ALLIED HEALTH PROFESSIONALS AND SUPPORT STAFF PERSPECTIVES ON PERSONAL HEALTH RECORD IMPLEMENTATION: A QUALITATIVE STUDY OF FAMILY HEALTH TEAMS

Allied Health Professionals and Support Staff Perspectives on Personal Health Record Implementation: A Qualitative Study of Family Health Teams

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Abstract

Primary care multi-disciplinary teams were central to recent reform plans for Canadian primary care, in response to limited resources and increasing demands. Health Information Technology was also an integral part of those plans as supporting infrastructure for the modernization of healthcare services, facilitating coordination, collaboration and access to services. As provider-centric Health Information Technology matures, attention turns to the patient. The hallmark of patient-centered applications is the electronic Personal Health Record System (PHR). These systems have grown beyond simple repositories of personal health information, extending to a range of information collection, sharing, self-management and exchange functions.

The implementation of PHRs in primary care multi-disciplinary teams involves many stakeholders including patients, physician, allied health professionals and support staff. There is significant literature on physician and patient perspectives on all PHR functions. However, little attention has been given to the other stakeholders: allied health professionals and support staff.

In this study, we explored the views of Allied Health Professionals (AHPs) and support staff, working in a primary care clinic adopting a patient-centered, multi-disciplinary model called the Family Health Team (FHT) model. Participants provided their insight on benefits, concerns and recommendations regarding the implementation of MyOSCAR, a PHR, at their clinic. Qualitative data was collected through semi-structured one-on-one interviews that were analyzed to extract common themes and summarize participant views. Process diagrams were produced to

highlight opportunities for improvement of current work processes through the integration of MyOSCAR functions.

As more teams are created in primary care and they attempt to implement new technologies, it is important to get a complete picture of all stakeholder views. This is the first study that focuses on the views of AHPs and support staff, contributing to the literature on PHR implementations. Findings from this study can contribute to future PHR implementations by informing planning and implementation.

Keywords:
Primary Care; Family Health Team; Personal Health Record; Allied Health Professionals; Support Staff;

Glossary

In this paper, an **Electronic Medical Record (EMR)** refers to software solutions in a physician's office that hold a partial health record, under the custodianship of a physician, with a portion of the relevant health information about a person. These solutions are generally not limited to holding patient information but have an array of features that vary based on physician requirements and the software's design (Hodge & Giokas 2011).

An **Electronic Health Record (EHR)** is an electronic longitudinal record that holds all relevant health information about a person over their lifetime under the custodianship of a responsible entity that could be a healthcare provider(s) or institution (Hodge & Giokas 2011).

A **Personal Health Record (PHR)** refers to a partial or complete electronic record under the custodianship of a person(s) (e.g. the patient and/or their family). The term PHR is not limited to just the record but extends to the software solution that holds it and also provides a range of additional features (Hodge & Giokas 2011).

Allied Health Professionals (AHPs), in this paper, refers to all professionals in primary care that are not physicians or physician residents, including nurses, nurse practitioners, dietitians, etc.

Primary Care refers to a range of services with a dual function of providing first-contact healthcare services and a coordination function ensuring continuity and ease of movement across the system (Health Canada 2005a).

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1. Introduction

Primary care in Canada is challenged by a shortage of resources in the face of larger demand, created by an aging population and the burden of chronic disease (Bodenheimer & Pham 2010; Rosser et al. 2011; J. M. Colwill et al. 2008). In an attempt to respond to the ensuing challenges, all Canadian jurisdictions have experimented with innovative models of primary care renewal that have shown success in improving services, outcomes and relieving pressure elsewhere in the healthcare system (Canadian Intergovernmental Conference Secretariat 2000). Since a common theme in all these models was the integration of multi-disciplinary teams in primary care, federal funds allocated to primary care renewal targeted the creation of such teams (Canadian Intergovernmental Conference Secretariat 2000; Health Canada 2005b). In Ontario, the integration of a range of different disciplines in primary care practices was achieved through utilizing federal funds to facilitate the creation of Family Health Teams (FHTs) (Health Canada 2005c). The FHT is a primary care model based on the Patient-Centered Medical Home (PCMH) model proposed by the American Pediatrics Association in the 1970s and further defined through consensus reached by the major primary care organizations in the United States (Rosser et al. 2011).

In a family practice adopting the PCMH model, care and care coordination is the responsibility of the patient's family physician who works with a multi-disciplinary healthcare team, ensuring that appropriate care is provided by the appropriate professional (Grumbach & Bodenheimer 2002). Depending on the patient's needs, the team may include specialists, nurses,

social workers, dietitians, family and community members; teams will form and reform in response to varying patient needs (M. Barr 2006).

Practices implementing the FHT model, the Ontarian version of the PCMH, receive funding that supports a multi-disciplinary team composition, including a number of Allied Health Professionals (AHPs)[1], based on the size and specific needs of the population served (Ministry of Health and Long-Term Care 2009). For patients with complex care needs, such as the elderly and chronic disease patients, primary care delivered through such teams produces better health management and outcomes (Dolovich et al. 2008; Sommers et al. 2000; Rich et al. 1995; Von Korff et al. 2005; Kates et al. 2002).

Health Information Technology (HIT) provides foundational support to PCMH implementations, such as the FHT, by facilitating coordination, collaboration and quality improvements (Finkelstein et al. 2011; Ministry of Health and Long-Term Care 2005). Electronic Medical Record (EMR) systems, HIT tools at the heart of the PCMH, have been extensively studied in order to identify issues and facilitate adoption by physicians (Archer & Cocosila 2011; Terry et al. 2012; Denomme et al. 2011; Peterson et al. 2011; McGinn et al. 2011). As the study of EMRs matures, there is growing interest in consumer HIT tools designed for patients, such as electronic Personal Health Records Systems (PHRs), that are part of an integrated HIT structure designed to support the PCMH and enhance the patient's experience (Archer et al. 2011; Finkelstein et al. 2011).

[1] While there is lack of consensus on the exact definition of AHPs (Association of Canadian Community Colleges 2012), in the context of this study, we use the term to describe health professionals other than physicians, including nurses, nurse practitioners, pharmacists, social workers, occupational therapists and dietitians.

The effective integration of HIT is achieved through an understanding of the care capabilities required by all stakeholders involved and a redesign of work processes (Miller et al. 2009). As lessons from pilot implementations of PCMH have shown, HIT can only provide support and facilitation and will not work without incorporating workflow, process and relationship change (Finkelstein et al. 2011). In FHTs, all members of the multi-disciplinary team involved in providing healthcare services are stakeholders in the implementation of new HIT applications. As studies have shown, AHPs in primary care multi-disciplinary teams contribute to improved services and better health outcomes (Sommers et al. 2000; Kates et al. 2002; Dolovich et al. 2008). Despite the important role they play, little attention has been given to the perspectives of AHPs in PHR implementations while much work has investigated physician and patient perspectives (Wagner et al. 2010; Yau et al. 2011; Witry, Doucette, Daly, B. T. Levy & E. a Chrischilles 2010; Hess et al. 2007; Wynia & Dunn 2010). This is especially significant since the patients most likely to adopt and use PHRs, namely chronic disease patients and the elderly and their caregivers (Archer et al. 2011), are those most often requiring the specialized services of AHPs.

This work contributes to this knowledge area through the exploration of the impact of the implementation of a PHR on the work of AHPs and support staff, key members of the multidisciplinary team providing care at an FHT clinic. The clinics involved in this study included a range of allied health professionals actively involved in the delivery of care. Prior to data collection, the participating clinics had launched or were planning to launch a pilot implementation of a web-based Personal Health Record (PHR) system that would provide patients with access to health information, health management tools, secure messaging and

online appointment booking. The first phase of the pilot implementation was expected to take six months.

The objective of this study is to answer the following **research questions**:

- How might an electronic Patient Health Record impact healthcare delivery processes involving allied health professionals and support staff in a Family Health Team?
- What benefits do allied health professionals and support staff expect from the use of electronic Patient Health Records in a family health team setting?
- What potential challenges do allied health professionals and support staff anticipate and what mitigation strategies do they recommend for such challenges?

Allied health professionals and support staff were interviewed to discuss their work processes, experiences and views related to the proposed system. Views expressed by participants regarding potential advantages and challenges resulting from a full-scale implementation were analysed and are reported here. As identified by participants, models of work processes expected to be affected by the full-scale implementation and adoption of the proposed web-based PHR system are also presented. Redesigned processes that capitalize on the implementation of the PHR, through the integration of features that support existing tasks, are discussed.

The dissertation proceeds as follows. First, the background for the study is presented, describing in further detail the crisis in primary care, patient-centered medical homes and patient health records. Next relevant literature is reviewed. This is followed by a description of the methods used, outlining the context and design of the study, participant selection, data

collection and analysis. Next, findings from the interviews are discussed and interpreted along with the description of the current and proposed work processes. Finally, conclusions are presented along with recommendations for future change.

2. Background

2.1 The Crisis in Primary Care

The number of primary care practices in the US and Canada falls short of population needs, especially in the area of adult care. In the United States a study projected shortages of 35,000–44,000 adult care generalists by 2025, if the number of medical graduates entering this specialty continues to decline (J. M. Colwill et al. 2008).

In Canada, Family Physicians (FP) are the point of entry for most healthcare services; they are the ones writing the majority of prescriptions for patients, initiating most specialist visits through referrals and providing most of the consultations in emergency departments (Manuel et al. 2006). In 1998 only 24% of medical graduates were entering family practice, Canada's only primary care specialty. The Canadian healthcare system was designed based on the expectation that 50% of graduates would enter family practice. A fee-for-service model has driven family doctors to increase the number of patient visits which has negatively impacted the quality of care and physicians' personal lives; promoting high-volume practices as opposed to patient-centered care (Rosser et al. 2011). Primary care reform, based on principles of patient-centered care, succeeded in a significant reduction of physician shortage by improving the quality of services for patients and working conditions for physicians (Kralj & Kantarevic 2012).

Patient-centered care supports the view that patients and their families are an integral part of the care team. They share in the decision-making process and their cultural preferences, lifestyle, values and family situations are taken into consideration (Cliff 2011). Patient-centered care addresses the rise in consumer expectations caused by the aging baby boomers and

unprecedented access to health information (Cliff 2011). Healthcare has traditionally been physician centered, ascribing little or no value to patient views. While the concept of patient-centered care appeared in the literature as early as the 1950's, only recently has it been seen as a priority for healthcare institutions (Cliff 2011).

In Primary Care, the Patient-Centered Medical Home (PCMH) presents a solution that addresses physician and patient concerns by emphasizing a team-based approach, HIT to support patient access to information and performance management, as well as, an improved payment model that rewards patient-centered care (Rosser et al. 2011). This model has gained popularity in the US and Canada: a growing number of pilots and demonstration projects are running across the US (Crabtree et al. 2010). In Canada, the Family Health Team initiative in Ontario, currently composed of 170 teams serving around 2 million Ontarians, is the largest implementation of the Patient-Centered Medical Home in North America (Rosser et al. 2011).

2.2 Patient-Centered Medical Homes

The Patient-Centered Medical Home (PCMH) is a healthcare delivery model that has at its core the Institute of Medicine's six aims for improving health care (i.e. making health care safer and more effective, patient centered, timely, efficient, and equitable) (Institute of Medicine 2001). The PCMH satisfies patient needs by improving care and addresses physician frustrations with practice, thus it presents a viable solution to the crisis in primary care (Rosser et al. 2011).

The Medical Home was first introduced in 1967 by the American Academy of Pediatrics, initially only as a source for a centralized pediatric medical record (Sia et al. 2004). In 1992, the concept was expanded to describe medical care where all aspects are managed and facilitated

by a well-trained physician and care is *"accessible, continuous, family centered, coordinated and compassionate"* (Sia et al. 2004). In 2004, the Future of Family Medicine project, an American nationwide research initiative to provide recommendations for the transformation of family medicine, presented a New Model of Family Medicine as part of its findings. In this model the patient has a personal medical home, and care is accessible, community-oriented, patient-centered, team based and utilizes advanced information systems (Martin et al. 2004).

The PCMH model is endorsed by the major primary care organizations in the United States including the American Academy of Family Physicians. The principles guiding the implementation of PCMH were jointly published by these organizations in 2007 and could be summarized as follows (Patient-Centered Primary Care Collaborative 2007):

1. Each patient has a **personal physician** who serves as the first point of contact, providing and directing continuous and comprehensive care;
2. On the practice level, the personal physician leads an **interdisciplinary team** that is collectively responsible for the ongoing care of patients;
3. Care is **whole-person** oriented, where the personal physician's responsibility extends to all aspects of the patient's healthcare including arrangements for care with other qualified professionals;
4. Integration across all units of the complex health care system and patient's community care ensures that care is coordinated, continuous and comprehensive. **Integrated** care helps assure that patients get the appropriate care when and where they need and want it. Health Information Technology is a key enabler of this integration;

5. **Quality** improvement and patient **safety** are key concepts supported through various initiatives such as appropriate utilization of information technology for optimal patient care, performance measurement, patient education and enhanced communication;
6. **Access** to service is enhanced through systems such as open access (same-day scheduling), web-based scheduling and new options for patients to communicate with their personal physician and practice team (e.g. online secure messaging)
7. The **payment** structure is realigned to support the model of care.

2.2.1 Implementing the PCMH in Canada: Family Health Teams

In 2004, the Family Health Team (FHT) model was introduced in Ontario, as part of primary care reform; now at 170 teams serving nearly 2 million patients, it is possibly the largest implementation of a patient-centered medical home in North America (Rosser et al. 2011). The FHT model expands the capacity of primary care through the use of teams that consist of family physicians and multi-disciplinary clinicians. Team compositions vary according to community needs, no two FHTs are the same; a sample FHT is shown in Figure 1. Through the utilization of multi-disciplinary teams a practice is able to provide a wider range of services while reducing the overload on individual physicians (Rosser et al. 2011).

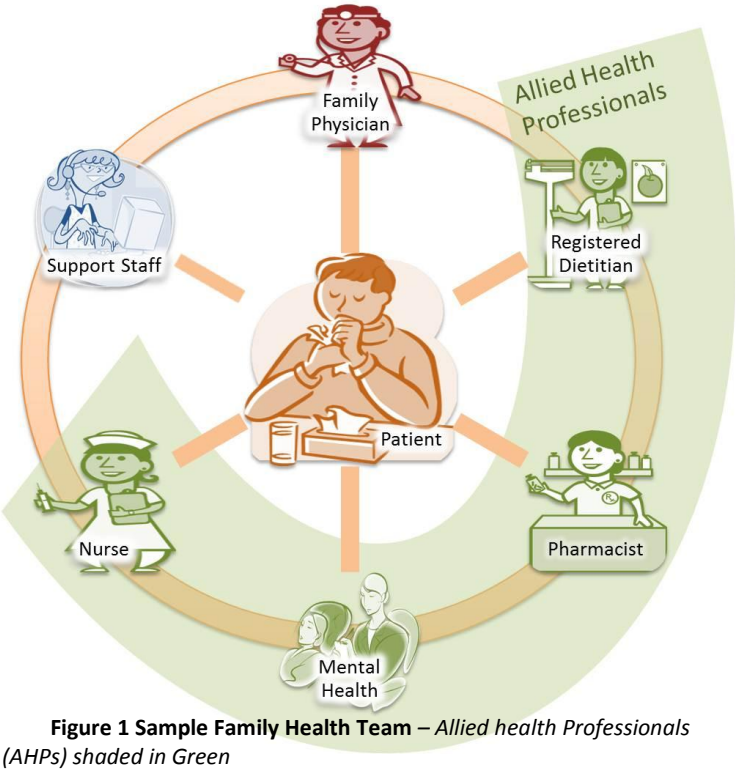


Figure 1 Sample Family Health Team – *Allied health Professionals (AHPs) shaded in Green*

Across Canada, a team-based approach to primary health care delivery has been adopted by many jurisdictions since the year 2000. A study, based on the 2007–08 Canadian Survey of Experiences with Primary Health (Jesmin et al. 2012), shows that team-based practice settings are positively associated with improvements in patient-centeredness. The multi-disciplinary nature of FHTs has enabled the provision of progressive services; for instance, problems with medications after a hospital or specialist visit were reduced by providing a medication reconciliation program run by a pharmacist on the FHT (Health Council of Canada 2009).

2.2.2 Health IT in the PCMH and FHT

Health Information Technology (HIT) plays an important role in the Family Health Team, facilitating almost all aspects of the delivery model. For example, EMRs facilitate the integration and coordination of care and the collection of data to support quality and safety initiatives

(Rosser et al. 2011). Additionally, functions incorporated into PHRs improve access by opening a new communication channel, providing access to test results and online appointment scheduling capabilities (Rosser et al. 2011; Casnoff 2010).

Enhanced and convenient access to traditional in-person care, as well as virtual services in response to the variety of individual needs, is a central tenet to the PCMH model (M. Barr 2006). HIT, with appropriate planning and implementation, can improve multiple aspects of access (Finkelstein et al. 2011). Information exchange functions incorporated in to EMRs foster inter-provider communication which is crucial for team care but excludes the patient, which does not help in terms of access, self-management and patient engagement (Bates & Bitton 2010). PHRs ideally should incorporate functionality that allows for patients or their caregivers to securely exchange messages with their healthcare providers, as shown in Figure 2, fostering convenient access to services such as prescription renewals, appointment booking and support for self-management (Bates & Bitton 2010). Patients provided with access to such secure messaging have successfully used it in lieu of appointments and expressed their appreciation for the alternative mode of communication (Zhou et al. 2007). Moreover, providing patients with convenient access to relevant health information through patient portals, practice websites, or PHRs enables them to make informed decisions about their healthcare needs, thus playing a more active role in the management of their own health (Ministry of Health and Long-Term Care 2006; M. Barr 2006).

