ENHANCING A HOME CARE EHEALTH APPLICATION FOR STROKE SURVIVORS WITH MULTIPLE CHRONIC CONDITIONS – BRINGING PRIMARY CARE INTO THE CIRCLE OF CARE

ENHANCING A HOME CARE EHEALTH APPLICATION FOR STROKE SURVIVORS WITH MULTIPLE CHRONIC CONDITIONS BRINGING PRIMARY CARE INTO THE CIRCLE OF CARE

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Abstract

The Canadian elderly population living with multiple chronic conditions (MCCs) is increasing. Multiple health care settings need to be involved in patients' care management with this vulnerable group. Therefore, meaningful collaboration and communication among health care providers in different sectors, especially at transition points, is highly desirable. This study focuses on the co-design of an expansion of an existing eHealth App (MyST) to include primary care providers who are in the stroke survivors' circle of care. MyST was originally developed for the home care sector and is currently accessible by home care providers, patients and their caregivers.

Primary care providers, another group of users of the proposed enhanced version of MyST, were not engaged in the design process. The objective of this study is to identify this user group's requirements and develop specifications for the design and development of MyST 2 to be implemented in real practice settings.

Persona-scenario co-design methodology was used for data collection. Two persona scenario discussion sessions were conducted with 5 health care professionals from different primary care practices. Three nurses participated in one session, and a dietitian and a social worker participated in another session. Participants in groups created personas and scenarios where their persona interacted with members of the circle of care using MyST 2.

Eight themes were identified in the data analysis process: Inter-professional team communication, Patient safety approach, Access to non-medical information, Facilitation of referral to community services and resources, Patient-centred care, System integration, Clinic EMR as a complementary tool, and Implementation considerations. Related to each theme, a list of design specifications was created, including required modules and features, and implementation specifications such as hardware requirements, team members' responsibilities, MyST 2 use policies, patient privacy, and provider training. The identified requirements will also inform the design and development of future Apps that support patients with MCCs who require home care.

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Dedication

To my beloved parents and

my dear husband

Table of Contents

List of Figures and Tables

Abbreviations and glossary of terms

MCCs: multiple chronic conditions which can include long-term health and social conditions

Home care (HC): is defined as the services provided for patients at their home or in the community supporting them to stay in home

Primary care (PC): is defined as a health service system that provides: entry into the system for all new inquiries and problems, person-focused care over time, care for all diseases excluding unusual conditions, and coordination of care provided by all other health care settings

Patient-centred care: a high-value practice model that all health care professionals work collaboratively together and with the patient involved in his/her care

App (Application): a software designed for specific tasks

ACHRU: Aging, Community and Health Research Unit, McMaster University

MyST (My Stroke Team): a web-based e-Health App created by a team in the Aging Community Health Research Unit (ACHRU) at McMaster University for stroke survivors with multiple chronic conditions and their home care team

MyST 2: second version of MyST App to include primary care team in the patient's circle of care

CCAC (Community Care Access Centre): is a local agency that provides information about different options of care and services, and can link people to required services. CCACs also "help the public access government-funded home and community services, and long-term care homes. CCACs work together, and with physicians, hospital teams and other health care providers to enhance access and co-ordination for people who need care in their own homes in the community, in supportive housing, or in a Long-Term Care Home." *

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* Ontario Ministry of Health and Long-Term Care. http://www.health.gov.on.ca/en/public/contact/ccac/. Accessed April 16, 2016

EHR: electronic health record

IT: information technology

HIT: health information technology

ICT: information and communication technology

UCD: user centred design which is a new approach developed by the field of human computer interaction design for stakeholder engagement and data collection

1. Introduction

The aging population living with multiple chronic conditions (MCCs) is increasing. Stroke is one of the most widespread and severe conditions among older adults, mostly occurring in the context of other chronic conditions such as hypertension and diabetes. This may potentially complicate the patients' care management process because multiple providers and different health care settings need to be involved in their care. Transition points, which are times when patients are moved from one health care sector to another, are critical points in the care of older adults with MCCs. Meaningful collaboration and communication among health care providers in different sectors, especially at transition points is highly recommended [1]. For example, a transition point could be a situation where a patient is discharged from a hospital to a home care program. In addition, primary care plays an important role in providing care for patients with different conditions and health care needs. However, primary care teams are not consistently provided with home care assessments and reports, and they are rarely consulted in patients' care planning and decision making. Therefore, there is a gap in proper collaboration and real-time communication and information sharing between primary care and home care. Strategies and tools need to be developed to enhance two-way communication between home care and primary care providers. In this study, we aimed to find some potential solutions to bridge the identified gap.

Advances in information and communication technology (ICT) and eHealth tools can significantly contribute to needed change and to resolving some of the challenges that we have ahead with integration of health systems. Technological tools and systems such as electronic health record (EHR) systems and Apps have the potential to facilitate two-way communication between primary care and home care sectors. A web-based App called MyST was specifically designed for stroke survivors with multiple chronic conditions to enhance communication among the home care team involved in the patient's circle of care. Adding the primary care team into this circle of care could potentially address the identified gap and help improve communication and information sharing between home care and primary care teams. Therefore, co-designing an expansion of MyST – named MyST 2 – to include primary care providers was the primary goal of this research project.

The research objective was to identify end users' requirements and develop specifications for consideration:

- In the design and development of MyST 2 to include primary care end users,
- To inform implementation of MyST 2 in a future study involving primary care providers and home care providers.

Research questions:

1) What design features are needed in MyST 2 to bring primary care teams into the home care circle of care?
2) What factors need to be considered in the implementation of an enhanced App (MyST 2) to facilitate collaboration and communication between HC and PC?

Diverse groups including stroke survivors and their family caregivers, primary care, home care, and also health care software development teams may benefit from the knowledge produced from this research project. The anticipated impact of this research is integrated and collaborative home care and primary care services for stroke survivors through the utilization of this enhanced version of MyST. This study also informs the development of future Apps that can support patients with other chronic conditions who require care at home.

In this study persona scenario activity, a strong user-centred design (UCD) methodology, was used to collect primary care users' requirements and to define design and implementation specifications for primary care providers using MyST 2. Data were gathered during two separate sessions with the total number of five participants. Collected qualitative data were transcribed and nodes were created for analysis. The feasibility of each node was examined and then nodes were grouped into themes and categories for consideration in MyST 2's development. A list of required features/modules in MyST 2 as well as items (nodes) for consideration in its deployment in real practice settings were extracted from stories created during persona scenario activities. These are presented in

the study results. Major identified themes were reviewed in literature as part of the analysis validation process.

The thesis is organized as follows: a) background literature, b) a description of identified gap/s in the literature c) the persona scenario methodology, d) analysis of results and e) discussion. Study strengths, limitations, and participants' feedback about the conducted persona scenario activities and their recommendations for improving the method and quality of collected data are also detailed. Finally, next steps, future works and study conclusions are presented at the end of this thesis.

2. Aging, chronic conditions and stroke

The average age in most countries continues to increase, and aging is positively correlated with the number of serious chronic conditions that people have [2]. Therefore, the elderly population living with MCCs is growing rapidly [3] [4]. Ontario is supporting a huge aging population with MCCs and complex care needs in the community [5]. Multimorbidity is another term for MCCs that is used when multiple diseases coexist in the same person [6]. There are numbers of theoretical and health care system organizational challenges associated with providing care for patients with multimorbidity [7].

Managing chronic conditions is a high priority for health care systems while the number of patients with MCCs is growing rapidly. Older adults with multimorbidity often experience a poor quality of life, and they experience some physical malfunctioning [8]. They frequently consume multiple medications for different conditions simultaneously and consequently face difficulties with adherence [9]. Providing care for elderly adults with MCCs often involves a number of health care settings that do not collaborate and communicate efficiently, and therefore the provided care is generally fragmented [10].

Stroke is one of the most widespread and debilitating conditions among older adults [11]. While stroke prevention and management has progressed, stroke is the third most common reason for death in Canada and it can also cause disability in older adults [11] [12]. Statistics show that more than 50,000 adults encounter strokes each year, and

currently more than 300,000 continue to live with the effects of stroke in Canada [13]. There is a 20% chance of having a second stroke within 2 years after a first stroke [14]. The cost associated with stroke care is very high, and it costs about $3.6 billion a year in health care costs and lost economic output including decreased productivity and lost wages [14]. The majority of stroke survivors are suffering from functional impairment and many are significantly disabled and need long-term care [15].

Stroke mostly occurs in the context of other chronic conditions such as hypertension and diabetes [11]. This may negatively affect stroke rehabilitation outcomes and complicate the treatment and management process because multiple providers and health care settings need to be involved in the process [11]. Care coordination and communication becomes a challenge when multiple settings are involved in providing care for a patient. Stroke survivors with MCCs are often in transition across a variety of care settings including acute care, home care and primary care. Consequently they are likely to experience fragmented care from these settings.

Providing stroke care, as with other chronic conditions, consists of three main phases: prevention, diagnosis and treatment, and recovery *(figure 1).* A successful health care system should develop a comprehensive strategy to include an integrated approach covering all three phases. Prevention could be divided into two categories: primary prevention which focuses on preventing the initial occurrence of a condition, and secondary prevention that focuses on reducing the risk of recurrence of a chronic condition (stroke in this case). Primary prevention is usually offered in a primary care setting where a primary care team may discuss lifestyle and stroke prevention strategies with patients at high risk of a first stroke occurrence. Secondary prevention could be offered in a variety of health care settings including acute care (right after the first stroke event) and long-term and community-based care (when patient is back into the community following the first event). Acute care settings, emergency departments and hospitals are mainly in charge of the second phase: stroke diagnosis and treatment. The third phase of stroke care is recovery which is the most gradual stage [16]. Stroke survivors with MCCs are mostly supported by community-based rehabilitation programs provided by the home care sector which is the largest part of community-based services [17]. They might also visit primary

care providers for managing their other chronic conditions while they are in a stroke rehabilitation program.

