. In the consultations with the chairs and another physician from both networks it was indicated that the second version of the survey felt longer but was quicker to fill out than version one. There was also a sense that version 2 was clearer and better at detailing the use of cICTs within the network. In examining their responses in completing the survey no discordant responses were found around their use of cICTs in the networks and their interactions as reported in survey questions 10-19, 20 and 23 (see Survey version 2 in Appendix E). Distribution of version 2 of the survey followed the protocol identified earlier.

3.7 Analysis

The analysis for this study involved both descriptive statistics and multivariable logistic regression analyses on the survey data from MMAP and NSCPCCN respondents individually and combined. The expected combined sample of the networks was 185 physicians; with 142 in MMAP and 43 in NSCPCN. This sample represented all active physician members in both programs who had been in the program for at least six months, as of August 2011. Given the fluctuating nature of members entering and exiting the programs the most current census from August 2011 was utilized to define the sample. In addition a minimum of 6 months of activity was chosen to ensure those members surveyed had an opportunity to interact in the programs.
Another source of data that was used was the mentor logs that had been submitted by the mentors to both networks to track interactions between themselves and the mentees. These logs were collected from both networks from August 2011 to August 2012. The logs were not chosen as a primary data source to measure interactions as both programs have indicated that the mentors were not submitting them on a regular basis. The final data source that was looked at was the generic usage data for the message board component of the communication portal from August 2011 – August 2012 only for MMAP as they were the only network on the portal in the specified time period.

3.7.1 Descriptive Analysis

With the first three research objectives in mind, descriptive statistics were used to analyze the survey data to characterize the respondents from the networks, the cICTs that they are using, the intended purpose of use and the effects of cICT use. Data for demographic variables of age, gender, physician type, duration in the program, practice location and practice setting are presented with both the number of respondents and the proportions as percentages (see Table 3.1 for list of variables). To provide more context to the demographic variables the following comparisons were made:

1. MMAP vs. NSCPCCN
2. MMAP vs. the family physician population in Ontario
3. NSCPCCN vs. the family physician population in Nova Scotia.

The demographic information for the family physician populations for both provinces came from the 2010 National Physician Survey (NPS) of the physician population in Canada. The NPS is a biannual survey that aims to gather demographic and practice information from all practising and in training physicians across Canada. Mann Whitney and Fisher’s exact tests were used to identify any significant differences (p <0.05) in the demographic variables between MMAP and NSCPCCN. These comparisons provide some insight on the relative makeup of the members in both programs and in relation to the physician population as a whole.
In illustrating the use of cICTs in the networks descriptive statistics were used to highlight differences between the networks for the following variables;

1. Type of cICT used
2. Area in which cICT used
3. Frequency of cICT used,
4. Device on which cICT is used,
5. Purpose of cICT use
6. Interest in cICT use in the networks

The statistics to characterize these variables are presented in tables and graphs with either or both the number of respondents and the proportions as percentages. Cronbach’s alpha statistics were calculated comparing the responses about the use of cICTs in each of the survey questions 10 through 19 against the reported cICT use in question 24 (see Survey version 2 in Appendix E) to gauge the consistency of responses. Data from mentor logs were also used to calculate the reported frequency of emails for the mentors in each program and this was descriptively compared to the survey findings for frequency of email used by the mentors in the respective programs. Finally generic non identified usage data from the communications portal were used to calculate the average message board posting frequency per poster. These data were descriptively compared to the reported frequency of message board use from the survey for the MMAP respondents.

Descriptive statistics was the first part of characterizing the effects of the use of cICTs on the networks. The data for the variables frequency of interactions, perception of cICT value in organizing face to face meetings and perception of cICT value in sharing and learning are presented as both the number of respondents for each response category and as a proportion. In addition data from the mentor logs from both programs were extracted to calculate the frequency of interactions for the mentors and the average frequency of face to face meetings. The calculated frequency of interactions from the logs was descriptively compared to the reported frequency of interactions for the mentors on the survey from each network.
3.7.2 Logistic Regression Analysis

Logistic regression analyses were used to further explore the effect that cICTs are having on the interactions between members. The measure of cICTs was represented by two main predictor variables; the frequency of email use and the number of cICTs used to collaborate within the network (Table 3.3). The variable of number of cICTs used is a sum of the different types of cICTs that are reported as being used to interact with other members in mentoring network. The categorical outcome measure in the logistic regression was the frequency of interaction between members.

The underlying hypotheses for the logistic regression analyses were as follows:

H1: A higher frequency of email use to collaborate with other program members is associated with a higher frequency of interactions.

H2: A higher number of cICTs used to collaborate with other program members is associated with a higher frequency of interactions.

Towards exploring these hypotheses a multivariable logistic regression model was created based on the combined data from both programs, with adjustment for additional baseline demographic factors as described below.

3.7.2.1 Variables in the multivariable models

The predictor variables included in the multivariable logistic regression analyses were frequency of email use, number of cICTs used, age, gender, duration in the program, role, practice location, and network affiliation. Age and gender were included as potentially relevant demographic variables. The focus on the frequency of email used is based on both programs identifying email as the most dominant form of regular communication. The number of cICTs used in the program to interact was included, as a number of studies around virtual/online communities of practice have found that the number of technologies used can increase the interactions within the network\textsuperscript{155,186}. Based on discussions with both programs the role variable was included as it was...
felt that mentors may be more active in the networks. The variable of practice location was included as it was hypothesized that members in rural areas could be more active given the lack of support they have in managing chronic pain compared to their urban colleagues. Duration in the program was included as the programs indicated that members would often start of less active, increase their activity over time and some would then taper their activity the longer they were in the program. The variable of network affiliation was included to help adjust for possible differences in activity between the networks.

In conducting the regression analyses the predictor variables of duration, location, frequency of email use and number of cICTs used have multiple categories that were collapsed and thus dichotomized into two categories (see Table 3.3). The rationale for collapsing categories was to maximize power for identifying significant relationships between variables. Categories were dichotomized by graphing out the response frequencies for each of the variables and setting the cutoff point so as to have roughly equal number of responses in each category and also made sense in relation to what the variable is describing. The variable of age remained as a continuous variable and the variables of role, gender, network affiliation were already dichotomous.

Table 3.3: Combining the categories of outcome and predictor variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Categories</th>
<th>Responses</th>
<th>N of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of interactions</td>
<td>Low &lt; 1 interaction / month</td>
<td>67</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High ≥ 1 interaction / month</td>
<td>58</td>
<td></td>
</tr>
<tr>
<td>Duration</td>
<td>Low &lt; 2 years</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High ≥ 2 years</td>
<td>81</td>
<td></td>
</tr>
<tr>
<td>Practice location</td>
<td>Category 1 Remote, rural &amp; small town</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Category 2 Urban/suburban &amp; inner city</td>
<td>77</td>
<td></td>
</tr>
<tr>
<td>Frequency of email use</td>
<td>Low &lt; weekly</td>
<td>98</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High ≥ weekly</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>Number of cICTs used</td>
<td>Low ≤ 1</td>
<td>67</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High &gt; 1</td>
<td>59</td>
<td></td>
</tr>
</tbody>
</table>
3.7.2.2 Building the multivariable models

The process of building a multivariable regression model for the combined data from both programs began by looking at each of the networks separately. After which the data from both networks were combined to help increase the power of the analysis. Separate univariable logistic regressions were conducted for each of the predictor variables. Variables with significant associations (p<0.05) as well as age and sex were used to construct a multivariable regression model for each network. The value in looking at each network separately was to help understand the associations with the variables before combining the data.

The data from both networks were then pooled and again univariable regressions for each of the predictors was conducted to identify those with a significant association (p<0.05) with the outcomes for inclusion in the final multivariable model. The variables age, and sex were included in the model despite non significant univariable association with the outcomes.

Model fit for each of the models was assessed using the Hosmer & Lemeshow chi-square test of goodness of fit test as well as the c-statistic, representing the area under the receiver operator curve. Variance inflation factors were calculated to test for co-linearity between the independent variables in the final multivariable model. All of the regression analysis and co-linearity diagnostics were performed using SAS® 9.3. Stata IC® version 12 was used for the calculating Fisher’s exact tests, Mann Whitney tests and Cronbach’s alpha statistics.
Chapter 4: Results

This chapter presents the results of the data that were collected for the two networks and from the proposed analysis. The first section describes the data collection statistics for both MMAP and NSCPCCN. The following sections are structured to present the results of the study as they relate to each of the following research objectives;

1. Characterize the members of MMAP and NSCPCCN
2. Characterize the types of cICTs that members are using and the cICTs they may be interested in using
3. Characterize the purposes for which cICTs are being used
4. Explore the effects of cICT use on sharing and learning in the group
5. Explore the effects of cICT use on interactions with the group

4.1 Data Collection

The administration of the surveys was conducted as per the research protocol that was outlined in the section 3.4.3. Distribution to the NSCPCCN members began in October 2011 at their semi annual meeting. At that meeting the survey was distributed to about 40% (n=14) of their membership and had a 100.0% response rate (Table 4.1). Over the next seven months the survey was distributed multiple times by both email and fax. In addition to this a combination of email and telephone reminders were used to contact members to confirm receipt and remind them to complete the surveys.

Table 4.1: Survey respondents

<table>
<thead>
<tr>
<th></th>
<th>NSCPCCN</th>
<th>MMAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Respondents</td>
<td>29</td>
<td>97</td>
</tr>
<tr>
<td>Response Rate</td>
<td>80.6%</td>
<td>72.4%</td>
</tr>
<tr>
<td>Respondents by Mode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>From Meetings</td>
<td>14 (48.3%)</td>
<td>16 (16.5%)</td>
</tr>
<tr>
<td>Online survey</td>
<td>0 (0)</td>
<td>73 (75.3%)</td>
</tr>
<tr>
<td>Email surveys</td>
<td>5 (17.2%)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Faxed surveys</td>
<td>10 (34.5%)</td>
<td>8 (8.2%)</td>
</tr>
</tbody>
</table>
The survey distribution to the MMAP members was to follow a similar protocol and focus data collection at large group meetings. However, due to a number of changes in direction by the MMAP administration and barriers encountered within the OCFP (a more detailed description of these challenges is provided in section 5.3) data collection was focused on the online version of the survey. Where requested surveys were also faxed. Distribution to the MMAP began at a mentors group meeting in October of 2011 where a 100.0 % response rate was achieved from the mentors (n = 13) in attendance (50.0% of mentors in the program). Due to the various barriers encountered the online survey was only distributed to the membership in February of 2012 and over the next 8 months 84 members responded online, at meetings and by fax (Table 4.1).

In a fashion similar to the reminder efforts for the NSCPCCN a combination of email and telephone reminders were used to confirm receipt and remind members to complete the surveys. In the process of contacting and reminding members, individuals were identified who were no longer a part of the program and this has been indicated in the flow chart in Figure 4.1.

Figure 4.1: Flow Chart of study participants
4.2 Characterizing the members of MMAP and NSCPCCN

In the context of the first objective this section presents a summary of the demographic characteristics of the respondents from both programs. Where there were no responses for a given item on a survey it was coded as NR and the denominator was reduced accordingly.

As presented in Table 4.2 it can be seen that both programs are quite similar across most of the demographic variables that are listed. However it should be noted that there are some significant differences in duration of members in the program, the practice locations and practice settings of members. In terms of practice duration this may be attributable to the NSCPCCN drive for adding new members and the timing of the survey implementation. A possible explanation for the higher proportions in the NSCPCCN categories of rural and small town could be due to the higher proportion of physicians in these categories seen in the Nova Scotia versus Ontario NPS data (Table 4.3 & 4.4). In Table 4.2 it can be also seen that MMAP has a significantly higher proportion of respondents in the inner city category when compared to NSCPCCN. The proportion of physicians in the inner city category of MMAP is also significantly higher than the Ontario NPS category. Perhaps this higher proportion could in part be attributable to the added emphasis of addictions management that is a part of MMAP and the importance of managing addictions in inner city populations. MMAP’s emphasis and a higher preponderance of addictions issues in remote areas may also help to explain why the remote category for MMAP is significantly higher in comparison to the Ontario NPS data (Table 4.4).
Table 4.2: MMAP and NSCPCCN demographic summary

<table>
<thead>
<tr>
<th></th>
<th>NSCPCCN (N = 29)</th>
<th>MMAP (N = 97)</th>
<th>Fisher’s exact</th>
<th>Combined (N = 126)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Age (St. Dev)</td>
<td>53.0 (9.0)</td>
<td>49.8 (8.5)</td>
<td>0.08†</td>
<td>50.7 (8.8)</td>
</tr>
<tr>
<td>&lt; 35</td>
<td>0 (0%)</td>
<td>8 (8.3%)</td>
<td></td>
<td>8 (6.5%)</td>
</tr>
<tr>
<td>35-44</td>
<td>6 (21.4%)</td>
<td>17 (17.7%)</td>
<td></td>
<td>23 (18.5%)</td>
</tr>
<tr>
<td>45-54</td>
<td>9 (32.1%)</td>
<td>43 (44.8%)</td>
<td></td>
<td>52 (41.9%)</td>
</tr>
<tr>
<td>55-64</td>
<td>11 (39.3%)</td>
<td>25 (26.0%)</td>
<td></td>
<td>36 (29.0%)</td>
</tr>
<tr>
<td>≥ 65</td>
<td>2 (7.1%)</td>
<td>3 (3.1%)</td>
<td></td>
<td>5 (4.0%)</td>
</tr>
<tr>
<td>No Response</td>
<td>1</td>
<td>1</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M (%)</td>
<td>15 (51.7%)</td>
<td>49 (50.5%)</td>
<td>1.00</td>
<td>64 (50.8%)</td>
</tr>
<tr>
<td>F (%)</td>
<td>14 (48.3%)</td>
<td>48 (49.5%)</td>
<td></td>
<td>62 (49.2%)</td>
</tr>
<tr>
<td><strong>Physician type</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GP/ Family Physician</td>
<td>28 (96.6%)</td>
<td>89 (91.8%)</td>
<td>0.68</td>
<td>117 (92.9%)</td>
</tr>
<tr>
<td>Medical/surgical specialist</td>
<td>1 (3.4%)</td>
<td>8 (8.2%)</td>
<td>0.68</td>
<td>9 (7.1%)</td>
</tr>
<tr>
<td><strong>Program Role</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mentor (%)</td>
<td>8 (27.6%)</td>
<td>26 (26.8%)</td>
<td>1.00</td>
<td>34 (27.0%)</td>
</tr>
<tr>
<td>Mentee (%)</td>
<td>21 (72.4%)</td>
<td>71 (73.2%)</td>
<td></td>
<td>92 (73.0%)</td>
</tr>
<tr>
<td><strong>Duration in program</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;1 year</td>
<td>12 (41.4%)</td>
<td>7 (7.2%)</td>
<td>&lt;0.0001*</td>
<td>19 (15.1%)</td>
</tr>
<tr>
<td>1-2 years</td>
<td>5 (17.2%)</td>
<td>21 (21.6%)</td>
<td>0.80</td>
<td>26 (20.6%)</td>
</tr>
<tr>
<td>2-3 years</td>
<td>10 (34.5%)</td>
<td>49 (50.5%)</td>
<td>0.14</td>
<td>59 (46.8%)</td>
</tr>
<tr>
<td>3-4 years</td>
<td>1 (3.4%)</td>
<td>14 (14.4%)</td>
<td>0.19</td>
<td>15 (11.9%)</td>
</tr>
<tr>
<td>≥ 4 years</td>
<td>1 (3.4%)</td>
<td>6 (6.2%)</td>
<td>1.00</td>
<td>7 (5.5%)</td>
</tr>
<tr>
<td><strong>Practice Location</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geographically Remote</td>
<td>0</td>
<td>5 (5.2%)</td>
<td>0.59</td>
<td>5 (4.0%)</td>
</tr>
<tr>
<td>Rural</td>
<td>7 (24.1%)</td>
<td>7 (7.2%)</td>
<td>0.02*</td>
<td>14 (11.1%)</td>
</tr>
<tr>
<td>Small Town</td>
<td>8 (27.6%)</td>
<td>10 (10.3%)</td>
<td>0.03*</td>
<td>18 (14.3%)</td>
</tr>
<tr>
<td>Urban/Suburban</td>
<td>11 (37.9%)</td>
<td>53 (54.6%)</td>
<td>0.14</td>
<td>64 (50.8%)</td>
</tr>
<tr>
<td>Inner City</td>
<td>2 (6.9%)</td>
<td>19 (19.6%)</td>
<td>0.001*</td>
<td>21 (16.7%)</td>
</tr>
<tr>
<td>Cannot identify</td>
<td>1 (3.4%)</td>
<td>3 (3.1%)</td>
<td>1.00</td>
<td>4 (3.2%)</td>
</tr>
<tr>
<td><strong>Practice Setting</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private office/clinic</td>
<td>20 (69.0%)</td>
<td>67 (69.1%)</td>
<td>1.00</td>
<td>87 (69.0%)</td>
</tr>
<tr>
<td>Community Hospital</td>
<td>11 (37.9%)</td>
<td>23 (23.7%)</td>
<td>0.16</td>
<td>34 (27.0%)</td>
</tr>
<tr>
<td>Nursing Home</td>
<td>10 (34.5%)</td>
<td>6 (6.2%)</td>
<td>&lt;0.0001*</td>
<td>16 (12.7%)</td>
</tr>
<tr>
<td>Research Unit</td>
<td>0</td>
<td>0</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Academic centre</td>
<td>3 (10.3%)</td>
<td>3 (3.1%)</td>
<td>0.13</td>
<td>6 (4.8%)</td>
</tr>
<tr>
<td>Emergency Department</td>
<td>4 (13.8%)</td>
<td>8 (8.2%)</td>
<td>0.47</td>
<td>12 (9.5%)</td>
</tr>
<tr>
<td>University Faculty</td>
<td>0</td>
<td>8 (8.2%)</td>
<td>0.20</td>
<td>8 (6.3%)</td>
</tr>
<tr>
<td>Community health centre</td>
<td>7 (24.1%)</td>
<td>28 (28.9%)</td>
<td>0.81</td>
<td>35 (27.8%)</td>
</tr>
<tr>
<td>Other</td>
<td>1 (3.4%)</td>
<td>5 (5.2%)</td>
<td>1.00</td>
<td>6 (4.8%)</td>
</tr>
</tbody>
</table>

* Statistically significant p < 0.05 †Mann Whitney Test St. Dev: Standard Deviation
Table 4.3: NSCPCCN vs. Nova Scotia National Physician Survey demographics