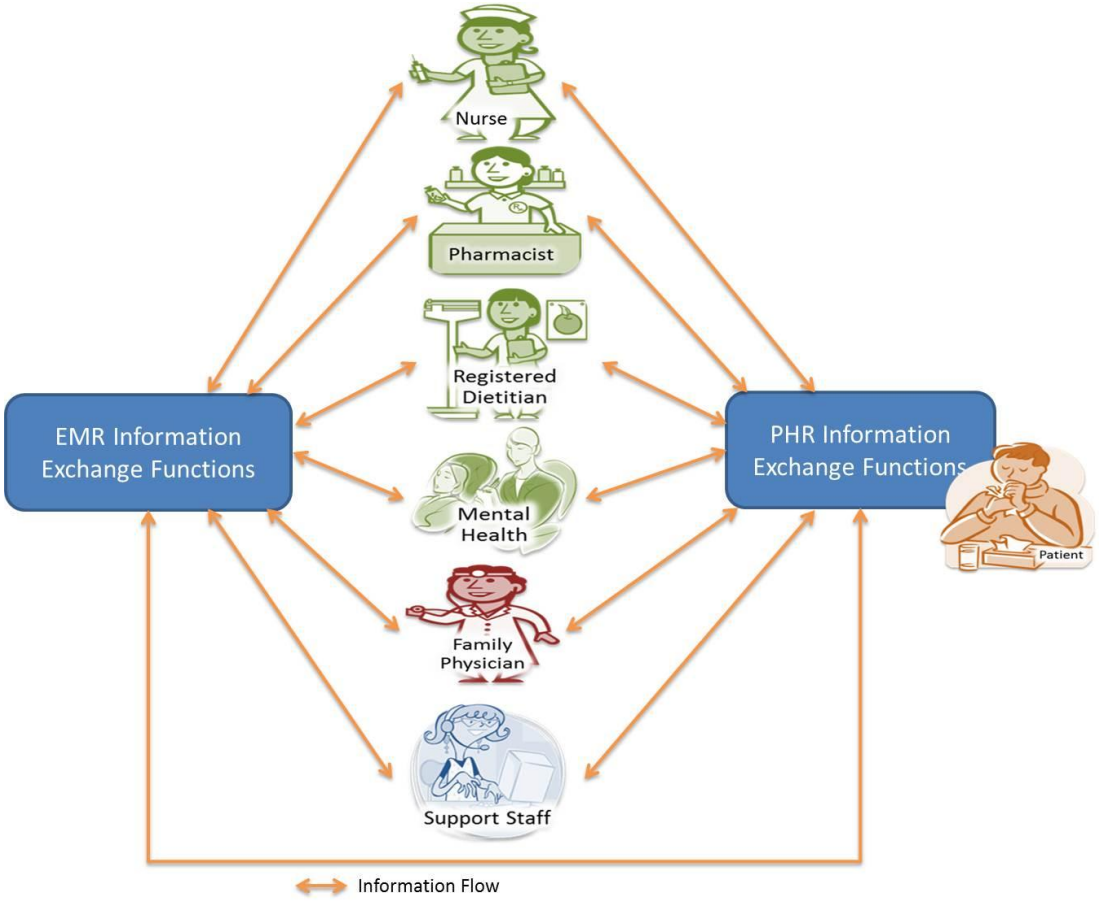


Figure 2 Information Exchange in the PCMH and FHT

The following are examples of how the United States Department of Veteran's Affairs has used Health IT to enhance access to its services as part of its implementation of a PCMH model of care (G. L. Jackson et al. 2011):

- Enhanced Communication between Patient and Care Team – secure messaging, prescription refill requests and other services are available through the web-based patient portal

- Providing Patients with Summaries of Personal Health Information – patients are provided with summaries of data they enter as well as data from several providers, including their plan of care
- Home Monitoring of Health Status – for patients at increased risk of complication and hospitalization, daily monitoring in the comfort of their homes is provided by home monitoring devices connected to telephone and broadband services. Data from these devices are reviewed by care teams
- Tele-consultations – virtual access to speciality services such as dermatology and mental health remove time and transportation barriers to these services
- Enhanced Self-Management Support – effective self management support progams have been developed through the utilization of various interaction modes, telephone and web-based, in addition to self-monitoring and medication adjustments
- Peer-to-Peer Interaction – new technology under development enhances the ability of patients to interact with peers around health issues

2.3 Personal Health Record Systems

To realize the vision of patient centered care patients needs to be well-informed and fully engaged in their care. Active participation in care requires providing patients with enough information and support for them to play a positive role. Patients should be provided with access to their medical records, detailed information about their condition(s), decision support tools, alerts and reminders, education and assistance with self-care (Davis et al. 2005). Electronic Personal Health Records (PHR) represent a platform that can provide a range of functions that

satisfy these requirements, facilitating the necessary transformation in the healthcare system (Tang & Lansky 2005).

2.3.1 PHR Architecture and Functions

PHRs are electronic applications designed to allow individuals to access, manage and share their health information in a private, secure and confidential manner (Markle Foundation 2004). In addition to data created through interactions of patients with the health care system, patients are able to record daily symptoms, personal exercise programs, data generated through home monitoring devices, over-the-counter medication information and more (Tang et al. 2006). By combining data, knowledge and software tools, PHRs can become more than a static repository for an individual's health information (Tang et al. 2006). Functionality in some of the implementations includes allowing patients to exchange secure messages with care providers, online appointment booking, decision support tools and health management tools (Tang et al. 2006).

From the perspective of the medium used, PHRs exist either as web-based systems, stand-alone desktop software or USB-based systems. Web-based PHRs are the most common and are likely to continue to be the preferred modality (D. A. Jones et al. 2010).

The Center for Information Technology Leadership (CITL) (Vincent et al. 2008) describes PHRs in terms of functions and architectures. PHR functions are further classified into infrastructure or application components. The separation between infrastructure and application is to decouple the data source, allowing for a more flexible and customizable system.

The PHR infrastructure is composed of information collection functions that allow patients to "pull" information from multiple and external sources; as well as information sharing functions that allow patients and other authorized users to view the information in a PHR. As seen in Figure 3, the infrastructure component is protected by user authentication protocols. External parties, with patient authorization, are able to access and view the data through application programming interfaces (APIs).

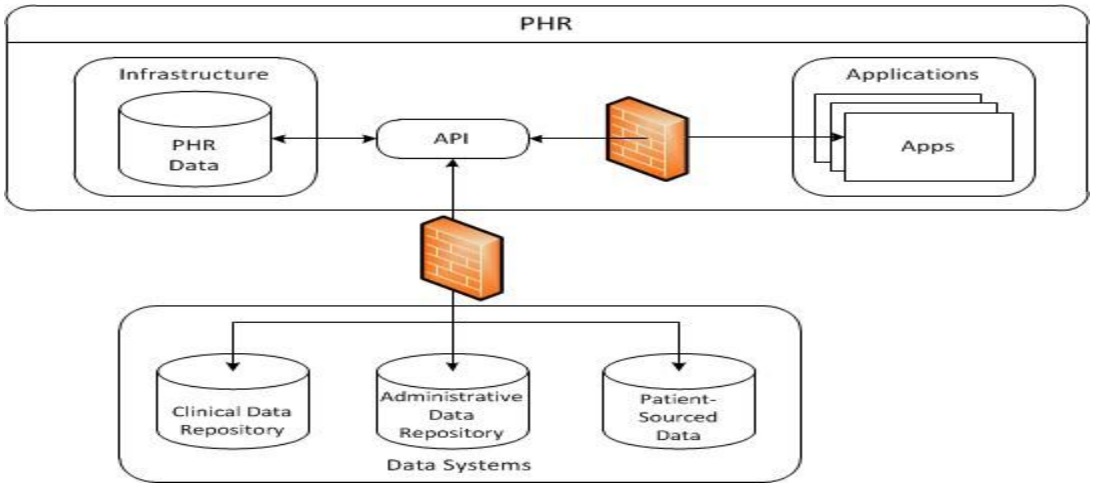


Figure 3 Representation of PHR Functions adapted from (Vincent et al. 2008)

Application functions are defined as those that support information exchange and self-management. An example of a self-management application would be a blood glucose application. Information exchange applications include secure messaging and e-visits. A summary of possible PHR functions is shown in Table 1.

Table 1 PHR Functions (Kaelber et al. 2008)

PHR Function	Definition	Example
Information Collection	Pulls data from multiple and/or external sources	• Profile/Family History • Test Results/Reports
Information Sharing	Allows patients and other authorized users to view PHR information	• Viewing test results/reports • Pharmacist review of medication profile
Information Self-Management	Allows patients to learn about, monitor and/or manage their health	• Health monitoring application • Evidence-based treatment choices and recommendations
Information Exchange	Allows patients to interact with others regarding their health by engaging in automated information exchange transactions	• Secure messaging • Appointment Scheduling • Pre-visit and post-visit care management questionnaires (e-visits)

CITL defines PHR architectures using four dimensions described in Table 2: methods of data incorporation, types of data systems, number of data sources, and type of data exchange. Based on these dimensions there are four separate categories of PHRs: provider-tethered, payer-tethered, third party and interoperable. Provider-tethered and payer-tethered systems have a single source of data: provider or payer. Third party systems interact with a number of data sources but the flow of data is uni-directional. For example, a PHR may access data from an EMR/EHR but the patient is unable to add notes or corrections. The interoperable PHR is the ideal case based on the existence of robust standards for healthcare information exchange. It represents a complete record of patient data and data flows in both directions; to and from multiple external systems. Data exchanges that require human intervention where data flows in only one direction are described as machine-interpretable by CITL. Those automated and enabled by data exchange standards are described as machine-organisable.

Table 2 CITL PHR Architecture Dimensions

Dimension	Description
Methods of data incorporation	Means by which information of any kind is entered into a PHR, determined by the source of data: professionally-sourced, patient-sourced or patient-rekeyed
Types of data Systems	Clinical, administrative or mixed
Numbers of data sources	Single silo data source or multiple data sources
Type of data exchange	Machine-interpretable (automated, two-way) or machine-organisable (manual, one-way)

2.3.2 PHRs in Canada

The current emerging Canadian PHR landscape, according to Deloitte's recent report (Deloitte Center for Health Solutions 2009), comprises three major PHR drivers: governments, hospitals and physicians. The report also expects that, if the efforts of these drivers are not consolidated, patient health information will be fragmented across multiple PHR platforms, the opposite of the consolidation sought by the PHR model. A basis for PHR interoperability that would enable consolidation is provided through Canada Health Infoway's (CHI) eHealth Certification Services which defines required health information exchange standards (Canada Health Infoway n.d.).

An example of a government-driven PHR is MyHealthAlberta, a personal health portal provided by the government of Alberta as a source of trusted health information and secure healthcare services (Government of Alberta 2012). By the end of 2012, Albertans will be provided with a PHR through MyHealthAlberta that will eventually be connected to the provincial Electronic Health Record (EHR) giving them access to personal health information, including prescribed dispensed drugs, known allergies and intolerances, immunizations,

laboratory test results and medical reports (Government of Alberta n.d.; Government of Alberta 2012).

Sunnybrook Health Sciences centre offers its patients and their families access to MyChart™, a web-based hospital-driven PHR, which pulls data from the institution's EHR and provides additional functions such as appointment scheduling and prescription refills (Curtis et al. 2011).

Finally, the Canadian Medical Association (CMA) launched its patient portal in 2008 at mydoctor.ca which provides chronic disease management, post-visit resources and secure messaging to subscribed physicians and patients (Canadian Medical Association 2008). Mydoctor.ca is an example of a provider-driven PHR because patients require an invitation from their provider.

A more recent introduction to the Canadian market are vendor-driven PHRs, designed to be consumer-driven and interoperable; sharing and communicating with compatible EMRs and acting as health information repositories customized by the consumer (Deloitte Center for Health Solutions 2009). In 2007, Microsoft launched its version of the PHR, MSHealth Vault, in the US; in 2009, TELUS purchased exclusive license rights to operate MSHealth Vault in Canada as TELUS Health Space (TELUS Health 2009). TELUS Health Space became Canada's first and only CHI certified consumer health platform (Canada Health Infoway n.d.).

The PHR implementation planned for the clinics in this study is MyOSCAR, an open-source PHR built on source code from the Indivo™ project of the Boston Children's Hospital Informatics Program (MyOSCAR n.d.). Indivo™ promotes an implementation of the interoperable PHR based on open source, free software and the use of open standards (Mandl et al. 2007). The Indivo™

project is described as a "personally controlled health record" emphasizing the patient's control over content and access to the record (Mandl et al. 2007). Several collaborators have adapted the Indivo™ code in diverse settings; for instance, MSHealthVault and Dossia Health Manager launched with Indivo™ source code (Children's Hospital Informatics Program n.d.). MyOSCAR is currently deployed as a pilot in two family practice clinics in Hamilton, Ontario. Although envisioned as an interoperable PHR, it currently functions as a provider-driven PHR, requiring physicians to invite their patients to sign up for accounts and the clinic's EMR (OSCAR[2]) is the only external data source.

MyOSCAR modules incorporate functions in all four areas of PHR functions, albeit on a limited scale with planned future extensions, as described in Table 3. The main features of MyOSCAR's current Hamilton pilot are (Sant 2012):

- Allowing users to exchange secure messages and share health information (vitals, medications, lab documents, etc.) with others, including: providers, family members, and friends.
- Allowing physicians to view home monitoring data, such as: glucose, BP, height and weight.
- Integration with OSCAR EMR to facilitate information sharing

Features planned for future phases include (Sant 2012):

[2] OSCAR is an acronym for Open Source Clinical Application Resource(OSCAR Canada Users Society n.d.)

- Online appointment booking for all types of appointments, including open access (same/next day) and later appointments
- Enabling users to create a "custom" PHR through the integration of various local and third-party health application (Apps)
- Possible integration of more external data sources including EMRs other than OSCAR

Table 3 Myoscar Modules Described and Grouped by Corresponding PHR Function

PHR Functions	MyOSCAR Module	Description
Information Collection	Setup	Import patient's information from OSCAR
	Profile/Family History	Demographic questionnaire used to collect information from patient
	Test Results and Reports	Physicians are able to send Test results and medication lists to patients through OSCAR EMR
Information Sharing	Symptom Index After new Medication	Pharmacist receives report generated from patients' survey answers
	Health Monitoring Medical Conditions Medication Profile	When the patient makes changes to these modules, the authorized healthcare provider is able to review these changes
	Appointment Booking	MyOSCAR allows a patient to select an appointment with their physician and physician's resident and share the reason and notes regarding the visit
Information Self-Management	Health Monitoring	Measurements of Blood Pressure, BMI and Glucose are entered and tracked by the patient
	Medical Conditions	Patients are able to edit their list of medical conditions
	Medication Profile	Patients are able to manage their list of medications by tracking dates of starting / stopped medications, the name of the medication , the dose at which it is to be taken and the length of time of the prescription
	Treatment Choices	Treatment recommendations based on the latest medical research
Information Exchange	Secure Messaging	Exchange messages with Health Care Provider

2.4 Personal Health Records in Family Health Teams – Stakeholders

There are four main categories of PHR functionality: information collection, information sharing, information self-management and information exchange. Information exchange and information sharing functions have the highest potential value according to a recent study on the value of PHRs (Kaelber & E. C. Pan 2008). These functions, including appointment scheduling, pre-encounter questionnaires and e-visits, impact various stakeholders by changing their work flows and processes (Kaelber & E. C. Pan 2008). For examples, receptionists are the key stakeholders when it comes to online scheduling as they spend a large portion of their day facilitating appointment scheduling (Ahluwalia & Offredy 2005). It is important to understand how they view online scheduling, what their concerns are and how they think the system could contribute to their ability to provide a better quality service to consumers. Below we briefly discuss four main groups of stakeholders in the context of PHRs in primary care in light of findings from previous work on their view of related challenges, benefits and needs.

2.4.1 Patients

Since patients are the main users of PHRs, many studies have examined their use of and attitudes towards these systems. Special attention has been given to groups most likely to adopt PHRs, those who interact frequently with the healthcare system: parents of young children, chronic disease patients and adults caring for elderly parents (Archer et al. 2011). Several studies focused on applications designed specifically for patients with a chronic condition such as congestive heart failure (Earnest et al. 2004) and diabetes, which received considerable attention (Hess et al. 2006; Ross et al. 2006; Wald, A. Businger, et al. 2009). According to

(Osborn et al. 2010)'s review of 26 articles studying the impact of applications designed specifically for diabetes patients, studies reported positive impacts on patient outcomes, patient-provider communication, disease management, and access to and patient satisfaction with healthcare services.

Among the features that patients find useful are access to medication lists, lab results, personal and provider notes as well as appointment booking (Wildemuth et al. 2006). Ralston et al. 2006 found that use and satisfaction was greatest for PHR services that were most actively part of clinical care, such as medical test results review, medication refills and after-visit summary review, as well as patient-provider communication. Similar results were also found in another study, where patients expressed great satisfaction with a service that allowed them to communicate with providers regarding prescription renewals, appointment booking and clinical inquiries (Neville et al. 2004). Content analysis of patient-provider email communication showed that patients adhered to guidelines, requests coming in through email were appropriate and allowed the patient to avoid an office visit or telephone request (Sittig 2003).

Patients interviewed in (Fisher et al. 2009), also found access to complete health records helpful by preparing them for consultations, compensating for poor or complex communication during consultations and reducing fragmentation of care.

A number of barriers to the wide scale adoption of PHRs by patients have also been identified. Firstly, there are barriers related to patient characteristics, specifically elderly and low-income patients who may not be able to access PHRS due to literacy issues, disabilities or limited/no access to computers and/or the Internet (Lober et al. 2006). Secondly, there is the

issue of cost. Despite patients identifying value in utilizing PHR, most are unwilling to pay substantial amounts to access these services (Bergmo & Wangberg 2007; Bryce et al. 2008).

The success of PHR design is related to a design process that involves users and features that support existing activities carried out by users to self-manage their own health and health information (Piras et al. 2010; K. A. Siek et al. 2011). Early PHRs lacked patient-centric design features , a fact that motivated user-centric design research to establish an emergent set of best practice criteria for usability, governance, minimum feature sets and other design factors (Halamka et al. 2008; Lafky & Horan 2011).

2.4.2 Physicians

Physician responses to PHR implementations varied between early adopters, enthusiastic about alternative methods to actively engage patients in their own healthcare, and reluctant physicians resisting change, which mimics patterns observed with EMR adoption (Fuji et al. 2008; Witry, Doucette, Daly, B. T. Levy & E. a Chrischilles 2010).

For example, electronic communication, one of the information exchange functions of PHRs, is a source of concern for physicians who anticipate work overload and cite lack of a compensation mechanism (Hobbs et al. 2003). These concerns could be partially alleviated by using a triage system where communications are primarily managed by non-physician staff; this matches existing work flows where a majority of patient communication in a primary care clinic is handled by non-physician clinic staff (Kittler, Wald, et al. 2004). Many studies investigated secure messaging and email communication from a physician perspective, reporting on satisfaction with that communication method within a primary care practice (Gaster et al. 2003;

Kittler, G. Carlson, et al. 2004) and limited wide-scale adoption of email and poor adherence to or understanding of guidelines (Gaster et al. 2003; Brooks & Menachemi 2006). A systematic review of 24 articles on patient-provider email communication found that benefits of email were recognized by patients and providers but use varied on factors related to patient and provider characteristics; additionally, concerns about privacy and security were raised and the need for clear guidelines for effective use was identified (Ye et al. 2010).