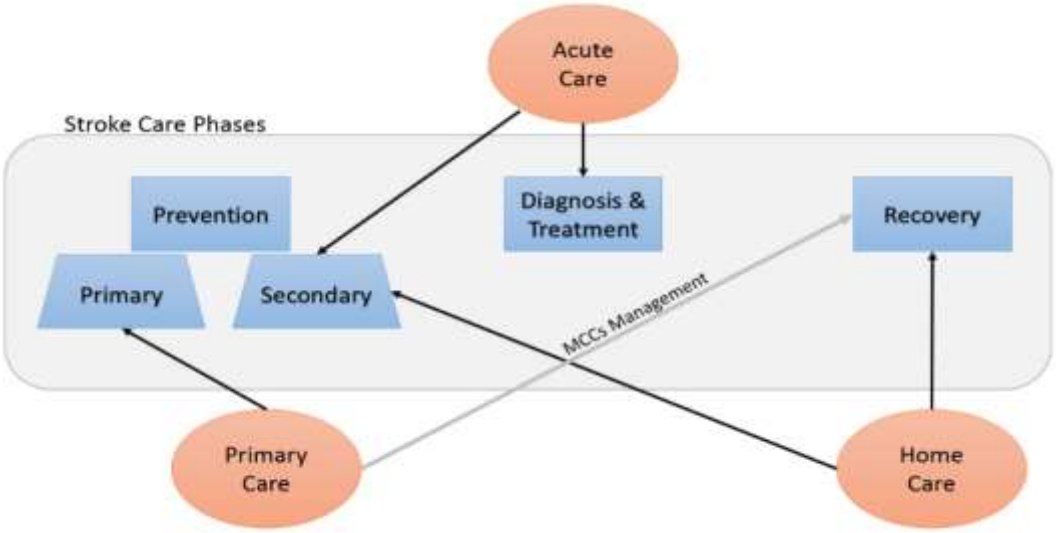

Figure 1: *Stroke care phases*

3. Home care

The Canadian Home Care Association (CHCA) in 2004 defined home care "as an array of services, provided in the home and community setting, that encompass health promotion and teaching, curative intervention, end-of-life care, rehabilitation, support and maintenance, social adaptation and integration, and support for the informal (family) caregiver" [17]. Home care services generally incorporate "the delivery of health care services in home setting with community services (e.g. Meals on Wheels, day programs, respite care facilities, volunteer services, and transportation services)", and could be offered for infants, children and adults based on CHCA statement [17]. Home care encompasses a broad range of health care services according to the above definition, therefore it has been recognized as an important element in the continuum of care in Canadian health care system [18]. This care option is also increasing due to the numbers of patients being discharged from acute care settings who still require continuous care [18].

Individuals receive different home care services (home support services, medical services, preventive care, etc.) based on their specific needs. The home care setting basically supports patients to live in the comfort of their own home and could be offered for a wide variety of patients with different needs and/or conditions including stroke survivors [17]. Home care services for stroke survivors might include physical therapy, occupational therapy, speech-language therapy, nursing, social work, personal care, and mental health counseling [19]. In Ontario, usually a home care coordinator or case manager who is a health care provider has the responsibility of coordinating the health care team during each patient care episode [20]. Since home care is not always delivered in a patient's home, it is sometimes called home and community care. In this thesis, **"home care**" and "home and community care" are interchangeably used, and defined **as the services provided for patients at their home or in the community supporting them to stay in home.**

4. Primary care

Primary care is the foundation of the Canadian health care system and the first point of contact for patients when they have health care inquiries [21]. Primary care is referred to "that level of a health service system that provides entry into the system for all new needs and problems, provides person-focused (not disease-oriented) care over time, provides care for all but very uncommon or unusual conditions, and co-ordinates or integrates care provided elsewhere by others" [22].

Diverse primary care models exist across the Canadian provinces and territories. The most common goals and objectives of primary health care are [23]:

1. Enhance access to primary care services
2. Improve continuity and coordination of care
3. Increase team-based collaboration in providing clinical care
4. Enhance quality of care
5. Increase focus on chronic conditions prevention and management

6. Promote patient engagement and self-care

Primary care and primary health care are two similar terms that could be used interchangeably. However, primary health care is a broader term according to the World Health Organization definition and could also be referred to the services provided not only for individuals, but also at population level (public health) [24]. In this thesis, **"primary care**" and "primary health care" are interchangeably used for simplicity, and defined as **a health service system that provides: entry into the system for all new inquiries and problems, person-focused care over time, care for all diseases excluding unusual conditions, and coordination of care provided by all other health care settings.**

4.1. Primary care team and collaboration

Managing and preventing chronic conditions are recognized as a growing challenge, especially with an increasing aging population [25]. The Canadian government planned to increase team-based models of primary care with a focus on improving chronic care delivery, health promotion, and disease prevention in order to make these teams accessible to half of Canadians by 2011 [25]. Therefore, there has been a big shift from a solo physician practice model towards team-based primary health care models. A primary health care team is described as two or more health care professionals working collaboratively together to provide basic health care services for individuals [26]. These team-based models usually incorporate a wider range of professionals involved in providing care for patients [27]. Family health teams and community health centers are the predominant models of inter-professional primary health care teams in Ontario. The team usually includes family physicians, nurses, nurse practitioners, dietitians, mental health workers, social workers, and pharmacists [23].

The idea of primary care teams is well embraced by Canadians, and the use of patient education and diseases prevention services offered by these teams has increased [28]. Almost three-quarters of the Canadian population prefer collaborative primary care teams that include family doctors [29] [30]. In a team-based care model, physicians can stay focused on medical issues while other professionals provide primary care services (e.g., nursing, dietary and physiotherapy) and patient education related to effectively

managing chronic conditions and improving their health behaviours [25]. In some cases, community-based teams not only provide medical care and health promotion services but also attempt to improve public health behaviours and mitigate risk factors for their patients [25].

Evidence shows that team-based collaborative care is an efficient way of providing primary care for patients with chronic conditions such as diabetes or heart diseases, and also for the elderly population [31][32][33]. Primary care teams help in improving patients' health conditions and also their overall quality of life [26]. Research supports that helping patients with successfully managing their chronic conditions can positively impact their health [26]. Moreover, people who receive care from primary health care teams know more about their conditions [34]. However, teams should have the right combination of professionals to serve different needs of patients. The mix of professionals in primary care teams is not static and is based on patients' needs. There is no clear description of the correct mix of health professionals to optimally address each specific health condition [25]. Furthermore, a team-based approach cannot be effective unless true communication and collaboration exists between professionals. Collaboration is referred to an active process with the following components [35]:

- **Sharing** vision, values, philosophy, responsibilities and planning
- **Partnership** in a productive relationship characterized by trust in one another and open communication
- **Interdependency** of professionals for achieving a common goal: patients' needs
- **Power** is shared among team members based on their experience and knowledge

A desirable collaboration works towards exploring and solving issues with the patient's active participation. In a successful team, professionals with different roles share responsibilities and are willing to participate in the patient-centered care planning and decision making [36]. Someone needs to take the team coordination role to ensure the proper collaboration and continuity of care. Working in a team-based primary care setting

is also advantageous for health care professionals. Team members have the opportunity to expand their knowledge and skills and work more actively with other professionals [26].

4.2. Primary care role in chronic conditions management

Primary care (which includes continuity, coordination and comprehensiveness) is well suited to manage the care of chronic conditions. Coordination of care across multiple health care settings and providers is the role of primary care settings which is tremendously important for patients with chronic conditions. Having a primary care team that is knowledgeable about the patient's conditions and his/her family while coordinating health care activities across different settings is very valuable for patients [37]. The majority of chronic conditions can be sufficiently managed at the primary care level, and ideally patients move across different health care settings (e.g., specialists and home care) while the primary care team takes the central role and coordinates the process [38] [39]. Also most of the care of chronically ill patients is provided by primary care [40]. Evidence shows that patients who have access to continuous and coordinated primary care have better health compared to those who do not [41].

The central role of primary care in providing care for older adults with chronic conditions should not be neglected. Effective management of chronic conditions consists of various professionals including non-physician roles. An article which reviewed the evidence about the effectiveness of primary care teams in chronic conditions management confirms the importance of different professional roles in caring for patients with MCCs [38]. The appropriate team structure is more important than physician specialty in providing chronic conditions care [42]. Primary care team members [38]:

- Coordinate and organize patients' care,
- Work with patients to set goals,
- Educate patients on successful self-management,
- Provide medical therapy to control patients' conditions, and
- Conduct follow-up regarding patients' conditions

In addition to the above, most older adults have more than one chronic condition. Primary care teams, with their extensive experience in diverse clinical issues and extra general training, could benefit patients with MCCs [38]. Therefore, primary care should be involved in providing and planning care for patients with multimorbidity. Most primary care programs for older adults with MCCs have been designed based on the Chronic Care Model that promotes six interconnected components: patient self-management, multidisciplinary care, coordinated care, evidence-based care, delivery system redesign, and clinical information systems [43].

Research shows that primary care could also play a crucial role in providing comprehensive services for stroke survivors and their caregivers [16]. The importance of primary care as the first point of contact for medical and non-medical information and issues in stroke rehabilitation was identified as one of the main themes in a focus group discussion with patients and caregivers [16]. In addition, primary care is also the main contact for at-risk patients. Therefore, the primary care team can support disease prevention for relevant individuals [44]. Primary care can play a key role in stroke prevention by:

- Increasing awareness of current stroke best practices, and
- Appropriately incorporating best practice guidelines into their team-based practice.

Many studies have shown that a considerable portion of patients with chronic conditions have not been offered an effective care plan due to health care system failures such as inefficient continuity [38]. Although primary care can play a significant role in chronic conditions care planning and management, health care system improvements such as meaningful communication and integration between different settings (e.g. between primary care and home care) are essential for its success [38].

5. Patient-centred care

It is very important that health care services be delivered in response to patients' needs and values [45]. Therefore, collaborative care must be designed around patients' needs in a way that efficiently provide high quality care for Canadians. Patient-centred

care is a high-value practice model in which all health care professionals work collaboratively together with the patient involved in his/her care [46]. The high-level goal in this model is to increase patient satisfaction, enhance patient-provider relations, and bring about better clinical outcomes. The collaborative patient-centred practice is defined by Health Canada as, “a practice orientation, an approach to care where health care professionals work together with their patients” (p. 28) [47]. In this model, two or more health care providers that may be from different disciplines or settings work together towards solving or exploring a patient’s issues with the patient’s active involvement during a period of time. This design supports all providers to actively participate in a patient’s care practice. It also develops respect for each discipline, enhances team members’ participation in decision making and clinical planning, and increases patient-centred goal setting [46]. Additionally, the patients’ role in self-care management and disease prevention is promoted.