<table>
<thead>
<tr>
<th></th>
<th>NSCPCCN (N =29)</th>
<th>NPS (N=256)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Age (St. Dev)</td>
<td>53 (9)</td>
<td>50 (10)</td>
</tr>
<tr>
<td>≤ 34</td>
<td>0</td>
<td>4.7%</td>
</tr>
<tr>
<td>35-44</td>
<td>21.4%</td>
<td>24.3%</td>
</tr>
<tr>
<td>45-54</td>
<td>32.1%</td>
<td>33.3%</td>
</tr>
<tr>
<td>55-64</td>
<td>39.3%</td>
<td>24.3%</td>
</tr>
<tr>
<td>≥ 65</td>
<td>7.1%</td>
<td>9.0%</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M (%)</td>
<td>51.7%</td>
<td>58%</td>
</tr>
<tr>
<td>F (%)</td>
<td>48.3%</td>
<td>42%</td>
</tr>
<tr>
<td><strong>Practice Location</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geographically Remote</td>
<td>0</td>
<td>0.6%</td>
</tr>
<tr>
<td>Rural</td>
<td>24.1%</td>
<td>15.8%</td>
</tr>
<tr>
<td>Small Town</td>
<td>27.6%</td>
<td>26.4%</td>
</tr>
<tr>
<td>Urban/Suburban</td>
<td>37.9%</td>
<td>43.9%</td>
</tr>
<tr>
<td>Inner City</td>
<td>6.9%</td>
<td>5.5%</td>
</tr>
<tr>
<td>Cannot identify</td>
<td>3.4%</td>
<td>4.0%</td>
</tr>
</tbody>
</table>

St. Dev: Standard Deviation

From the tables (Table 4.2-4.4) it can be seen that the respondents from NSCPCCN are fairly comparable to the general family physician population in Nova Scotia in the context of the variables that were examined. The respondents from MMAP appear to also be mostly similar to the Ontario NPS general family physician respondents. However there seem to be differences between geographically remote and inner city proportions. Statistical comparisons could not be performed between the two surveys (MMAP and NPS) because of non-independence of the two physician samples.
Table 4.4: MMAP vs. Ontario National Physician Survey demographics

<table>
<thead>
<tr>
<th></th>
<th>MMAP (N = 97)</th>
<th>NPS (N=2283)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Age (St. Dev)</td>
<td>49.8 (8.5)</td>
<td>50.52 (11.18)</td>
</tr>
<tr>
<td>≤ 34</td>
<td>8.3%</td>
<td>7.2%</td>
</tr>
<tr>
<td>35-44</td>
<td>17.7%</td>
<td>24.4%</td>
</tr>
<tr>
<td>45-54</td>
<td>44.8%</td>
<td>30.6%</td>
</tr>
<tr>
<td>55-64</td>
<td>26.0%</td>
<td>25.2%</td>
</tr>
<tr>
<td>≥ 65</td>
<td>3.1%</td>
<td>11.2%</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M (%)</td>
<td>50.5%</td>
<td>56.68%</td>
</tr>
<tr>
<td>F (%)</td>
<td>49.5%</td>
<td>43.14%</td>
</tr>
<tr>
<td><strong>Practice Location</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geographically Remote</td>
<td>5.2%</td>
<td>1.2%</td>
</tr>
<tr>
<td>Rural</td>
<td>7.2%</td>
<td>8.7%</td>
</tr>
<tr>
<td>Small Town</td>
<td>10.3%</td>
<td>15.6%</td>
</tr>
<tr>
<td>Urban/Suburban</td>
<td>54.6%</td>
<td>56.9%</td>
</tr>
<tr>
<td>Inner City</td>
<td>19.6%</td>
<td>12.1%</td>
</tr>
<tr>
<td>Cannot identify</td>
<td>3.1%</td>
<td>2.3%</td>
</tr>
</tbody>
</table>

St. Dev: Standard Deviation

4.3 Characterizing the types of cICTs that members are using and may be interested in using

This section presents the results of the descriptive analyses that pertain to the second study objective. In addition to characterizing the types of cICTs used, the frequency of use, the number of cICTs used by respondents, the platform for use and the member’s interest in various cICTs are also presented.

4.3.1 Types of cICTs used

Table 4.5 illustrates that email and telephone are the most widely used cICTs, with the proportion of email use being almost double that of telephone. Of those not using email, 50 % of respondents in both programs reported not using any other cICT. Another point is the
significantly higher use of message boards in MMAP. This is likely due to the significant efforts of MMAP to encourage the use of this tool on the communication portal, often as a substitute to email. However it is interesting to note that despite these efforts to use message boards in place of emails, 95.7% of members using message boards in MMAP continue to use email to communicate with other members.

Table 4.5: Rank order of cICTs used in MMAP & NSCPPCN

<table>
<thead>
<tr>
<th>cICT rank order</th>
<th>NSCPPCN (N= 29)</th>
<th></th>
<th>MMAP (N= 97)</th>
<th></th>
<th>Combined (N=126)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N using</td>
<td>% using</td>
<td>cICT rank order</td>
<td>N using</td>
<td>% using</td>
<td>cICT rank order</td>
</tr>
<tr>
<td>Email</td>
<td>27</td>
<td>93.1%</td>
<td>Email</td>
<td>73</td>
<td>75.3%</td>
<td>Email</td>
</tr>
<tr>
<td>Telephone</td>
<td>10</td>
<td>34.5%</td>
<td>Telephone</td>
<td>39</td>
<td>40.2%</td>
<td>Telephone</td>
</tr>
<tr>
<td>Messaging</td>
<td>2</td>
<td>6.9%</td>
<td>Message Boards</td>
<td>23</td>
<td>23.7%</td>
<td>Message Boards</td>
</tr>
<tr>
<td>Web &amp; Video Conference</td>
<td>2</td>
<td>6.9%</td>
<td>Messaging</td>
<td>10</td>
<td>10.3%</td>
<td>Messaging</td>
</tr>
<tr>
<td>Chat</td>
<td>1</td>
<td>3.5%</td>
<td>Chat</td>
<td>9</td>
<td>9.3%</td>
<td>Chat</td>
</tr>
<tr>
<td>SNS</td>
<td>1</td>
<td>3.5%</td>
<td>Video Sharing</td>
<td>6</td>
<td>6.2%</td>
<td>Web &amp; Video Conference</td>
</tr>
<tr>
<td>Internet based voice calls</td>
<td>0</td>
<td>0</td>
<td>Web &amp; Video Conference</td>
<td>4</td>
<td>4.1%</td>
<td>Video Sharing</td>
</tr>
<tr>
<td>Message Boards</td>
<td>0</td>
<td>0</td>
<td>Internet based voice calls</td>
<td>2</td>
<td>2.1%</td>
<td>Internet based voice calls</td>
</tr>
<tr>
<td>Blogs &amp; microblogs</td>
<td>0</td>
<td>0</td>
<td>Blogs &amp; microblogs</td>
<td>1</td>
<td>1.0%</td>
<td>Blogs &amp; microblogs</td>
</tr>
<tr>
<td>Video Sharing</td>
<td>0</td>
<td>0</td>
<td>SNS</td>
<td>0</td>
<td>0</td>
<td>SNS</td>
</tr>
<tr>
<td>Wikis</td>
<td>0</td>
<td>0</td>
<td>Wikis</td>
<td>0</td>
<td>0</td>
<td>Wikis</td>
</tr>
</tbody>
</table>

SNS = Social Networking Sites
In attempting to address concerns about the reliability and validity of the findings around the use of cICTs Cronbach’s alpha statistics were calculated and are presented in Table 4.6. This table shows that there is a good consistency of responses about cICT use for those technologies that are used most frequently. Cronbach’s alpha statistics were not calculated for wikis and blogs and microblogs as no respondents in either of the questions indicated the use of this cICT. Another concern about the validity of the reported types of cICTs used is around the potential bias that could have been introduced from exposure to the first version of the survey findings (see section 3.5.4.2). To address this concern the responses to the survey question asking about what most influences use of cICTs were analyzed. It was found that no respondents identified the exposure to the first version of the survey version as an influence.

Table 4.6: Cronbach’s alpha statistics for cICT use

<table>
<thead>
<tr>
<th>cICT</th>
<th>Cronbach’s alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Messaging</td>
<td>0.98</td>
</tr>
<tr>
<td>Email</td>
<td>0.97</td>
</tr>
<tr>
<td>Internet based voice calls</td>
<td>1.00</td>
</tr>
<tr>
<td>Message Boards</td>
<td>0.95</td>
</tr>
<tr>
<td>Chat</td>
<td>0.79</td>
</tr>
<tr>
<td>Social Networking Sites</td>
<td>1.00</td>
</tr>
<tr>
<td>Video sharing</td>
<td>0.80</td>
</tr>
<tr>
<td>Web &amp; video conferencing</td>
<td>0.80</td>
</tr>
<tr>
<td>Wikis</td>
<td>NA</td>
</tr>
<tr>
<td>Blogs &amp; microblogs</td>
<td>NA</td>
</tr>
</tbody>
</table>

Figure 4.2 helps to illustrate that a substantial proportion of respondents are using a broad variety of cICTs in their personal lives. It can also be seen that the proportion of respondents using a given cICT follows a downward pattern from personal to non-network to network collaboration. This pattern is seen even in email but is not as steep as the other cICTs. A similar declining pattern is also present when the networks are looked at separately (see Table F.1 in Appendix F).
To add more context as to the use of cICTs by respondents the use of email for non-network collaboration was compared to the NPS data on email use to communicate about clinical issues with other physicians. It was found that 96.9% of MMAP survey respondents used email for non-network collaboration vs. 52.1% in the Ontario NPS data. Similarly it was also found that 82.8% of NSCPCCN used email for non-network collaboration vs. 48.5% in the Nova Scotia NPS data.

4.3.2 Frequency of use of cICTs

This next section presents the data around the reported frequency of use of the various cICTs. Figure 4.3 illustrates that the majority of respondents in both MMAP and NSCPCCN are using various cICTs every few weeks. Email is the only cICT that has a substantial number of respondents using it once a week or more often. Table F.2 in the Appendix F provides a more detailed breakdown of the frequency of use of all cICTs in both programs.
To further scrutinize the validity of these results comparisons were made between the frequency of reported email use on the survey to the frequency of reported email communications between mentors and mentees in the mentor logs over a one year period. MMAP only had 4/26 mentors submit logs from October 2011-2012 while NSCPCCN had 5/8 members submit logs. Given the small proportion of MMAP mentors submitting logs, only the mentor logs from the NSCPCCN were used for comparisons, as they provided a more representative sample. With respect to the reported frequency of email use it was found that on the survey 62.5% of mentors and 80.0% of mentors in their logs reported using email between once every eight weeks up to once a week. However when considering this comparison, it must be noted that the mentor log data have not been validated and do not reflect the same data collection time frame (12 months) as elicited in the survey (2 months).

Another approach that was used to further assess the accuracy of the survey data was to compare the reported frequency of message board use by survey respondents from MMAP and the calculated message board posting frequency by MMAP members on the communications portal. The calculated average is based on non-identified portal usage metrics. From the survey responses it was found that 91.3% of those using message boards have done so anywhere between once every two weeks to once every eight weeks. In corroboration the calculated average posting frequency from portal data is one post every six weeks per participant.
4.3.3 The number of cICTs used

Figure 4.4 illustrates that the peak proportion of number of cICTs used in the respondent’s personal lives is around 5-6 cICTs, then shifts to 2-3 cICTs in non network collaboration and finally is at 1 cICTs for network collaboration. In further examining those using two cICTs it was found in MMAP that the most commonly used are telephone (54.8%) and email (100.0%) and in NSCPCCN it is also telephone (85.7%) and email (100.0%). In MMAP it was also found that in the two cICT user group 35.5% (n=11) members are using message boards as one of the cICTs.

Figure 4.4: Number of cICTs used by members in MMAP and NSCPCCN

Finally, it is also noted that the respondents as a group appear to be using fewer cICTs as they move from their personal, to the professional non network collaborations and finally to collaboration in the networks. This downward trend is not unexpected given a similar downward trend that was seen in the reported proportion of respondents using a cICT (Figure 4.2).

4.3.4 Platforms of cICT use

This section focuses on the use of cICTs on mobile and handheld devices in the context of the network collaboration. Table 4.7 provides a rank order of those cICTs that have been reported as
being used on a mobile or handheld device in at least one network. This table highlights that mobile use of cICTs is focused on email and telephone. It can be noted that in both networks the proportion of telephones users reporting use on a mobile device is greater than what is seen for email.

Table 4.7: Rank order of cICTs used on a mobile device in NSCPCCN and MMAP

<table>
<thead>
<tr>
<th>NSCPCCN</th>
<th>MMAP</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>cICT rank order</td>
<td>N using on mobile device</td>
<td>% using on mobile device</td>
</tr>
<tr>
<td>Telephone (N = 10)</td>
<td>9</td>
<td>90.0%</td>
</tr>
<tr>
<td>Email (N = 10)</td>
<td>6</td>
<td>22.2%</td>
</tr>
<tr>
<td>Messaging (N = 2)</td>
<td>2</td>
<td>100%</td>
</tr>
<tr>
<td>Message Board (N = 0)</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Figure 4.5 compares the use of the different cICTs on a mobile & handheld device across all three environments (personal, non network and network collaboration). The category for telephone does not have any data for mobile use collected in the personal and non-network collaboration areas. From this graph it can be seen that there is a general decline of use from the personal to non-network collaboration and finally to network collaboration. This decline is best characterized by the email category. It was also found that 97.5% of members using email on a mobile device in the network environment also reported using it for personal uses. This raises the question about what may be limiting the members who are using mobile based email in their personal lives from using it to communicate in the networks. It should also be pointed out that both chat and message boards contradict this trend and this could be due to the small numbers of individuals who have reported using these cICTs and also can be related to the effects of the promotion of message boards in the MMAP program.
4.3.5 The interest in cICTs in the networks

This section focuses on which cICTs members in MMAP and NSCPCCN are most interested and most uninterested in. In Table 4.8 it can be seen that many cICTs have both significant levels of reported interest as well as a lack of interest. However, it would appear that web and video conferencing and message boards are two cICTs that have both a good deal of interest and a lower level of disinterest.
### Table 4.8: Rank order of interest in cICTs in each network

<table>
<thead>
<tr>
<th>cICT rank order</th>
<th>NSCPCCN</th>
<th>MMAP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N interested (%)</td>
<td>N not interested (%)</td>
</tr>
<tr>
<td>Web &amp; Video Conference (N = 28)</td>
<td>17 (60.7%)</td>
<td>7 (25.0%)</td>
</tr>
<tr>
<td>Internet based voice calls (N = 29)</td>
<td>13 (44.8%)</td>
<td>12 (41.4%)</td>
</tr>
<tr>
<td>Message Boards (N = 26)</td>
<td>12 (46.2%)</td>
<td>6 (23.1%)</td>
</tr>
<tr>
<td>Messaging (N = 27)</td>
<td>9 (33.3%)</td>
<td>12 (44.4%)</td>
</tr>
<tr>
<td>Video Sharing (N = 27)</td>
<td>8 (29.6%)</td>
<td>12 (44.4%)</td>
</tr>
<tr>
<td>Wiki (N = 27)</td>
<td>8 (29.6%)</td>
<td>8 (29.6%)</td>
</tr>
<tr>
<td>Blogs (N = 27)</td>
<td>7 (25.9%)</td>
<td>13 (48.1%)</td>
</tr>
<tr>
<td>Social Networking Sites (N = 27)</td>
<td>3 (11.1%)</td>
<td>18 (66.7%)</td>
</tr>
<tr>
<td>Chat (N = 27)</td>
<td>1 (3.7%)</td>
<td>19 (70.4%)</td>
</tr>
</tbody>
</table>

In summary, of the use of cICTs in MMAP and NSCPCCN it can be seen that email and telephone are the most used cICTs in both networks in terms of the percentage of members using it as well as being the cICTs that are the most frequently used by the largest proportion of members to collaborate in the network. It has also been observed that regardless of whether the members are using a mobile device or a desktop device to communicate, email and telephone are still the most used. In MMAP it was found that message boards are being used by a substantial number of individuals and this is likely due to the emphasis on the use of the MMAP communication portal. This section has also highlighted a declining trend in the number of different cICTs that members use between their personal, professional non network collaboration.
and network collaboration. A similar declining trend has been noted for mobile based use of cICTs from their personal lives to network collaboration.

### 4.4 Characterizing the purposes of cICT use in the networks

In addressing the third study objective this section presents the survey results of the reported purposes of using cICTs in both networks. The focus is primarily on the most used cICTs which are; email and telephone for both MMAP and NSCPCCN and message boards for MMAP alone. Table 4.9 illustrates that email, telephone and message boards are being used for the full of ranges of purposes that were explored in the survey. However the highest proportion of members for all three cICTs used them as tools for discussion of chronic pain issues. This finding is consistent with a study of email communication in the Collaborative Mental Health Network which identified that email was used for the translation of knowledge about the management of patients\(^{189}\).

Table 4.9: Most used cICTs and their purpose of use in the networks

<table>
<thead>
<tr>
<th></th>
<th>Email MMAP</th>
<th>Email NSCPCCN</th>
<th>Telephone MMAP</th>
<th>Telephone NSCPCCN</th>
<th>Message Boards MMAP</th>
<th>Message Boards NSCPCCN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrange face to face meetings</td>
<td>45.2%</td>
<td>63.0%</td>
<td>30.8%</td>
<td>30.0%</td>
<td>17.4%</td>
<td>0</td>
</tr>
<tr>
<td>Discuss chronic pain issues</td>
<td>87.8%</td>
<td>77.8%</td>
<td>61.5%</td>
<td>80.0%</td>
<td>91.3%</td>
<td>0</td>
</tr>
<tr>
<td>Communicate with administration</td>
<td>41.1%</td>
<td>44.4%</td>
<td>50.0%</td>
<td>50.0%</td>
<td>17.4%</td>
<td>0</td>
</tr>
<tr>
<td>Build relationships</td>
<td>26.0%</td>
<td>29.6%</td>
<td>20.5%</td>
<td>10.0%</td>
<td>26.1%</td>
<td>0</td>
</tr>
</tbody>
</table>

With respect to all other cICTs used (see Table F.3 in Appendix F) it was also found that the purpose identified by the highest proportion of respondents is as a tool for discussion of chronic pain issues. This finding suggests that whichever cICT is used for network collaboration it is primarily to support discussions about chronic pain issues. Another element that can be highlighted is that respondents are using cICTs that cover the spectrum of synchronous to asynchronous and thin (text) to richer (audio & video) mediums to facilitate these discussions. Unfortunately the survey did not collect any data that could provide a further understanding about what factors may affect the choice of one cICT over another and also on which device (i.e. handheld vs. desktop).
4.5 Exploring the effect of cICTs on interactions, sharing and learning in the networks

The results presented in this section are in relation to the final two study objectives of exploring some of the effects that the cICTs that are being used for collaboration are having on the members in the network. The results summary begins by examining the data around the frequency of interactions between members and then looks at the perceived value of cICTs in sharing knowledge and learning from other members. Finally a description is provided of the process and results of constructing a multivariable regression to assess the effects that cICTs may be having on the frequency of interactions and on the perceived value of cICTs to support the sharing of knowledge and learning from one another.