In studies where PHR interventions showed positive impact on the healthcare delivery process or patient engagement, physicians were more eager to adopt and expressed satisfaction with the systems. In a randomized evaluation, physicians found that a PHR function that helps prepare patients for encounters resulted in improved communication and effective use of appointment time (Barnabei et al. 2008). Similarly, in a study surveying 113 primary care providers in an integrated health system where patients were provided with access to their medical records, a majority placed value on patients reviewing and commenting on EMR data specific to medications, care regimens for diabetic patients, family medical history, and health maintenance (Barnabei et al. 2008). Physicians were satisfied with email communication with patients which increased patient satisfaction and did not produce the anticipated excess workload (Neville et al. 2004). Physicians initially voicing concerns over an intervention, where chronic disease patients were given access to test results and notes, had a far more positive experience than they anticipated, especially in terms of workload and patient satisfaction (Earnest et al. 2004).

2.4.3 Allied Health Professionals and Support Staff

A limited number of studies are dedicated to non-physician clinic staff views in relation to PHR functions or applications. One study explored the views of support staff (receptionists and practice managers) along with physicians regarding online appointment booking (Flynn et al. 2009). There was limited reporting on support staff views, in contrast to the physicians; the study reported support staff frustrations with the system due to it not working properly and justification of poor patient uptake, which was blamed on poor promotion (Flynn et al. 2009).

Nine nurses and two dietitians along with seven doctors were interviewed in a qualitative study assessing their views on a PHR application designed specifically for pediatric diabetic patients (Nordqvist et al. 2009). In that study, healthcare professional views were similar, all expressed positive attitudes towards the system and expected it to play a positive role in patient education and facilitating interaction between the diabetes team and patients and their families (Nordqvist et al. 2009).

Finally, among ten specialties interviewed for their views on patient generated data in PHRs in (Huba & Zhang 2012), six were allied health professionals. This study found that a majority of healthcare professionals valued patient generated information, provided that it is presented in a way that supports their work and knowledge discovery. Although healthcare professionals also supported information sharing, they expressed concerns such as causing anxiety for patients.

3. Methods

3.1 Overall Approach

A case study, as a research method, has numerous definitions (Myers 1997), yet the scope of a case study as described by (Yin 2002):

> "A case study is an empirical inquiry that:
> - investigates a contemporary phenomenon within its real-life context, especially when
> - the boundaries between phenomenon and context are not clearly evident"

The case study research strategy employed by this study is justified by the fact that contextual conditions in the question of impact of a PHR (MyOSCAR) on the work of team members in a FHT are not readily separable from the phenomenon under study. A case study research strategy guides study design, data collection and analysis (Yin 2002). Yin defines three case study types: explanatory, exploratory and descriptive, based on the purpose of the study. A descriptive case study allows for the illustration of selected topics within an evaluation. Since this study illustrates the work processes of clinic staff members and potential challenges and opportunities for improvement, it fits in the descriptive case study type.

The study employed primarily qualitative data, representing staff views, collected through one-on-one semi-structured interviews designed around the research questions. By extending the data to the description of relationships, preferences and concerns of staff about work in a primary healthcare setting, richer data is collected through interviews than a review of documented procedures. The analysis process comprises two phases: content analysis and process analysis. Firstly, content analysis that employed an editing approach resulted in a theme

template highlighting the main topics discussed in the interviews and linked them together whenever possible. Secondly, the process analysis phase uses data extracted in the content analysis phase to highlight potential changes and improvement opportunities in relevant work processes. Business Process Management Notation (BPMN)[3], a standard notation in business process modelling, was used to model current and future anticipated processes. BPMN is understandable by the end-user while allowing for the embedding of technical details needed to specify messages in web based applications (S. White 2004).

3.2 Setting

The contextual conditions of this study can be described in terms of the specific system investigated and the organizational setting. The specific PHR referenced in the questions to the participants is MyOSCAR. The planned features and functions of MyOSCAR in an ongoing pilot implementation (see Table 3) are used to define the scope of the investigation. For example, appointment booking currently being implemented through MyOSCAR is limited to members of the FHT and would not allow for booking with external consultants or specialists. Although MyOSCAR is envisioned as an interoperable PHR, in this implementation integration is limited to OSCAR, the clinic's EMR.

In terms of the organizational setting, the study focused on teaching clinics offering a range of primary care services through a FHT model. This study was set within two different FHTs, the McMaster FHT (Hamilton, Ontario) and Queen's FHT (Kingston, Ontario). Both FHTs were in the early stages of a pilot implementation of MyOSCAR. Therefore participants had some exposure

[3] BPMN is a standard for business process modelling. The full standard and a short introduction are available at http://www.bpmn.org.

to MyOSCAR, on a conceptual level, through discussions preceding the pilot implementation. The McMaster FHT is affiliated with OSCAR/MyOSCAR through the Department of Family Medicine, McMaster University and has a long history of developing and testing both programs. Both McMaster and Queen's FHTs use the OSCAR electronic medical record which links to and shares information with MyOSCAR. The first set of interviews was conducted at the McMaster FHT in May 2012. Following the analysis of the data collected from the initial set of interviews, Queen's FHT staff members were invited to participate in a second set of interviews in August 2012.

Both clinics operate in an urban area. The McMaster FHT serves a patient population of 17,600 while the Queen's FHT serves 12,500 patients. AHPs from the McMaster FHT work at the Stonechurch Family Health Center (SFHC), the McMaster Family Practice (MFP) or both. Support staff for each site is different. All interviews for the McMaster FHT were conducted on-site at SFHC with SFHC staff. The number of staff members from each position and the number interviewed are shown in Table 4 .

Table 4 SFHC Staff Composition

Role	Total	Sample Interviewed
Reception	11	3
Social work	3	2
Nurse Practitioner	6	2
Registered Practical Nurse	4	1
Dietitian	1	1
Pharmacist	2	2
Occupational Therapist	2	2
Physician Assistant	1	1
Clinic Manager	1	1

Interviews conducted with Queen's staff were conducted over the phone, due to travel restrictions. Recruitment attempts yielded a lower response; the table below lists the number of staff members in the Queen's FHT and the number interviewed.

Table 5 Queen's Staff Composition

Role	Total	Sample Interviewed
Reception	10	1
Social Work	2	0
Nurse Practitioner	4	1
Registered Practical Nurse	5	0
Dietitian	1	1
Pharmacist	1	1
Occupational Therapist	0	0
Physician Assistant	0	0
Clinic Manager/Coordinator	3	2

3.3 Sample and Participant Recruitment

Purposive maximum variation sampling was used to select participants from the clinics, meaning that participants in all available categories of health professionals (except physicians) and support staff[4] were approached. The number of participants interviewed in each category was a convenience sample based on their response to the interview invitation.

McMaster FHT (SFHC)

After receiving approval from the Hamilton Health Sciences/ McMaster Faculty of Health Sciences Research Ethics Board, an email was sent to the clinic director to introduce the researcher and the purpose of the study, and to coordinate approaching AHPs and support staff to participate. A pilot phase was planned where five individuals in different roles would be approached and interviewed to inform the remaining interviews. Emails were sent to selected

[4] There are other groups of support staff including billing clerks and clinic aids. The support staff groups selected (receptionists and clinic managers) were the one most likely to be directly impacted by a PHR implementation.

individuals based on recommendations of the clinic director. These emails generated only one response which resulted in the completion of one interview. This interview was analysed and concepts emerging were highlighted and further investigated with other participants.

Following that, the author attended a clinician meeting to be personally introduced to team members at the clinic. An administrative staff member was assigned with the task of continued coordination of interview appointments. This stage resulted in 14 more interviews conducted over 3 days. Each interview ranged between 15-30 minutes. The number of staff interviewed in each category is shown in Table 4.

Queen's FHT

The interviews here were conducted 3 months later, after primary analysis of Clinic A interviews was complete. The delay in conducting the interviews was a result of the FHT experiencing delays in their pilot implementation project. Due to travel restrictions, all interviews were conducted over the phone. A liaison from Queen's was responsible for the recruitment process. The invitation email was forwarded to her with recommendation to approach staff in all categories. Themes emerging from the primary analysis of McMaster interviews were used to modify the interview guide to enrich the data. The recruitment process continued for two weeks resulting in 6 interviews.

3.4 Data Collection

Qualitative data collection methods range between participant observation methods used in field research to many types of interviews that gather participant accounts of their social experiences (Blaikie 2009). Typically, case study research designs do not employ participant

observation, rather interviews and documentary materials are preferred (Myers 1997). The qualitative data in this study was collected using semi-structured, one-on-one interviews employing an interview guide based on the research questions; although the specific order in which the questions were presented depended on the flow of the conversation. AHPs and support staff members were asked about current work processes relevant to MyOSCAR, interactions with patients, their involvement with the pilot, and their opinions regarding the implementation of MyOSCAR, including potential benefits and challenges from the implementation of MyOSCAR and their recommendations for a smooth transition.

Concepts emerging in earlier interviews were noted by the interviewer and further tested and developed in later interviews. McMaster FHT (SFHC) interviews were conducted in person at a quiet location in the clinic at a time chosen by the participant. Prior to the interview, the interviewer presented each participant with an information sheet and briefly explained the purpose of the study. Participants were asked to sign a consent form which allowed for the audio-recording of the interview and the use of the interview contents in the study. Queen's FHT interviews were conducted over the phone. The information sheet and consent form were sent to participants prior to the interview. Consent forms were signed and faxed back. Each interview lasted for approximately 25 minutes. Audio recordings were later transcribed verbatim for analysis.

3.5 Data Analysis

Content analysis was used to extract data that highlight the views of staff regarding potential challenge and improvement opportunities, in addition to their description of their work processes. The process analysis phase used the data from content analysis to build process

models and highlight opportunities for improvement. These models can be used to guide process change and system design.

3.5.1 Content Analysis

Themes emerging throughout the interviews were recorded by the interviewer and used as the initial coding template. After that, the author and a researcher, with experience in primary care and information technology, independently analyzed consecutive sets of interviews using an editing approach, as an organizational style. The editing approach involved extracting themes and organizing data according to the emerging code template (Addison 1999). The analysts met after independently coding each set of interviews to ensure consistency by exchanging codes and discussing differences. Consensus was reached by either adding new themes or by one analyst changing her coding. When a new code was introduced, one analyst reviewed previous interviews to check for data that would fit under it.

To ensure rigour in analysis, both analysts discussed their assumptions and potential biases about PHR use in clinical practice throughout the analysis, which resulted in changes and additions to the coding scheme and descriptions of the concepts that emerged. Additionally, summaries of results were given to interview participants as a member-check to ensure that ideas and concepts were captured correctly.

Support staff interviews were completed first and the final themes and concepts were presented in a diagram that was approved by both analysts. A business process diagram was created for select processes that would be most affected by the implementation of MyOSCAR,

based on the interview data. These diagrams were used to highlight and discuss potential improvement opportunities. The same was repeated for AHP interviews.

A member-check was conducted to ensure rigour resulted in an overall confirmation of themes and the addition of comments provided by some participants. Comments provided clarification on certain aspects and added further detail to a theme.

3.5.2 Process Analysis

Organizations are comprised of social and technical systems that influence each other and are influenced by the external environment (Appelbaum 1997). Thus, if social systems are unable to cope with or integrate improvements in technical systems, they are unlikely to improve productivity or effectiveness (Appelbaum 1997). Organizations successfully integrating information technology to improve productivity consider their internal environment, including social and technical systems and their external environment, by utilizing "Business Process Redesign" (BPR) (Earl 1994).

The concept of "business process" provides an input-output activity view of business versus the traditional functional, responsibility centered and structured view. BPR is defined by (Davenport & Short 1990) as the "analysis and design of work flows and processes within and between organizations" where processes are "a set of logically related tasks performed to achieve defined business outcome".

BPR can be achieved through four main steps: process definition, baseline process analysis, process evaluation and target process design (Wastell et al. 1994). Data collected in this study is sufficient for baseline process analysis that would facilitate BPR for the successful integration of

MyOSCAR in the clinics. Based on participant comments and descriptions we present a model of current processes that would involve MyOSCAR. We show these processes before the integration of MyOSCAR as well as their envisioned state after the integration.

To model the processes before the implementation of MyOSCAR and the envisioned new processes after the implementation, BPMN was utilized. This notation was selected because it is easily understood by non-technical audiences as well as being well-suited for the specification of messages which are central to web-based application design (S. White 2004). Tasks performed by a system or a human participant are identified and labeled and grouped by participant in swim lanes on the diagrams. This allows for clear identification of changes in role participation in each process.

3.6 Ethics

The questions put forth by this study and the procedures used were reviewed by and received approval from the Hamilton Health Sciences/McMaster University Faculty of Health Sciences Research Ethics Board (REB). Written consent was obtained from all participants prior to inclusion in the study. Participants received a small token of appreciation after the interviews as approved by the REB.

4. Content Analysis

4.1 Support Staff Interviews

McMaster FHT (SFHC)

Three teams of family physicians, nurses and support staff practice at the clinic. On one team, a physician has been communicating through MyOSCAR with selected patients for years. All physicians were invited to participate in the clinic-wide pilot implementation of MyOSCAR. The first three respondents were able to invite their patients to participate in this pilot. A receptionist from each of these teams was interviewed, as well as the clinic manager. One receptionist has been working at the clinic for the past twelve years while the other two receptionists have been there for less than three years.

Queen's FHT

Only one receptionist from the Queen's FHT was interviewed. She indicated that she has been working at the clinic for less than two years. No physicians were using MyOSCAR to communicate with patients at this clinic. Physicians received similar invitation to participate in a clinic-wide pilot but invitations to patients were sent several months later due to extra time required to enable MyOSCAR in the site.

Below is a summary of support staff comments and opinions without author bias. The summary is structured around the theme template that emerged from the analysis. Six major themes are identified, with a number of sub-themes under each. These are summarized in Figure 4. Any insertion of author opinions or comments in the following summary is indicated in *(parenthesized and italicized text).*

4.1.1 Pilot Involvement

At SFHC, two of the three receptionists had limited involvement with the pilot. They were primarily asked questions by patients, mostly regarding account setup (usernames and passwords), which they referred to a helpline that was setup to address these issues. All receptionists and the unit manager were aware of what MyOSCAR was and of the pilot that was running.

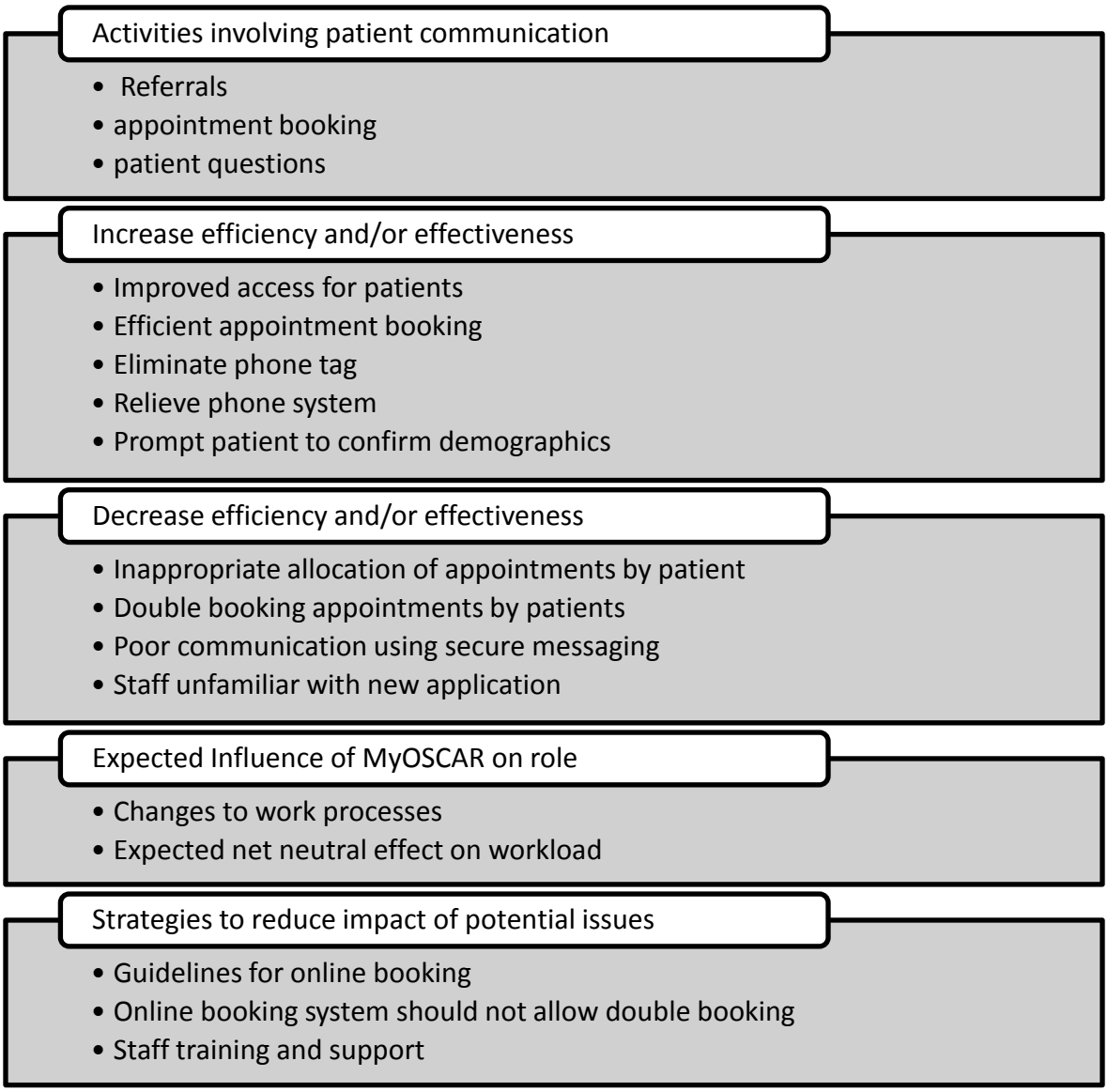


Figure 4 Themes for Support Staff

4.1.2 Theme 1 - Activities Involving Patient Communication

Referral

Certain team members are assigned the responsibility of managing consults and referrals. When physicians request patient consults, they call or fax the requested professional's clinic with the patient's chart and reason for the request. The clinic then calls or faxes back an appointment which is communicated to the patient. If test results are required the consultant's clinic calls the family clinic with that request.

Appointment Booking

With open access[5] in place the receptionists spend the majority of the morning period booking appointments. The "block period" between 8:30 and 9:15 is when most of the appointments are booked. When patients call to request appointments they are encouraged to book with the medical resident first. Patients may also book a follow up appointment in person after they have seen their physician. Receptionists also call patients to inform them about specialist and test appointments booked for them.

Patient Questions

The majority of calls received by receptionists are for appointment requests. The remaining calls could be requests for information about programs at the clinic or patients' test results. Questions about test results are triaged to a healthcare provider, usually a nurse or doctor;

[5] Open access means that appointments with Physicians, Residents, Nurses and Nurse Practitioners are offered on same or next day basis. The patient is guaranteed an appointment within 48 hours. This is also known as "advanced access" (Murray & Tantau 2000; Tantau 2009).

depending on the provider's availability the patient may speak to him/her immediately or a message is left for callback.