The patient-centred care model is designed around the patient’s concerns and benefits. Patients are in control of their own health care and have the opportunity to more dynamically participate in their care planning and treatment in this model [35]. The group of health care professionals who simultaneously provide care for a patient during a period of time along with the patient and his/her family compose a circle that could be called “circle of care” with the patient in the middle of the circle. This circle of care is not a static circle over time because patient’s needs and issues might change, and therefore different professionals may need to be included in the team. Everyone in the circle of care should be efficiently informed about the patient-centred care model. Health care providers should be trained about how to efficiently collaborate together in an interdisciplinary team, and also how to effectively engage the patient in his/her care practice. Patients need to be educated as well. Health care professionals are usually in charge of training patients in order to empower them in decision making with a sufficient level of knowledge about their condition/s, and also regarding their role and responsibility in the team [35]. In this model, patients should be in charge of choosing what care services they want to receive and what they do not, and controlling and assessing the quality of provided services. Patients’ lack of knowledge about the collaborative approach could be very problematic. They might get

frustrated about working with various team members if they are not trained about different professionals' role in their care plan [35].

Collaborative patient-centred care is a useful and powerful approach when multiple sectors are involved in providing care for a single patient. This approach can create a unified team called circle of care consisting of all professionals from different sectors with the patient's centric role. It also provides the opportunity to eliminate unnecessary services, and enhance the quality of care for patients [48].

A patient-centred model is the most reasonable and optimal approach for designing health information applications and technology because it makes it possible to create an integrated and unified application with the patient at the centre while all professionals in the circle of care can access the same application and information. As a result, all team members regardless of which setting they are coming from will have the opportunity to seamlessly communicate and collaborate with each other and the patient in the care practice [48]. Figure 2 illustrates the patient-centred care approach and the eHealth technology.

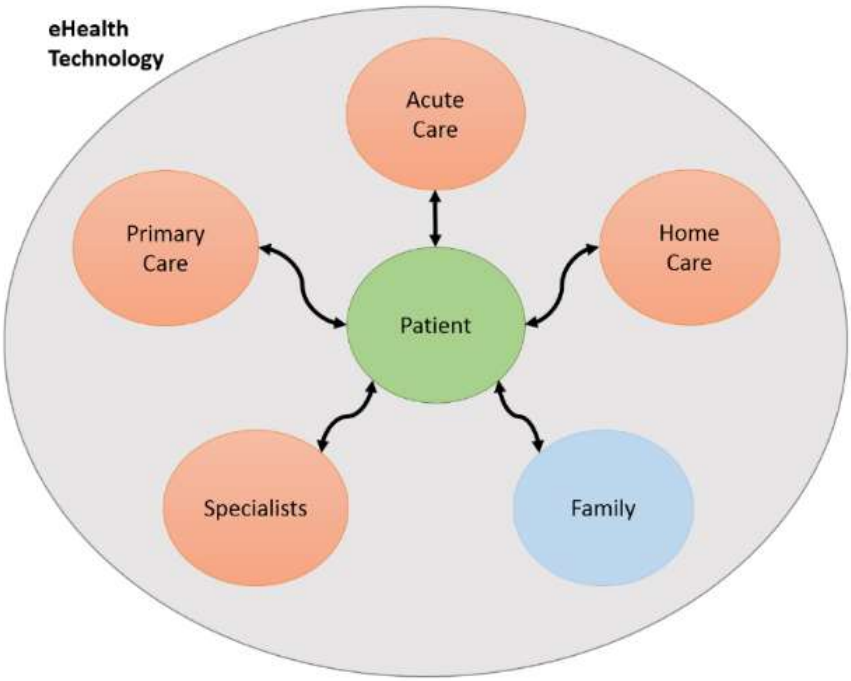

Figure 2: *Patient-centred care approach and eHealth technology*

6. MyST App

MyST (My Stroke Team) a web-based e-Health App was created by a team in the Aging Community Health Research Unit (ACHRU) at McMaster University. The App is for stroke survivors with multiple chronic conditions and their home care team to enhance communication and planning among those in the patient's circle of care. The specific objective for designing such an application was to overcome barriers of community-based stroke rehabilitation. It was designed based on focus groups and interviews with home care providers and other stakeholders involved in the rehabilitation [49]. Home care providers (e.g., the care coordinator, nurse, occupational therapist, physiotherapist and personal support workers) and patients with their family caregivers have access to the application. Patients and family caregivers can view MyST documentation but have no permissions to write or make contributions in the application in the current version.

MyST supports [49]:

1. **Patient-centered care** – goal setting with patient
2. **Collaborative practice** – real-time communication and information exchange among home care providers and decision making among providers and patient and family caregivers
3. **Evidence-based care** – the use of best practices for community-based stroke rehabilitation
4. **A proactive comprehensive approach** – focus on health promotion and disease prevention
5. **Facilitation of referral to community agencies and other resources** – according to patient's priorities for community reintegration
6. **A strengths-based approach** – understanding and developing a patient's strengths to meet their goals
7. **Patient empowerment (self-management approach)** – to take a lead role in management of their health and stroke recovery

MyST is currently being tested to support a community-based stroke rehabilitation intervention which includes four components: 1. Patient-centered care, 2. Trained home

care providers, 3. Inter-professional home care team approach (CCAC Care Coordinators, Nurses, OTs, PTs, PSWs, Speech and Language Therapists, Social Workers), and 4. System navigation [50]. This intervention is designed by the ACHRU unit with the objective of identifying the feasibility, usability and acceptability of MyST among home care providers, patients and their family caregivers. In this 6 month intervention, each patient will receive monthly in-home visits by one of the trained home care providers including PSWs in addition to their usual home care services. Stroke survivors and their family caregivers are also involved in the care process including goal setting. Home care providers will participate in monthly team meetings to discuss the patient and complete the team meeting record documentation in MyST. The care coordinator will coordinate communication among the home care team, patient, and their family caregivers [50]. Although the inclusion of primary care providers in the circle of care for the home-dwelling stroke patients was discussed and explored during the original MyST design, it was determined to be beyond the scope in terms of budget and time available for the build within the funding model.

7. Gap: meaningful communication, collaboration and integration

7.1. Multidisciplinary team collaboration

Meaningful collaboration and communication among health care providers in different sectors including hospitals, primary care and community and home care especially at transition points is essential. Transition points are referred to time points when a patient is moved from one health care sector to another. One of the important transition points for older adults with MCCs is discharge from hospital to community [51]. Unfortunately, the continuum of care is not well-integrated in Canada, and usually collaboration and information sharing is missing when multiple sectors are involved in providing care for a patient. There is a specific known gap in communication between primary care and home care [1]. It is critical to ensure that information about the patient and related plan of care is shared in a timely fashion to support consistency and continuity of care [1]. Continuity of care is defined as “an ongoing relationship between an individual

and his/her health care provider/team which implies coordination to facilitate seamless transitions among health care professionals and across the continuum of programs, organizations and levels of care" [21].

Half of Canadian physicians in an international survey indicated that at least one of their patients had some issues in the past month due to lack of coordination and fragmented care across multiple health care settings [52]. Poor care coordination and communication among multiple sectors might have a negative impact on quality of patient care and also inappropriate utilization of different health care services. Providing high-quality care for patients with MCCs when the home care setting is involved may be a challenge because efficient collaboration and communication between home care and primary care teams who work in different settings and maintain separate patient records most often does not exist.

Moreover, as previously mentioned, many patients receiving home care services are elderly, with multiple chronic conditions. A report by the "Expert Group on Home and Community Care" in Toronto in March 2015 noted that patients who receive care from multiple settings and their family caregivers need greater integration among the different health care sectors [1]. Patients and their families expect the primary care team and home care coordinator to communicate regularly about their health care status and planning. In addition, although it has been identified that patients who have access to continuous primary care have better health [41], primary care providers are rarely involved in home care plan development, and do not communicate effectively with home care team [1].

Primary care needs to be more supportive of patient care and clinical outcomes and its delivery should be better aligned with home care settings. Communication between physicians and the home care coordinator is usually poor in Ontario [1]. Primary care teams are not consistently provided with home care assessments and reports. They are also rarely consulted in care planning and decision making. Strategies are required to enhance two-way communication between home care and primary care providers. Managing primary care settings and services through the same unit that manages the home care setting might be an important factor to align these two settings [1] [53]. Also, it

is essential to consolidate care services planning, responsibility and navigation across different health and community sectors in order to enhance the connection and communication between primary care and home care.

In some situations, health care providers involved in a patient's circle of care are unfamiliar with each other's responsibility and authority in the team, and this results in inconsistent care planning and delivery. Integrated and interdisciplinary teams that involve patients in the circle of care is the prerequisite element for continued care delivery across multiple health care settings. An integrated patient health record which includes the care plan and could be accessed by all team members following patient authorization could be a strong facilitator tool for communication. Implementing and expanding the use of a mutual EHR system accessible by all team members regardless of their settings could contribute to standardizing and enhancing communication across different settings and disciplines [18], because technology could facilitate ongoing and real time communication among the circle of care team [1].

There are many patient safety issues related to a lack of continuity in care and inefficient collaboration and communication [18]. Lack of solid and meaningful communication at patient transition points between acute care, home care and primary care is the cause for discontinuity of required information in patient's care, and this might increase potential safety issues for the patient [18]. Information could include changes in diagnoses, treatment and any other specific care requirements. Accessibility to a shared patient's chart by all providers from different settings might have the potential to reduce the risk associated with miscommunication between multiple settings. Moreover, reliance on voice messages for sharing important information such as assigning staff to conduct patient visits is not an appropriate communication process. In addition, asking the patient to share specific information with other providers is inappropriate, because the patient might have some disabilities such as impaired memory and fail to convey the information and could be a burden for the patient. Such communication failures may be the cause of medication errors. Technology and more specifically shared electronic patient records might be the solution for more efficient communication among health care providers, and consequently, may reduce the incidence of medical errors.