4.5.1 Interactions

In Figure 4.6 it can be seen that the two networks, for the most part, follow a similar distribution of interaction frequencies. To further scrutinize these results a comparison was made of the reported frequency of interactions amongst all NSCPCCN mentor respondents to the calculated frequency of interaction based on NSCPCCN mentor logs. The reason for focusing on only NSCPCCN has been outlined in section 4.2. In this comparison it was found that 6/8 mentors responding to the survey and 4/5 mentors with logs reported interacting monthly or more often.

Figure 4.6: Frequency of interactions between members in MMAP & NSCPCCN
An observation to be made about these results is that over 90% of respondents (Table F.4 Appendix F) in both programs are interacting at least once every two months. Both programs report that on average members are involved in about two face to face meetings a year. A calculated average for reported face to face meetings from the NSCPCCN mentor logs reconfirms the program’s estimate. Taken together this seems to imply that the majority of interactions between members was mediated through cICTs.

4.5.2 Sharing and learning

Figure 4.7 (and Table F.5 in Appendix F) helps to illustrate that the majority of respondents in both programs either agree or strongly agree that cICTs are valuable in supporting discussions with other members to share and learn about managing patients with chronic pain. This finding is consistent with the results of a study of the Collaborative Mental Health Network which found that email communications among members was able to support various forms of knowledge translation\textsuperscript{189}.

Figure 4.7: Respondents perceived value of cICTs to support discussions

From Figure 4.8 (and Table F.6 Appendix F) it can also be seen that a majority of respondents perceive cICTs to have a valuable role in organizing face to face meetings between members. Additionally there are very few respondents who disagree with this statement.
4.5.3 Regression Analysis

This subsection describes the construction of a multivariable logistic regression model to further explore how cICTs are affecting the interactions that take place amongst members in the network. The first step in creating this model was to analyze the networks independently. Tables 4.10 and 4.11 list the results of the univariable logistic regressions for each of the variables for each of the networks independently.

Table 4.10: NSCPCCN univariable logistic regression: Odds of increased frequency of interactions (≥1 interactions/month)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Reference</th>
<th>Odds Ratio</th>
<th>Confidence Interval</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lower</td>
<td>Upper</td>
</tr>
<tr>
<td>Age</td>
<td>NA</td>
<td>1.01</td>
<td>0.92</td>
<td>1.10</td>
</tr>
<tr>
<td>Gender</td>
<td>M</td>
<td>0.67</td>
<td>0.15</td>
<td>3.01</td>
</tr>
<tr>
<td>Practice location</td>
<td>Rural</td>
<td>1.97</td>
<td>0.42</td>
<td>9.32</td>
</tr>
<tr>
<td>Duration in program</td>
<td>≥ 2</td>
<td>0.75</td>
<td>0.17</td>
<td>3.49</td>
</tr>
<tr>
<td>Role</td>
<td>Mentee</td>
<td>9.60</td>
<td>1.45</td>
<td>63.50</td>
</tr>
<tr>
<td>Frequency of email use</td>
<td>&lt; weekly</td>
<td>14.17</td>
<td>1.36</td>
<td>147.07</td>
</tr>
<tr>
<td>Number of cICTs used</td>
<td>&gt; 1</td>
<td>8.75</td>
<td>1.53</td>
<td>50.11</td>
</tr>
</tbody>
</table>

* Statistically significant (p < 0.05)
Table 4.11: MMAP univariable logistic regression: Odds of increased frequency of interactions
(≥1 interactions/month)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Reference</th>
<th>Odds Ratio</th>
<th>Confidence Interval</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lower</td>
<td>Upper</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>NA</td>
<td>0.98</td>
<td>0.93</td>
<td>1.03</td>
</tr>
<tr>
<td>Gender</td>
<td>M</td>
<td>2.87</td>
<td>1.26</td>
<td>6.54</td>
</tr>
<tr>
<td>Practice location</td>
<td>Rural</td>
<td>0.79</td>
<td>0.30</td>
<td>2.06</td>
</tr>
<tr>
<td>Duration in program</td>
<td>≥ 2</td>
<td>0.43</td>
<td>0.17</td>
<td>1.06</td>
</tr>
<tr>
<td>Role</td>
<td>Mentee</td>
<td>3.18</td>
<td>1.22</td>
<td>8.30</td>
</tr>
<tr>
<td>Frequency of email use</td>
<td>&lt; weekly</td>
<td>17.41</td>
<td>3.77</td>
<td>80.28</td>
</tr>
<tr>
<td>Number of cICTs used</td>
<td>&gt; 1</td>
<td>4.86</td>
<td>2.05</td>
<td>11.54</td>
</tr>
</tbody>
</table>

* Statistically significant (p < 0.05)

Using the results of the univariable regressions a multivariable logistic regression model for each program was constructed. The model for the NSCPCCN could not include all the predictor variables that were significant (Table 4.10) due to the number of respondents (n = 29). As such the variables of primary interest (frequency of email use and number of cICTs used) were included and role was left out. Table 4.12 reports that none of the associations that are identified are significant, and this may be attributable to the sample size for the network.

Table 4.12: NSCPCCN multivariable logistic regression: Odds of increased frequency of interactions (≥1 interactions/month)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Reference</th>
<th>Adjusted Odds Ratio</th>
<th>Confidence Interval</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lower</td>
<td>Upper</td>
<td></td>
</tr>
<tr>
<td>Frequency of email use</td>
<td>&lt; weekly</td>
<td>5.00</td>
<td>0.27</td>
<td>91.51</td>
</tr>
<tr>
<td>Number of cICTs used</td>
<td>&gt; 1</td>
<td>3.75</td>
<td>0.40</td>
<td>35.53</td>
</tr>
</tbody>
</table>

C-statistic: 0.75, Hosmer-Lemeshow; p = 1.00

The multivariable regression model for MMAP included all the significant variables of gender, role, frequency of email use and number of cICTs used. Age was also included as it was considered as a potentially significant variable that the model should be adjusted for.
From Table 4.13 it can be seen that the variables with a significant independent association with the outcome, frequency of interactions after adjusting for age, gender and role are frequency of email use and number of cICTs used.

Table 4.13: MMAP multivariable logistic regression: Odds of increased frequency of interactions (≥1 interactions/month)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Reference</th>
<th>Adjusted Odds Ratio</th>
<th>Confidence Interval</th>
<th>p value</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>NA</td>
<td>1.02</td>
<td>0.96</td>
<td>1.08</td>
<td>0.60</td>
<td>0.60</td>
</tr>
<tr>
<td>Gender</td>
<td>M</td>
<td>2.44</td>
<td>0.84</td>
<td>7.10</td>
<td>0.10</td>
<td>0.10</td>
</tr>
<tr>
<td>Role</td>
<td>Mentee</td>
<td>1.22</td>
<td>0.036</td>
<td>4.21</td>
<td>0.75</td>
<td>0.75</td>
</tr>
<tr>
<td>Frequency of email use</td>
<td>&lt; weekly</td>
<td>16.42</td>
<td>3.25</td>
<td>83.02</td>
<td>0.0007*</td>
<td>0.0007*</td>
</tr>
<tr>
<td>Number of cICTs used</td>
<td>&lt; weekly</td>
<td>3.40</td>
<td>1.19</td>
<td>9.69</td>
<td>0.02*</td>
<td>0.02*</td>
</tr>
</tbody>
</table>

C-statistic: 0.81, Hosmer-Lemeshow; p = 0.18

Table 4.14 illustrates the results of the univariable logistic regression for each predictor variable, on the outcome, frequency of interactions after the data from both networks had been combined. From this table it is noted that the variables with a significant association with the outcome were role, frequency of email use and the number of cICTs used.

Table 4.14: Combined networks’ univariable logistic regression: Odds of increased frequency of interactions (≥1 interactions/month)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Reference</th>
<th>Odds Ratio</th>
<th>Confidence Interval</th>
<th>p value</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>NA</td>
<td>1.01</td>
<td>0.97</td>
<td>1.05</td>
<td>0.70</td>
<td>0.70</td>
</tr>
<tr>
<td>Gender</td>
<td>M</td>
<td>1.99</td>
<td>0.98</td>
<td>4.07</td>
<td>0.06</td>
<td>0.06</td>
</tr>
<tr>
<td>Practice location</td>
<td>Rural</td>
<td>0.59</td>
<td>0.27</td>
<td>1.31</td>
<td>0.20</td>
<td>0.20</td>
</tr>
<tr>
<td>Duration in program</td>
<td>≥ 2</td>
<td>0.53</td>
<td>0.25</td>
<td>1.13</td>
<td>0.10</td>
<td>0.10</td>
</tr>
<tr>
<td>Role</td>
<td>Mentee</td>
<td>4.02</td>
<td>1.72</td>
<td>9.42</td>
<td>0.001*</td>
<td>0.001*</td>
</tr>
<tr>
<td>Network affiliation</td>
<td>NSCPCCN</td>
<td>1.57</td>
<td>0.67</td>
<td>3.67</td>
<td>0.30</td>
<td>0.30</td>
</tr>
<tr>
<td>Frequency of email use</td>
<td>&lt; weekly</td>
<td>16.16</td>
<td>4.54</td>
<td>57.50</td>
<td>&lt;0.0001*</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Number of cICTs used</td>
<td>&gt; 1</td>
<td>5.61</td>
<td>2.60</td>
<td>12.11</td>
<td>&lt;0.0001*</td>
<td>&lt;0.0001*</td>
</tr>
</tbody>
</table>
The multivariable logistic regression using the combined data included the three significant variables from the univariable analysis of the combined data (Table 4.14) plus the potentially significant variables of age, gender and network affiliation. The results of this are presented in Table 4.15.

Table 4.15: Combined networks’ multivariable logistic regression: Odds of increased frequency of interactions (≥1 interactions/month)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Reference</th>
<th>Adjusted Odds Ratio</th>
<th>Confidence Interval</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>NA</td>
<td>1.02</td>
<td>0.96</td>
<td>1.07</td>
</tr>
<tr>
<td>Gender</td>
<td>M</td>
<td>1.19</td>
<td>0.48</td>
<td>2.92</td>
</tr>
<tr>
<td>Role</td>
<td>Mentee</td>
<td>2.60</td>
<td>0.94</td>
<td>7.15</td>
</tr>
<tr>
<td>Network affiliation</td>
<td>NSCPCCN</td>
<td>1.40</td>
<td>0.47</td>
<td>4.14</td>
</tr>
<tr>
<td>Frequency of email use</td>
<td>&lt; weekly</td>
<td>10.70</td>
<td>2.84</td>
<td>40.33</td>
</tr>
<tr>
<td>Number of cICTs used</td>
<td>&lt; weekly</td>
<td>2.93</td>
<td>1.19</td>
<td>7.21</td>
</tr>
</tbody>
</table>

C-statistic: 0.82, Hosmer-Lemeshow; p = 0.49

From Table 4.15 the only predictor variables with significant independent associations with an increased frequency of interaction in the network were email frequency and number of cICTs used. The forest plots in Figures 4.9 and 4.10 illustrates how the estimated adjusted odds ratios for variables of frequency of email use and number of cICTs change between the multivariable logistic regressions for each network separately versus the final model based on the combined data.
The co-linearity diagnostics for the variables in the final multivariable logistic regression model showed that the variance inflation factor ranged from 1.1 to 1.3 for all variables. Because the calculated variance inflation factors were all below 2.5 there is likely no co-linearity between these variables\textsuperscript{190}.

Table 4.16 presents the data of a form of sensitivity analysis that aimed to identify any significant changes to the associations between just the predictor variables of frequency of email use and the number of cICTs used and the outcome variable of frequency of interaction when imputed responses were included in a limited multivariable regression model containing just
these two predictors. A total of 44 imputed responses were added to the combined data for each of the predictor and the outcome variables. From these results it would appear that when non responders were included with significantly different imputed responses the noted association between the number of cICTs used and the frequency of interactions was no longer significant, however frequency of email use remains significant.

Table 4.16: Sensitivity analysis

<table>
<thead>
<tr>
<th>Variables</th>
<th>Combined Data</th>
<th></th>
<th>Combined + Imputed Data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Adjusted Odds Ratio</td>
<td>Confidence Interval</td>
<td>Adjusted Odds Ratio</td>
<td>Confidence Interval</td>
</tr>
<tr>
<td></td>
<td>Upper</td>
<td>Lower</td>
<td>Upper</td>
<td>Lower</td>
</tr>
<tr>
<td>Frequency of email use</td>
<td>11.02</td>
<td>2.99</td>
<td>40.56</td>
<td>6.88</td>
</tr>
<tr>
<td>Number of cICTs used</td>
<td>3.67</td>
<td>1.61</td>
<td>8.38</td>
<td>1.04</td>
</tr>
</tbody>
</table>
Chapter 5 : Discussion, Limitations and Conclusions

This chapter ties all the elements of this thesis together by first summarizing the rationale and results. The next section will explore the potential implications of these findings by looking at the implications of the results at a micro, meso and macro level. A review of the challenges that have been encountered in conducting this research will be presented in the next section. Some of the limitations of this work and potential future directions will be explored in the final section.

5.1 Summary of the study and its results

The rationale for this study described a concept called role optimization and how it can be a part of a solution to address the substantive issues around inadequate access and quality of care for those patients with chronic pain. As an example of role optimization two networks (MMAP and NSCPCCN) that utilize a novel form of networked mentoring to engage in knowledge translation in the process of optimizing the roles of member physicians in the management of chronic pain have been explored. It was postulated that the CoP theoretical framework could be used in a relatively novel way to explore how cICTs are helping to promote knowledge translation by looking at its effects on the concepts of community and a shared practice. Survey methods were used to develop a better understanding of how cICTs are being used to support knowledge translation in both MMAP and NSCPCCN. The following subsections provide a summary of the results grouped in terms of how they have helped to fulfill the study objectives.

5.1.1 Characterize the members of MMAP and NSCPCCN

The results of the survey have helped to fulfill the first objective of the study by identifying that both networks are very similar in their composition and also broadly reflect the family physician
population in Nova Scotia and Ontario. The similarity of the programs could be attributed to analogous program structures and recruitment strategies.

5.1.2 Characterize the types of cICTs that members are using and the cICTs they may be interested in using

In exploring the second objective of the study it was found that respondents used a broad variety of cICTs, ranging from thin to rich media and synchronous to asynchronous tools. However the primary cICTs that were utilized in both desktop and mobile devices were email and telephone. In terms of cICT use across different environments a declining trend was noted in the proportion of members using any cICTs from personal use to non network collaboration to network collaboration. A similar trend can be seen for most cICTs in mobile based use as well. Though a majority of respondents in both networks are interested in web and video conferencing tools there is also a significant proportion of respondents who are not interested in these tools.

5.1.3 Characterize the purposes for which cICTs are being used

In relation to the third objective it was found that a majority of members use most cICTs for the purpose of supporting discussion around the management of chronic pain. In terms of usage a trend was seen in which the proportion of members using any cICTs declines from personal use to non network collaboration to network collaboration. A similar trend can be seen for most cICTs in mobile based use as well.

5.1.4 Explore the effects of cICT use on sharing and learning in the group

A majority of respondents in both networks perceived that cICTs are valuable in supporting discussion to share and learn about chronic pain management and in organizing face to face meetings.
5.1.5 Explore the effects of cICT use on interactions with the group

With respect to the effects of cICTs it was identified in the multivariable analysis that a higher frequency of email use and a higher number of cICTs used are associated with a higher frequency of interactions. When coupled with data from the network logs it could be inferred that the majority of interactions in the networks are taking place though cICTs.

In summary, in the process of fulfilling the objectives this study has also been able to address the research question that asks: **How are collaborative ICTs used in a community of practice of physicians involved in the management of chronic pain in Ontario and Nova Scotia to promote knowledge translation in a mentoring network for the purposes of role optimization?**

5.2 Implications

This section explores the implications of the results from this study by looking at the micro (the level of the individual member) the meso (the level of the network administration) and macro (the level of provincial funding bodies).

5.2.1 Implications at the micro level

From the study results it was found that cICTs play an important role in mediating most of the interactions that take place between members in the networks. The extensive use of cICTs and their value in enabling geographically distant members to interact could be an explanation as to why both programs have significant member representation from the rural regions in both provinces. One might have expected that the importance of cICTs to mediate interactions could have skewed the age of the participants in relation to the physician population in either province. A potential explanation for why this did not occur could be due to the fact that the most used cICTs are primarily email and telephone which are fairly ubiquitous tools. Though between 40 to 65% of respondents indicated they were using various social media tools (e.g. wikis, SNS and
video sharing) in their personal lives, less than 6% noted using any of these tools to collaborate in the network. Perhaps one explanation is that for the types of knowledge exchange, social media tools are perceived as being no more effective or efficient than email or telephone. Alternatively, members could have concerns about privacy and security of communications or they may be uncomfortable or unsure about how to incorporate these tools into the process of knowledge exchange in the mentoring network environment.

The results from the survey have shown that the primary reason the majority of respondents in both groups are using email and telephone is to engage in discussions about chronic pain management with other members. It was also found that a majority of respondents perceive that these cICTs are helpful in being able to support dialogues around sharing and learning about chronic pain management. From this it can be inferred that the use of cICTs in these networks is valuable in helping to develop a shared practice. Beyond mediating discussion it was also identified that cICTs are valuable tools in supporting members to organize face to face meetings.

From the survey results it can be seen that respondents are using cICTs that have a wide range of features. Email is the primary communication tool and it can be characterized as asynchronous and thin (text based). This is most often supplemented with the use of the telephone, a synchronous and richer (audio) tool. In MMAP we have also seen a number of respondents using message boards primarily in conjunction with email. Message boards, like email, are asynchronous text based tools but are better suited than email to support a conversation among large groups of individuals. It can also be seen that respondents are interested in using web and video conferencing tools that are synchronous and rich (video) tools. From these results it is possible to infer that text and asynchronous tools are the base for most discussions. However, there is also a need for more synchronous and richer tools to be used. Perhaps the choice of which cICT to use depends on the complexity and urgency of the discussion.