4.1.3 Theme 2 - Increase Efficiency and/or Effectiveness

Improved Access for Patients

MyOSCAR will be an additional channel of communication that could make it easier for a patient to access the services they need. Because of open access all 23 phone lines at the clinic are busy between 8:30am and 9:30am. By providing an alternative channel to book appointments, patients with other questions or concerns could be tended to at this time.

Efficient Appointment Booking

If patients are able to book their own appointments, that would relieve some of the receptionists' time, allowing them to deal with other issues, such as test results and specialist appointments, in more detail. Since a majority of the calls received are about appointments, if a significant percentage of patients use the online option, that will reduce those types of calls. *(Instead of repeatedly calling a busy line, the patient will simply log in, view and evaluate the open slot and choose the most suitable one)*

Eliminate "Phone Tag"

Often times a receptionist will call a patient with a message. If the patient is unable to take her call, she will either call back at a time the patient specifies or leave a message for them to call the clinic back. In a process named "phone tag", the receptionist may miss the patient's call and the patient may miss the receptionist's call repeatedly. Being able to send the patient an

electronic message in a secure fashion would eliminate phone tag saving the receptionist's time (*and ensuring more timely delivery of the message).*

Relieve Phone System

The volume of calls received by the clinic is expected to decrease if a significant number of patients choose to book online. Additionally, allowing patients to communicate with their care providers using secure messaging may impact the number of calls received by the front desk. As indicated by Receptionist2, patients comfortable using MyOSCAR secure messaging have on occasion shown their preference for using that method of communication.

> "… we are at the maximum with our phone system. We need to do something right now, because of the fact that they are busy" – Clinic Manager

> "…a lot of the time you will hear some of the patients say oh I will just MyOSCAR the doctor." – Receptionist2

Prompt Patient to Confirm Demographics

When receptionists check patients in, they review their demographics; checking for expired healthcards and changed addresses. Patients with a new address often forget their address has changed. Therefore receptionists must prompt patients by reading the address on record and verifying that. If patients are prompted to check their address while booking their online appointments, that would likely ensure addresses are updated and eliminate a step from the check-in routine. This would require that data from MyOSCAR is pulled into the OSCAR record and updates are marked.

4.1.4 Theme 3 - Decrease Efficiency and/or Effectiveness

Inappropriate Allocation of Appointments by Patient

Appointment allocation is described by receptionists as complex with many variables at play. The duration of the appointment varies according to appointment type and provider preference. Certain types of appointments should be booked only on specific days in the week. An attempt at documenting the booking process of one team of physicians resulted in an eight page document. The clinic manager highlighted difficulties in transferring receptionists across teams due to the variation in physician preferences across teams. Patients may book all available doctor appointments, avoiding booking with residents or they may book with a provider unable to cater to their needs. *(For instance, they may book a Registered Practical Nurse, whose scope is limited whilst they should have booked with a Nurse Practitioner or Physician.)* Receptionists are concerned about such inappropriate booking and are reluctant to give up part of the control they have over provider schedules. Moreover, there is a concern that appointments will booked up too quickly, interfering with the receptionists'

> "Not booking enough time, or too much time or on the appropriate days, like there are certain days where we don't do physicals or well-baby visits. So those would also have to be booked accordingly."
> – Receptionist1

> "…because I am a little bit of a control freak and every doctor wants things done differently and you know, we kind of know how to triage, where to put an appointment"
> – Receptionist3

> "…appointments would be booked up so quickly they wouldn't have space to book….important appointments that needed to be done. They thought that they would all be filled by people online, just booking appointments."
> – Clinic Manager

ability to accommodate patients calling in. These concerns were all posed as questions: what happens when…? They expect that the pilot implementation will be able to address these concerns.

Double Booking Appointments by Patients

Concerns varied about double booking, where more than one patient booked an appointment with the same care provider. Two receptionists indicated that this is a concern they and their colleagues have, explaining that it happens currently with receptionists booking patients. On the other hand, one receptionist and the clinic manager indicated that it would not be possible for patients to double book as this is not allowed by the current system used by receptionists to book patient's appointments; they expect this restriction to carry over to MyOSCAR's online booking.

Poor Communication Using Secure Messaging

Although communication through secure messaging may eliminate phone tag, there is a concern that it may take multiple exchanges to convey a simple message. In a phone conversation, all concerns and information requests can be addressed on the spot. The asynchronous nature of electronic messaging could result in multiple "back and forth" messages.

Staff Unfamiliar With New Application

The SFHC clinic manager raised a concern regarding staff not comfortable with new technology, requiring more support to avoid a feeling of being overwhelmed.

4.1.5 Theme 4 - Expected Influence of MyOSCAR on role

Changes to Work Processes

Support staff members anticipate a shift in focus for the receptionist's position from basic appointment booking to addressing patient questions, triaging calls, and more complex appointment booking. This will only be achieved if enough patients are booking online, which may be unlikely in the immediate future.

Expected Net Neutral Effect on Workload

Initially, receptionists voiced concerns over job security, as their workloads may decrease significantly with patients booking online. Later in the conversations, receptionists would retract this statement citing only shifts in the focus of their work. The clinic manager also confirmed that online booking is not a threat to jobs and workload is unlikely to be dramatically affected as more time is given to other tasks. Additionally, new tasks such as responding to electronic messages and dealing with inappropriate booking may add to the receptionists' workload. Efficiency gains and efficiency losses are expected to result in a net neutral effect on workload, as shown in Figure 5.

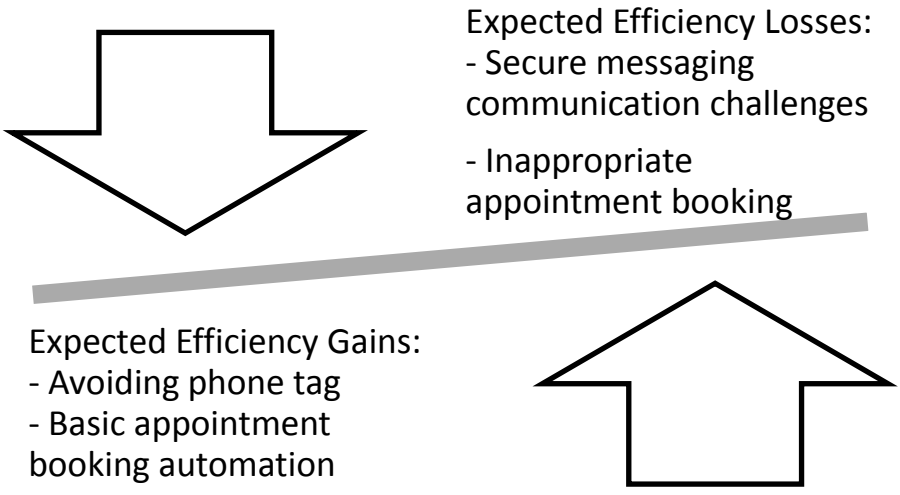


Figure 5 Expected net neutral effect on workload

4.1.6 Theme 5 - Recommended Strategies to Reduce Impact of Potential Issues

Guidelines for Online Booking

Receptionists agreed that the risk of inappropriate booking could be mitigated by providing patients with clear guidelines about when to book and for how long. Additionally, patients should be instructed to provide clear descriptions for their visit reason. This would assist receptionists in managing appointments and making any adjustments, if necessary.

Online booking system should not allow double booking

By ensuring that the patients' online booking module prevents more than one patient to book the same provider at the same time, the issue of double booking will be avoided.

Staff training and support

By providing staff with adequate training and support and utilizing lessons learnt from the pilot stage, a smooth transition is more likely. The SFHC has recently changed their booking system to open access and these strategies were effective in that change process.

4.2 Allied Health Professionals Interviews

A total of fourteen AHPs were interviewed for this study. Of those, eleven were affiliated with the McMaster FHT and three with the Queen's FHT. All AHPs interviewed were not directly involved in the current MyOSCAR pilot at their respective clinics. Only 2 AHPs, a Nurse Practitioner and Dietitian from McMaster, indicated that they ever had a patient with a MyOSCAR account setup to communicate with them.

Below is a summary of AHP comments and opinions without author bias. Starting with a note on readiness for electronic communication, where we discuss providers' use of email prior to the implementation of MyOSCAR, and a clarification of referral based services, followed by a summary structured around the theme template that emerged from the analysis. Some data from clinic managers are also incorporated here as they are more relevant to AHPs than support staff. Eight major themes are identified, with a number of sub-themes under each. These are summarized in **Error! Reference source not found.**. Any insertion of author opinions or comments in the following summary is indicated in *(parenthesized and italicized text).*

4.2.1 Readiness for Electronic Communication

Despite privacy and security concerns, six AHPs indicated using email to communicate with patients who were aware that email is insecure and only to be used for non-urgent messages. In fact, the clinic director at Queen's FHT indicated that most email communications was initiated by patients whom are able to figure out staff email addresses because of their academic affiliations. Such patients seek out this channel of communication to follow up on issues with their providers in a way that is convenient for them.

The most cited reason for using email was for medication adjustment follow up, especially insulin dose management for diabetic patients. Reasons cited for email use are summarized in Table 6. Additionally, all AHPs interviewed indicated that secure messaging with patients would be useful. *(These comments are discussed in more detail in following sections.)*

> "I hate using email because there is no expectation of privacy but it works…I think [patients] have better access to email than they do their own phone at times… I would much rather do that on a secure system." – Pharmacist 3

> "…having that secure venue for that communication versus what we do now through the email system that I use" – Nurse Practitioner 3

Table 6 AHP Use of Email for Patient Communication

Total AHPs Interviewed	**14**
Currently using Email for Patient Communication	6
Can Identify Potential Use for Secure Messaging with Patients	14
Reasons Cited for Email Use	Medication adjustment; Over-the-counter treatment recommendations; Logs of patient home readings; Non-urgent inquiries/requests by patients unable to come to the clinic;

4.2.2 Referral Based Services

Pharmacists, dietitians, occupational therapists and social workers described their services as referral based. Patients require a referral from a physician or nurse practitioner in order to access their services. Nurse practitioners, the registered practical nurse, and the physician assistant mentioned that they provided regular care for a broad range of patients. They are directly accessible to patients, requiring no referrals. *(This differentiation will be cited throughout as it affects the various themes extracted. For the purpose of this discussion, going forward for the first group, requiring referrals, the term "Consultants" will be used. Figure 6 shows the two separate groups)*

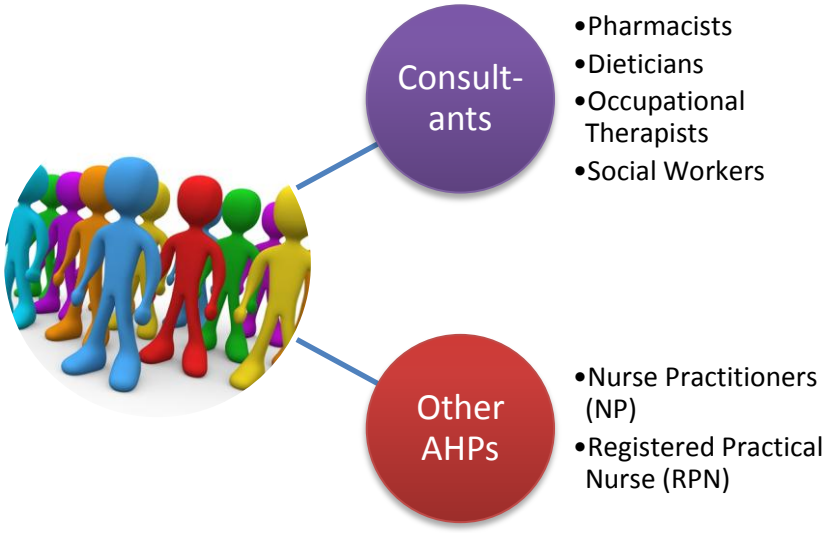
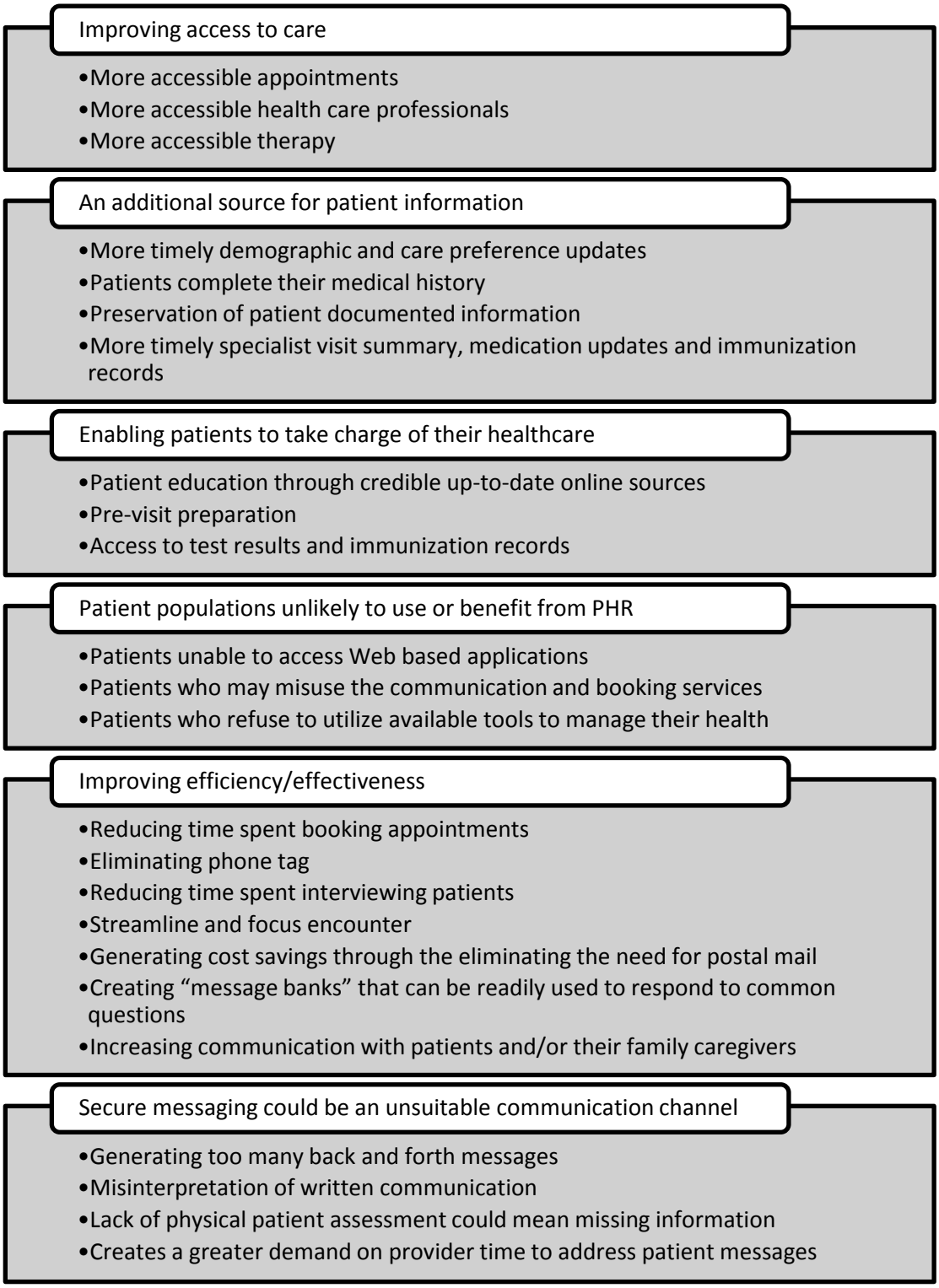
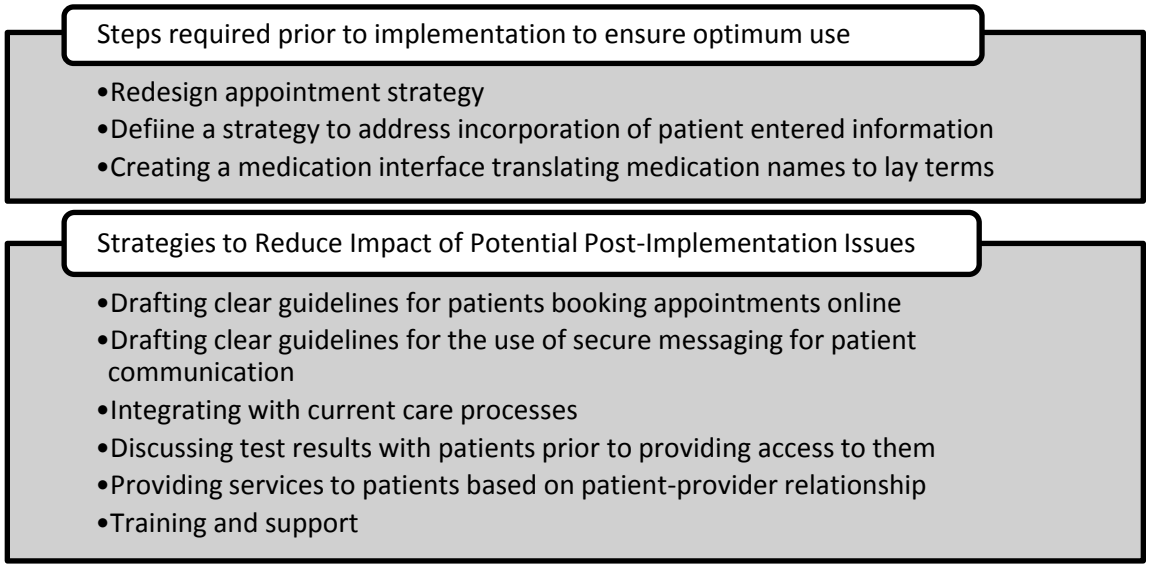


Figure 6 AHP Service Type Groups

Figure 7 AHP Themes





4.2.3 Theme 1 – Improving Access to Care

More Accessible Appointments

Participants indicated that they expect providing patients with the ability to book their own appointments online to make appointments more accessible to patients. Currently, patients unable to come to their appointments may be deterred from calling the clinic, for reasons such as busy lines. If online rescheduling or cancellation is designed to be easy to use, patients are likely to utilize that function and should be encouraged to do so. This would free up appointments for other patients to book and reduce the number of no shows.

Most consultants indicated they managed the majority of their appointment booking. Booking appointments with patients over the phone may result in multiple exchanges of voice mail messages until an agreeable time is found. Patients and consultants are not constantly available to receive calls. Online appointment booking would allow consultants to share open slots from which patients can directly select.