7.2. Silo system issues

Lack of a unified system approach to integrate multiple health care settings is a barrier for meaningful collaboration between settings in patient care provision [21]. Health care tends to consist of many silos between levels (each setting of the continuum of care) such as acute care, home care and primary care, and again within each level for example, different departments of a hospital [54]. This siloed structure is the reason for many problems in the health care system, such as failures in communication and trust across settings and increased complacency.

Communication is less complex within silos compared to among silos. Therefore, health care providers in different settings do not know enough about each other's role and practice. Health care providers build **trust** within their silos however it is not expanded beyond it. Team collaboration cannot be formed without trust and therefore health care systems without teams fail to efficiently operate. Last but not least, in a silo structure system, health care providers in each silo become focused only on their practice and may become **complacent** with their circumstances. This can prevent them from seeking new opportunities for collaboration [54].

Silos create the potential for medical errors, duplication of clinical tests, increased costs, missing information (e.g. patient's allergies), and a lack of coordinated care [55]. Some of the problems with this traditional care setting orientation are shown on the diagram *(figure 3)* presented at the 2015 HealthAchieve conference in Toronto [55]. This diagram illustrates the disconnection between primary care, acute care, sub-acute care, urgent care and home care, and the subsequent issues with the siloed structure and discontinuity. Elimination of silos and restructuring the whole system with well-integrated and coordinated health care teams based on a unified system approach is required for enhancing the quality of delivered care for Canadians and overall clinical outcomes. Another diagram *(figure 4)* indicating the benefits of coordinated care orientation was also demonstrated at the HealthAchieve conference [55]. Figure 4 details that coordinated care could enhance the patient's health information exchange across multiple sectors and therefore reduce medical errors. It also displays how this new care approach can: engage

patients through the use of technology, and facilitate advanced health analytics using integrated information thereby benefiting patients.

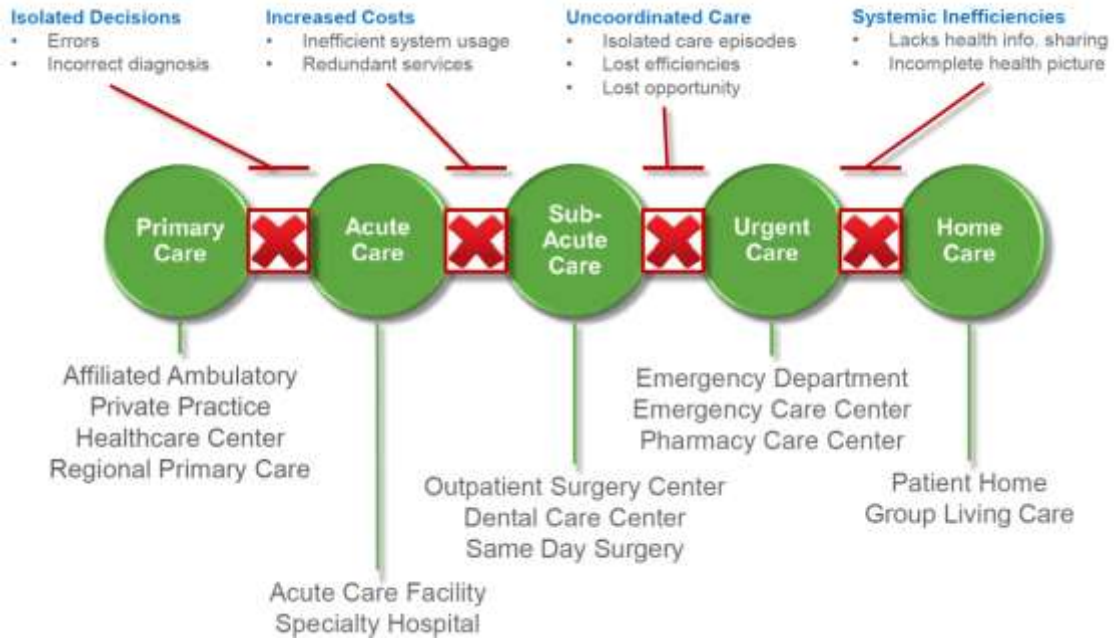

Figure 3: *Traditional care setting orientation* [55]*: Reprinted with permission from John P Hoyt, EVP HIMSS Analytics.*

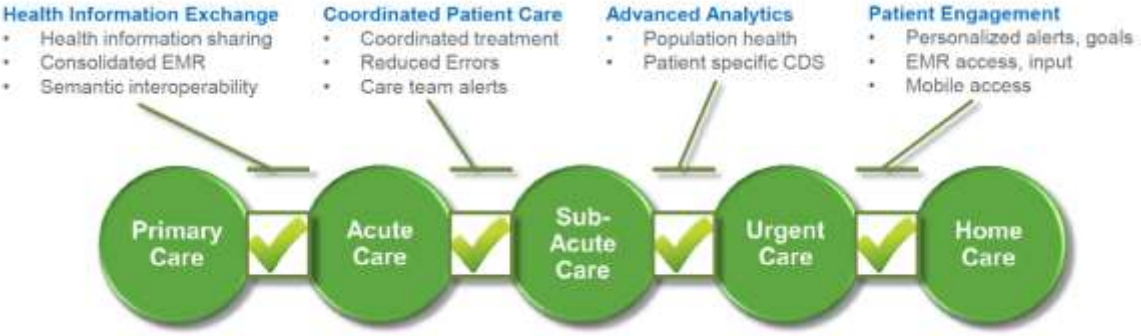

Figure 4: *Coordinated care orientation* [55]*: Reprinted with permission from John P Hoyt, EVP HIMSS Analytics.*

7.3. Continuity of care maturity model

The Continuity of Care Maturity Model (CCMM) was developed by the Healthcare Information and Management Systems Society (HIMSS), a not-for-profit US organization, in order to optimize holistic care management in both individual and population level, and also enhance health care outcomes through information technology use [56]. There are multiple stakeholders from three divisions (governance, clinical, and information technology divisions) involved in fulfilling CCMM goals *(figure 5).* The model consists of 8 stages (0 to 7) detailed in the figure 6, and has been reviewed and assessed by a variety of stakeholders and care settings all around the world. CCMM has the potential to facilitate care coordination, collaboration and information sharing across multiple settings by means of health information technology (HIT). Advanced analytics and patient engagement can also be better employed in CCMM design. This model focuses on optimized utilization of EHR and HIT by the patient and all providers involved in the patient's circle of care.

Figure 5: *Multiple model stakeholder* [55]*: Reprinted with permission from John P Hoyt, EVP HIMSS Analytics.*

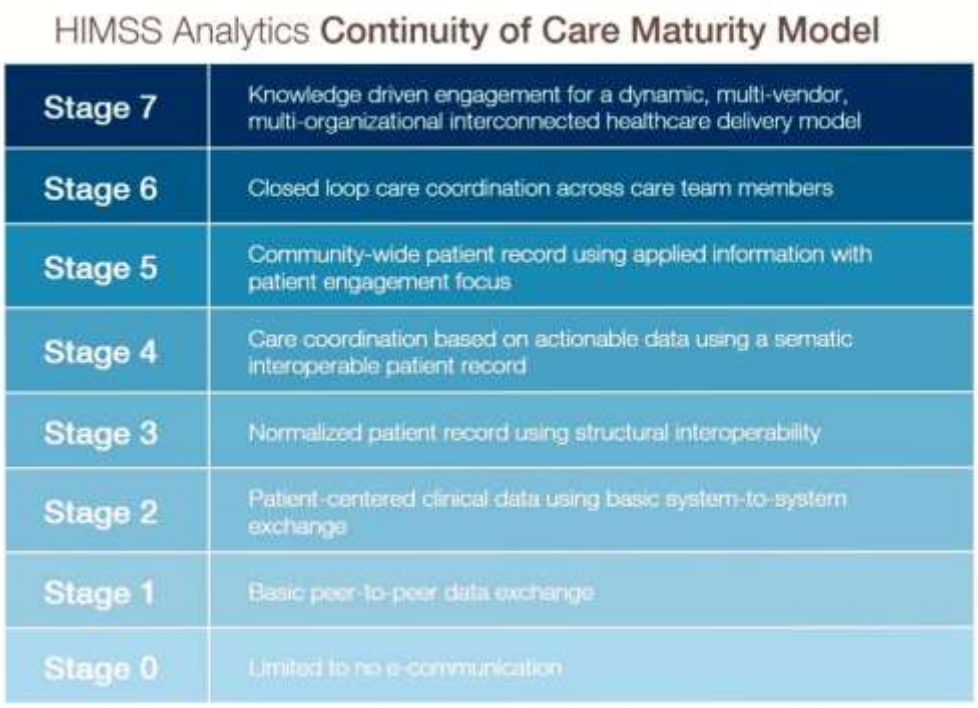

Figure 6: *HIMSS analytics continuity of care maturity model* [55]*: Reprinted with permission from John P Hoyt, EVP HIMSS Analytics.*

The purpose of this study which is better connecting home care and primary care in providing care for older population with MCCs through electronic health (eHealth) tools and applications is well in alignment with achieving the objective of CCMM final stage (stage 7). Therefore, we can learn from this model that many other steps need to be taken before achieving the final stage goals. For example, a patient-centred care approach and within setting collaboration and information sharing are essential elements in implementing and enhancing cross-organizational collaboration and communication.

8. eHealth tools (App and EHR) role in facilitating collaboration and communication

The most established forms of communication across health care sectors are non-electronic such as face-to-face communication or phone calls. However, research indicated that ICT and eHealth tools such as telehealth, EHR systems, and electronic reminders have the potential to positively impact the quality of care provided for patients with MCCs [17]. In general, HIT tools support patients with MCCs to stay at home with less disorder, and self-manage their conditions. On the other hand, eHealth tools help health care clinicians to reduce paper file recording, better manage and monitor patients' conditions, collect and evaluate patients' information over time, efficiently exchange and share information with other clinicians, receive electronic alerts in serious situations for patients, reduce duplications and clinical errors, and consequently improve the care coordination and quality of delivered care [57]. As mentioned many times in this thesis, technological tools could be implemented to facilitate an ongoing and real time two-way communication between home care and primary care providers [1]. Therefore, primary care settings have the opportunity to be better involved in patient care planning through the utilization of eHealth tools. However, eHealth tools and applications should be designed using a patient-centred care approach to bring about all mentioned values for patients and providers.