5.2.2 Implications at the meso level

It is proposed that the results of the multivariable regressions that identified a significant association between a higher use of cICTs and a higher frequency of interactions (section 4.5.3) are indirect evidence that cICTs can help foster the sense of community in these networks. It is
also proposed that the effect of the cICTs on interactions can help in the process of developing a
shared practice. Evidence for this second proposition is found in the majority of respondent’s
perception that cICTs are valuable in the sharing and learning between members (section 4.5.2) that
is necessary for the development of a shared practice. In supporting these foundational
elements of a CoP it can be understood how cICTs are helping to support knowledge translation
within these networks.

The finding that the majority of interactions in both networks occur through cICTs is an
important one for both administrations. To date these programs have been considered as CoPs
that utilized cICTs to supplement regular face to face meetings. However from this work it is
possible to start thinking of these networks as primarily virtual/online CoPs. This
reconceptualization of the networks is valuable as it focuses the attention of MMAP and
NSCPCCN on the importance of cICTs to the activity of the networks. This focus can include
the need to take an active role in managing currently used cICTs and even introducing new
cICTs to enhance both knowledge translation and interactions. Towards this end, both MMAP
and NSCPCCCN have started to take more active roles in managing the cICTs that are used in
the network primarily through the design and promotion of a common communication portal.
Beyond the value of cICTs to support virtual interactions there is also some evidence that it is of
value in organizing face to face meetings. As such both networks may want to consider also
looking at ICTs that are designed to facilitate members to organize face to face meetings.

In understanding the value of cICTs within a network it is also possible to see the potential value
of these tools to enable interactions and knowledge translation across networks. The
administrations of MMAP and NSCPCCN are already encouraging inter-network collaboration
primarily through the use of the communication portal. A potential implication of using cICTs to
support inter-network collaboration is that it can help in the development of new networks in
other provinces in Canada. This can be valuable in terms of a new network that is building up its
community and needs a critical number of members\textsuperscript{192} to support its ongoing activity. It can also
be of value to those networks that are limited in size and may not be able to achieve a critical
number of participants that are necessary to keep the community active.

The use of cICTs can help to reduce the costs incurred by both networks by reducing the number
of face to face meetings. MMAP is already taking advantage of this by replacing one of their full
network annual meetings with an online education seminar instead. It is important to point out that there are some concerns that completely eliminating face to face meetings and only using cICTs could detract from the overall group cohesion.

Looking at the interest levels of members beyond email and telephone it can be seen that even in those cICTs in which a significant number of respondents are interested (e.g. web & video conferencing and message boards) there are also a significant number of respondents who are not interested in them. The implication for both networks is that in the introduction of any new cICTs will likely require significant planning and effort to demonstrate the value of the cICT to the sizable number of members who have reservations about their use. Of note both programs are in the process of encouraging use of message boards and making web and video conferencing available to all the members to use through the communication portal. Finally given the relatively lower mobile based use of cICTs the networks may want to explore what underlies this finding on the premise that increasing mobile use could also be beneficial to increase interactions191.

5.2.3 Implications at the macro level

In the background chapter (section 2.3) the process of role optimization was outlined as a potential solution to the issue of access to chronic pain management that is particularly problematic in rural and remote areas of Canada. Based on the results presented the case is made that cICTs can be of value in supporting the knowledge translation process that is an important element of role optimization. As such it is proposed that cICTs can help facilitate the widening and deepening of roles in the process of role optimization. It is also suggested that cICTs may be playing a role in enabling physicians in rural and remote areas in Ontario and Nova Scotia to actively participate in both programs. Based on these two elements provincial health ministries that are funding programs like MMAP and NSCPCCN may want to ensure that cICTs are an integral element of the programs.

A point of interest for provincial health ministries and perhaps Health Canada as well, is in the value of cICTs to support knowledge translation between provinces through inter-network collaboration. This form of collaboration could help to break down the silos of practice and
promote cross pollination of ideas between provinces. This in turn could lead to improved quality of care in chronic pain management for all involved. The interest in internetwork collaboration is already growing beyond Nova Scotia and Ontario and starting to focus on fledgling networks in New Brunswick, Newfoundland and Quebec.

The results from this work could also be of value to provincial ministries of health that are engaging in expanding the scope of non physician health professionals and encouraging interprofessional collaboration to improve access and the quality of care.\textsuperscript{193} The potential value is in looking at these efforts of increased collaboration and scope extension as a process of role optimization. In this case there may be value in cICT enabled knowledge translation networks, like MMAP and NSCPCCN, to support health professionals to collaborate with each other and enhance their competencies in expanding their scopes of practice. Interestingly both MMAP and NSCPCCN have already begun to engage in inter-professional mentoring by expanding their membership to include: pharmacists, nurses, nurse practitioners, psychologists and physiotherapists.

5.3 Challenges

This section highlights some of the challenges that were encountered in conducting this research. The discussion will focus on the following two areas; the challenges in engaging with program administrations to conduct research and the challenges in conducting research involving physicians.

Based on the experiences gained in conducting this research it is apparent that far more than a good research question, a study protocol and research ethics board approvals were required to successfully complete the study. A critical element was establishing relationships with the administration of both programs and some of the members with the goal of developing trust. Without an established relationship and trust it is unlikely either program would have consented to conducting this study. The process of establishing a relationship took time and required an introduction from a trusted colleague to the administrators. Building a relationship happened through the many interactions that took place using various cICTs and through participation in mentor and mentee meetings. The use of cICTs played an important role in allowing regular
interactions with both MMAP and NSPCCN. In the process of participating and learning about the strengths and challenges that face these networks a relationship was fostered and trust was built. This was further enhanced by efforts to ensure that the research that was being formulated to study the networks would be of value to the network as well. In working with MMAP there was an added dimension to relationship and trust building as the program is embedded within another organization and so is subject to the decisions of another administrative arm. This added dimension proved at times to be challenging as it made it difficult to ascertain the decision making structure of the program.

The challenges of conducting survey based research involving physicians are well established in the literature. Many of these challenges are focused on issues around low participation or low response rates. Keeping this in mind the original study protocol was focused on collecting the majority of data at large group meetings. However, due to changes in program direction (MMAP eliminating a number of large group meetings) and a relative lack of attendance of existing members at these meetings email, fax and web surveys were used to reach a majority of participants. Interestingly it was found that when members where approached in meetings a 100% response rate was achieved from those members.

In focusing on other modes of delivering the survey it was expected that reminders using email, fax and telephone calls would be needed to encourage members to respond. Approximately two weeks after the distribution of the surveys the reminder protocol was implemented. It began with emails that were sent out by the administration of both programs. After two email reminders were delivered over a span of four weeks reminders were also provided by telephone and fax to all members who had yet to respond. One of the difficulties in implementing a reminder protocol is whether a lack of a survey response indicates that the member has no intention to complete the survey or needs more time to respond, or they require a reminder to do so or that the survey has not been received. In order to minimize the annoyance that reminders could pose records were maintained to keep track of how many times a member was individually contacted and that this number did not exceed five contacts. It was also considered that frequent reminders could be an annoyance to those who intended to complete the survey but had not. In addition to tracking the number of contacts, the timing between individual contacts using email, fax and telephone was also tracked and spaced out by at least two weeks.
Both fax and telephone contacts for members were almost entirely for their offices whereas the email contact was often for their personal accounts. It was found that the use of email and fax was a less intrusive manner in which to contact members and was a less time intensive option to implement. However a non response to either option was again difficult to interpret. When responses were received it was only with completed surveys and not to indicate that a member had no intention of completing the survey. The use of the telephone had a significant advantage of gathering a more definitive response from the reception staff or the member as to whether they had not received the survey, were not interested in responding, had forgotten, or were interested but needed more time. Another advantage of the telephone is that it also helped to identify those members who had not responded because they had stopped being active in the program and had not communicated this to the program’s administration. This helped to better determine the actual number of active participants in the networks. However a limitation of this method is that it was a more intrusive method of communication often interfering with the staff and the program members during scheduled clinic hours. In addition the telephone option was time consuming and often required multiple calls to identify potential office hours in which to speak to anyone, or requests by the reception staff to call back at a more convenient time or to call back after the receptionist had an opportunity to speak to the member about the survey. Based on this, it can be seen how active data collection for this survey required seven months for NSCPCCN and eight months for MMAP, more than double what would be expected for typical data collection time frames\textsuperscript{182}.

One of the final challenges that was faced in conducting this study was related to being able to determine the number of active participants in the programs where the membership was in flux with people entering and exiting the programs throughout the year. The solution that was used was to include those members who were registered in the program as of September 2012 (just before the beginning of data collection) and had been active for at least six months.

### 5.4 Limitations

In looking at the selection biases the focus will be on non responder and self selection biases. Non responder bias is an important issue in any survey based research as it raises concerns that
the data from non respondents are substantively different from those generated by the respondents. In this study the non response rates were fairly small at n =7 (19.4%) in NSCPCCN and n =37 (27.6%) in MMAP. In the literature it is felt that a response rate of over 70% is likely to considerably reduce the effects that non responses can have on a survey’s results\textsuperscript{182}. As noted in the results chapter NSCPCCN had a response rate of 80.6% and MMAP had 72.8%, suggesting that non responder bias likely had a minimal impact on the results of this study. However in contrast to this the sensitivity analysis in section 4.6.3 may implies that when substantively different imputed responses for non responders are used some of the associations between the predictor variables and the outcome variable are no longer significant. However when exploring the literature around non response issues evidence was found that surveys of physicians tend to not be as significantly affected by non responder bias in part due to the homogeneity of the population and their response patterns\textsuperscript{173}. As such sensitivity analyses with radically different imputed responses may not be the most appropriate manner in which to assess non responder bias in this population. It can also be argued that the different survey modes used in both networks and the similar results found in both could be evidence that non responder bias may not be as significant an issue for this study\textsuperscript{182,183}. Taking all of these points into consideration, it is suggested that the potential for a non responder bias to have a significant effect on the study findings is likely minimal.

Self selection bias is also a potential limitation of this work. In this study the self selection is less about who has chosen to respond and more about who has continued to remain a part of both programs. It is possible that those members who remain in the networks are comfortable using cICTs to discuss chronic pain management issues and those who are not have left the networks. As such the findings of this study may not be applicable to all mentoring networks.

Measurement bias is the most important potential limitation of this study. In looking at measurement bias we can identify concerns about response bias. The use of multiple survey modes in this study could raise some concerns that the mode could have affected the types of responses. This potential effect, however, is hotly debated and currently the evidence appears to support that the mode used is unlikely to create any significant response issues\textsuperscript{182,183}. Another potential concern around response bias in this study is related to the use of a reminder protocol and evidence that such measure can increase inaccurate responses\textsuperscript{194,195}. However there is also evidence that this form of bias is less of an issue in the context of physician based surveys\textsuperscript{173}. \textsuperscript{182}
Given that the exploration of cICT use in the survey is primarily retrospective it is possible that recall bias can raise questions as to the accuracy of the responses. Similarly concerns can also be raised about measurement accuracy and error of the survey given that there is no pre-existing reliability or validation evidence.

The following is a summary of the limited evidence focusing on the reliability and some preliminary validation evidence as it pertains to the cICT use components of the survey as this is the critical construct of interest. Evidence supporting the reliability of this survey was difficult to establish given the nature of the population and the potential variability of the responses as it pertains to cICT use. As such this precluded the collection of data around test-retest, inter-rater and split half reliability. With these limitations in mind the focus was placed on internal analysis for reliability and some evidence using Cronbach’s alpha statistics were presented in section 4.3.2 that support the consistency of responses around whether cICTs have been used.

The following is a summary of the evidence for measurement validity of the survey. The described process of developing this survey based on the exploration of the literature, consultation and study of the networks provides some limited evidence for the content validity of the survey. There is also some evidence for face validity based on the consultations with the networks to assess the surveys. The positive associations between the predictive measures of frequency of email use and the number of cICTs used to the outcome measure of frequency of interactions can be viewed as some evidence for the convergent validity of the findings.

The primary evidence for concurrent validity is the similarity of the frequency of message board use reported in the survey in comparison to the calculated average frequency of posts per poster to the communication portal message board (section 4.3.2). Ideally the responses for each individual from the surveys would be compared to their activity on the portal. Unfortunately this was not part of the original protocol for ethics review. A limitation of using the average number of posts is that it potentially underestimates the frequency of use as it does not account for the potential to view a post and not respond. Unfortunately the ability to measure this type of activity is not currently available on the communication portal. Another comparison that can be viewed as evidence for concurrent validity is the similarity described in the results between the reported frequency of email use by mentors in the survey and the calculated frequency of email use by mentors as reported in their mentor logs (section 4.3.2). In addition there is also a description in
the results (section 4.5.1) about the similarity between the frequency of interactions for mentors as reported on the survey and the calculated frequency of interactions as reported in the mentor logs. It is important to keep in mind that the mentor logs are intended to track the interactions between mentors and mentees and as such may not capture the use of cICTs for purposes other than discussions. It is important to consider that the evidence for concurrent validity can be challenged as none of the comparison measures have been validated. In addition there also may be some concerns about the timing of when the two measures have been applied.

Contamination bias is also a possible concern in this study given that 73% of NSCPCCN and 23% of MMAP members were exposed to a similar version (unintended pilot) of the final survey. In the results (section 4.3.1) the content analysis of the open ended question asking what things did members think influence them to use technologies found that no members in either network reported the unintended pilot as an influence. This would not be considered definitive evidence to discount the potential of contamination bias.

In reviewing the various forms of potential bias it is felt that selection bias (non responder & self selection) and contamination bias are likely to have had a minimal effect on the findings that have been presented. Although there is some evidence to support elements of reliability of the survey (internal analysis) and validity of the findings (face, content, concurrent and convergent) it is still felt that measurement bias is a significant potential concern. Keeping this in mind it is important to view the results of this exploratory study as preliminary and needing to be further substantiated with future efforts looking at the same or similar networks.

5.5 Future directions

In terms of expanding the understanding of the use of cICTs in these networks it would be valuable to further examine the factors that might play a role in choosing which cICT to use for discussions with other network members. Similarly it would also be interesting to examine the types of discussions that are taking place through various cICTs and whether particular types of discussions are limited to certain cICTs.
Re-administering the survey on an annual basis may help to fill a gap in the current findings about how the use of cICTs in these networks changes with time. The inclusion of other health professional in both networks makes an interesting case to re-apply the survey to identify any changes to the use and effects of cICTs. The current study was limited to identifying an indirect effect of cICTs on community. Perhaps with the use of mixed methods and social network analyses this can be better characterized and establish direct evidence as to the effect of cICTs on the concept of community. Another area that would be valuable to study would be in assessing whether improved knowledge translation through the use of cICTs leads to a greater change in favourable behaviours as further evidence for the value of cICTs in optimizing roles. There is also a need for more evidence towards validation of this survey. Finally in all of these potential studies it is possible to explore a wealth of various data sources particularly from the communication portal which will help to provide an accessible means by which to measure the use of cICTs in a more comprehensive manner.

5.6 Conclusions

The results of this study have provided new insights about the value and role of collaborative ICTs in supporting knowledge translation in a community of practice by mediating discussions in two physician mentoring networks about the management of chronic pain. In supporting knowledge translation activities within these two mentoring networks it was possible to see how cICTs could be of value in the process of optimizing the roles of health care practitioners. From an academic perspective this study has outlined a relatively novel use of CoP theory to study knowledge translation activities and has helped to fill some of the gaps in the literature by describing the structure, function and the participants in two examples of mentoring networks that are seeking to optimize physician roles. From a practical perspective this study has helped to provide a richer and more precise picture of the networks and the cICTs they are using, which could be valuable to the management and future growth of both MMAP and NSCPCCN. Finally, the results of this study also highlight the potential of cICTs to help foster and link mentoring networks like MMAP and NSCPCCN. This in turn could improve the quality of care for chronic pain patients by promoting inter-professional collaborative care and role optimization across Canada.
References


106. Action Plan for The Organization and Delivery of Chronic Pain Services in Nova Scotia

107. Optimizing patterns of community referral to tertiary level specialists for management of

108. Jarvis P. Towards a philosophical understanding of mentoring. Nurs Educ Today

109. Zanting A, Verloop N, Vermunt JD, Van Driel JH. Explicating practical knowledge: An
extension of mentor teachers' roles. European Journal of Teacher Education


113. Geisler E. The metrics of knowledge: Mechanisms for preserving the value of managerial

114. Swap W, Leonard D, Shields M, Abrams L. Using mentoring and storytelling to transfer
knowledge in the workplace. Journal of Management Information Systems

115. Crocitto MM, Sullivan SE, Carraher SM. Global mentoring as a means of career
development and knowledge creation: A learning-based framework and agenda for future

116. Geisler E, Ritter B. Differences in addictive complexity between biological evolution and

117. Bryant SE. The impact of peer mentoring on organizational knowledge creation and
sharing: An empirical study in a software firm. Group and Organization Management

118. Kitson A, Harvey G, McCormack B. Enabling the implementation of evidence based

Getting evidence into practice: The role and function of facilitation. Journal of Advanced

120. Grzybowski S, Lirenman D, White MI. Identifying educational influentials for formal and
informal continuing medical education in the province of British Columbia. The Journal


130. Thornton T. Tacit knowledge as the unifying factor in evidence based medicine and clinical judgement. *Philosophy, Ethics, and Humanities in Medicine* 2006;1(1).


Appendix A: Search strategies

1 Comprehensive literature search strategy around role optimization

This was a comprehensive search to explore the concept of role optimization. It is not intended to be a systematic or scoping review. References were identified from Medline, Embase, ABI Inform Global and ERIC. Searches began in 2009 and the final search was in June 2012. The following are the final search terms used and the results of the searches:

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2 Comprehensive literature search strategy around mentoring networks

The search that was conducted in exploring the concept of mentoring networks was conducted in April 2012. This was a comprehensive search and was not intended to be a systematic or scoping review. The following are the search terms and the results of the search in Medline, EMBASE and Google Scholar:

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Embase 1974 to 2012 April 20
Google Scholar search strings: ("mentoring network" OR "mentoring networks" OR "mentoring circle" OR "mentoring circles") (~definition OR framework OR frameworks OR concept OR concepts OR model OR models) =1,850 hits, only the first 200 hits were looked at.
Appendix B: Program exploration questions

The following questions were used to help explore and better understand both the MMAP and NSCPCCN networks. The data sources that were used to explore these questions included: attendance at network meetings and informal discussions with network administration.

1. When was the network started?
   a. For example talk about pilot programs that may have predated the establishment of the network.