Additionally social workers cited electronic communication as a way to ensure patient referrals are processed. This would be done by sending patients a secure message indicating that their referral has been received and they should hear back from the clinic within 3 weeks. The patient would be asked that if they do not get a call or email in the specified time period, they should call the clinic as their referral might have been lost. This serves as insurance that all patients referred do get processed and appointment are scheduled for them.

> "…for setting up appointments, because I'm not here every day and I don't have a place to phone to talk directly to me, I have to leave a message, does this appointment time work for you, if this doesn't work let me know some other ones, then they phone me back and leave me a v/m message, I get the v/m message that that time doesn't work and those times don't work either, this time would be better, then I have to phone them back, yes this time would work for me, no that one is no good how about another time, so there is like 4-5 phone calls sometimes to just set up an appointment." – Occupational Therapist 2

> "…it would also let them know yes they are indeed on the [waiting] list and they could be told, if you don't get this information in 3 weeks email us because maybe the referral got lost. So we would never have the situation where, because occasionally a referral gets misplaced." – Social Worker 2

Electronic communication through secure messaging can also be used to inform patients that they are due for an appointment and need to schedule one. This process currently involves phone calls, which if not returned are followed by a letter mailed to the patient's home address. Secure messaging could be used in this scenario to replace calls and/or postal mail. An electronic message with a link to directly book an appointment would allow patients to access appointment through a single medium and a lower number of steps.

More Accessible Health Care Professionals

For patients and providers, secure messaging represents an additional communication channel that can be more convenient than phone calls. The asynchronous nature of electronic messaging does not require both parties to be available at the same time to exchange information. Thus, providers are able to address patient

> "…the convenience that we all know and find from email and electronic messaging could certainly carry over into medical treatment." – Physician Assistant

> "Particularly helpful for certain sections of the population like students who maintain us as their primary care provider but live away… people who you know live locally but maybe work in Toronto and they have a better way of communicating." – Nurse Practitioner

questions at a time most suitable for their schedule. Patients are able to send questions and review answers at their convenience. Electronic messaging would benefit specific patient populations such as those living locally but commuting to work, students returning home for holidays, and patients spending long periods of time in seasonal homes.

> "…the patient could email or update their chart saying they are on antibiotics, but I guess the only caveat is that you have to make sure someone on the other end gets that information in a timely fashion." – Pharmacist 2

Moreover, in situations where patients need to notify providers of changes in their medication or condition, messaging is a suitable avenue. This requires a mechanism to ensure that information is seen by the appropriate provider or incorporated in the patient's record in reasonable time.

> "…I think the MyOscarMyOSCAR could also help us mental health therapists just to see how people are doing, how people are managing…" – Social Worker 2

Additionally, messaging can be used by providers to maintain a connection with patients in between appointments. If a patient sees a specialist, they are able to update their providers on changes they're making. Patients are able to report on treatment progress alerting providers of any serious issues. Mental health patients were cited as a group that would benefit from an email from their provider, in between appointments, checking up on their condition and progress.

More Accessible Therapy

Participants identified certain therapeutic processes that could be facilitated by using secure messaging. This makes therapy more accessible by eliminating travel times and schedule restrictions on patients.

Some examples cited by participants are:

Insulin Titration: This is something that can be managed over secure messaging, eliminating the need for an appointment. A patient is only required to send in measurements of their blood glucose levels taken at home, to which a provider can respond with recommendations on insulin doses and diet.

> "So we do that a lot through email so they send me in their blood sugar log books via email and gives me a chance to read it, review it and then I email them back suggestions for changing their medication or other supportive things that they might need." – Nurse Practitioner 3

Replacing Follow Up Calls: Counselling provided over the phone could almost entirely be replaced with secure messaging. Depending on a provider's role and preference, a significant portion of their work may currently utilize telephone follow up.

> "[Secure Messaging] gives us faster access, it gives us immediate access and it might prevent an appointment" – Social Worker 1

Patients Unable to Physically Come to an Appointment: Patients with mobility issues or social anxieties can be offered some treatment over secure messaging and/or utilizing online tools.

> "…someone who is not able to come here because of social anxiety…completing an online questionnaire or do the homework for CBT, cognitive behavior therapy, there is a lot that can be done online rather than having to see the person." – Social Worker 2

Continuity of Care: Patients are referred to Consultants to treat certain conditions or symptoms. When an episode of care is complete, the patients no longer come in for regular appointments. At that point, patients and providers may wish to keep in touch to address issues that may arise occasionally. These issues may be addressed through brief counselling using messaging or by sharing community resources with the patient. This provides the patient with access to therapy outside of conventional care when they need it.

> "I'm more likely to want to use my Oscar with the patient that I finished with who hits a bump on the road 3 months later… and I could give them back some feedback…I've already seen that I have a relationship with…" – Social Worker 1

4.2.4 Theme 2 – An Additional Source for Patient Information

More Timely Demographic and Care Preference Updates

MyOSCAR offers an opportunity for patients to communicate changes to their personal information, such as a new address or telephone number. Additionally, they are able to document changes to their preferences such as allowing the sharing of health information with family members or a change in the power of attorney. Updated information helps professionals provide better service. A patient with a new telephone number would be very difficult for the clinic to reach. Allowing them to send quick messages to the clinic with their new or preferred contact information would facilitate communication of vital information.

Patients Complete Their Medical History

A complete history is collected for every new patient. Updates or changes to medical history could be missed after that. Patient prompts and reminders could ensure that they record any updated information and share it with the clinic.

Preservation of Patient Documented Information

Some patients are required to complete standard questionnaires or progress tracking sheets, at home or in the clinic's waiting room, as part of their assessment. Depending on the patient's condition there may be numerous sheets that are not necessarily scanned into the electronic record. Allowing patients to fill these electronically presents the opportunity for integrating them into the patient's record or at least retaining copies as part of the patient's own record.

More Timely Specialist Visit Summary, Medication Updates and Immunization Records

Patients receiving services outside the clinic need to alert their care providers of changes in their medications, diagnosis or immunizations. If the clinic's record is shared with a patient, they are able to identify missing information such as immunizations received at different locations. After a patient visits a specialist they can promptly message any medication changes or new diagnosis to their provider without the need to wait for an appointment or waiting for business hours to place a call.

> "Any amount of information that we have from the patient about changes or updates or more complete picture of their health, whether it's a more complete picture of their immunizations or their BP, anything, that is always helpful. " – Nurse Practitioner 2

4.2.5 Theme 3 - Enabling Patients to Take Charge of Their Healthcare

Patient Education through Credible Up-To-Date Online Sources

All participants found that MyOSCAR provides a good opportunity for patient education. Through secure messaging, providers can address patient questions and attach links and documents that patients can refer to. Printed information is more likely to be lost while electronic messaging can be accessed any time form virtually anywhere. Periodic newsletters currently mailed to specific patient populations could be made available in electronic form through MyOSCAR. Since this eliminates printing and mailing, newsletters can become more frequent and archives of older issues would be accessible.

Pre-Visit Preparation

Preparing a patient for a visit is especially helpful for patients with chronic diseases; for instance, it could facilitate monitoring vital signs to control medications such as insulin and blood thinners. Reminders for patients to complete their tracking and send their information prior to their appointments ensure they are well-prepared for their visit. Patients filling forms or reporting on progress against treatment goals using MyOSCAR can do so at their convenience, allowing them time to think and provide more detail if possible. It may prompt them to ask questions of their provider and send them prior to their visit. The patient is therefore well-prepared for their visit and has thought through issues that can be discussed during the visit. Forms given to patients to fill prior to procedures or visits, such as the pre-op form, tend to get lost by patients. Providing electronic copies of all forms for patients, along with standard checklists for specific visits enables patients to be well-prepared and involved in their care.

> "… to get them prepared for the visit, it would be a wonderful idea because a lot of chronic disease management is all about helping that patient be better prepared for the visit."
> – Dietician 1

Access to Test Results and Immunization Records

Providing patients with access to parts of their medical records would increase their awareness of the progress of their health conditions. Parents with copies of their or their child/ren's immunization records are able to identify missing immunizations, playing a bigger role in the management of their child/ren's or their own healthcare. *(This is currently managed through a small booklet handed to parents of a newborn which is quite easy to misplace.)* The ability to login and print an immunization record whenever it is required presents a value add for

patients. It is necessary to ensure that any information provided to patients is easy for them to understand. Records filled with medical jargon will only serve to confuse.

> "…public health sends out notices to parents, saying…these immunizations are not up to date, a parent could…review that and see whether they need to book an appointment to come in or…just… submit that new information to public health because sometimes they come in for the appointment [only to] put the dates when the immunizations were actually given, they don't need any more shots…" – Registered Practical Nurse

Patients seeing a number of specialists require a copy of their test results with them at these appointments. Ideally, these are faxed to the specialist by the clinic to prevent unnecessary repeating of tests. Often, faxes are lost, so patients are usually provided with a copy of their tests to take to their specialist appointment. Patients travelling to other provinces or countries could save the cost of expensive tests by keeping copies of their most recent test results, in case they require medical attention during their trips. In these situations, test results available through MyOSCAR provide a better solution than paper that can be lost or insecure email.

4.2.6 Theme 4 – Patient Populations Unlikely to Use or Benefit from PHR

Although all participants agreed MyOSCAR would be of some benefit, many stated that certain populations will not be able to harness those benefits.

Patients unable to access Web based applications

Although access to the internet has spread to the point that it is almost unimaginable in Canada, that some people do not have access to a computer or the internet. Yet, for example, among the population receiving mental health treatment in primary care by social workers there

are many who may not be able to access the internet. Elderly patients may find it challenging to learn to use new technology or may not have access to internet services. Many of the chronic disease patients treated by AHPs are elderly and low-income patients. Language proficiency and literacy could be an additional barrier for some patient populations.

> "…the nature of our patient population as I am sure that many clinics have… lower income patients or patients with poor literacy… we also have quite a large elderly population and I don't know how comfortable they would always be with computers." – Clinic Manager 2

Patients Who May Misuse the Communication and Booking Services

Participants indicated that they expect a small percentage of the population will misuse access privileges. They may book appointments unnecessarily or attempt frequent unnecessary electronic communication. This is an issue that exists within the current system and is expected to carry over.

Moreover, some participant expressed concern over patients sending urgent messages and expecting an immediate response. Participants currently using email for some of their communications were less concerned about this issue, stating that patients have been compliant with their rule about not sending urgent messages.

> "…certain populations seek healthcare probably more frequently than they may need to" – Nurse Practitioner 1

> "…we can't be all things to all people and when you open the communication, you become all things to all people because everybody else has shut down their access in the system" – Pharmacist 3

Patients Who Refuse To Utilize Available Tools to Manage Their Health

Patients cannot be forced to use available tools to manage their care. Some patients do not pay enough attention to their health, missing appointments and ignoring reminders. For these patients, MyOSCAR and all other tool are not expected to help.

> "…there is a whole other group of patients that I can call 10-times to come in and they'll never come in… but they are probably the people that are not on MyOSCAR anyway" – Physician Assistant

4.2.7 Theme 5 – Improving Efficiency/Effectiveness

Reducing Time Spent Booking Appointments

Consultants managing the booking of their patient appointments may spend a lot of time finding an agreeable time and date, especially for harder to reach, busy patients. Allowing patients to book their appointments online will save those consultants around 5-10 minutes per patient.

Eliminating Phone Tag

If a provider is unable to reach a patient over the phone, they may leave a message for them to return their call. Not all patients have voice mail, so a provider may need multiple attempts to reach a patient. On the other hand, the provider is not always available to get calls. Phone tag is the process where

> "…you don't like to leave a detailed message because of confidentiality; you don't know who is listening to those messages" – Registered Practical Nurse

> "…the phone tag is a huge thing for me that is huge, takes a lot of our time." – Social Worker 2

patients and providers require multiple attempts to finally be able to exchange information over the phone. The privacy of messages left on voice mail is unknown, limiting the information that can be shared through them. Secure messaging is likely to reduce time spent by providers attempting to communicate with a patient. A provider can simply respond to a message at a time that is convenient for them.

Reducing Time Spent Interviewing Patient

In cases where information could be collected from a patient prior to their visit, a lot of the information could be provided directly by the patient. Participants indicated savings of around ten minutes from appointments generally around an hour long.

> "…a lot of information they could actually fill out before they come in and then send to us and that saves time, we can review beforehand if we want, I find that would be helpful." – Nurse Practitioner 3

Streamline and Focus Encounter

Patient provided information, such as glucose logs, treatment goals and questions/concerns sent prior to an encounter can serve to make it more effective. For instance, a dietitian receiving glucose and food logs would be able to review them and think of multiple courses of action that can be discussed with the

> "Often times they will come in with a big laundry list of what they want to talk about so maybe if they summarized their thoughts in their chart or whatever that looks like, then that might be useful and time saving to have it sort of put all together and then we can kind of prioritize, based on their lists" – Physician Assistant

patient. An encounter would be guided by the patient's preference and focus on their goals making effective use of appointment time and satisfying the patient. Patients can use secure messaging to send in their questions or goals before the encounter. In addition to that, patients booking their appointments online may feel more comfortable describing in more detail why they would like to be seen. Often patients might be reluctant to share that information with front staff.

Generating Cost Savings through Eliminating the Need for Postal Mail

Costs associated with mailing information or documents to patients can be avoided through using electronic communication. These include labor and material costs.

Creating "Message Banks" That Can Be Readily Used to Respond to Common Questions

As the use of secure messaging to patient questions matures, templates can be created from frequently asked questions. Secure messaging offers the opportunity to document responses and re-use them with little additional effort. That way research used to address one patient's concerns is not lost.

Increasing Communication with Patients and/or Their Family Care Givers

The convenience of secure messaging could increase communication between patients and providers which may transform their relationship and allow for alternative modes of delivering therapy. Communication extends to family caregivers who can be provided with access control over their charge's health record. For instance, they could communicate non-urgent health issues that could facilitate the monitoring of patients with dementia or changing symptoms of

end-stage illness. AHPs could provide instruction and advice to assist caregivers in providing care.

4.2.8 Theme 6 – Secure Messaging Could Be an Unsuitable Communication Channel

Generating Too Many Back and Forth Messages

Despite saving time, for example by eliminating phone tag, secure messaging could be inefficient in some situations. Situations where multiple messages are exchanged back and forth without resolving the issue might be better addressed over the phone or with an in-person visit. Certain interviewing styles that guide interventions, such as motivational interviewing with open-ended questions cannot be carried out over secure messaging.

> "…A quick question, it will be fine…but that counseling piece, that what do you think will work for you? … will require a lot of back and forth questioning and that could end up taking more time than just a quick phone call" – Dietician 1

Misinterpretation of Written Communication

Written communication carries the risk of misinterpretation. Providers would need to ensure the language they use could be easily interpreted by the patient as they will not be able to find out what the patient has understood except if the patient responds. Otherwise, the patient could read their message and simply take action based on what they understood. There is also the risk of offending a patient through a certain writing style that they may find unacceptable.

> "…because if I gave you some input but phone or by email and you go off and you didn't quite understand and something goes wrong, that's a risk" – Occupational Therapist 1
>
> "…we have to be careful what we type because what we think is appropriate words to use, might not be on the other end" – Nurse Practitioner 3

Lack of Physical Patient Assessment Could Mean Missing Information

Body language helps assess a patient's complaint. Over the phone, a person's tone could provide hints to their state. A conversation carried over the Web lacks these subtleties that can help guide a provider's response.

Creating a Greater Demand on Provider Time to Address Patient Messages

AHPs not accustomed to online communication may require a period of adjustment where they would be spending more time responding to messages than they would like. Responding to messages is viewed as an additional requirement that would require the designation of dedicated time. In order to respond to a patient request or question over

> "…just be another thing for me to check" – Pharmacist 3
>
> "[Messaging] could be done during your administration time so it's not taking away from your other patient appointments" – Nurse Practitioner 3

secure messaging, a provider may need to review their chart to refresh their memory. In contrast, during a visit the provider is already focused on the patient and has reviewed their chart; it has been accounted for in the appointment scheduling. Other requests or questions may require a considerable amount of research to respond to, involving several attachments and resources not readily available. That creates an additional demand on an already busy schedule. A nurse practitioner already relying on email in many of her communications downplayed concern over time, citing a learning curve after which time savings will be attained. *(This concern can be mitigated through the effective use of the "message banks")*

4.2.9 Theme 7 – Steps Required Prior to Implementation to Ensure Optimum Use

Redesign Appointment Strategy

In order to allow for booking appointments online, providers would need to set aside specific appointment slots. Durations of appointments and types of appointments that can be booked must be defined. Calendars must be accessible by MyOSCAR and maintained and updated with changes such as vacation time.

> "… [patients] normally wait for us 2-3 weeks, it's not like same day booking for them. So I would have a day available once a month that would become available the week before [for online booking]" – Social Worker 1

Devising a Strategy to Address Patient Entered Information

Would patient entered information be integrated into the patient's records? Who would be responsible for reconciling medications in the patient entered record and physician maintained

record? These questions were posed by pharmacists interviewed. If medication lists created by the patient are going to be shared with other providers or integrated into their record, the specific medication reconciliation approach that will be adopted must be defined. (*Once such a strategy is defined, patient entered information could be utilized to its full potential.)*

> "…if I can build a dictionary for patients and link those words to relational fields I've got gold, I don't have a bunch of babbling free text." – Pharmacist 3

Creating a Medication Interface Translating Medication Names to Lay Terms

An experienced pharmacist stated that by using free text to record medications in MyOSCAR, that information is not very useful. In order for patient entered medication lists to be useful to pharmacists, they would need an interface that is able to translate data entered by patients to relational fields that can be imported and reconciled with medication lists in the pharmacist's system.

4.2.10 Theme 8 – Strategies to Reduce Impact of Potential Post-Implementation Issues

Having Clear Guidelines for Patients Booking Appointments Online

Restrictions on types of appointments that can be booked and their durations prevent misuse and ensure better booking practices. It would be beneficial to be able to personalize access to certain appointments, based on patient needs. A clear policy should be outlined for patients to manage their expectations and prevent frustrations.

Having Clear Guidelines for the Use of Secure Messaging for Patient Communication

Participants agreed that it is important to include a disclaimer outlining what types of communications could be handled through secure messaging and what response times patients can expect. This is necessary to prevent frustrations caused by what patients would take as delayed responses and also inappropriate use of messaging for issues that would better be handled through an in-person appointment.

Integrating With Current Care Processes

Participants cited examples of tasks that could be completed with the use of MyOSCAR, provided that MyOSCAR is designed to complement the current process. For instance, patients on blood thinners must inform the clinic if they start taking antibiotics. It is important that this information is noted in their chart. If patients are allowed to use secure messaging to deliver that information, there has to be a way to ensure it is incorporated into their chart in a timely fashion.

Another example of where MyOSCAR must integrate with current processes is patient questionnaires. Specifically, questionnaires designed with sections that a patient can complete and others that require provider input. The electronic versions of these should be able to integrate all sections and cater for varying response lengths, comments and annotations.