An integrated electronic platform which includes patient health records and care plans, and could be accessed by all patient care team members regardless of their settings could be a strong facilitator tool for collaboration and communication [18]. Efficient communication across multiple sectors by means of eHealth applications not only can increase the quality of care, but also save more time for providers [58]. A Canadian study [58] found that the number of primary care teams who electronically have access to their patients' information recorded by other health care settings is very low (3 out of 10). Hence, more progress in the development and use of eHealth tools is required for Canadian health care system to gain the full benefits of such innovations and instruments.

Currently, the primary care team is not involved in MyST application. Adding the primary care team into this circle of care in MyST could address the identified gap (lack of

meaningful communication between home care and primary care) and help improve communication and integration between these two teams. This could ultimately enhance the quality of care for patients with MCCs (for stroke survivors in this case). In this thesis study we collected primary care requirements for an eHealth tool (MyST) as a communication tool to facilitate their collaboration and information exchange with the home care team.

9. Methodology

9.1. Co-design – traditional model and UCD model

Understanding end-user requirements and needs is critical in designing any new piece of technology. Attention to the user requirements in health care technologies and applications design and implementation is mostly ignored and this results in poor design and development [59]. In addition, eHealth projects become more multidisciplinary, and more stakeholders with different backgrounds and specialty are involved in the system design process. Engaging all stakeholders who will be the product/program end users in the development process is very important [60]. However, it is not adequate to directly ask users to characterize their requirements for an Information Technology (IT) system, and expect novel notions [61], because it is hard to think about something (system) that does not exist at the moment. Working with users to identify their activities within the context of their work could help in designing technologies to be better aligned to their needs and increase system acceptance. Co-designing health interventions and eHealth applications with health care providers and patients becomes critically important to enhance uptake of the technology [62]. Co-design could refer to design for (users mainly putting their needs in the design process), design by (users strongly participated in design process) and design with (users being involved in designing process) [62]. Usability of electronic applications depends on 3 different aspects: 10% on the interface of the App (the “look”), 30% on system navigation and user interaction with the App (the “feel”) and 60% on how the App meets users’ mental model in doing their practice [63].

There are some traditional methods like focus groups and interviews with stakeholders for gathering system/program requirements. In such traditional IT design methods, participants usually have a consultant role, and they are asked to answer to a set of predefined questions based on their previous experiences [64]. However, IT designers and developers are the ultimate decision makers in such situations [65]. Research shows that lack of a shared (common) understanding of the discussion topic among end users and system development team is a major problem of traditional requirement gathering methods [66]. Shared understanding is a fundamental element for

a meaningful system design and development. This misunderstanding usually occurs due to difference in users' and developers' backgrounds.

User centred design (UCD) is a new approach developed by the field of human computer interaction design for stakeholder engagement and data collection. In UCD, there is a deep communication and understanding between the end users and development team which is a crucial factor in HIT development and implementation. All users' requirements and limitations are incorporated into the application design [65]. Fundamental principles of the UCD are [66]:

1) User is set at the centre of the design,
2) Users and their tasks are focused from the initial stage of the design
3) System's usability is evaluated based on experiment, and
4) System is designed, evaluated and modified with end users iteratively.

User profile and persona is a type of UCD model that helps in capturing users' mental model: their expectations from the application, past experience and foreseen actions. Therefore, not only the users' demographic, but also their needs, emotions and actions are highly considered in this method of applications design and development [65]. System developers/researchers use the captured users' mental models to create a conceptual model, then they design and create an IT application using the conceptual model [67]. Some studies have mentioned that conceptual model is a successful way towards creating a shared understanding of the system between end users and developers [66]. Therefore, such modern system design methods can overcome some of the problems of traditional models. Scenario-based design is another method to understand and collect end users' requirements when designing and developing IT applications [68]. In this method, the focus is on the users' tasks and actions without any attention to understanding the users [69].

9.2. Persona-scenario design method

Persona-scenario method is a combination of user profiles and scenario-based design methods. Personas (authentic but fictitious characters – in this study, characters representing typical primary care providers) and scenario (stories about the persona-

system interactions – in this study stories in which these characters interact with MyST in practice) is an activity which has been effectively used to co-design eHealth technologies with end users [70]. In persona-scenario practice, participants (potential future users) are asked to create personas and scenarios based on a series of guiding questions. Personas should be the best representation of the participants' group, and scenarios are a crucial complement to personas and their voice. Personas which are created based on users' knowledge are the main characters in the user generated stories, and make the scenarios more memorable [71]. Scenarios are well organized **narratives** that make the information transmission and communication among the interdisciplinary team easier [64]. Table 1 shows general narrative elements and the translation of narrative theory to persona-scenario [72].

One of the persona-scenario method innovators, Cooper suggests a progression view to the activity from high-level to very detailed scenarios with an intense attention to user-system interactions [64]. Cooper also differentiates between scenarios about an existing problem before the system implementation (problem scenarios), and scenarios about a new situation and actions after the system implementation (design scenarios). In persona-scenario practice, unlike traditional methods, participants are allowed to be creative and describe an interaction from many different point of views with as much detail as they would like to present [64]. Persona-scenario has some potential benefits [70]:

- Participants are allowed to use their perceptions in addition to their experiences in creation of their personas and scenarios, and this helps in meaningful eHealth applications design and implementation.
- It helps in identifying the unknown elements in system design and potential synergy among them.
- End users are engaged in the design process from the initial stage and this helps to increase the final eHealth tool/program uptake and adoption.

Table 1: The story form and its elements *[72]*: Copyright 2016 by Springer

NARRATIVE ELEMENTS	NARRATIVE ELEMENTS IN A PERSONAS-SCENARIO
Character(s): a protagonist as well as minor characters. A character can be any entity that has agency, involved in the action.	In persona-scenarios the persona is the protagonist.
Time: both the time in which the actions take place, e.g. the future, and the story development over time - beginning, middle, and end.	Most persona-scenarios are set in present time but they can also concern a distant future. The story time can last minutes, days, months, etc.
Problem: a loss, a need, a lack of something, an obstacle to overcome, a conflict.	The persona has a problem.
Setting: presentation of characters, location, problems, and time.	The narrative begins with a presentation of the persona, his or hers problems, the place where the action takes place as well as the time (present time/distant future).
Opening episode: the character reacts to the problem, sets a goal, and outlines a path to the goal.	The persona defines the goal and starts to act.
Episodes: development toward the goal. Episodes consist of: Beginning Attempts Events (accidents, obstacles, happenings, deliberate human actions) Development	The persona-scenario develops through a sequence of episodes that concern the problem, the goal and the attempts to reach the goal, the events involved in these attempts and the obstacles hindering fulfillment of the goal.
Resolution: the problem is solved and the goal is reached - or not.	There are two types of persona-scenarios – one where the problem is solved and the goal is reached, and one where they are not.
Plot: the linkage and order of the episodes.	Most persona-scenarios are presented in a linear manner, without deviations from the story time.
Overall story: starts with a beginning, goes through a middle, and arrives at the end. The overall story is sensitive towards what is considered ordinary social practice within a given culture and explains deviations from accepted social practice.	Each episode links to and has to be meaningful in relation to the overall story. The persona-scenario has to explain why non-routine actions and events happen and how they are dealt with.
Narrator's perspective: The narrative is told by someone.	Most persona-scenarios are told in third-person allowing the narrator to be omnipotent.

9.2.1. Persona-scenario: design tool or a communication device?

Persona-scenario activity is a useful UCD method for properly understanding and conveying users' needs and ideas to system developers and researchers. Therefore, it has been considered as a successful communication device for ensuring that all can achieve a common understanding of the project and system specifications [73]. In addition, all stakeholders, system designers and researchers can have a unified conception of the system/product future users with utilization of personas. Although scenarios describe users' need, and the conditions of new system utilization, they usually do not include detailed system design resolutions. All design decisions are made after the scenarios are analyzed and evaluated by the IT designers. Accordingly, persona-scenario activity has been seen less effective as a design tool by itself [73]. Therefore, we used the qualitative data analysis procedure in addition to the persona-scenario activity to identify design features.

9.2.2. Extended persona-scenario

An extended version of persona-scenario activity for a case in which the end user of the product is an organization instead of individual users has been proposed in a study conducted in Japan [74]. When the end user is a larger setting, both individual and organizational behaviors should be considered in the design process. The study evaluated the application of organization persona-scenario method. To do so, they utilized three description methods before running the persona-scenario activity to better understand the project's perspective: person correlation diagram for illustrating relation between different individuals, organizational chart for displaying hierarchical and horizontal structure of the organization, and use case chart for describing required IT system specifications. Use case chart is a type of UML (Unified Modeling Language) method that helps IT developers to better understand conditions of system application by end users. At the end, it was concluded that all the 3 utilized methods help in better planning and preparation for extended persona-scenario activity. Consequently, the following persona-scenario method was found as an effective communication device that facilitates the system specifications identification.

9.3. Persona-scenario method utilized in literature

A study [72] that compared persona-scenario method with narrative theory, and proposed guidelines for this activity has identified that stories (scenarios) should be adequately detailed and concrete in order to address the existing problems and provide design ideas for future IT system to solve the problems. It has been suggested that the described problem should always be solved by the end of the design scenario. The above study also recognized that there is a need for detailed guidelines and practical methods that help with analyzing stories and generating IT design requirements from the user-created scenarios. Another study found the persona-scenario activity to be a useful method for large IT system design projects because it helps in properly translating the users' need to the system design team [73]. However, it suggested that a comprehensive education about the use of personas and activity structure should be provided for the participants and design team.