2. Why was it started?

3. What are the core goals?
   a. Are the networks a Role Optimization tool for primary care to increase the capacity of primary care to manage chronic pain? In which case this becomes a question of scope i.e. number of physicians involved.
   b. Is this about a service to make PCPs comfortable with CNCP management? With little regard to how many PCPs are involved.
   c. How do the goals of the network align or differ from the CMHCN?

4. Describe the structure of the network:
   a. Talk about both the mentor - mentee organization and admin structure.
   b. There is no formal definition of what mentoring networks are as such how do you define them? This will help to propose a definition that we can put forth in this paper.

5. What is the current financing arrangement for the networks?
   a. What about the future?
   b. How has CMHCN been financed and continuing to be financed?

6. What pre-existing programs influenced the form and structure of this group?
   a. Like the CMHCN.
   b. Are you aware of other programs with similar structure and goals? This is not limited to chronic pain and addictions.

7. Describe how members seem to be interacting with each other?
   a. What I have observed is that there appear to be at least two types of members;
      i. The “core” members who behave in a way similar to a naturally occurring CoP, i.e. the interest in the subject material is what drives their participation. These individuals interact with each other more often than the others and also form relationships beyond information exchange. The “core” members can be mentors or mentees and their interactions are not just mentee-mentor but can be mentee-mentee or mentor to mentor as well.
      ii. The peripheral group (which may be made up of sub groups as well) perhaps are not as interested in the domain of chronic pain and perhaps are more interested in acquiring the information and knowledge often for discrete
perhaps singular events. In which case they may not be interested in establishing a mentoring relationship. Perhaps they may be motivated by other factors e.g. college requirements for remediation, acquiring CME credits, or access to knowledge on demand.

b. What about over time, do we see an ebb and flow of participants?
   i. Do we see much change amongst the core if they exist?
   ii. Do we see mentees take on mentor roles?

8. What incentives help to drive activity of members?
   a. The goal of exploring this is that it helps us to understand some of the motivations of the members to participate.
   b. Does the financial incentive play a role in the activity, i.e. are the mentors taking advantage of the financial incentives?
   c. Do the CME credits play a role in activity, i.e. are the members taking advantage of the CME credits made available?
      i. At the MMAP Oct 27 meeting discussion with Ryan indicated that most physicians do not take advantage of CME.

9. The future of the networks:
   a. What are the future goals of MMAP and NSCPCCN?
   b. Explore the potential growth and limits, is there a size limit?
   c. Explore what or if these networks should have an effect on CNCP care in the community.
   d. What lessons could this provide for networks and other chronic disease entities
   e. Explore potential policy changes for primary care in terms of how CNCP management is delivered from primary care and upwards. Does this link in with ideas of primary care and special interest and new models where they become intermediate referral resources? This draws from the model of CNCP in the UK.

10. What role do you see for technology in the networks currently? How about in the future?
    a. How might technology serve the members in the networks (ease to participate, access to information)?
    b. How might technology help the network (e.g. growth of the network, sharing information)?
Appendix C: Mentoring and mentoring networks

This appendix is focused on providing a deeper exploration of the concept of mentoring and the types of mentoring that both MMAP and NSCPCCN are using.

3 Conceptions and frameworks of mentoring

3.1 Mentoring conceptions

The exploration of the concept of mentoring should start by examining some of the definitions of mentoring. In trying to define mentoring one thing that emerges from the literature is that there is fluidity to the concept of mentoring over time and across multiple disciplines. This makes concrete definitions a difficult venture. However there appears to be some consensus that the earliest description of a mentor was by the Greek author Homer in his work ‘The Odyssey’ wherein the character Mentor is charged with helping Telemachus to mature from adolescence to adulthood. Beyond this consensus there is very little agreement about definitions of mentoring within a discipline or across disciplines. What has been noted is that it is difficult to define mentoring and much of that difficulty could be rooted in the fact that mentoring is defined based on the purpose it is intended to serve. What follows is a selection of some definitions of mentoring that highlight recurring themes.

Within the nursing literature there are a plurality of definitions and the following is a typical example; “a humanistic, nurturing, and social relationship requiring mutual learning, sharing, and professional and personal growth for both the mentor and the protégé”.

It has also been defined as “a relationship between a person with expertise and someone who wants to learn – an experienced professional and a beginner”.

A review of mentoring in the field of psychology yielded the following in the context of academia; “Mentoring is a personal and reciprocal relationship in which a more experienced, (usually older) faculty member acts as a guide, role model, teacher, and sponsor of a less experienced (usually younger) student or faculty member. A mentor provides the protégé with knowledge, advice, counsel, challenge, and support in the protégé’s pursuit of becoming a full member of a particular profession”.

A review of the medical literature yielded the following interpretation; “a dynamic, reciprocal relationship in a work environment between an advanced career incumbent (mentor) and a beginner (protégé), aimed at promoting the development of both”.

What emerges from these definitions is that there is some agreement that mentoring entails some form of a relationship and a bidirectional exchange between a mentor and a mentee (or protégé). The area for contention is centered on what the structure of this relationship is and what the goals of this relationship’s are.
Another way in which one can try and explore the boundaries of mentoring is to consider how it is defined in relation to similar concepts. Along these lines much work has been done to try and distinguish between precepting and mentoring and role models and mentoring. A review of the nursing literature on mentoring listed the following definition for precepting versus mentoring;

“Preceptorship as a more short-term arrangement than mentoring, with preceptors being responsible for teaching and assessing clinical performance.”

What this definition serves to highlight to us is that mentoring does not involve formal assessment of the growth of the mentee as its core function, but shares the role of teaching with precepting. However it is important to remember that for every rule there is are exceptions, as such there are settings where the mentor can be an assessor. The literature in the area of medicine has looked extensively at the use of role models to influence career selection and education. What follows is a selected definition of role models in comparison to mentoring;

“A role model teaches primarily by example and helps to shape professional identity and commitment through promoting observation and comparison. Unlike mentors, role models may have only brief contact with physicians in training and do not so much deliberately mold students as inspire by their own conduct. Professional achievement, personality, power, influence, lifestyle, and values may all determine the influence a teacher has on a student.”

This comparison helps us to focus on the importance of a relationship between the mentor and mentee in mentoring. It also helps us to understand the importance of informal influence as the main focus of role modeling, versus mentoring where informal influence is one of many foci. When contrasted with previous definitions of a mentor it highlights to us that there is a significant overlap between mentors and role models.

3.2 Mentoring frameworks

Having explored some of the varied definitions of mentoring we can begin to see some of the difficulties in trying to find a singular encompassing definition for this concept. In an attempt to bring some clarity to the confusion that surrounds mentoring a paper from the field of psychology by Karcher et al. present an interesting framework within which to consider the various forms of mentoring. Though the paper’s framework was described in the context of youth mentoring programs in psychology, a number of the ideas presented echo what has been described in other fields. The paper proposes the consideration of mentoring programs along three dimensions;

1. Mentoring contexts
2. Mentoring structure
3. Mentoring goals

Mentoring context refers to the location of where a program is conducted. Generally these can be divided into field versus site based programs. In this case field pertains to locations that are chosen by the mentee and mentor versus site based programs which determine the locations to meet. Field based programs also have a greater freedom in how the mentoring relationship is
developed versus site based programs. The description of field based programs is analogous to ideas of informal mentoring. Informal mentoring implies that the relationship is defined by the mentor and the mentee\textsuperscript{109}. Whereas site based mentoring is analogous to formal mentoring where a program defines the goals and structure of the relationship\textsuperscript{109}.

Mentoring structure refers to how the mentoring relationship is formatted. The following are a list of structural types:

1. One to one mentoring: the traditional structure as described by Homer\textsuperscript{196}, one mentor to one mentee.
2. Group mentoring: one mentor to multiple mentees. Offer opportunities to learn in a social environment, through interactions and role modelling.
3. Cross-Age or Peer mentoring: refers to mentoring within a peer group.
4. Intergenerational mentoring: youth being mentored by adults older than 55 years old.
5. E.mentoring: using any form of information communication technologies as the primary mode of communication between mentors and mentees.

From this list of structures we can see that some elements are specific to youth based mentoring programs such as Intergenerational mentoring. However elements such as one to one, group and peer mentoring are structures that are utilized in different disciplines\textsuperscript{109} \textsuperscript{199} \textsuperscript{203}. I will raise a point of contention with the listing of e.mentoring within the structural dimension. I believe that it is better suited to be listed in the context dimension, since the electronic medium provides an opportunity to redefine the venue in which individuals can interact. As such we can see that the e-mentoring context can support all of the other structural elements that are listed. Another issue is that this dimension fails to take into account the emerging notion of interdisciplinary mentoring\textsuperscript{204}. In this form of mentoring a mentee can be matched with additional mentors outside of their discipline. A final point that the structural dimension does not address is the notion of one mentee to multiple mentors. This is the case in MMAP where mentees are matched to mentors with an expertise in addictions.

The final dimension is mentoring goals and looks to classify mentoring based on the goal of the program. In this dimension two elements are described; developmental and instrumental mentoring. Developmental mentoring is described as using supportive relationships to influence social, emotional and academic growth. In the descriptions of mentoring programs in nursing and medicine we encountered the use of such developmentally oriented programs to influence career success, research productivity and recruitment and retention efforts. Instrumental mentoring refers to mentoring that emphasizes acquiring specific skills to achieve particular goals. The mentoring programs described in the areas of education and management used such skill oriented programs for training teachers and retaining managerial knowledge. Karcher et al.\textsuperscript{202} point out an important caveat that developmental programs will have impacts on skills acquisition and that instrumental programs can lead to improved social, emotional and academic growth. This caveat serves to point out that the distinction made between developmental and instrumental serve are artificial distinctions that serve as a starting point for developing an understanding about mentoring. The last point to be made here is that it is important to distinguish between the goals of mentoring versus the goals of a program. For example the goal of mentoring in many medical programs is developmental growth which helps to achieve a program’s goal of increased retention/recruitment. This may indicate that a fourth dimension that explores program goals should be added to this framework. Elements of this fourth dimension can be drawn from some of the uses we have seen previously. They can include; retention, recruiting, increase in productivity and professional development to name a few.
The value of this framework is to be able to classify mentoring programs in a more descriptive manner. Mentoring can be conceived of as a complex intervention when it is being used to change behaviours. As such the boundaries of a classification system can help researchers to study programs that are similar and dissimilar to gain a further understanding of mentoring’s impact on specific outcomes and how it is able to achieve them.

4 Mentoring Networks

Both MMAP and NSCPCCN describe the form of mentoring in their programs as being a Mentoring Network. In reviewing the literature around mentoring the term mentoring networks was rarely encountered and a formal definition was not found. As such a more specific literature review was undertaken to help identify definitions or conceptions of the term Mentoring Networks in the research literature and review some of the uses of this term amongst mentoring programs as well. The literature review included searches within Medline, Embase, Google Scholar (see Appendix A for search details). Based on these searches no formal definitions were found for the term mentoring networks, however there were at least four different conceptualizations identified.

The first conceptualization of Mentoring Networks is as a network (or a pool) of available mentors from which interested mentees can select a mentor with whom to engage in a traditional dyadic relationship. This conceptualization of mentoring networks has been described in both health care and engineering literatures and is used for the purposes of improving access to mentoring. When viewed from the Karcher et al’s framework this conceptualization is focused on the context element in providing field based mentoring.

The second conceptualization of mentoring networks is where mentees are engaging in multiple networked relationships for mentoring. A network in this case refers to two or more bidirectional relationships that a mentee is engaging in. Research literature around this conceptualization comes from a broad number of fields; education, academic development, healthcare, library sciences, public sector, organizational and business literatures. Within this conceptualization the terms Mutual Mentoring, Mentoring Circles and Group Mentoring are used to further describe subsets within this form of mentoring. Mutual Mentoring or Developmental Network Mentoring, is centered on an individual mentee and bidirectional relationships between the mentee and a group of mentors. This form of mentoring has been used in academic and business organizations for career development purposes. Mentoring Circles (also called Peer Group Mentoring) refers to mentoring groups without a clearly identified mentor. Instead all the members function as both mentors and mentees to support each other. Group Mentoring involves a group of mentees matched to one or multiple mentors and encourages bidirectional learning relationships between all of the members. This form of mentoring has been successfully used in organizational knowledge management and retention efforts as well as in academia and health care for career development and retention. A recent literature review of the theoretical and empirical literature around the topic of Group Mentoring further subdivided this subset into Many to One Mentoring and Many to Many mentoring. The Many to One form of mentoring describes many mentees to one mentor with mentoring taking place between mentor to mentee and mentee to mentee. Finally the Many to Many form of mentoring refers to many mentees to many mentors where mentors and mentees are all learning from each other. In looking back at the Karcher et al framework this
conceptualization of mentoring networks is focused more on the structural dimension of mentoring.

The third conceptualization of mentoring networks uses the term to reflect the use of a mentoring process to help mentees develop professional networks that help with career development, retention and satisfaction. In this instance both mentoring forms of dyadic and multiple networked mentoring relationships are considered for their value to create professional networks. This conceptualization of mentoring networks within the Karcher et al framework is focused on mentoring goals more specifically as a developmental tool.

The fourth and final conceptualization was not described in the research literature but was found in the description of mentoring programs that were identified in the Google search. In this conceptualization the term mentoring network is used to refer to a program that offers different mentoring options, such as traditional dyadic mentoring, and group mentoring. The program examples of this conceptualization that were found in this search are mostly focused on mentoring of youth.

With an understanding of what the term Mentoring Networks can imply we can look more closely at how MMAP and NSCPCCN conceptualize Mentoring Networks and how it sits within the literature and common uses. To begin with both MMAP and NSCPCCN are structurally almost identical and share common core goals of enabling participating members to more comfortably and confidently manage chronic pain at the primary care level through a process of knowledge translation and supportive relationships. This similarity in goals and structure is not a surprising finding given the close ties at the administration level during the development phase of these programs as well as the common inspiration from the CMHCN. In discussion with both MMAP and NSCPCCN they have identified the following features of mentoring in their programs:

1. Mentoring Networks adds in the features of networks to mentoring that facilitates the bidirectional flow of knowledge not only between mentors and mentees but also between mentors to mentors and mentees to mentees across the entire program.
2. The mentoring in both programs places a value on the expertise of a mentor, but also recognizes a diversity of expertise by facilitating and encouraging the sharing of different forms of expertise that resides with mentees.
3. This expanded perspective of expertise helps to foster inter-professional mentoring activities.
4. In this setting the role of the mentor is not simply as a source of expertise but also as a facilitator for sharing between mentees and fostering relationships between members.
5. The notion of various forms of expertise being shared freely within a network of individuals can be conceived of as Mentoring 2.0, drawing on notions of Wikipedia® and the Web 2.0 analogy.

The MMAP and NSCPCCN description of mentoring networks would appear to align well with the Many to Many form of Group Mentoring that was described in the research literature around Mentoring Networks. Peer group Mentoring may also align with MMAP and NSCPCCN description of mentoring networks it is important to recognize that both programs still clearly designate a mentor.
Having positioned the form of mentoring within the Mentoring Networks literature it would be valuable to also look at how MMAP and NSCPCCN’s form of also fits within the Karcher et al framework for mentoring. In looking at the first dimension of context, both programs utilize field based mentoring where both mentor and mentee decide on location and time of meetings. The second dimension looks at structure and the MMAP and NSCPCCN formulation of mentoring fits within both group mentoring and e-mentoring classifications. In terms of the dimension of goals the mentoring in both programs primarily focuses on instrumental mentoring to translate knowledge to manage chronic pain but also engages in developmental goals through the emphasis on supportive relationships. Finally in considering the suggested fourth dimension of programs goals both programs look to increase better management of chronic pain at the primary care level through supportive mentoring relationships.

Appendix C References


12. Pharmacist & Physician mentoring program: An inter and intra-professional mentorship strategy for Ontario Pharmacists and Physicians working together to optimize medication use. Inter/Intraprofessional Mentorship Program: Knowledge exchange and curricular development workshop; 2009; Toronto, Canada.


Appendix D: Information and consent documents

1. MMAP survey information and consent document

Information and Consent for Surveys

Thank you for taking the time to review this information and consent document for a voluntary survey that is a part of Dr. Radhakrishnan’s masters thesis work based at the University of Toronto and is supported by the Medical Mentoring for Addictions and Pain (MMAP).

The title of this study is; Exploring the use of ICTs for knowledge translation among physicians who are optimizing roles in chronic pain management. Your involvement in this study would require about 15 minutes of your time to fill in a short survey.

The purpose of this short survey is to learn about your use of certain technologies to communicate, particularly in the context of your MMAP interactions. The results of these surveys will be used to help the program to design communications options that would provide a better experience for all the participants (mentors and mentees included). The analysis of these results will also be used for research purposes, publications and presentations.

All of the surveys are confidential and will ask about personal information like age, gender, and general details about your clinical focus and practice. All efforts will be made to keep your responses confidential and secure. One measure that is being taken is to use a unique identification number to identify your surveys. This helps to make sure that your name is kept separately from your survey data and only the MMAP administration will have access to the files to link the two. In addition all your survey responses and data will be stored in locked offices, or on password protected computers or encrypted drives for up to 7 years. After 7 years your data will be disposed of in a secure manner. Your data will only be available to the research team and anonymized data will be shared with your program. All published work based on your responses will contain no identifiable information about any of the participants.

Your participation in this survey is voluntary. If you choose not to participate it will have no negative consequences for you. Your participation will be valuable to MMAP in helping to improve the program to serve your communication needs better. If you decide to participate you can choose to withdraw from the study at any time even after you have submitted your surveys. In order to do so contact Dr. Radhakrishnan (contact information below) to inform him of your request and to indicate if you would like to remove your data as well.
By filling out this survey it will imply that you have consented to participate and to having your responses used for program improvement and for research purposes. Once you have completed the survey please submit them to Dr. Radhakrishnan before leaving the meeting.

If you choose to not participate simply do not fill in the survey

Thank you for your time and for considering to participate in this research study

If you have any questions or concerns about this study please contact;

Dr. Arun Radhakrishnan  
123 Edward street, suite 1118  
Toronto, ON  
Ph: (416) 593 7700  
Email: arun.radhakrishnan@utoronto.ca

If there are any questions or concerns about how you have been treated as a research participant please contact;

Rachel Zand  
Director, Office of Research Ethics, University of Toronto  
Ph: (416) 946 3389  
Rachel.zand@utoronto.ca

2. MMAP mentor log information and consent document

Information and Consent to review MMAP mentor logs

Thank you for taking the time to review this information and a request to consent document to allow access to your mentor logs. This request is being made by Dr. Radhakrishnan’s as a part of his masters thesis based at the University of Toronto and is supported by the Medical Mentoring for Addictions and Pain (MMAP).