Discussing Test Results with Patients Prior to Providing Access to Them

Currently, a health professional is required to explain test results to patients before they are made available to them. Similarly, if test results are accessible to patients through MyOSCAR,

they must be explained by a health professional first. This ensures that a patient understands what the results mean and what action, if any, they need to take.

Providing services to patients based on patient-provider relationship

Utilizing MyOSCAR largely depends on the patient. Based on a provider's relationship with a patient, they can anticipate which patients would probably make the best use of MyOSCAR. Especially for secure messaging, it is recommended to open that channel only for patients with an active relationship with the health professional they want to communicate with.

> "…you know somebody well enough so you know how they respond to things," – Occupational Therapist 1
>
> "There are patients that I…if we could communicate via [MYOSCAR], it would be very useful, productive and helpful. There are patients I have that absolutely I would not want [communicating via MyOSCAR] " – Social Worker 1

Training and support

Providers require assistance with new activities required for the effective use of MyOSCAR in patient communications, such attaching documents. Levels of technical proficiency are expected to vary across the spectrum of roles in allied health, therefore, training programs must cater to all needs to ensure proper adoption and smooth transition to new communication options.

5. Process Analysis

5.1 Front Desk Process

Based on support staff interviews and revision of the clinic's policy we find that the role of the receptionist at the front desk[6] is conducted primarily over the phone. Three main processes are carried out by receptionists primarily over the phone: appointment booking, call triaging and information dissemination. Additionally, when patients come in for an appointment the process by which they receive care comprises the checking-in activity carried out by the receptionist.

Information dissemination is the process by which patients receive information from the clinic, where calls could either originate from the clinic or the patient. The clinic may call patients to inform them of test results being available or specialist appointments that have been booked for them.

Patients calling with health concerns are triaged to the appropriate health professional. If a health professional is unreachable, the receptionist takes a message and arranges for callback. Calls to the clinic's voice mailbox are not returned, a patient must speak to a receptionist.

Below, we firstly discuss appointment booking and related improvement opportunities. The automation of appointment booking also presents an opportunity to speed up the check-in activity. Next, we discuss receiving/making calls to patients and related improvement opportunities.

[6] Receptionists may take on some back office tasks such as filing and basic billing/accounting. These are out of scope for this study.

5.1.1 Appointment Booking

All FHTs are mandated to improve access to their services. The McMaster FHT succeeded in a phased implementation of "Open Access" started close to a year ago. This entails that appointments with family physicians, residents, nurses and nurse practitioners are booked on a same- or next- day basis. Patients are advised to call as early in the day as possible, before 10 am, to book an appointment; this creates a "block" period where all clinic lines are busy. As such, patients with less urgent matters are advised to call later in the day.

Open access booking is not implemented universally at Queen's FHT. Yet, there are a number of same day appointments available for patients. Clinic management is planning to increase the number of same day appointments available, in addition to other plans to improve access to services.

The appointment booking process for both clinics is very similar. Additionally, Queen's staff also experiences similar peak periods where there is a long queue of phone calls to book appointments.

The "Appointment Booking" process starts with a patient having symptoms or concerns. They call the clinic to request an appointment. If they get through to a receptionist, she inquires about the reason for their request and reviews available slots that match the patient's reasons for a visit. She offers an appointment with a resident first, if the patient rejects that, she will attempt to find an opening with the patient's physician. Patients can also be offered appointments with a nurse or nurse practitioner. When an appropriate slot is agreed upon the receptionist books the appointment on the clinic's system. This process is shown in Figure 8.

Rules for booking appointments are based on physician preferences and vary from physician to another.

The term “Message” used in the Figure 8, **Error! Reference source not found.** and consecutive figures refers to any information exchanged, regardless of the medium. For instance, when a patient requests an appointment they share information with the receptionist regarding the reason for their request and identifying information. Information exchanged using activities marked as MyOSCAR activities are electronic messages.

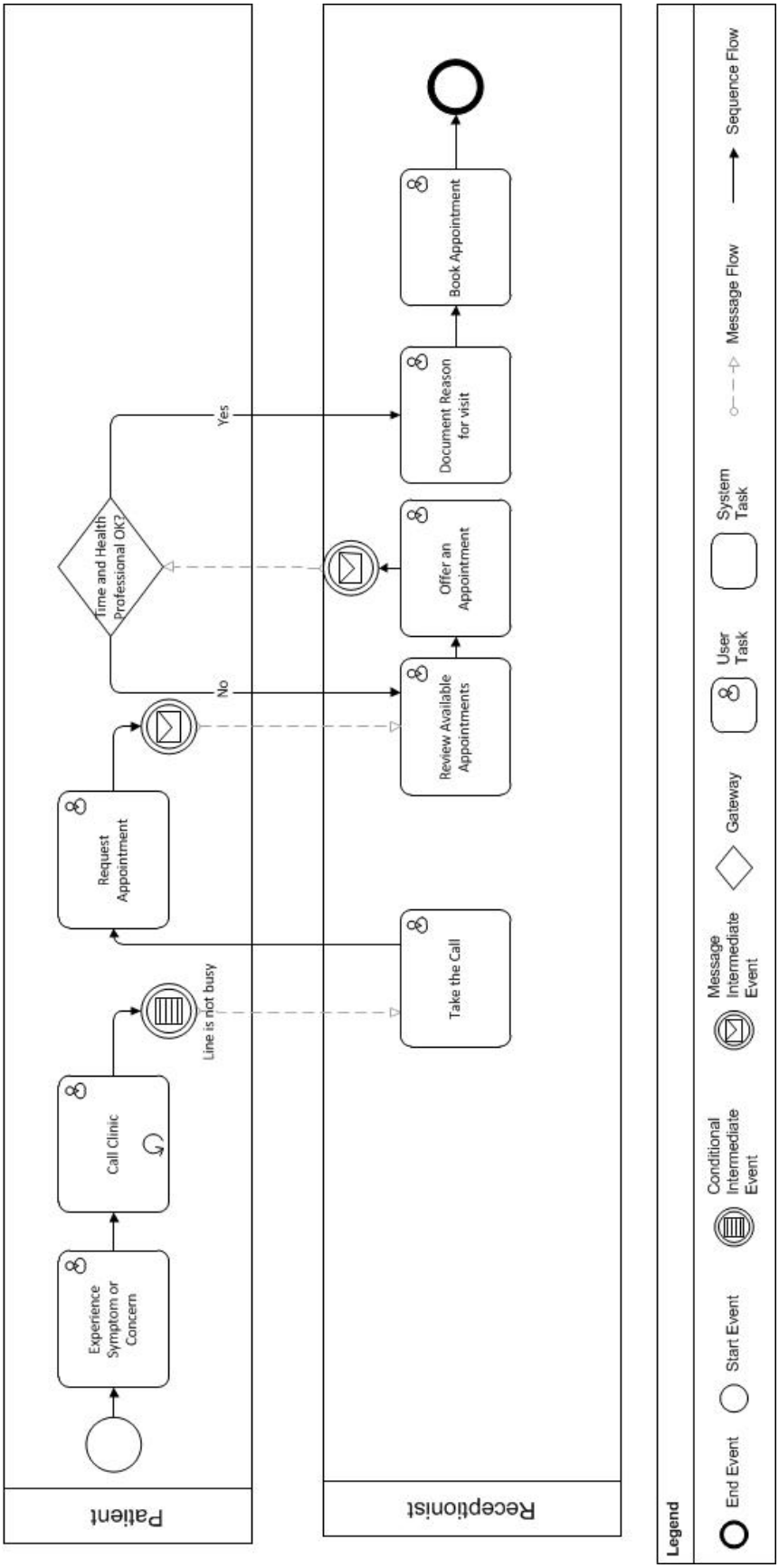


Figure 8 Appointment Booking Process

Improvement Opportunities – Automation

During peak periods, all lines could be busy causing a patient to redial numerous times or be put on hold until they are able to book their appointment. This translates into several issues:

1. the patient is wasting time waiting to get through,
2. receptionists are rushing through the booking to answer more incoming calls and
3. patients with other requests may not be attended to properly.

The "Appointment Booking" process could be fully automated through MyOSCAR, allowing patients to carry out the process independently without relying on receptionists. This could alleviate a significant portion of the receptionist's load, allowing for more time to be spent on back office tasks and information dissemination. Since the patient population includes those less likely to adopt online booking, such as those without convenient access to a computer and elderly patients, receptionists would continue to book some appointments.

Online appointment booking would be a module in MyOSCAR, accessible through the same secure log in process. A drop down menu would allow patients to select the type of appointment they wish to book. Based on the type selected, appointment duration is set. Additional variables could also be controlled such as available days and recommendations regarding the health professional to book. Patients are prompted to insert additional notes such as questions to the provider and detailed description of symptoms and concerns and their duration. They may control who views these additional notes. The automated process is shown in **Error! Reference source not found.**.

Improvement Opportunities – Data Verification

The process of checking patients in entails a confirmation of their demographics. Specifically, the address must be verbally confirmed by reading out the address on record and confirming there is no change. The automation of the booking processes offers an opportunity for the confirmation of demographics at the patient's leisure in the comfort of their homes.

With online booking, a patient is prompted to review their demographics after they confirm their appointment selection (see **Error! Reference source not found.**). The front desk is electronically notified of any changes. The incorporation of the changes into OSCAR (the patient's EMR) could either be automated or may require manual updates.

Improvement Opportunities – Process Standardization

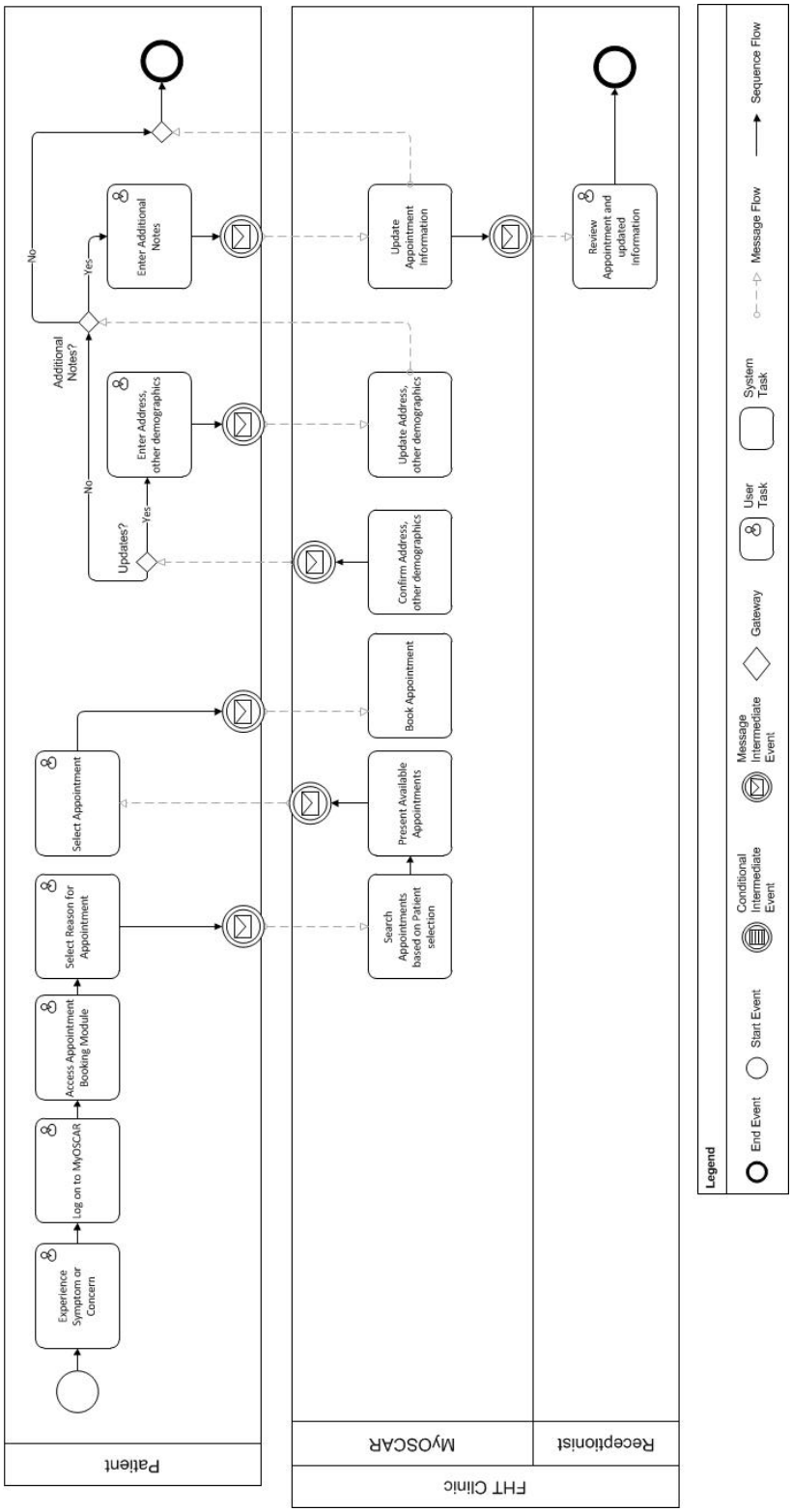
Variation between physician preferences prevents the sharing of staff across teams. A team may include around 8 physicians and 12 residents, in addition to nurses, each with their own appointment preferences. The SFHC clinic manager mentioned efforts within the clinic to encourage physicians to allow for a more standardized appointment booking process. The design process for the appointment booking module could present an opportunity to discuss process standardization.

5.1.2 Receiving/Making Calls to Patients

Front desk receives all calls to the clinic. Patients cannot access providers directly. Receptionists receiving patient calls either address their questions based on information available to them or triage the call to a health provider. The following table summarizes the issues and potential improvement opportunities with MyOSCAR secure messaging and online information options related to addressing patient questions:

Issue	Improvement Opportunity
Patient/Receptionist is delayed waiting to get through a busy line or go through "phone tag"	With secure messaging, a message can be sent at the sender's convenience and accessed at the recipient's convenience. This asynchronous communication is best for non-urgent matters.
Patient may lose information provided and repeatedly call the clinic	Providing patients with information in an electronic message provides an audit trail and allows them to reference the information when needed
Patient calls to inquire about clinic or community services	Providing links to websites with detailed information regarding clinic or community services will eliminate these calls.

Figure 9 Automated Appointment Booking Process



5.2 Treatment Process

Allied health professionals participating in this study were asked about the process they use to provide care for their patients. The main focus was on those activities or processes directly involving patients as these are the ones relevant to MyOSCAR. The overall process comprises activities involved in one cycle of care that targets a specific complaint; it is identified as the "Provide Treatment Process". The "Provide Treatment Process" shown in Figure 10 is comprised of the following subprocesses: "Book Appointment", "Prepare for Visit", "Conduct Visit" and "Provide Phone Consult". Each of these subprocesses is comprised of a set of tasks (activities), one or more of which will be impacted by MyOSCAR.

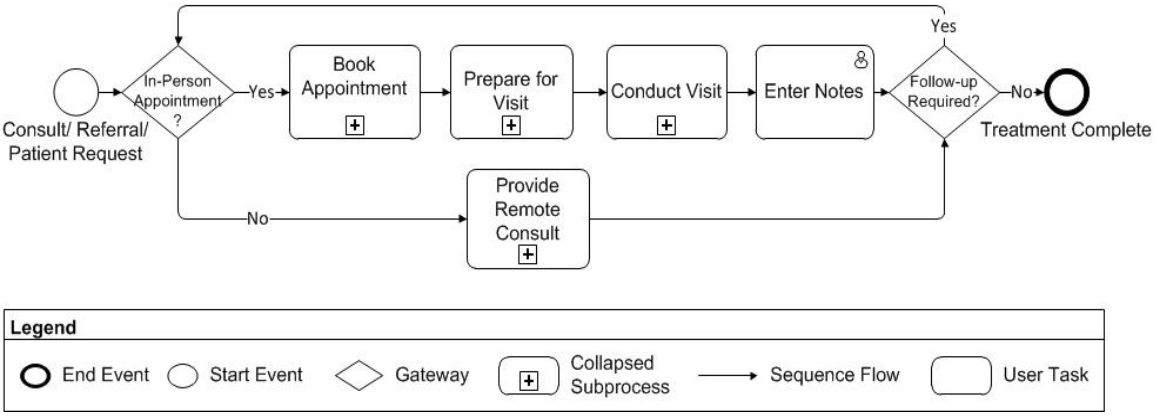


Figure 10 "Provide Treatment" Process

Next a description of the "Provide Treatment Process" is provided followed by the description of subprocess. The implementation of MyOSCAR may eliminate tasks, transfer task responsibility to a different role or introduce new tasks all together. For each subprocess, anticipated changes, after the implementation of MyOSCAR, are shown on a separate process

diagram. Opportunities for improvement and impact on stakeholders, based on information provided by participants, are then described.

5.2.1 "Provide Treatment" Process

As shown in Figure 10, the trigger event initiating this process is a message that either comes in the form of a consult/referral request from another health practitioner or a request from the front desk on behalf of a patient. In this context, a message is a piece of information shared by one party with another either electronically or verbally. Consults for instance may come to providers in an OSCAR message, a formal consult request through OSCAR or in-person. The request received could be for an in-person appointment or could be addressed in a phone (remote) consult. If an in-person appointment is required, the "Book Appointment" process starts. Providers indicated following different booking practices. Before the patient arrives, the provider reviews their information and prepares for the visit ("Prepare for Visit"). The activities required to prepare for a patient varies from one specialization to the other. A pharmacist for instance, may need hours of review to analyze a patient's prescriptions and related diagnosis. On the other hand, a Physician Assistant or RPN seeing patients all day would only be able to do a quick review. Following the patient's visit the provider enters their notes into the patient's medical record. If follow up is required the process repeats until treatment is completed. This overall process remains the same after the implementation of MyOSCAR. Changes would be made to the details of some of the subprocesses. For instance, "Provide Remote Consult" could be delivered through electronic secure messaging when it is available through MyOSCAR, versus the sole option of phone consults preceding the implementation of MyOSCAR.

5.2.1.1 "Book Appointment" Process

The appointment booking process could be carried out through the front desk or directly by the provider. Figure 11, shows the current referral appointment booking process. The labeled rectangles, known as swim lanes, identify the role responsible for the enclosed tasks. If a referral is booked through the front desk, the tasks in the provider's swim lane will transfer to front desk staff.

The "Book Appointment" process starts after the need for an in-person appointment is identified. The patient is then contacted, usually through a phone call. The provider then offers available openings and the times are negotiated until an agreeable time is found. The opening is booked for the patient and the provider requests information that the patient needs to bring to the appointment such as a food log (for the dietitian), a medication list or home reading of blood pressure, glucose or INR. The patient acknowledges these requests and would bring that information to the appointment.