A group of researchers engaged end users in designing a public health information system using a series of participatory design methods including: interview, qualitative data analysis, persona-scenario design and think aloud exercise [75]. In this study, the researches and design team (not end users) created personas and scenarios after analyzing the collected information during the interviews, and they validated the scenarios with participants in a think aloud process. This study basically used the traditional format of persona-scenario method in IT system design. However, empowering end users in creation of personas and scenarios based on their knowledge and experiences seems to be a more effective way of utilizing this method [70][76].

A study about developing an eHealth tool for patients undergoing weight loss treatment also used persona-scenario technique for the design process [76]. They ran the exercise separately with patients and health care providers where participants were asked to create personas and scenarios themselves. The study found that patient persona creation was easier for health care providers groups. Moreover, clinician groups more often used the created personas in their scenarios in comparison to patient groups. It has been recommended to create a comfortable environment during the exercise in order to engage participants in contributing to the study. Finally, the authors concluded that

conducting the persona-scenario activity with different user groups is very useful in facilitating the research team to capture all required information for designing eHealth solutions from different perspectives. However, the dual role of the research team as exercise facilitators and also information analysts was mentioned as a study limitation, because this might impact the system design.

Valaitis and her colleagues utilized persona-scenario method for co-designing a complex primary care intervention called TAPESTRY [70]. Different groups of participants in separate sessions were engaged to create personas and scenarios to inform the research team in the intervention design process. The team transcribed the scenarios, analyzed the information, and created a table of design specifications including "actions that were required to actualize the ideas and items that were required to execute the actions" [70]. Although the conducted study found the persona-scenario method very useful, the following items were identified as potential challenges:

- In a session with fewer participants, for example 3 people with different expertise, all have to collaborate in creating personas and scenarios, therefore the created personas cannot be representative of the group.
- Sometime participants might not have a sufficient level of knowledge or experience about the program or system components therefore they might develop some infeasible scenarios.

10. The study context

The persona-scenario exercise was used in this thesis study to help gather end users' requirements and define design specifications for primary care providers using MyST 2. In addition, the exercise helped in identifying action items (e.g., training, strategies, policies) for consideration in the implementation of MyST 2 in practice settings to facilitate two-way communication between home care and primary care settings. The data collection procedure, data analysis process and identified results are described in details below:

10.1. Data collection

10.1.1. Participants

Following McMaster research ethics board (REB) approval, a mix of 5 to 8 primary care providers such as physicians, nurse practitioners, nurses, dietitians, mental health workers, social workers, pharmacists, and occupational therapists from the Hamilton and Burlington area were invited to take part in the two hour long exercise. The sample size was determined based on the need to run persona scenario activities for co-designing eHealth applications. There is general consensus that there is no need to run usability tests with more than 5 users to achieve best results [77]. It has been shown that by adding more users less and less new information will be gathered.

We were aware that it is important to compensate primary care providers to ensure their participation given they might lose income when they are not at work. Therefore, we decided to provide $200 compensation for their participation although they were only informed that they would receive an honorarium but not the amount. We used a snowball sampling technique [78] to identify potential health care providers in primary care settings by sending emails and explaining the nature and purpose of this study.

10.1.2. Sessions

The study consisted of two persona scenario sessions held at McMaster University, Hamilton, Ontario. Participants were invited to only attend one session each, and both

sessions were two hours long. There were three researchers to help with activity facilitation and data collection during the sessions.

Both sessions started with a brief introduction (50 minutes) to study objectives, MyST's current features and functions and the main components of the stroke rehabilitation intervention that MyST supports (e.g., collaborative practice, patient-centered care, proactive comprehensive approach, strengths-based approach, and evidence-based care). A quick demo of MyST App was presented to illustrate its core design features and functions.

MyST currently can be used by patients and their caregivers, and all home care providers involved in the patient's circle of care. Patients and caregivers have access to some features but not all. MyST allows health care professionals to communicate in a real-time manner, send alerts regarding patient status change, and share their patient's visit record with each other. There are fields available in MyST for recording evidence-informed safety assessments. In addition, providers can collaboratively create goals with patients, and also tasks for each other. MyST also enables online access to stroke best practice guidelines and directories of community resources. Following is the list of existing modules in MyST and their brief descriptions:

- **Client's Information** including patient and caregivers' contact information; patient's health information such as allergies, stroke information and other chronic conditions; client's level of independence; and special instruction(s) for visiting patient
- **Client's circle of care information**
- **Alert** functionality
- Action Items:
    - **Record My Visit**: an action item for recording home visit reports, and tracking health screening assessment scores – for all home care providers excluding personal support workers (PSWs)
    - **PSW Checklist**: an action item for completing stroke safety checklist – for PSWs

  - **Team Meeting Record**: an action item for recording team meeting summaries reports – for home care coordinator
  - **Community Reintegration Plan**: an action item for adding/reviewing patient's community reintegration plan (e.g. equipment, lab services)
  - **Medication Review**: an action item for indicating patient's medication is reviewed
  - **Review Stroke Best Practices**: an action item for reviewing stroke best practices online
- Client's chart **timeline** – including all client's events recorded in MyST in a chronological order which can be filtered by category (e.g., tasks, goals, PSW checklist)
- **Task** creation functionality
- **Goal** creation functionality
- Adding online **resource links for client's** review

Although a demo of MyST was offered during sessions, participants were encouraged to think beyond what is currently present in the application. Participants were then asked to sign consent forms (Appendix I) prior to participation in the persona scenario exercise (60 minutes). Persona scenario sessions are usually divided into two stages: first, conducting the persona scenario exercise and second, a facilitated discussion. However in this study we omitted the second stage due to the small number of participants per session who worked in one group altogether and were aware of all the members contributions throughout the activity. A discussion is useful in larger groups where everyone can hear others' personas and scenarios and comment on them which provides more information to inform design and implementation.

In persona scenario exercises, participants are divided into small groups of two or three (ideally in pairs) where group members have similar characteristics where possible (e.g. discipline). In this study, each session was comprised of one small group. The first session consisted of three members and the second session consisted of two members. Each group was asked by the facilitator (the author) to create a primary care persona

(character) and one or two scenarios (a situation where the persona interacts with the home care team and primary care team using MyST 2) based on guiding questions (i.e., what discipline is your persona? How long has he/she worked in primary care? What is the situation that brings your persona to use MyST 2? How does he/she use it? What is the response? Or how does the issue/ situation get resolved?). The persona scenario development and discussion guide is attached in Appendix II. A research assistant facilitated the group conversation by clarifying questions and giving directions regarding completion of the exercise. The assistant took notes of key points raised on a laptop for future analysis.

The created stories described participants' ideas on the use of features in MyST 2 as well as ways that MyST 2 could be implemented in practice. For example, stories included how primary care was brought into the circle of care, how training on the App occurred in a primary care setting, as well as how it was implemented in day-to-day practice. Both sessions' group exercises and presentations were audio taped and transcribed for qualitative content analysis.

10.2. Data analysis

The audio-tapes from both sessions were transcribed. Then, the author read the transcription many times, and also listened to the audiotapes again to searching for common ideas. These ideas, or nodes, were listed and grouped into broader themes based on the similarity of the items. All nodes with the high-level themes were inserted into Excel for analysis. The author broke each theme into more detailed categories to group nodes further which helped to identify new features and functions of MyST to support integration with primary care. Constant comparison was used to identify these categories. In addition, a discussion session between the author and her supervisor supported the confirmation of the final categories. As a final decision, under each theme, nodes were classified under 4 categories: *1. Existing feature* (an existing feature of MyST that is sufficient to be used to address the idea), *2. Addition to an existing feature* (some changes/additions to an existing feature is required), *3. New feature (*a new feature is required to be built in MyST 2), and *4. Existing or new feature* (an existing feature of MyST might be sufficient or a new feature could be specifically built in MyST 2). If a node included

a function/feature in MyST 2, the feature's name (either the feature currently has a name in MyST, or we created a name for the new feature) was added to a column called Feature.

Specifications for MyST 2 App design (technology design and development) and/or implementation (technology implementation) were created for each node. Further examination of nodes determined if the identified item from persona scenario activity was feasible, unfeasible or needs more investigation. The feasibility of items was determined based on an estimation of resources required for the development of features, clarity of implementation procedure in the stories, current provincial privacy legislation, and current level of patient and family access to the application (permissions). The author's supervisor who was present at both persona scenario sessions reviewed the identified themes, categories and design and implementation specifications to support the relevance and validity of the analysis. The author and her supervisor met to review the conducted analysis and results and minor refinements were made. Figure 7 shows the study analysis procedure. In the final step, the identified major themes were searched in the literature to validate and explain the results in the final stage.

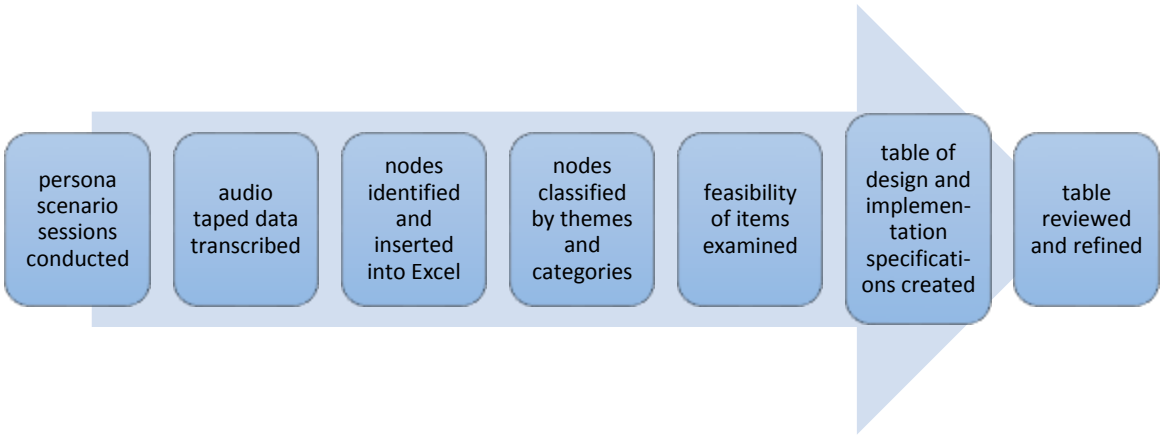

Figure 7: *Analysis process to create design and implementation specifications*

10.3. Results

After an extensive search, we succeeded to recruit five primary care providers: two registered nurses, one nurse practitioner, one dietitian and one social worker. They were

identified through members of ACHRU stakeholder team who worked in or resided in the Hamilton and Burlington area that included researchers, staff, trainees (undergraduate, graduate and post-doctoral students), decision makers and caregivers of older adults.