The title of this study is; Exploring the use of ICTs for knowledge translation among physicians who are optimizing roles in chronic pain management. Your involvement in this part of the study would require you only to read and if you choose sign this consent form granting Dr. Radhakrishnan the opportunity to review your mentor logs from September 2011 to January 2012.
The purpose of being able to review your logs is to learn about what types of mediums or
technologies are used to communicate between mentors and mentees in MMAP. The review of
your logs will only extract the date of an interaction and the type of medium used to interact.
There will be no personal information that will be extracted in the process of reviewing your
logs. The results of this work will be used to help the program to design communications options
that would provide a better experience for all the participants (mentors and mentees included).
The analysis of these results will also be used for research purposes, publications and
presentations.

All of the data extracted from the logs will be kept confidential and all efforts will be made to
keep them secure. All of the data extracted from the logs will be anonymized and stored in
locked offices, or on password protected computers or encrypted drives for up to 7 years. After 7
years your data will be disposed of in a secure manner. Your anonymized data will only be
available to the research team and your program. All published work based on your responses
will contain no identifiable information about any of the participants.

Your consent to allow a survey of your mentor logs is voluntary. If you choose not to participate
it will have no negative consequences for you. Your participation will be valuable to MMAP in
helping to improve the program to serve your communication needs better. If you decide to
participate you can choose to withdraw from the study at any time even after you have submitted
your consent forms. In order to do so contact Dr. Radhakrishnan (contact information below) to
inform him of your request. However your data cannot be removed once it has been extracted as
it will be anonymized and there is no way to track it and remove it.

By signing this form below it will imply that you have consented to participate by having your
mentor logs reviewed and for the use of the extracted data for program improvement and for
research purposes. If you choose to participate please sign and fill in the area indicated below
and return it to Dr. Radhakrishnan. You will be provided with a copy of this signed form.

Thank you for your time and for considering to participate in this research study

If you have any questions or concerns about this study please contact;

Dr. Arun Radhakrishnan
123 Edward street, suite 1118
Toronto, ON
Ph: (416) 593 7700
Email: arun.radhakrishnan@utoronto.ca

If there are any questions or concerns about how you have been treated as a research participant
please contact;

Rachel Zand
Director, Office of Research Ethics, University of Toronto
Ph: (416) 946 3389
Rachel.zand@utoronto.ca
3. NSPCCN survey information and consent document

5 PARTICIPANT INFORMATION TO TAKE PART IN A RESEARCH STUDY

STUDY TITLE: Exploring the use of Information Communication Technologies for knowledge translation among physicians who are optimizing roles in chronic pain management.

PRINCIPAL INVESTIGATOR: Dr. Arun Radhakrishnan MD CM, CCFP
123 Edward Street, suite 1118
Toronto, ON, M5G 1E2
Telephone: (416) 593 7700
email: arun.radhakrishnan@utoronto.ca

ASSOCIATE INVESTIGATORS:
Dr. P. MacDougall: Director Nova Scotia Chronic Pain Collaborative Care Network
Dr. A. Jadad: Thesis Supervisor; Professor Health Policy Management and Evaluation, University of Toronto
Dr. R. Upshur: Thesis committee; Professor Department of Family and Community Medicine, University of Toronto
1. INTRODUCTION

You have been invited to take part in a research study. Taking part in this study is voluntary. It is up to you to decide whether to be in the study or not. Before you decide, you need to understand what the study is for, what risks you might take and what benefits you might receive. This consent form explains the study.

Please read this carefully. Take as much time as you like. If you like, take it home to think about for a while. Mark anything you don’t understand, or want explained better. After you have read it, please ask questions about anything that is not clear.

The researchers will:
- Discuss the study with you
- Answer your questions
- Keep confidential any information which could identify you personally
- Be available during the study to deal with problems and answer questions

We do not know if taking part in this study will help you. You may feel better. On the other hand it might not help you at all. It might even make you feel worse. We cannot always predict these things. We will always give you the best possible care no matter what happens.

If you decide not to take part or if you leave the study early, your usual health care will not be affected.

2. WHY IS THIS STUDY BEING DONE?

Chronic pain is a significant issue affecting many people in Nova Scotia. With a lack of specialist the wait times for management are unbearably long. The Nova Scotia Chronic Pain Collaborative Network is a program that attempt to address this issue by creating a mentoring network to support family doctors in managing chronic pain more effectively. The goal of this work is to understand that types of information communications technology you use in particular in the mentoring network and some of their possible effects. It is hoped that through this work better systems can be designed using the right types of communications technology. As a novel and unique program there has been no research to date in this area.

3. WHY AM I BEING ASKED TO JOIN THE STUDY?

You are being asked to join the study because you are a member of the Nova Scotia Chronic Pain Collaborative Care Network.

4. HOW LONG WILL I BE IN THE STUDY?
It is expected that the study will take one year to complete. Approximately 20 minutes of your time will be required to complete a questionnaire.

5. HOW MANY PEOPLE WILL TAKE PART IN THIS STUDY?

This study is taking place throughout Canada. The total number of participants will be up to 300 physicians and up to 150 physicians from the Capital Health group.

6. HOW IS THE STUDY BEING DONE?

A short survey will be distributed to all members of Nova Scotia Chronic Pain Collaborative Network. Those who do not respond will be followed up with a web based version of this survey or a mailed version. Dr. Radhakrishnan will be available to answer any questions at all times. The survey will ask you to share some information about yourself (age, gender, type of physician) and your practice (practice location and type) and to also describe your use of technologies and their impacts on your interactions in the mentoring network.

7. WHAT WILL HAPPEN IF I TAKE PART IN THIS STUDY?

If you agree to be a part of this work you will be asked to fill out the survey that will take about 15 minutes. There will be no further requirements of you after the survey has been completed. If you choose to withdraw you may do so at anytime even after the surveys are submitted. Simply inform Dr. Radhakrishnan and he will ensure that your surveys are appropriately disposed of and if you wish all your data will be withdrawn from the study.

8. ARE THERE RISKS TO THE STUDY?

Since this study is based on asking questions we think that there is little or no risk to you if you decide to join the study. We do not want to alarm you but please be aware that there may be risks that we don’t yet know about.

You may find the questionnaire you receive during the course of the study upsetting or distressing. You may not like all of the questions that you will be asked. You do not have to answer those questions you find distressing.

All of the information that you give to the study will be kept private. Only Dr. Radhakrishnan and the research team will see the information that can identify you.
Although every effort will be made to protect your privacy, there is still a chance that someone other than the research team might access the information. We think the chance of this ever happening to you is very small.

9. WHAT HAPPENS AT THE END OF THE STUDY?
You will be given access to a copy of the publications when they are finished.

10. WHAT ARE MY RESPONSIBILITIES?
As a study participant you will be expected to:

- Follow the directions of the Principal Investigator
- Answer the questionnaire to the best of your ability.

11. CAN I BE TAKEN OUT OF THE STUDY WITHOUT MY CONSENT?
Yes. You may be taken out of the study at any time, if:

- There is new information that shows that being in this study is not in your best interests.
- The Capital Health Research Ethics Board or the Principal Investigator decides to stop the study.

You will be told about the reasons why you might need to be taken out of the study.

12. WHAT ABOUT NEW INFORMATION?
It is possible (but unlikely) that new information may become available while you are in the study that might affect your health, welfare, or willingness to stay in the study. If this happens, you will be informed in a timely manner and will be asked whether you wish to continue taking part in the study or not.

13. WILL IT COST ME ANYTHING?
Compensation
You will not be paid to be in the study.

Research Related Injury
If you become ill or injured as a direct result of participating in this study, necessary medical treatment will be available at no additional cost to you. Your signature on this form only indicates that you have understood to your satisfaction the information regarding your participation in the study and agree to participate as a subject. In no way does this waive your legal rights nor release the Principal Investigator, the research staff, the study sponsor or involved institutions from their legal and professional responsibilities.

### 14. WHAT ABOUT MY RIGHT TO PRIVACY?

Protecting your privacy is an important part of this study.

When you sign this consent form you give us permission to:

- Collect information from you
- Share information with the people conducting the study
- Share information with the people responsible for protecting your safety

Access to records
The study doctor and members of the research team will see records with Nova Scotia Chronic Pain Collaborative Care Network that identify you by name. Other people may need to look at the health and study records that identify you by name. These might include:

- the CDHA Research Ethics Board and Research Quality Associate

Use of records,
The research team will collect and use only the information they need to complete the Study. This information will only be used for the purposes of this study. This information will include your:

- information from study questionnaires

All information from the questionnaires will not be shared with others without your permission. Your name will not appear in any report or article published as a result of this study. All questionnaire information collected will be stored on an encrypted and password protected drives at the University of Toronto. If you are filling in the survey on the web your responses will be stored on a server outside of Capital Health but within Canada. Information collected for this study will kept as long as required by the institution. This will be 7 years or more.

If you decide to withdraw from the study, the information collected up to that time can be removed from the study if you choose.

Information collected and used by the research team will be stored by the research team at the University of Toronto. The Principal Investigator is the person responsible for keeping it secure.
You may also be contacted personally by Research Auditors for quality assurance purposes.

Your access to records
You may ask the study doctor to see the information that has been collected about you. The groups and people who have access to your records are:

- The Capital District Health Authority Research Ethics Board (CHREB) which is responsible for the protection of people in research here
- Quality assurance staff including the auditors for the CHREB, who ensure that the study is being conducted properly

The information they check may include questionnaire results.

### 15. WHAT IF I WANT TO QUIT THE STUDY?

If you chose to participate and later change your mind, you can say no and stop the research at any time. If you wish to withdraw your consent please inform the Principal Investigator. All data collected up to the date you withdraw your consent will remain in the study records, to be included in study related analyses. While the data from completed questionnaires will be kept for study analyses, you may choose to withdraw from the study at any time. However if you choose to all your questionnaire data can be removed from any analysis when you withdraw.

### 16. DECLARATION OF FINANCIAL INTEREST

The Principal Investigator has no financial interests in conducting this research study.

### 17. WHAT ABOUT QUESTIONS OR PROBLEMS?

For further information about the study call Dr. Arun Radhakrishnan. Dr. Radhakrishnan is in charge of this study at this institution (he is the “Principal Investigator”). Dr. Radhakrishnan’s work telephone number is (416) 593-7700 or email him. If you can’t reach the Principal Investigator, please refer to the attached Research Team Contact Page for a full list of the people you can contact for further information about the study.

The Principal Investigator is **Dr. Arun Radhakrishnan.**
Telephone: (416) 593 7700
Email: arun.radhakrishnan@utoronto.ca

### 18. WHAT ARE MY RIGHTS?

After you have reviewed this consent form you can retain it for your records.
If you have any questions about your rights as a research participant, contact the Patient Representative at (902) 473-2133.

19. CONSENT

I have reviewed all of the information in this consent form related to the study called:

Exploring the use of ICTs for knowledge translation among physicians who are optimizing roles in chronic pain management.

I have been given the opportunity to discuss this study. All of my questions have been answered to my satisfaction.

I agree to allow the people described in this consent form to have access to my records at Nova Scotia Chronic Pain Collaborative Care Network.

I understand that I am free to withdraw at any time.

The consent for this study is an implied consent. Therefore in order to consent for this study you simply need to proceed to filling out the provided questionnaire.

Please feel free to retain this form as your copy.

4. NSCPCCN mentor log information and consent document

9 CONSENT TO TAKE PART IN A RESEARCH STUDY
10 Participant Information for Physicians

STUDY TITLE: Exploring the use of Information Communication Technologies for knowledge translation among physicians who are optimizing roles in chronic pain management.

PRINCIPAL INVESTIGATOR: Dr. Arun Radhakrishnan MD CM, CCFP
123 Edward Street, suite 1118
Toronto, ON, M5G 1E2
Telephone: (416) 593 7700
email: arun.radhakrishnan@utoronto.ca

ASSOCIATE INVESTIGATORS: Dr. P. MacDougall: Director Nova Scotia Chronic Pain Collaborative Care Network
1. INTRODUCTION

You have been invited to take part in a research study. Taking part in this study is voluntary. It is up to you to decide whether to be in the study or not. Before you decide, you need to understand what the study is for, what risks you might take and what benefits you might receive. This consent form explains the study.

Please read this carefully. Take as much time as you like. If you like, take it home to think about for a while. Mark anything you don’t understand, or want explained better. After you have read it, please ask questions about anything that is not clear.

The researchers will:
- Discuss the study with you
- Answer your questions
- Keep confidential any information which could identify you personally
- Be available during the study to deal with problems and answer questions

We do not know if taking part in this study will help you. You may feel better. On the other hand it might not help you at all. It might even make you feel worse. We cannot always predict these things. We will always give you the best possible care no matter what happens.

If you decide not to take part or if you leave the study early, your usual health care will not be affected.

2. WHY IS THIS STUDY BEING DONE?

Chronic pain is a significant issue affecting many people in Nova Scotia. With a lack of specialist the wait times for management are unbearably long. The Nova Scotia Chronic Pain Collaborative Network is a program that attempt to address this issue by creating a mentoring network to support family doctors in managing chronic pain more effectively. The goal of this work is to understand that types of information communications technology you use in particular in the mentoring network and some of their possible effects. It is hoped that through this work better systems can be designed using the right types of communications technology. As a novel and unique program there has been no research to date in this area.

3. WHY AM I BEING ASKED TO JOIN THE STUDY?
You are being asked to join the study because you are a member of the Nova Scotia Chronic Pain Collaborative Care Network.

**4. HOW LONG WILL I BE IN THE STUDY?**

It is expected that the study will take one year to complete. Approximately 10 minutes of your time will be required to review this consent form requesting access to your interaction records with the NSCPCCN.

**5. HOW MANY PEOPLE WILL TAKE PART IN THIS STUDY?**

This study is taking place throughout Canada. The total number of participants will be up to 300 physicians and up to 150 physicians from the Capital Health group.

**6. HOW IS THE STUDY BEING DONE?**

The part of the study that you are being consented for today will involve access to the mentor interaction records that are provided to the Nova Scotia Chronic Pain Collaborative Network. If you choose to participate the program will grant only the PI the opportunity to review your records from November 2010 to May 2011. The purpose of access to these records is to extract the following information; date of an interaction and medium used to interact (e.g. telephone, email, messaging). There will be no identifying information that will be extracted from these records. Dr. Radhakrishnan will be available to answer any questions at all times.

**7. WHAT WILL HAPPEN IF I TAKE PART IN THIS STUDY?**

If you agree to be a part of this work you will be asked sign this consent form and return it to the PI. After that there will no other requirements of you. If you choose to withdraw you may do so at anytime. Simply inform Dr. Radhakrishnan.

**8. ARE THERE RISKS TO THE STUDY?**

Since this study is based on looking at your submitted records we think that there is little or no risk to you if you decide to join the study. We do not want to alarm you but please be aware that there may be risks that we don’t yet know about.

If at any time you feel uncomfortable with our access to your records please advise Dr. Radhakrishnan.
All of the information that you give to the study will be kept private. Only Dr. Radhakrishnan and the research team will see the information that can identify you.

Although every effort will be made to protect your privacy, there is still a chance that someone other than the research team might access the information. We think the chance of this ever happening to you is very small.

9. WHAT HAPPENS AT THE END OF THE STUDY?

You will be given access to a copy of the publications when they are finished.

10. WHAT ARE MY RESPONSIBILITIES?

As a study participant you will be expected to:

- Follow the directions of the Principal Investigator

11. CAN I BE TAKEN OUT OF THE STUDY WITHOUT MY CONSENT?

Yes. You may be taken out of the study at any time, if:

- There is new information that shows that being in this study is not in your best interests.
- The Capital Health Research Ethics Board or the Principal Investigator decides to stop the study.

You will be told about the reasons why you might need to be taken out of the study.

12. WHAT ABOUT NEW INFORMATION?

It is possible (but unlikely) that new information may become available while you are in the study that might affect your health, welfare, or willingness to stay in the study. If this happens, you will be informed in a timely manner and will be asked whether you wish to continue taking part in the study or not.

13. WILL IT COST ME ANYTHING?

Compensation
You will not be paid to be in the study.

Research Related Injury
If you become ill or injured as a direct result of participating in this study, necessary medical treatment will be available at no additional cost to you. Your signature on this form only indicates that you have understood to your satisfaction the information regarding your participation in the study and agree to participate as a subject. In no way does this waive your legal rights nor release the Principal Investigator, the research staff, the study sponsor or involved institutions from their legal and professional responsibilities.

14. WHAT ABOUT MY RIGHT TO PRIVACY?

Protecting your privacy is an important part of this study.

When you sign this consent form you give us permission to:
- Collect information from you
- Share information with the people conducting the study
- Share information with the people responsible for protecting your safety

Access to records
The study doctor and members of the research team will see records with Nova Scotia Chronic Pain Collaborative Care Network that identify you by name. Other people may need to look at the health and study records that identify you by name. These might include:
- the CDHA Research Ethics Board and Research Quality Associate

Use of records.
The research team will collect and use only the information they need to complete the Study. This information will only be used for the purposes of this study. This information will include:
- dates of interactions with mentees and medium used.

Your name and contact information will not be extracted. As such it cannot be shared with others without your permission. Your name will not appear in any report or article published as a result of this study. Information collected for this study will kept as long as required by the institution. This will be 7 years or more.

If you decide to withdraw from the study, the information collected up to that time cannot be removed from the study as there will be no way to identify it. After your part in this study ends, we may continue to review your records at the Nova Scotia Chronic Pain Collaborative Care Network. We may want to follow your progress and to check that the information we collected is correct.

Information collected and used by the research team will be stored by the research team at the University of Toronto. The Principal Investigator is the person responsible for keeping it secure.
You may also be contacted personally by Research Auditors for quality assurance purposes.

Your access to records
You may ask the study doctor to see the information that has been collected about you. The groups and people who have access to your records are:

- The Capital District Health Authority Research Ethics Board (CHREB) which is responsible for the protection of people in research here
- Quality assurance staff including the auditors for the CHREB, who ensure that the study is being conducted properly

The information they check may include log extraction data

15. WHAT IF I WANT TO QUIT THE STUDY?
If you chose to participate and later change your mind, you can say no and stop the research at any time. If you wish to withdraw your consent please inform the Principal Investigator. All data collected up to the date you withdraw however will remain in the study records, to be included in study related analyses.

16. DECLARATION OF FINANCIAL INTEREST
The Principal Investigator has no financial interests in conducting this research study.