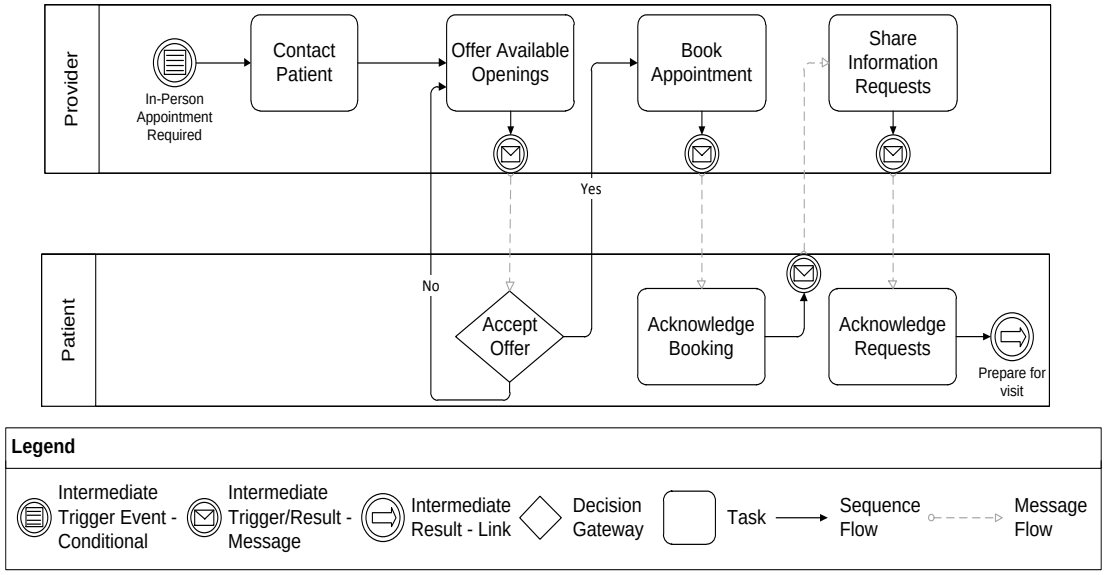


Figure 11 Current Booking Process

This appointment booking process could be fully automated which would address a number of opportunities for improvement. Following, we present the automated process model, after which we discuss the MyOSCAR could create a more efficient booking process.

5.2.1.2 MyOSCAR Appointment Booking

In the previous section we discussed automating appointment booking through MyOSCAR from the point of view of front desk staff. Receptionists at the front desk are dedicated to answering telephone calls. For allied health professionals, not near a phone all the time, booking appointments could be a challenge. Additionally, AHPs frequently request patients to record or track some sort of data; that could be their blood glucose, blood pressure or food intake. Moreover, they may want patients to review certain information prior to their meeting such as a service contract.

A referral based process starts at the clinic which contacts the patient to offer an appointment. With online booking this can be achieved through a secure electronic message sent to the patient detailing to them again why they are being offered this service, available openings and information required from them prior to the appointment (such as blood glucose logs). The patient then goes on to booking the appointments and could set electronic reminders to be sent to his/her inbox. Information requested in the invitation email could be electronically sent to the provider through secure messaging.

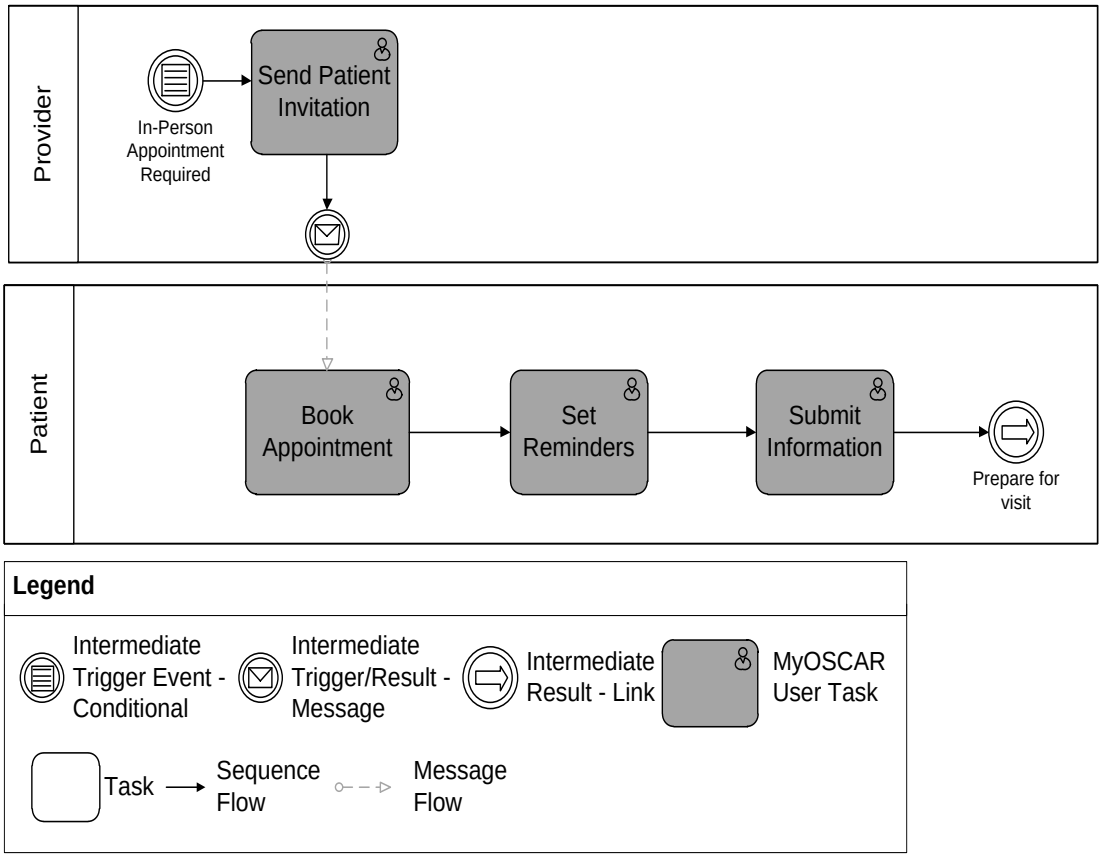


Figure 12 MyOSCAR Enabled Booking Process

5.2.1.3 Opportunities for Improvement – Appointment Booking

The main theme of the redesign of the booking process through MyOSCAR is integration with the patient's (customer's) process. Integration is a best practice in business process redesign whereby a business process is rendered more efficient, from a time and cost perspective (Reijers & Limanmansar 2005). If we were to assume a patient is utilizing email in their daily communications and logging their vital signs on their MyOSCAR record, we could integrate tasks from the booking process into their daily activities.

Send Patient Invitation

A phone call depends on the availability of both initiating and receiving party. Secure messaging, an essentially asynchronous process, removes that dependency. Utilizing

mechanisms such as requesting a read receipt, that alerts the sender when the message is read by the recipient, would ensure information is received. The message sent to the patient informs them of all details that need to be conveyed to them prior to booking their appointment, including tests they need to complete and information they need to provide. A message, being a written form of communication, can be referred to at a later time and allows for the communication of more detailed information than verbal communication. Sending the patient an invitation message is the only task involving the provider in the MyOSCAR appointment booking process.

Book Appointment

The automated process of booking an appointment through MyOSCAR emulates the manual process, where the MyOSCAR system replaces the provider. The patient selects an appointment from those available. This automation has greater flexibility from the patient's point of view (it can be completed at any time, not limited to provider availability). Including an option that enables the patient to cancel or change an appointment adds flexibility to the process. From a provider's point of view, the automation eliminates dependency on the availability of the patient and offers the ability to send detailed information and requests to the patient.

Set Reminders

The patient's utility of MyOSCAR presents an additional opportunity where a patient could create their own customized alerts reminding them of their appointment. If required this step would have been carried out manually through the phone system. If we assume a patient checks their email daily (to which they can forward their MyOSCAR alerts) then we are integrating a

clinic task into their existing process saving time and effort. Electronic reminders could also prove to be more effective as a number of them could be created at various intervals.

Submit Information

If patients are to utilize MyOSCAR to record and track measurements made at home, it presents an opportunity to share this data electronically. In its simplest form this would be achieved by copying the data into a secure message sent to the respective provider. Automatic data exchange, where data is automatically pulled from MyOSCAR into the patient's record in the clinic, with their permission, is a more complex task to achieve.

5.2.1.4 Prepare for Visit

Prior to conducting a visit, all providers review the patient's chart with varying degrees of detail.

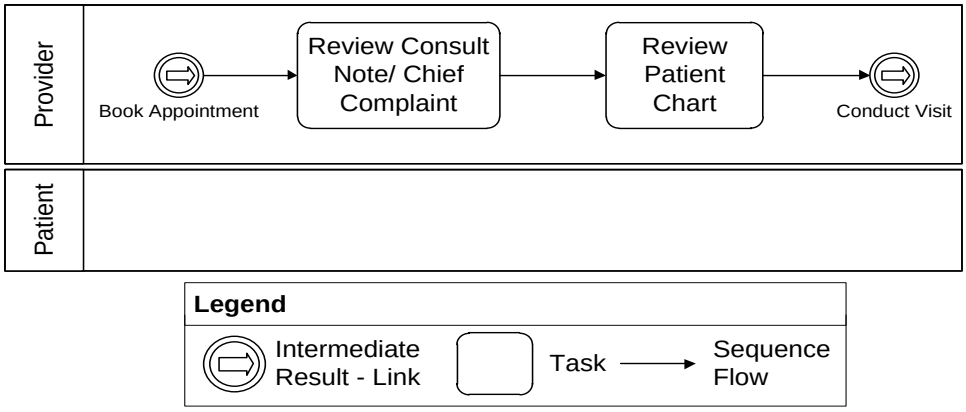


Figure 13 Prepare for Visit

5.2.1.5 Opportunities for Improvement – Preparing for a Visit

The patient's utilization of MyOSCAR to share information adds to the sources that would require the provider's revision prior to the visit. This could cost more time but could promote more effective use of appointment time through focusing the visit. Additionally, a patient could

review information regarding their treatment options, which was sent to them through MyOSCAR, prior to the visit, so they can come well-informed and prepared with any questions.

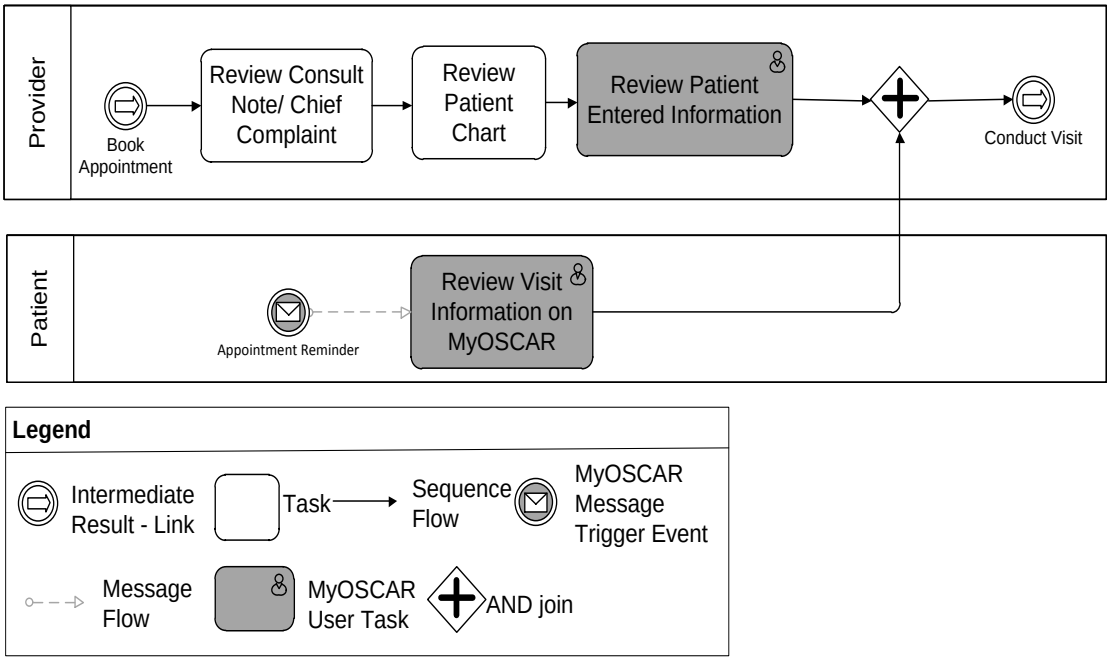


Figure 14 MyOSCAR Enabled Visit Preparation

5.2.1.6 Conduct Visit

Conducting a visit is comprised of three main steps: interviewing the patient, discussing the diagnosis and recommending a treatment plan. The treatment plan is communicated to the patient verbally or in written form for more complex plans.

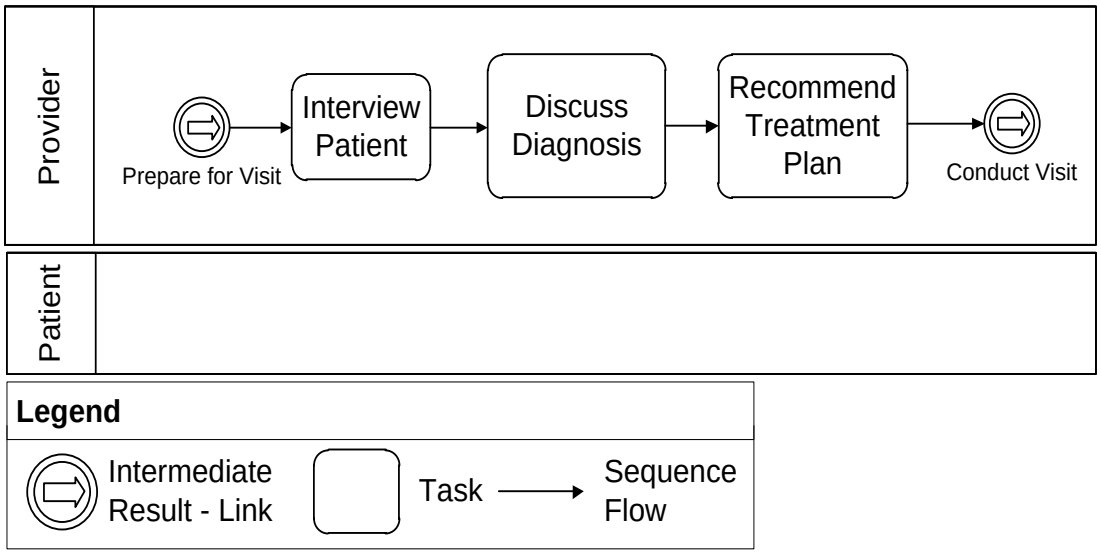


Figure 15 Conduct Visit

5.2.1.7 Improvement Opportunity – Conduct Visit

The use of MyOSCAR secure messaging offers an opportunity to share a copy of the agreed upon treatment plan with the patient to which they can later refer to.

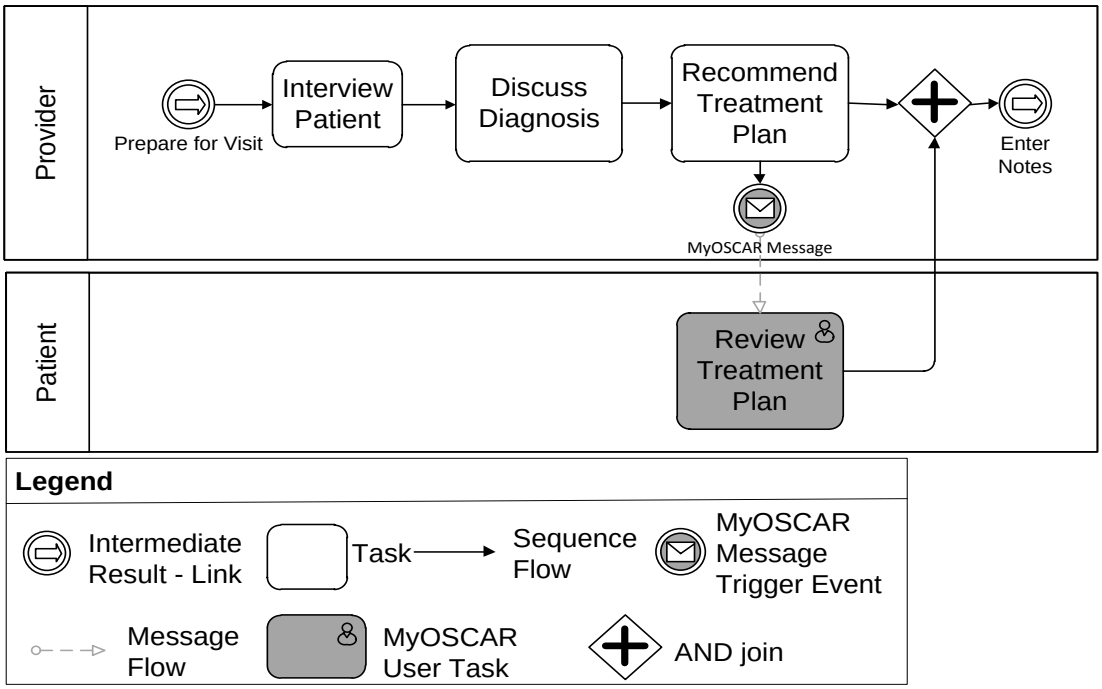


Figure 16 MyOSCAR in Conduct Visit

5.2.1.8 Provide Remote Consult

In situations where a face-to-face visit is unnecessary providers can follow up with patients over a phone conversation. A patient requiring a consult attempts to contact the provider, either through the front desk or by trying to reach them over the telephone. The provider follows up on the treatment, addressing the patient's concerns and updates the treatment plan, if necessary.