Both registered nurses and the nurse practitioner (3 participants) joined the first session, and the social worker and the dietitian (2 participants) took part in the second one. All five primary care participants were female health care providers with different number of years working in a primary care setting. They had varied levels of experience in working with technology, collaboration with home care and providing care for stroke survivors. Table 2 shows a summary of participants' backgrounds and demographics.

Table 2: Participants' demographics

	Participant #1	**Participant #2**	**Participant #3**	**Participant #4**	**Participant #5**
Discipline	Nurse Practitioner	Registered Nurse	Registered Nurse	Dietitian	Social Worker
Number of years working in primary care	11 years	3 years	8 years	4 years	15 years
Type of primary care delivery model	Community Health Centre	Family Health Team	Family Health Team	Community Health Centre	Family Health Team
Degree of experience working with home care *(1: not at all comfortable – 10: extremely comfortable)*	8	9	8	7	3
Level of comfort working with rehabilitation of stroke survivors *(1: not at all comfortable – 10: extremely comfortable)*	8	8	5	8	4

Comfortable working with eHealth tools and technology	yes	yes	Depends on App	Yes	No

In total, three personas were created with four scenarios during the two sessions: one persona (a registered nurse) with two scenarios during the first session, and two personas (a dietitian and a social worker) with one scenario for each during the second session. Researchers asked the second session's group to create two personas to have the opportunity of understanding how MyST 2 App might be used by both personas from different disciplines. They first created a social worker persona together with a scenario, and then a dietitian with its story. Appendix III shows detailed descriptions of created personas and scenarios for both sessions.

- **Lucy**: The first session's persona was a mid-20 year old **registered nurse** working in a primary care family doctor's office. A registered nurse was a realistic character because it was a good representation of the group members' discipline and experiences (all were nurses or nurse practitioners in this session). The persona had 2-5 years of experience working in home care. She was proficient and open to technology use. She did not have many experiences with stroke rehabilitation. Lucy had received MyST 2 training as part of her orientation to the family health team. In addition, online training content was available for her future reference. She was accessing MyST 2 through the use of the office's computers or an iPad connected to Internet.
- **Karen**: The second session's first persona was a 40 year old primary care **social worker** with 5 years of experience in social counselling. She rarely communicated with the home care team. She had a reasonable and competent level of experience in working with technology such as electronic medical records (EMR) system. However, Karen had a very limited experience of working with stroke survivors. She received MyST 2 training during Tuesdays' lunch and learn program in the clinic's group training sessions.

- **Jennifer**: The final persona in the second session was a 24 year old **dietitian** who worked part-time in a primary care clinic and part-time in the hospital stroke clinic. She had a very limited experience of collaboration with the home care team. Jennifer was very good in working with modern technology. She had learned how to use MyST 2 through watching online videos. She looked up MyST 2 training materials in YouTube, and watched a two minute long overview video. Then she played with MyST 2 to better understand it, and afterwards she watched longer- modular videos for more detailed training.

As mentioned, two persona scenario sessions with the total number of five primary care providers were held (one on November 2015 and another one on March 2016) for data collection. During the two sessions, three personas were created, and each one considered as one resource in the transcription and data analysis procedure. Fifty-five unique nodes (items) were generated from the transcribed discussions. All these items were grouped together under 8 emerging themes:

- Inter-professional team communication
- Patient safety approach
- Access to non-medical information
- Facilitation of referral to community services and resources
- Patient-centred care
- System integration
- Clinic EMR as a complementary tool
- Implementation considerations

Specifications for implementation of the MyST 2 App in a primary care setting were identified by the author for each node and for every theme. Appendix IV shows the results table including all identified nodes and specifications. In addition to this, a main theme titled “Implementation considerations” was identified for items that were directly raised by participants: They were placed under the “Implementation considerations” theme. There was repeated overlap between items relevant to the “Inter-professional team communication” and the “Patient safety approach” themes.

Under each theme, nodes were classified under 4 categories as relevant to the existence of the feature (that was described in the node) in MyST App as noted above. The reason for this categorization was to group nodes in a most efficient way to be applied to MyST 2's development (features, modules). Therefore, the created specifications table could be easily used as a To-Do list by App programmers for developing MyST version 2.

Feasibility of each node was checked to find out whether design and/or implementation of each discussed item was feasible, infeasible or it needs more investigation. Next, the table of specifications for MyST 2 App's design and implementation was created. In some cases, participants directly named the required features and other implementation considerations but in other instances the required specifications were extracted from the created scenarios by the research team. Table 3 shows a small sample of the results table which is available in full in Appendix IV.

Table 3: A small sample table of study results

Theme /*Category*	**Item (node)**	**Sources**	**References**	**Feasibility**	**Design Specifications**	**Implementation Specifications**	**feature**
Inter-professional team communication			4				
Category: Existing feature			1				
	Primary care dietitian creates task for home care providers (for example for OT)	3	1	feasible	1. Primary care team has access to task module of MyST and is able to create tasks for home care team	1. Training for primary care team about how to create a task for home care team 2. Training for home care team about how to complete each task	Task

Theme /Category	Item (node)	Sources	References	Feasibility	Design Specifications	Implementation Specifications	feature
Category: Addition to an existing feature			1				
	Primary care NP creates task for home care team with different priorities (green/yellow/red) in the MyST 2 following the med change	1	1	feasible	1. Primary care team has access to task module of MyST and is able to create tasks for home care team 2. The task module in MyST 2 has an additional feature that the task creator can prioritize task (maybe with different color codes)	1. Training for primary care team about how to create a task for home care team 2. Training for home care team about how to complete each task 3. Creation of some policy about how to prioritize tasks	Task
Category: New feature			1				
	MyST 2 has an instant messenger which allows primary care NP to do a quick follow up with home care nurse if she is available	1	1	feasible/needs more investigation	1. A new module in MyST 2 which is an instant messenger 2. Both primary care and homecare teams have access to the module and they can send an instant message for each other	1. Feasibility of adding this new module should be investigated from the policy point of view 2. If it was feasible, there should be some policy around the use cases of it by each team	Messenger

Theme /Category	Item (node)	Sources	References	Feasibility	Design Specifications	Implementation Specifications	feature
Category: Existing or new feature			1				
	Home care nurse requests medication change including the reason for change by phone (author suggests to use MyST 2 instead)	1	1	feasible	1. A new module in MyST 2 for creation of a time sensitive request (maybe same as task with an urgency rating and a push feature potentially to email) by home care team for primary care team 2. Primary care team has access to view the request in a timely manner 3. Mechanism to alert PC that the screening has been completed.	1. A specific training for teams about how to write the request with sufficient explanation 2. A specific training for teams about how to view the request and respond to it (take action) in a timely manner 3. Creation of policy about urgent requests, and also a notification if the requested team member/s did not respond within a designated period of time	request (task) with urgency rating
patient safety approach			3				
Category: Existing feature			1				
	Primary care NP checks the last date of medication review which is done by	1	1	feasible	1. Primary care team (NP and other relevant providers, not all	1. Training for primary care team about how to view	med review (or view

Theme /Category	Item (node)	Sources	References	Feasibility	Design Specifications	Implementation Specifications	feature
	home care nurse and is recorded in MyST 2				the team) has access to view the medication review module (or maybe just timeline items are enough) of MyST	medication review updates	timeline item)
Category: New feature			2				
	Primary care SW looks at patient's diet info before visiting the patient	2	1	feasible	1. A new module in MyST 2 to include patient's diet 2. Primary care has access to view this new module	1. Determine who will be responsible for adding this info into MyST 2, and keeping it up to date 2. Determine what type of dietary information would be valuable to include 3. Training for primary care and home care team about where to find this info	patient's diet
	Home care provider starts a video conference (if necessary) with primary care team while visiting patient in home	1	1	Likely not feasible	1. A new feature in MyST 2 for conducting video conference (telehealth) 2. Home care team has access to this feature to start a video	1. Feasibility of adding this new feature should be investigated from the health care system policy and technology capability	video confere nce

Theme /Category	Item (node)	Sources	References	Feasibility	Design Specifications	Implementation Specifications	feature
					conference 3. Primary care team is notified somehow when a video conference call is requested, and answer the request	development point of view 2. Determine if real time videoconferencing would be feasible given the usual work flow of home care and primary care.	