17. WHAT ABOUT QUESTIONS OR PROBLEMS?
For further information about the study call Dr. Arun Radhakrishnan. Dr. Radhakrishnan is in charge of this study at this institution (he is the “Principal Investigator”). Dr. Radhakrishnan’s work telephone number is (416) 593-7700 or email him. If you can’t reach the Principal Investigator, please refer to the attached Research Team Contact Page for a full list of the people you can contact for further information about the study.

The Principal Investigator is Dr. Arun Radhakrishnan.
Telephone: (416) 593 7700
Email: arun.radhakrishnan@utoronto.ca

18. WHAT ARE MY RIGHTS?
After you have reviewed this consent form you can retain it for your records

If you have any questions about your rights as a research participant, contact the Patient Representative at (902) 473-2133.
In the next part you will be asked if you agree (consent) to join this study. If the answer is “yes”, you will need to sign the form.

19. CONSENT FORM AND SIGNATURES

I have reviewed all of the information in this consent form related to the study called:

Exploring the use of ICTs for knowledge translation among physicians who are optimizing roles in chronic pain management

I have been given the opportunity to discuss this study. All of my questions have been answered to my satisfaction.

I agree to allow the people described in this consent form to have access to my mentor records.

This signature on this consent form means that I agree to take part in this study. I understand that I am free to withdraw at any time.

______________________________        _______________________
____ / _____                        / _____
/ __________                      / __________
Signature of Participant Name (Printed) Year Month
Day*    

______________________________        _______________________
____ / _____                        / _____
/ __________                      / __________
Witness to Participant’s Signature
______________________________  _______________________
____ / _____ / ____

Signature of Investigator
______________________________  _______________________
____ / _____ / ____

4. Signature of Person Conducting Consent Discussion
______________________________  _______________________
____ / _____ / ____

Note: Please fill in the dates personally

I WILL BE GIVEN A SIGNED COPY OF THIS CONSENT FORM.

Thank you for your time and patience!
Appendix E: Survey versions 1 and 2

1 Survey Version 2 (final)

Survey of the use of technologies to communicate
by members of MMAP/NSCPCCN

MSc Thesis Study
Dr. Arun Radhakrishnan MD CM CCFP
Department of Health Policy Management and Evaluation
Faculty of Medicine, University of Toronto

Thank you for taking the time to fill out this survey, we estimate it will take you 15 minutes to finish.

In this survey we would like to learn about you, the types of information technologies that you use and the effect these technologies have on your experiences in the Medical Mentoring for Addictions and Pain (MMAP) Nova Scotia Chronic Pain Collaborative Care Network (NSCPCCN) program. There are a total of 24 questions to be completed in 3 different sections.

Identification Number: _________________
Section 1: About you and your practice

1. Your year of birth: 19 ___ ___

2. You are: □ Male □ Female

3. Which best describes you? Please check only one
□ Family physician/GP
□ Family physician/GP with a specific focus to your practice (e.g. ER, anesthesia, chronic pain), please specify ____________________________
□ Medical/surgical, please specify ____________________________
□ Other Health Professional, please specify ____________________________

4. Are you a mentor or a mentee? Select only one
□ Mentor □ Mentee

5. How long have you been a member of MMAP/NSCPCCN (mentor or mentee)? Select only one
□ <1 year □ 2-3 years □ 4 or more years
□ 1-2 years □ 3-4 years

6. With respect to your patient care setting where you manage patients with chronic pain, describe the population PRIMARILY served by your practice. Please check only one.
□ Inner city □ Rural
□ Urban/suburban □ Geographically isolated/remote
□ Small town □ Cannot identify a primary population

7. The following is a list of practice settings. Check the category(ies) which best describe(s) the setting(s) where you work. Please select all that apply
□ Private office/clinic □ Academic health sciences centre
□ Community hospital □ Emergency departments
□ Nursing home/home for the aged □ University faculty
□ Research unit □ Community clinic/health centre
□ Other

Section 2: Your use of information and communication technologies

This section explores how you use information and communication technologies (ICT) in your daily and professional life. There are a total of 12 questions in this section.

The following definitions are being used in this survey:
ICTs: A product intended to fulfill or enable the function of information processing and communication by electronic means including transmission and display
PC/laptop: can be a desktop computer, laptop, netbook or a tablet PC
Handheld devices: mobile phone, smart phone (e.g. iPhone™, BlackBerry©), tablet/slate device (e.g. iPad™).
Collaboration: working or learning with other individuals to achieve a task. Includes activities like organizing meetings and building relationships.
8. In your personal life indicate which of the following technologies you have used in the last 6 months and where applicable which device you used them on. *Select all that apply.*

<table>
<thead>
<tr>
<th>Technology</th>
<th>Used</th>
<th>Not Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Messaging (SMS or text messaging, Blackberry Messaging™)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>For the following tools also indicate which device was used</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Email/email lists (email mailing lists)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internet based voice calls (e.g. Skype™, Google Talk™)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Message boards (web pages to list questions and view answers)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chat services (e.g. MSN messenger™, Google Talk™)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Networking sites (e.g. Facebook©)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blogs and microblogs (e.g. Twitter©)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Video sharing (e.g. YouTube©)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Web or video conferencing (e.g. Skype™)</td>
<td></td>
<td></td>
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<tr>
<td>Wikis (e.g. Wikipedia®)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. Indicate which of the following technologies you have used outside of MMAP/NSCPCCN to collaborate with other health care professionals in the last 6 months? *Select all that apply*

<table>
<thead>
<tr>
<th>Technology</th>
<th>Used</th>
<th>Not Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telephone calls (land line or cell)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Messaging (text messages)</td>
<td></td>
<td></td>
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<tr>
<td>For the following tools also indicate which device was used</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Email/ email lists</td>
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<tr>
<td>Chat services</td>
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<tr>
<td>Social Networking sites</td>
<td></td>
<td></td>
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<tr>
<td>Blogs and microblogs</td>
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<tr>
<td>Video sharing</td>
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<tr>
<td>Web or video conferencing</td>
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<tr>
<td>Wikis</td>
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</tbody>
</table>
10. In the last 2 months have you used Telephone calls (e.g. calls on a landline, cell phone) to collaborate (includes learning) or interact with other MMAP/NSCPCCN members (mentors and mentees included)?

☐ Yes ☐ No

If you answered No go to question 11 otherwise complete 10 a, b and c.

a. In the last 2 months how do you make telephone calls to other MMAP/NSCPCCN members (select all that apply)

☐ Fixed line conventional phone
☐ Cellular/mobile phone service

b. In the last 2 months how often have you used telephone calls to collaborate and interact with other MMAP/NSCPCCN members?

☐ Several times a day ☐ About once a day ☐ 3-5 days/week
☐ 1-2 days/week ☐ Every few weeks

c. For which of the following purposes do you use telephone calls when collaborating and interacting with other MMAP/NSCPCCN members (select all that apply)

☐ Communicate to set up face to face meetings
☐ To discuss chronic pain related issues
☐ Communicate with MMAP/NSCPCCN administration (e.g. about meetings)
☐ To build relationships with MMAP/NSCPCCN members
☐ Other uses

11. In the last 2 months have you used Internet Based Voice calls (e.g. Skype™) to collaborate (includes learning) or interact with other MMAP/NSCPCCN members (mentors and mentees included)?

☐ Yes ☐ No

If you answered No go to question 12 otherwise complete 11 a, b and c.

d. In the last 2 months how do you make Internet Based Voice calls to other MMAP/NSCPCCN members (select all that apply)

☐ Internet voice calls (e.g. Skype™) on a desktop/laptop
☐ Internet voice calls (e.g. Skype™) on a mobile device
e. In the last 2 months how often have you used Internet Based Voice Calls to collaborate and interact with other MMAP/NSCPCCN members?

☐ Several times a day  ☐ About once a day  ☐ 3-5 days/week  
☐ 1-2 days/week  ☐ Every few weeks

f. For which of the following purposes do you use Internet Based Voice calls when collaborating and interacting with other MMAP/NSCPCCN members (select all that apply)

☐ Communicate to set up face to face meetings  
☐ To discuss chronic pain related issues  
☐ Communicate with MMAP/NSCPCCN administration (e.g. about meetings)  
☐ To build relationships with MMAP/NSCPCCN members  
☐ Other uses

12. In the last 2 months have you used email and group email mailing lists (e.g. LISTSERV™) to collaborate (includes learning) or interact with other MMAP/NSCPCCN members (mentors and mentees included)?

☐ Yes  ☐ No

If you answered No go to question 13 otherwise complete 12a, b and c.

a. In the last 2 months how have you used email or email mailing lists with other MMAP/NSCPCCN members (select all that apply)

☐ Desktop/laptop computer  ☐ Handheld device (e.g. smart phone, tablet)

b. In the last 2 months how often have you used email to collaborate and interact with other MMAP/NSCPCCN members?

☐ Several times a day  ☐ About once a day  ☐ 3-5 days/week  
☐ 1-2 days/week  ☐ Every few weeks

c. For which of the following purposes do you use email when collaborating and interacting with other MMAP/NSCPCCN members (select all that apply)

☐ Communicate to set up face to face meetings  
☐ To discuss chronic pain related issues  
☐ Communicate with MMAP/NSCPCCN administration (e.g. about meetings)  
☐ To build relationships with MMAP/NSCPCCN members  
☐ Other uses
13. In the last 2 months have you used message boards (web page of questions and answers or the forum on the MMAP/NSCPCCN portal) to collaborate (includes learning) or interact with other MMAP/NSCPCCN members?

☐ Yes  ☐ No

If you answered No go to question 14 otherwise complete 13a, b and c.

a. In the last 2 months how have you used message boards with other MMAP/NSCPCCN members (select all that apply)

☐ Desktop/laptop computer  ☐ Handheld device (e.g. smart phone, tablet)

b. In the last 2 months how often have you used message boards to collaborate and interact with other MMAP/NSCPCCN members?

☐ Several times a day  ☐ About once a day  ☐ 3-5 days/week
☐ 1-2 days/week  ☐ Every few weeks

c. For which of the following purposes do you use message boards when collaborating and interacting with other MMAP/NSCPCCN members (select all that apply)

☐ Communicate to set up face to face meetings
☐ To discuss chronic pain related issues
☐ Communicate with MMAP/NSCPCCN administration (e.g. about meetings)
☐ To build relationships with MMAP/NSCPCCN members
☐ Other uses

14. In the last 2 months have you used messaging (e.g. SMS or text messaging, Blackberry Messaging™) or chat services (e.g. MSN Messenger™) to collaborate (includes learning) or interact with other MMAP/NSCPCCN members?

☐ Yes  ☐ No

If you answered No go to question 15 otherwise complete 14a, b and c.

a. In the last 2 months how have you used messaging or chat services with other MMAP/NSCPCCN members (select all that apply)

☐ Chat services on a desktop/laptop computer
☐ Messaging (SMS) on your mobile phone (e.g. cellular phone, smart phone)
☐ Chat services on a handheld device (e.g. smart phone, tablet)

b. In the last 2 months how often have you used messaging or chat to collaborate and interact with other MMAP/NSCPCCN members?

☐ Several times a day  ☐ About once a day  ☐ 3-5 days/week
☐ 1-2 days/week  ☐ Every few weeks
c. For which of the following purposes do you use messaging or chat when collaborating and interacting with other MMAP/NSCPCCN members (select all that apply)

☐ Communicate to set up face to face meetings
☐ To discuss chronic pain related issues
☐ Communicate with MMAP/NSCPCCN administration (e.g. about meetings)
☐ To build relationships with MMAP/NSCPCCN members
☐ Other uses

15. In the last 2 months have you used Social Networking sites (e.g. Facebook©) to collaborate (includes learning) or interact with other MMAP/NSCPCCN members?

☐ Yes  ☐ No

If you answered No go to question 16 otherwise complete 15a, b and c.

a. In the last 2 months how have you used social networking sites with other MMAP/NSCPCCN members (select all that apply)

☐ Desktop/laptop computer  ☐ Handheld device (e.g. smart phone, tablet)

b. In the last 2 months how often have you used social networking sites to collaborate and interact with other MMAP/NSCPCCN members?

☐ Several times a day  ☐ About once a day  ☐ 3-5 days/week
☐ 1-2 days/week  ☐ Every few weeks

c. For which of the following purposes do you use social networking sites when collaborating and interacting with other MMAP/NSCPCCN members (select all that apply)

☐ Communicate to set up face to face meetings
☐ To discuss chronic pain related issues
☐ Communicate with MMAP/NSCPCCN administration (e.g. about meetings)
☐ To build relationships with MMAP/NSCPCCN members
☐ Other uses

16. In the last 2 months have you used blogs or microblogs (e.g. Twitter© or blogs on the MMAP/NSCPCCN portal) to collaborate or interact with other MMAP/NSCPCCN members?

☐ Yes  ☐ No

If you answered No go to question 17 otherwise complete 16a, b and c.
a. In the last 2 months how have you used blogs or microblogs with other MMAP/NSCPCCN members (select all that apply)

☐ Desktop/laptop computer  ☐ Handheld device (e.g. smart phone, tablet)

b. In the last 2 months how often have you used blogs or microblogs to collaborate and interact with other MMAP/NSCPCCN members?

☐ Several times a day  ☐ About once a day  ☐ 3-5 days/week
☐ 1-2 days/week  ☐ Every few weeks

c. For which of the following purposes do you use blogs or microblogs when collaborating and interacting with other MMAP/NSCPCCN members (select all that apply)

☐ Communicate to set up face to face meetings
☐ To discuss chronic pain related issues
☐ Communicate with MMAP/NSCPCCN administration (e.g. about meetings)
☐ To build relationships with MMAP/NSCPCCN members
☐ Other uses

17. In the last 2 months have you used video sharing (e.g. YouTube© or videos on the MMAP/NSCPCCN portal) to collaborate or interact with other MMAP/NSCPCCN members?

☐ Yes  ☐ No

If you answered No go to question 18 otherwise complete 17a, b and c.

a. In the last 2 months how have you used video sharing with other MMAP/NSCPCCN members (select all that apply)

☐ Desktop/laptop computer  ☐ Handheld device (e.g. smart phone, tablet)

b. In the last 2 months how often have you used video sharing to collaborate and interact with other MMAP/NSCPCCN members?

☐ Several times a day  ☐ About once a day  ☐ 3-5 days/week
☐ 1-2 days/week  ☐ Every few weeks

c. For which of the following purposes do you use video sharing when collaborating and interacting with other MMAP/NSCPCCN members (select all that apply)

☐ Communicate to set up face to face meetings
☐ To discuss chronic pain related issues
☐ Communicate with MMAP/NSCPCCN administration (e.g. about meetings)
☐ To build relationships with MMAP/NSCPCCN members
☐ Other uses
18. In the last 2 months have you used web or video conferencing (e.g. Skype™) to collaborate or interact with other MMAP/NSCPCCN members?

☐ Yes  ☐ No

If you answered No go to question 19 otherwise complete 18a, b and c.

a. In the last 2 months how have you used web and video conferencing with other MMAP/NSCPCCN members (select all that apply)

☐ Desktop/laptop computer  ☐ Handheld device (e.g. smart phone, tablet)

b. In the last 2 months how often have you uses web and video conferencing to collaborate and interact with other MMAP/NSCPCCN members?

☐ Several times a day  ☐ About once a day  ☐ 3-5 days/week

☐ 1-2 days/week  ☐ Every few weeks

c. For which of the following purposes do you use web and video conferencing when collaborating and interacting with other MMAP/NSCPCCN members (select all that apply)

☐ Communicate to set up face to face meetings

☐ To discuss chronic pain related issues

☐ Communicate with MMAP/NSCPCCN administration (e.g. about meetings)

☐ To build relationships with MMAP/NSCPCCN members

☐ Other uses

19. In the last 2 months have you used wikis (e.g. Wikipedia®) to collaborate or interact with other MMAP/NSCPCCN members?

☐ Yes  ☐ No

If you answered No go to question 20 otherwise complete 19a, b and c.

a. In the last 2 months have you used Wikis with other MMAP/NSCPCCN members (select all that apply)

☐ Desktop/laptop computer  ☐ Handheld device

b. In the last 2 months how often have you used Wikis to collaborate and interact with other MMAP/NSCPCCN members?

☐ Several times a day  ☐ About once a day  ☐ 3-5 days/week

☐ 1-2 days/week  ☐ Every few weeks
c. For which of the following purposes do you use Wikis when collaborating and interacting with other MMAP/NSCPCCN members (select all that apply)

☐ Communicate to set up face to face meetings
☐ To discuss chronic pain related issues
☐ Communicate with MMAP/NSCPCCN administration (e.g. about meetings)
☐ To build relationships with MMAP/NSCPCCN members
☐ Other uses

**Section 3: The effects of ICTs on MMAP/NSCPCCN**

This section will explore the effect that ICTs you may be using are having on your MMAP/NSCPCCN experience. The are a total of 5 questions in this section.

20. In the last 2 months how often have you interacted with MMAP/NSCPCCN members?
*Select one.*

<table>
<thead>
<tr>
<th>Once a day or more often</th>
<th>Once a week up to once a day</th>
<th>1-3 times/month</th>
<th>Less often</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

Please indicate your level of agreement to the following two questions

21. The technologies I have described using were helpful in organizing face to face meetings to share and learn about managing patients with chronic pain with other MMAP/NSCPCCN members.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Unsure</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐</td>
<td>☐</td>
<td>☐</td>
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<td>☐</td>
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</tr>
</tbody>
</table>

22. I was able to use the technologies described above to have discussions with other MMAP/NSCPCCN members to share and learn about managing patients with chronic pain.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Unsure</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
23. Indicate which of the following technologies that you are not already using which might be interesting to you to communicate with other MMAP/NSCPCCN members. Select all that apply

<table>
<thead>
<tr>
<th>Already using</th>
<th>Not using</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Interested</td>
</tr>
<tr>
<td>Messaging (e.g. SMS)</td>
<td>□</td>
</tr>
<tr>
<td>Email/ email lists (e.g. LISTSERV™)</td>
<td>□</td>
</tr>
<tr>
<td>Voice calls (e.g. Skype™)</td>
<td>□</td>
</tr>
<tr>
<td>Message boards</td>
<td>□</td>
</tr>
<tr>
<td>Chat services (e.g. MSN Messenger™)</td>
<td>□</td>
</tr>
<tr>
<td>Social Networking sites (e.g. Facebook©)</td>
<td>□</td>
</tr>
<tr>
<td>Blogs and microblogs (e.g. Twitter©)</td>
<td>□</td>
</tr>
<tr>
<td>Video sharing (e.g. YouTube©)</td>
<td>□</td>
</tr>
<tr>
<td>Web/video conferencing</td>
<td>□</td>
</tr>
<tr>
<td>Wikis (e.g. Wikipedia®)</td>
<td>□</td>
</tr>
</tbody>
</table>

24. What things do you think influence you the most to use technologies with other MMAP/NSCPCCN members?

_________________________________________________________________________
_________________________________________________________________________

End of the survey
Thank you!
Thank you for taking the time to fill out this survey, we estimate it will take you 15 minutes to finish.