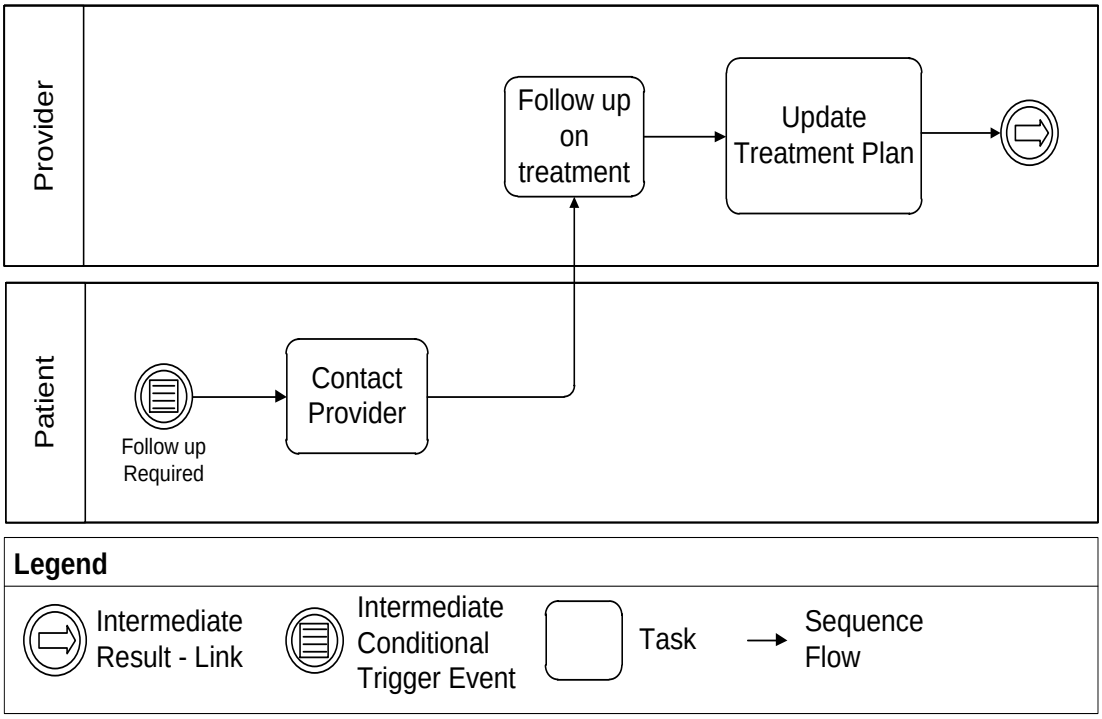


Figure 17 Current Process for Remote Consult (Phone Follow-up)

5.2.1.9 Improvement Opportunity – Remote Consult over MyOSCAR Messaging

The use of secure messaging offers an alternate route to conduct remote consults. With MyOSCAR a remote consult would start with a patient sending a message that contains their complaint or concern, in addition to monitoring data, prescription or any other supporting information. This allows a patient utilizing MyOSCAR to manage their health to engage their

health providers from within the same environment. This follows the concept of integrating treatment processes with patient processes.

After receiving the patient's message a provider assesses if they require a face-to-face visit; if they do the provider would proceed with the book appointment process. Otherwise, the provider composes and sends an appropriate response using secure messaging. The patient reviews the recommendations and has the opportunity to respond with further inquiry.

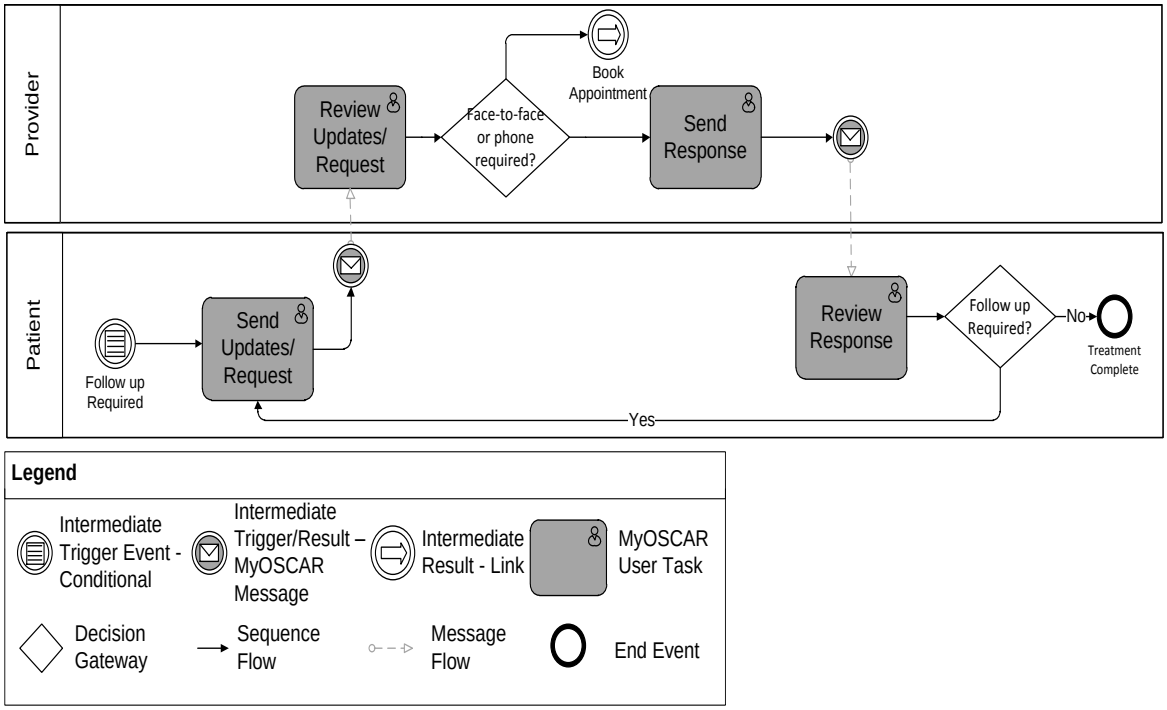


Figure 18 Provide Remote Consult using MyOSCAR

6. Discussion & Conclusion

6.1 PHRs in FHTs

Involving AHPs in the design, implementation and use of a PHR in a clinical setting adopting the PCMH or FHT models extends its functionality and potential benefit. As this study's results illustrate, views provided by a pharmacist, for example, on medication consolidation and tracking are more detailed and specialized than physcians. Another example is social workers, whom by virtue of their profession know of advancements in the field of mental health in primary care, including online tools that can help patients. In a FHT, where we are trying to ensure appropriate care is provided by the appropriate professional, this has to extend to the design and use of PHRs. Tools that incorporate views of all team members contribute to the concept of comprehensive, whole-person oriented care.

Another aspect of FHTs that PHRs contribute to is patient education. In a FHT, patients should be provided with enough information to make the right decisions about their and their families' healthcare. AHPs are involved in the development and provision of patient education in FHTs. For example, dietitians are able to provide specialized resources providing nutrition facts and diet information. The resources available to patients are more comprehensive when AHPs contribute to them.

Finally, opening electronic communication channels between AHPs and their patients extends the range of access patients have to AHP services, allowing them to receive more effective and timely care. Improved access is one of the objectives of FHTs. PHRs can improve access to appointments through more convenient online booking, access to providers through

electronic communication and access to care through "e-consults" that can replace visits. Through "e-consults" and other online tools, patients are able to access healthcare services through the internet. Providing access to PHRs to the subset of patients cared for by AHPs is a logical step, as these tend to be the more complex cases requiring specialized care. These systems though, must be designed in a way that compliments AHP care delivery processes and patient self-management processes.

6.2 Summary of Findings

The objective of this study was to explore the views of AHPs and support staff in relation to the implementation of a PHR in their clinic. Particularly, the target was to understand what would change in the way they complete certain processes, what are the potential benefits and challenges, what are their recommendations to mitigate those challenges. Through the analysis of the data collected in this study we are able to answer the research questions posed:

1. How might an electronic Patient Health Record impact healthcare delivery processes involving allied health professionals and support staff in a Family Health Team?
2. What benefits do allied health professionals and support staff expect from the use of electronic Patient Health Records in a family health team setting?
3. What potential challenges do allied health professionals and support staff anticipate and what mitigation strategies do they recommend for such challenges?

6.2.1 Impact on Work Processes in a FHT

The implementation of MyOSCAR creates a parallel alternative process for some work processes while it enhances other processes. Online appointment booking, through MyOSCAR, is an alternative to booking in person or over the telephone. Patients who choose to book online

will require minimal involvement from the front desk staff. They would also be able to set reminders for themselves, review relevant information and update their information if needed. The impact on front desk staff workload is dependent on the number of patients choosing to book online.

MyOSCAR can impact provider-patient communication prior to a visit, between visits and after a visit, by enabling patients to share their health information and concerns with providers and allowing providers to share treatment plans, results and recommendations with patients.

In many situations, electronic communication only replaces current traditional methods. For example, a patient who would traditionally call the clinic with a request would instead send an email with the same request. If that request requires the attention of a healthcare provider, they would respond to it in an electronic message or by calling the patient. Participants have agreed that the number of situations where email would be the preferred method of communication is limited and that it will exist as a parallel system. Depending on the number of patients choosing this parallel system, the demand on provider time would vary. New tasks are created in provider workflows to review information shared by the patient prior to the visit and to create a post-visit summary or treatment plan that can be shared with the patient. In a limited number of cases, providers have indicated that electronic communication could replace an in-person visit. For example, when a patient is unable to come to the clinic or could be provided therapy through trusted online tools. The frequency of these cases and the extent of their impact on provider's workload remain to be explored.

6.2.2 Potential Benefits of using PHRs in a FHT

From a front desk perspective, a well-designed implementation of MyOSCAR could have a considerable impact on the number of calls and types of calls received. Automated appointment booking could reduce the pressure on phone lines during peak periods. Patient-physician electronic communication could also reduce calls coming in with clinical inquiries. Providing patients with information on labs and clinic services, as well as copies of their test results through the PHR, could also eliminate some patient calls. Additionally, in an automated process there are opportunities for patients to enter more detailed notes regarding their appointment and review their information to make sure it is up to date. In the manual process where a patient calls to book an appointment, they are not able to attach detailed notes to their appointment booking nor do they check the accuracy of their personal information. Moreover, the ability to set reminders would reduce no-shows and free up staff previously assigned the task of calling patients with appointment reminders. The effectiveness of electronic reminders in reducing no-shows has been reported by (Horvath et al. 2011).

PHRs are anticipated to improve access to appointments, access to providers and to therapy. The online booking of appointments is more convenient for many patients. Access to providers is improved through secure messaging that allows for communication in between office visits and telephone consultations. In certain disciplines, such as social work, therapy can be provided through online tools that can be accessed at a patient's convenience. Electronic communication can be a good replacement for some office visits and telephone consultations in some cases such as insulin titration (Zhou et al. 2007).

Although electronic communication, through online booking and secure messaging, offers an additional communication channel, participants did not expect it to replace traditional channels, rather it would complement them. This is in line with findings from previous studies that assessed the impact of electronic communication on traditional communication in a clinic setting (Katz et al. 2003; Bergmo et al. 2005).

Providers expected MyOSCAR to support patient and provider preparation prior to a face-to-face medical encounter, support communication of care plans and objectives, created during an encounter, and provide communication between encounters that can replace telephone and office visits. They anticipated that this will focus encounter discussions and result in more effective use of time. Results reported in (Barnabei et al. 2008; A. Businger et al. 2007; Wald, R. W. Grant, et al. 2009; Fisher et al. 2009) all support this notion of more effective encounters and enhanced communication. Participants also highlighted benefits in extending the communication to patient's caregivers, especially those caring for elderly and chronic disease patients who could benefit from the assistance of providers.

A PHR was also found to be a good opportunity for patient education and engagement. Through the PHR, providers can guide patients to credible sources, tailor information when needed and respond to inquiries. Periodical newsletters could be produced more often because they would require less cost and effort than printed ones. Moreover, information could be kept up to date and patients could be informed of the most recent evidence-based guidelines and treatment options. Educational opportunities afforded through PHR functions and applications are well-recognized in the literature, e.g. (Wiljer et al. 2006; Ahern et al. 2011; Gordon 2011).

6.2.3 Potential Challenges and Concerns of using PHRs in a FHT

A number of concerns were raised by participants. Receptionists were concerned about ceasing to have control over appointment booking. Each FHT clinic consists of a number of providers, most of which have specific appointment booking preferences pertaining to the length of each type of appointment, specific days to book specific types of appointments, etc. As these rules change from provider to provider a definition of booking rules becomes too complex due to the lack of standardization. This is not only an obstacle to implementing online booking but also makes it difficult for front desk staff serving one team in the clinic to switch to another team, to address some staff shortage, for example. This issue of standardization of booking rules should be addressed with providers prior to the implementation of appointment booking automation.

Participants expressed concern over certain patient groups: those who cannot use the PHR and those who abuse it. The elderly and low income patients stand to benefit from PHRs but may face obstacles regarding access and use of computers and the internet. A study, by Lober et al. 2006, investigated the use of a PHR by an elderly, disabled and low-income population and found that despite a number of barriers, the group was able to create and maintain a PHR, mostly with the assistance of a nurse or social worker. These specific patients were residents of a publicly subsidized housing project and received weekly visits from a nurse or social worker, which is when most of them accessed their PHR. The elderly, disabled and low-income patient barriers to PHR adoption could be overcome through publicly funded assistance or through the help of caregivers. Based on input from older adults in user studies, certain design features such

as large fonts and limited functionality that could be gradually increased as users become more proficient, may encourage older adults to use a PHR (Khan et al. 2010; K. A. Siek et al. 2011).

On the other hand, there are patients who do not exercise the best judgement and may abuse certain access privileges by overusing them, such as using secure messaging to constantly contact providers and demand attention. The latter population, according to participants, is small and may not have a major impact. Additionally, misuse can be mitigated by restricting access to specific patients or using a triage-based system that filters messages received by providers. No reports were found in the literature describing misuse of secure messaging by patients.

Security and privacy, a concern cited often in similar studies (Hobbs et al. 2003), was not a major theme in this study because there was an assumption that MyOSCAR incorporated adequate security messages and privacy policies.

Although electronic communication through secure messaging was valued by most participants, many cited concerns about its limitations. Electronic communication is unable to convey messages carried in body language and voice tone that can help a provider assess a patient's state. Additionally, there are no means of confirming that data conveyed in secure messages is interpreted correctly. Nonetheless, patient-physician electronic communication reduced in-person visits but not telephone consultations in an investigation by (Bergmo et al. 2005). Furthermore, (Zhou et al. 2007) report on an increased utilization of a PHR with secure messaging by diabetic patients, whom are able to use secure messaging to replace many types

of visits. Therefore, despite the limitations cited by participants in this study, in some situations secure messaging can be utilized to reduce clinic visits.

Addressing certain clinical enquiries could be more efficient in an office visit or telephone conversation; these particular topics could require too many electronic message exchanges. Responding to secure messages will create an additional demand on provider's time, which is also a concern. Efficiencies will only be gained if time taken to respond to secure messaging is less than the alternative visits or telephone consultations (Zhou et al. 2007). The findings of (Bergmo et al. 2005) indicate that secure messaging is less likely to replace as many telephone consultations as in-person visits.

Patient provided information was viewed as an additional source of information that can fill gaps in medical history, medication lists, immunization dates, etc., but participants were concerned about how this data will be incorporated in a patient's record and how it could be useful to their work. For instance, free text generic medication lists may not be as valuable to pharmacists completing medication reconciliation as would standard fields of data. A study exploring Canadian Family Physicians found similar concerns over the quality of patient entered data (Yau et al. 2011).

6.2.4 Participant Recommendations to Mitigate Concerns

Recommendations by participants to address concerns raised, fall into two categories: pre-implementation measures and post-implementation guidelines and maintenance.

Before implementing online booking, the greater issues of the appointment booking process needs to be addressed. The process is not standardized due to customization of rules

according to each provider preference. In a clinic with over 40 providers this becomes too complicated. Additionally, providers need to define appointments for which they would allow online booking.

The clinic needs to decide on whether or not patient-entered information that a patient chooses to share with providers, such as medication lists and glucose readings, will be incorporated into the patient's official medical record, in the clinic's EMR. If the information will be incorporated, it is must be clearly marked as patient-entered information to separate it from physician-entered information. Although patient-entered information could improve care by giving providers a more complete record (Schneider 2010), there are concerns over the accuracy of patient-entered information (Witry et al. 2010). Participants recommended drafting a clear guideline and policy regarding patient entered information.

If patient-entered information is to be incorporated into their official record or is used to aid in knowledge discovery, it must be in an appropriate format that is useful to providers. High volumes of unprocessed patient entered data creates an additional burden for providers (Liu et al. 2011). The information provided to patients from external sources, such as the EMR, must be easy to understand by patients. This can be achieved through the creation of interfaces that provide terminology services, translating patient language to medical terms and vice versa. Several projects, such as RxNorm, normalized medication names at a given level of abstraction to facilitate more sophisticated functions of health information technology, such as decision support (Nelson et al. 2011). RxNorm, or a similar standard nomenclature could be used as a basis for an interface between the PHR and EMR. It is especially important to mitigate the risk of

patient comprehension errors, found to be the highest with medication names (Keselman & Smith 2012).

Post-implementation issues such as inappropriate appointment booking or electronic communication can be mitigated through devising clear guidelines and policies that govern these new processes and manage patient expectations. Osborn et al. 2011 highlight this important role of proper guidelines when implementing PHRs. Based on their experiences with a wide scale implementation of a PHR at Vanderbilt University Medical Center, authors recommend policies and procedures that were instrumental in the success of their implementation (Osborn et al. 2011).

6.3 Limitations and Future Research

The main limitation of this study is the small sample size in each group which may limit the scalability and validity of the results. Beyond that, measures were taken to ensure the validity of results, including participant review and approval of interview summaries, more than one researcher analyzing the data and aligning results to findings in previous literature.

From a generalization perspective, the main MyOSCAR features discussed in this study, such as health information sharing and secure messaging, are found in other web-based, physician-driven PHRs, such as CMA's mydoctor.ca[7] and Canadian Patient Access' myPatientAccess[8], which could allow some of the results of this study to benefit the implementation of PHRs with similar features in a FHT. However, not all features available in MyOSCAR are available in similar

[7] https://www.mydoctor.ca/patient/public/en/mediaRelease.html
[8] http://www.mypatientaccess.ca/services

PHRs. For example, limited data is pulled from the clinic's EMR, OSCAR, into the PHR MyOSCAR while mydoctor.ca does not pull any data from the physician's EMR. Online appointment booking is also unavailable through mydoctor.ca. Online medication refills and downloads of medical history are available to myPatientAccess users in exchange for a fee; these features are not available to MyOSCAR users.

The specific tasks required to complete a process and time spent on each cannot be assessed using semi-structured interviews. That requires observing subjects in their working environments and defining measures to evaluate processes. Future research is needed to further define and evaluate current processes and target processes with a PHR in place using Key Performance Indicators.

Although participants provided valuable insight that can be used to inform future implementation phases, they were unable to comment on specific experiences with MyOSCAR, due to delays in pilot implementation. Future research should assess their views post-implementation and comment on how they may have changed.

The low uptake of PHRs remains a challenge for many pilot implementations. Patients must see the direct value in using these applications to invest time in them. The use of and satisfaction with a PHR have been shown to be highest for services most actively part of clinical care, such as medication refills, and patient-provider communication services (Ralston et al. 2006). If the features discussed in this study are implemented in a way where they are incorporated in the healthcare delivery process, it may encourage uptake. Future research could investigate if running two parallel systems, online and offline, along with low PHR adoption

rates, impacts anticipated operating efficiencies. There could be a critical number or percentage of patients required to attain measurable operating efficiencies.

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