In this survey we would like to learn about you, the types of information technologies that you use and the effect these technologies have on your experiences in the Medical Mentoring for Addictions and Pain (MMAP) program or the Nova Scotia Chronic Pain Collaborative Care Network (NSCPCCN). There are a total of 16 questions to be completed in 3 different sections.

Identification Number: _________________
Section 1: About you and your practice

1. Your year of birth: 19 ___ ___

2. You are: □ Male □ Female

3. Which best describes you? Please check only one
   □ Family physician/ GP
   □ Family physician/ GP with a specific focus to your practice (e.g. ER, anesthesia, chronic pain), please specify __________________________
   □ Medical/surgical, please specify __________________________
   □ Other Health Professional, please specify _______________________

4. Are you a mentor or a mentee? Select only one
   □ Mentor □ Mentee

5. How long have you been a member of MMAP/NSCPCCN(mentor or mentee)? Select only one
   □ <1 year □ 2-3 years □ 4 or more years
   □ 1-2 years □ 3-4 years

6. With respect to your patient care setting where you manage patients with chronic pain, describe the population PRIMARILY served by your practice. Please check only one.
   □ Inner city □ Rural
   □ Urban/suburban □ Geographically isolated/remote
   □ Small town □ Cannot identify a primary population

7. The following is a list of practice settings. Check the category(ies) which best describe(s) the setting(s) where you work. Please select all that apply
   □ Private office/clinic □ Academic health sciences centre
   □ Community hospital □ Emergency departments
   □ Nursing home/home for the aged □ University faculty
   □ Research unit □ Community clinic/health centre
   □ Other

Section 2: Your use of information and communication technologies

This section explores how you use information and communication technologies (ICT) in your daily and professional life. There are a total of 4 questions in this section.

The following definitions are being used in this survey:

ICTs: A product intended to fulfill or enable the function of information processing and communication by electronic means including transmission and display

PC/laptop: can be a desktop computer, laptop, netbook or a tablet PC

Handheld devices: mobile phone, smart phone (e.g. iPhone™, BlackBerry©), tablet/slate device (e.g. iPad™).

Collaboration: working or learning with other individuals to achieve a task. Includes activities like organizing meetings and building relationships that are needed when working as a group.
8. In your personal life indicate which of the following technologies you have used in the last 6 months and where applicable which device you used them on. Select all that apply.

<table>
<thead>
<tr>
<th>Technology</th>
<th>Used</th>
<th>Not Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Messaging (SMS, Blackberry Messaging™)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For the following tools also indicate which device was used:

<table>
<thead>
<tr>
<th>Tool</th>
<th>Used on Desktop/laptop computer</th>
<th>Used on handheld device</th>
<th>Not Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Email/email lists (e.g. LISTSERV™)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internet based voice calls (e.g. Skype™, Google Talk™)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Message boards</td>
<td></td>
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<tr>
<td>Chat services (e.g. instant messaging)</td>
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<tr>
<td>Social Networking sites (e.g. Facebook©)</td>
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<tr>
<td>Blogs and microblogs (e.g. Twitter©)</td>
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<tr>
<td>Video sharing (e.g. YouTube©)</td>
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<tr>
<td>Web or video conferencing (e.g. Skype™)</td>
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<tr>
<td>Wikis (e.g. Wikipedia®)</td>
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</tr>
</tbody>
</table>

9. Indicate which of the following technologies you have used outside of MMAP/NSCPCCN to collaborate with other health care professionals in the last 6 months? Select all that apply.

<table>
<thead>
<tr>
<th>Technology</th>
<th>Used</th>
<th>Not Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telephone calls (land line or cell)</td>
<td></td>
<td></td>
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<tr>
<td>Messaging</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For the following tools also indicate which device was used:

<table>
<thead>
<tr>
<th>Tool</th>
<th>Used on Desktop/laptop computer</th>
<th>Used on handheld device</th>
<th>Not Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Email/ email lists</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internet based voice calls (e.g. Skype™)</td>
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<td>Message boards</td>
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<tr>
<td>Chat services</td>
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<td>Social Networking sites</td>
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<tr>
<td>Blogs and microblogs</td>
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<td>Video sharing</td>
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<tr>
<td>Web or video conferencing</td>
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<tr>
<td>Wikis</td>
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</tbody>
</table>
10. In the last 2 months how often have you use the following technologies to collaborate with other MMAP/NSCPCCN members? *Select all that apply*

<table>
<thead>
<tr>
<th>Technology</th>
<th>Several times a day</th>
<th>About once a day</th>
<th>3-5 days/week</th>
<th>1-2 days/week</th>
<th>Every few weeks</th>
<th>Never</th>
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<tbody>
<tr>
<td>Telephone calls</td>
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<tr>
<td>Consider the use of the following tools on a Desktop/laptop computer</td>
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<td>Email/ email lists</td>
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<tr>
<td>Internet based voice calls (e.g. skype™)</td>
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<tr>
<td>Message boards</td>
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<tr>
<td>Chat services</td>
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<td>Social networking sites</td>
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<tr>
<td>Blogs and microblogs</td>
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<td>Video sharing</td>
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<tr>
<td>Web or video conferencing</td>
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<tr>
<td>Wikis</td>
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</table>

11. In the last 2 months how often have you use the following technologies on a mobile handheld device to collaborate with other MMAP/NSCPCCN members? *Select all that apply*

<table>
<thead>
<tr>
<th>Technology</th>
<th>Several times a day</th>
<th>About once a day</th>
<th>3-5 days/week</th>
<th>1-2 days/week</th>
<th>Every few weeks</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Email/ email lists</td>
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<td>Message boards</td>
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<td>Chat services</td>
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<td>Social networking sites</td>
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<tr>
<td>Blogs and microblogs</td>
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<tr>
<td>Messaging</td>
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<tr>
<td>Internet based voice calls (e.g. Skype™)</td>
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<tr>
<td>Video sharing</td>
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<tr>
<td>Web or video conferencing</td>
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<tr>
<td>Wikis</td>
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</tbody>
</table>
Section 3: The use and effects of ICTs on MMAP/MMAP/NSCPCCN

This section will explore the effect that ICTs you may be using are having on your MMAP/NSCPCCN experience.

12. Based on your responses to question 10 and 11 what was/were the specific purpose(s) for using the technologies listed below in MMAP/NSCPCCN in the last 2 months? Select all that apply:

<table>
<thead>
<tr>
<th>Technology</th>
<th>Communicate with other members to set up face to face meetings</th>
<th>To discuss Chronic Pain related issues.</th>
<th>Communicate with MMAP/NSCPCCN administration (e.g. about meeting times)</th>
<th>To build relationships with MMAP/NSCPCCN members</th>
<th>Other uses</th>
<th>Not used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telephone calls</td>
<td></td>
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<td></td>
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<tr>
<td>Messaging (e.g. SMS)</td>
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<tr>
<td>Email/ email lists (e.g. LISTSERV)</td>
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</tr>
<tr>
<td>Internet based voice calls (e.g. Skype™)</td>
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<tr>
<td>Message boards</td>
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<tr>
<td>Chat services (e.g. instant messaging)</td>
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</tr>
<tr>
<td>Social Networking sites (e.g. Facebook©)</td>
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<tr>
<td>Blogs and microblogs (e.g. Twitter©)</td>
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</tr>
<tr>
<td>Video sharing (e.g. YouTube©)</td>
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</tr>
<tr>
<td>Web/video conferencing</td>
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</tr>
<tr>
<td>Wikis (e.g. Wikipedia®)</td>
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<td></td>
</tr>
</tbody>
</table>

13. In the last 2 months how often have you interacted with MMAP/NSCPCCN members? Select one.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Once a day or more often</th>
<th>Once a week up to once a day</th>
<th>1-3 times/month</th>
<th>Less often</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
Please indicate your level of agreement to the following two questions

14. The technologies I have described using were helpful in organizing face to face meetings to share and learn about managing patients with chronic pain with other MMAP/NSCPCCN members.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Unsure</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
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</tr>
</tbody>
</table>

15. I was able to use the technologies described above to have discussions with other MMAP/NSCPCCN members to share and learn about managing patients with chronic pain.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Unsure</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>N/A</th>
</tr>
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</tbody>
</table>

16. Indicate which of the following technologies that you are not already using which might be interesting to you to communicate with other MMAP/NSCPCCN members. Select all that apply

<table>
<thead>
<tr>
<th>Technology</th>
<th>Interested</th>
<th>Not Interested</th>
<th>Do not know enough about this tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Messaging (e.g. SMS)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Email/ email lists (e.g. LISTSERV™)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internet based voice calls (e.g. Skype™)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Message boards</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chat services (e.g. MSN Messenger™)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Networking sites (e.g. Facebook©)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blogs and microblogs (e.g. Twitter©)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Video sharing (e.g. YouTube©)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Web/video conferencing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wikis (e.g. Wikipedia®)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

End of the survey

Thank you!
Table F.1: Use of cICTs across areas for MMAP and NSCPCCN

<table>
<thead>
<tr>
<th>cICTs</th>
<th>MMAP</th>
<th>NSCPCCN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Personal n (%)</td>
<td>Non Network n (%)</td>
</tr>
<tr>
<td>Email</td>
<td>97 (100.0%)</td>
<td>94 (96.9%)</td>
</tr>
<tr>
<td>Telephone</td>
<td>90 (92.8%)</td>
<td>39 (40.2%)</td>
</tr>
<tr>
<td>Message Boards</td>
<td>45 (46.4%)</td>
<td>23 (24.0%)</td>
</tr>
<tr>
<td>Messaging</td>
<td>71 (73.2%)</td>
<td>39 (41.0%)</td>
</tr>
<tr>
<td>Web &amp; video conference</td>
<td>55 (56.7%)</td>
<td>40 (41.7%)</td>
</tr>
<tr>
<td>Chat</td>
<td>23 (23.7%)</td>
<td>8 (8.4%)</td>
</tr>
<tr>
<td>Video sharing</td>
<td>54 (55.7%)</td>
<td>16 (16.8%)</td>
</tr>
<tr>
<td>Internet based voice calls</td>
<td>63 (64.9%)</td>
<td>20 (20.8%)</td>
</tr>
<tr>
<td>Blogs &amp; microblogs</td>
<td>17 (17.5%)</td>
<td>7 (7.4%)</td>
</tr>
<tr>
<td>Social networking sites</td>
<td>38 (39.2%)</td>
<td>7 (7.4%)</td>
</tr>
<tr>
<td>Wikis</td>
<td>63 (64.9%)</td>
<td>20 (20.8%)</td>
</tr>
</tbody>
</table>
Table F.2: Frequency of cICT use in MMAP and NSCPCCN

<table>
<thead>
<tr>
<th></th>
<th>MMAP (%)</th>
<th>NSCPCCN (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Email</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiple time a day</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Once a Day</td>
<td>3 (3.1%)</td>
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</tr>
<tr>
<td>Multiple times a week</td>
<td>5 (5.2%)</td>
<td>1 (3.4%)</td>
</tr>
<tr>
<td>Once a week</td>
<td>14 (14.4%)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Every few weeks</td>
<td>51 (52.6%)</td>
<td>2 (6.9%)</td>
</tr>
<tr>
<td>Never</td>
<td>24 (24.7%)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>No response</td>
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<td>0 (0)</td>
</tr>
<tr>
<td><strong>Telephone</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MMAP (%)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>NSCPCCN (%)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td><strong>Message Boards</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MMAP (%)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>NSCPCCN (%)</td>
<td>0 (0)</td>
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</tr>
<tr>
<td><strong>Messaging</strong></td>
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<td>0 (0)</td>
</tr>
<tr>
<td>NSCPCCN (%)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td><strong>Web &amp; Video Conference</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MMAP (%)</td>
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<td>0 (0)</td>
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<tr>
<td>NSCPCCN (%)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td><strong>Chat</strong></td>
<td></td>
<td></td>
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<tr>
<td>MMAP (%)</td>
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<td>0 (0)</td>
</tr>
<tr>
<td>NSCPCCN (%)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td><strong>Video Sharing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MMAP (%)</td>
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<td>0 (0)</td>
</tr>
<tr>
<td>NSCPCCN (%)</td>
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<tr>
<td>MMAP (%)</td>
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<td>0 (0)</td>
</tr>
<tr>
<td>NSCPCCN (%)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td><strong>Blogs &amp; Microblogs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MMAP (%)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>NSCPCCN (%)</td>
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<td>0 (0)</td>
</tr>
<tr>
<td><strong>Social Networking Sites</strong></td>
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</table>
Table F.3: Purpose of cICT use for each network

<table>
<thead>
<tr>
<th>Method</th>
<th>Email</th>
<th>Telephone</th>
<th>Message Boards</th>
<th>Messaging</th>
<th>Chat</th>
<th>Web &amp; Video Conference</th>
<th>Video Sharing</th>
<th>Internet based voice calls</th>
<th>Blogs &amp; Microblogs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Arrange face to face meetings</td>
<td>Discuss chronic pain issues</td>
<td>Communicate with Administration</td>
<td>Build relationships</td>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>MMAP (%)</td>
<td>33 (45.2%)</td>
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<tr>
<td>NSCPCCN (%)</td>
<td>17 (63.0%)</td>
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<td>8 (29.6%)</td>
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<tr>
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<td>4 (17.4%)</td>
<td>21 (91.3%)</td>
<td>4 (17.4%)</td>
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<td>6 (26.1%)</td>
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<td>5 (55.6%)</td>
<td>5 (55.6%)</td>
<td>4 (44.4%)</td>
<td>6 (66.7%)</td>
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<td>1 (100.0%)</td>
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<td>1 (25.0%)</td>
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</tr>
<tr>
<td>MMAP (%)</td>
<td>1 (50.0%)</td>
<td>1 (50.0%)</td>
<td>1 (50.0%)</td>
<td>1 (50.0%)</td>
<td>0 (0)</td>
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</tr>
<tr>
<td>NSCPCCN (%)</td>
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<td>0 (0)</td>
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<tr>
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<td>0 (0)</td>
<td>1 (50.0%)</td>
<td>1 (50.0%)</td>
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</tr>
<tr>
<td>MMAP (%)</td>
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<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td></td>
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</tr>
<tr>
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<td>0 (0)</td>
<td>0 (0)</td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Make note that we did not include SNS and wikis as no one in either program reported using these.
Table F.4: Frequency of interactions between members in MMAP & NSCPCCN

<table>
<thead>
<tr>
<th>Frequency</th>
<th>MMAP N= 97 (%)</th>
<th>NSCPCCN N= 29 (%)</th>
<th>Combined N= 126 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Once a day or more often</td>
<td>1 (1.0%)</td>
<td>0 (0)</td>
<td>1 (0.8%)</td>
</tr>
<tr>
<td>Once a week or more often</td>
<td>13 (13.5%)</td>
<td>4 (13.8%)</td>
<td>17 (13.6%)</td>
</tr>
<tr>
<td>Once a month or more often</td>
<td>33 (34.4%)</td>
<td>7 (24.1%)</td>
<td>40 (32.0%)</td>
</tr>
<tr>
<td>Less than once a month</td>
<td>40 (41.7%)</td>
<td>17 (58.6%)</td>
<td>57 (45.6%)</td>
</tr>
<tr>
<td>Never</td>
<td>9 (9.4%)</td>
<td>1 (3.4%)</td>
<td>10 (8.0%)</td>
</tr>
<tr>
<td>No response</td>
<td>1 (1.0%)</td>
<td>0 (0)</td>
<td>1 (0.8%)</td>
</tr>
</tbody>
</table>

Table F.5: Respondents perceived value of cICTs to support discussions

<table>
<thead>
<tr>
<th>Perceived Value</th>
<th>MMAP</th>
<th>NSCPCCN</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree</td>
<td>7.2%</td>
<td>17.2%</td>
<td>10.3%</td>
</tr>
<tr>
<td>Agree</td>
<td>59.8%</td>
<td>58.6%</td>
<td>59.5%</td>
</tr>
<tr>
<td>Unsure</td>
<td>12.4%</td>
<td>0.0%</td>
<td>9.5%</td>
</tr>
<tr>
<td>Disagree</td>
<td>3.1%</td>
<td>3.4%</td>
<td>3.2%</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>1.0%</td>
<td>3.4%</td>
<td>1.6%</td>
</tr>
<tr>
<td>Not Applicable</td>
<td>15.5%</td>
<td>17.2%</td>
<td>15.9%</td>
</tr>
<tr>
<td>No Response</td>
<td>1.0%</td>
<td>0.0%</td>
<td>0.8%</td>
</tr>
</tbody>
</table>

Table F.6: Respondents perceived value of cICTs to organize face to face meetings

<table>
<thead>
<tr>
<th>Perceived Value</th>
<th>MMAP</th>
<th>NSCPCCN</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree</td>
<td>12.5%</td>
<td>3.4%</td>
<td>10.4%</td>
</tr>
<tr>
<td>Agree</td>
<td>46.9%</td>
<td>62.1%</td>
<td>50.4%</td>
</tr>
<tr>
<td>Unsure</td>
<td>11.5%</td>
<td>17.2%</td>
<td>12.8%</td>
</tr>
<tr>
<td>Disagree</td>
<td>5.2%</td>
<td>3.4%</td>
<td>4.8%</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>1.0%</td>
<td>0.0%</td>
<td>0.8%</td>
</tr>
<tr>
<td>Not Applicable</td>
<td>22.9%</td>
<td>13.8%</td>
<td>20.8%</td>
</tr>
<tr>
<td>No Response</td>
<td>1.0%</td>
<td>0.0%</td>
<td>0.8%</td>
</tr>
</tbody>
</table>
Appendix G: Glossary of terms

ICTs: Information and Communication Technologies
CoP: Communities of Practice
MMAP: Medical Mentoring for Addictions and Pain
NSCPCCN: Nova Scotia Chronic Pain Collaborative Care Network
OCFP: Ontario College of Family Physicians
CPSO: College of Physicians and Surgeons of Ontario
cICTs: Collaborative information and communication technologies
SMS: Short message service
SNS: Social networking site
NHS: National Health Service
PCP: Primary care physician
IASP: International Association for the Study of Pain
St. Dev.: Standard Deviation