10.3.1. MyST 2 design and development specifications

Following is the list of features/modules required for MyST 2 based on the results from the scenarios. Some of the items can be managed by existing features in MyST, however, some additions to a number of existing features are necessary to make them suitable for primary care providers' use. In addition, some new modules/features were identified from generated scenarios to be considered for MyST 2 development. The feasibility of creating some of them needs further investigation from a health system policy perspective and also patients' privacy and legislation. The following table (number 4) includes the list of extracted features/modules and specifications as aligned with each identified theme:

Table 4: Identified MyST 2 features and specifications grouped by themes

Theme: Inter-professional team communication	
Category: Existing feature	
Feature	*Specifications*
Task	View and create tasks
Alert	View and create alerts

Goal	View and create goals with patient
Timeline	View and add timeline items
Category: Addition to an existing feature	
Feature	*Specifications*
Task	The task module in MyST 2 has an additional feature that the task creator can prioritize task (maybe with different color codes)
Team Meeting Record (action item)	1. A new feature in the existing "Team Meeting Record" action item of MyST, where primary care team can easily acknowledge the team meeting record summary by clicking on a check sign 2. Primary care providers involved in the patient's circle of care need to be included in the dropdown list of people attending the team meeting
Category: New feature	
Feature	*Specifications*
Messenger	A new module in MyST 2 which is an instant messenger, and both primary care and home care teams have access to the module and can send an instant message to each other. Needs more investigation from the policy point of view
Home Care and Primary Care Direct Communication (action item)	A new module in MyST 2 (additional to existing action items) for the home care team (maybe only the home care coordinator) and primary care team to have asynchronous communication. Data could be added/recorded and viewed by both teams
Document Upload	A new spot (feature) in MyST 2 accessible by both teams for uploading documents (e.g., dermatology images, diet resources) and sharing it with patient and other providers in the circle of care

Video Conference	A new feature in MyST 2 for conducting video conferences (telehealth) Likely not feasible at this stage
Request with urgency rating	A new module in MyST 2 for creation of a time sensitive request (maybe same as task with an urgency rating and a push feature potentially to email)
Primary Care Update (action item)	A new module in MyST 2 (additional to existing action items) for primary care updates which could be a new module similar to the home care "Record My Visit" action item. Data should be specifically recorded the by primary care team in this spot, and viewed by all circle of care members.
Theme: Patient safety approach	
Category: Existing feature	
Feature	*Specifications*
Medication review	View record
Record My Visit – home care (action item)	View record
Alert	View and create alerts
PSW Checklist (action item)	View record
Timeline	View and add timeline items
Category: Addition to an existing feature	
Feature	*Specifications*
PSW Checklist (action item)	A new feature in the existing "PSW Checklist" action item of MyST, where care coordinator can easily click on each concern and apply it to someone in the circle of care (might be in the primary care team) for their review

Alert	All alerts created by home care in MyST 2 will be pushed over to a tablet at primary care connected to MyST 2, and showing alerts
Category: New feature	
Feature	*Specifications*
Medication List	A new spot in MyST 2 for adding the patient's medication list (it might be manually added, or automatically pulled from clinic's EMR) Needs more investigation regarding automatic data pulling
Lab Values	A new spot in MyST 2 for adding patient's lab values (it might be manually added, or it might be automatically pulled from clinic's EMR) Needs more investigation regarding automatic data pulling
Patient's Diet	A new spot in MyST 2 to include the patient's diet Need to clarify what type of dietary information is desired (e.g., daily intake or something else?)
Vital Signs	A new spot in MyST 2 for adding the patient's vital sign results collected by home care team
Document Upload	Same as described above
Video Conference	Same as described above
Request with urgency rating	Same as described above
Primary Care Update (action item)	Same as described above
Theme: Access to non-medical information	
Category: Existing feature	
Feature	*Specifications*
Patient Information	View and add information
Patient Circle of Care Information	view information

Category: Addition to an existing feature	
Feature	*Specifications*
Patient Information	New tab (fields) added to the existing "Patient's Information" module of MyST for adding patient's physician information, pharmacy information, and power of attorney information
Category: New feature	
Feature	*Specifications*
Patient Search Function	A new feature in MyST 2 called "search" that is accessible by primary care team to look up if a patient's chart exists on the MyST 2 App Needs more investigation from the policy and privacy perspectives
Calendar and Reminder	A new feature in MyST 2 available for all circle of care to create reminders and get notifications Needs more investigation regarding how user will be notified (e. g., push or pull within clinic's EMR, via email, text messages)
Theme: Facilitation of referral to community services and resources	
Category: Existing feature	
Feature	*Specifications*
Community Reintegration Plan (action item)	View and add plan
Category: Addition to an existing feature	
Feature	*Specifications*
Community Reintegration Plan (action item)	A new field under "Core Services" of MyST (which is placed in the "Community Reintegration Plan" action item) is required for interpreter information
Theme: Patient-centred care	

Category: Existing feature	
Feature	*Specifications*
Goal	View and create goals with patient
Theme: System integration	
Category: New feature	
Feature	*Specifications*
Medication List	Same as described above
Lab Values	Same as described above
Calendar and Reminder	Same as described above
Theme: Clinic EMR as a complementary tool	
Category: New feature	
Feature	*Specifications*
Self-Reminder Message	Primary care has access to create a message for themselves in the clinic's EMR to check MyST 2 to see follow up results of actions being taken by home care in response to their requests
Calendar and Reminder	Primary care has access to create a reminder on MyST 2 for themselves, and it will be automatically sent to their email or linked to their clinic's EMR

10.3.2. MyST 2 implementation specifications

There were implementation consideration items that were directly mentioned in the scenarios or extracted after analysis. Some of the important points made during persona scenario discussions that require consideration are as follows (table 5):

Table 5: Identified MyST 2 implementation considerations

Theme: Implementation Considerations	
Node (Item)	*Specifications*

Primary care team uses laptop, iPad or computer station to access MyST 2 App	**Hardware requirements** There should be sufficient level of devices available in the primary care office for accessing MyST 2 via internet
There is a tablet at the primary care clinic which is visible to all practitioners showing flashing alerts (with their priorities) for example for quick patient visit requests created by home care team in MyST 2	**Health care system policy** **Hardware requirements** Feasibility of having a tablet connected to MyST 2 and showing alerts at a primary care clinic should be further investigated from the health care system policy perspective and technology capability. Some policies need to be placed for proper and efficient use of this feature in the organization
Ideally one primary care provider will be able to attend the monthly home care team meeting, or to have a short conference call with home care team (maybe with the home care coordinator) after their team meeting about the patient's status review	**Health care system policy** **Patient's preference** Feasibility of having a primary care provider attend the home care team meeting or have a short conference call with them needs to be investigated from the health care system policy point of view, and patient's preference regarding individuals to join the meeting
The home care nurse calls the clinic and requests a medication change including the reason for change	**Implementation policy and procedure** It has been suggested to send requests within MyST 2 App for less urgent cases. However, an implementation policy and procedure is required about emergency

	requests for medication changes, and also a process to follow if primary care did not respond within a period of time
MyST 2 has a new feature such as an instant messenger which allows the primary care nurse practitioner to do a quick follow up regarding a shared patient with the home care nurse if she is available online	**Implementation policy and procedure** If the feasibility of adding messenger module is confirmed, some implementation policies and procedures are needed around the use cases of this module by each team
List of patient's medication is available in MyST 2	**Implementation policy and procedure** **Teams' responsibilities** If the list is going to be manually added into MyST 2, there should be an agreed upon policy between primary care and home care about who takes the responsibility to add the medication list into MyST 2 and keep it up to date
Patient's lab values from the primary care clinic are added into MyST 2	**Implementation policy** **Teams' responsibilities** If it is going to be manually added into MyST 2, there should be some policy and procedure between primary care and home care about who takes the responsibility to add it into MyST 2 and keep it up to date (author's note: it seems most appropriate to have primary care to add lab values into MyST 2 given they tend to request lab results)

Primary care team searches for a patient's name in MyST 2 to find out if the patient's chart exists in the system. Primary care can then request access to his/her chart	**Implementation policy and procedure** **Teams' responsibilities** **Patient's privacy** First, feasibility of searching MyST 2's database to look for a specific patient's chart needs to be investigated from the privacy perspective. If the feasibility is validated, some implementation policy and procedures should be determined. For example: • Who will have the responsibility of creating MyST 2 accounts for primary care providers (someone from primary care or home care?) • Who will have the authority to confirm or cancel primary care's access request (authentication mechanism) • Level of access to patient's information for different professionals (e.g. dietitian vs. social worker) should be determined and built into MyST 2
Home care team shares a picture relevant to patient's context (e.g., skin condition) with primary care team	**Hardware requirements** **Patient's privacy** First, MyST 2 needs to have a place for uploading documents such as photos. Then, the following items are required to be considered for including this feature in MyST 2:

	• Patient consent and privacy issues related to sharing such information, and managing images that are on staff devices after upload • Hardware requirement such as cameras by home care providers

Some items about use of MyST 2 by the patient and his/her family were cited in stories that are not feasible for MyST 2 implementation due to their current limited access to the App and its functions. Currently, patient and caregivers only have a view access to some information and functions in MyST. This access it is not going to be expanded in MyST 2 at this stage. This might be considered in next versions of MyST App which will require patients' and caregivers' involvement in design and development process. The following items were mentioned in participants' stories:

- Patient's family are able to leave a message on MyST 2 for the dietitian about patient's daily dietary plan
- The primary care dietitian looks at patient's diet on MyST 2 that is added by patient and/or his family

Comprehensive **training** about all MyST 2 components (e.g., collaborative practice, patient-centered care, proactive comprehensive approach), functions and features (e.g. creating goals, reviewing information, adding visit record), and its execution in practice setting (e.g. roles and responsibilities in adding information into MyST 2, level of integration between clinic's EMR system and MyST 2 App, policies and procedures for emergency cases) is mandatory for both the primary care and home care team. Training specifications for each identified node are detailed in the results table available in the appendix IV. Proper training could facilitate the efficient and meaningful implementation and use of this application by both teams.

11. Discussion

Based on analysis of gathered data from the persona scenario activities, eight major themes and a detailed list of functions and implementation considerations were identified. The importance of some of these themes and also the large numbers of identified features (function required in MyST 2) are supported in literature.

Supporting meaningful communication and collaboration between all inter-professional members of patient's circle of care (home care and primary care) was one of the main themes. Meaningful communication is essential for improved connectedness between home care and primary care in providing care for shared patients with MCCs. A study [79] conducted in British Columbia with interviews involving 32 health care providers also flagged the importance of continuity and communication among the circle of care. The study found three levels of continuity among patient's circle of care: Information continuity, management continuity and relationship continuity. It is noted that all of these three types of continuity depend on inter-professional communication. This study also identified different types of communication strategies between providers: person to person or information sharing with more than one person, concurrent or non-concurrent communications. It is highlighted that the circle of care should be created and strive to enable continuity, and form a sense of trust and sufficient knowing between all providers involved in patient's care. The importance of having a multidisciplinary team including home care and primary care that collaborate in providing care for patients with multimorbidity is stressed in literature [42]. An efficient team for chronic condition management might consist of home care and primary care nurses, a case manager, social workers, clinical pharmacists, and other professionals depending on patient's needs. All professionals need to communicate sufficiently to provide quality care for patients. In our analysis, we realized that communication among home care and primary care teams through MyST 2 will be terminated when the patient's home care program is completed.

Although it seems that primary care is directing home care on activities, it is crucial to understand whether home care needs to have the role to assign primary care tasks/actions? If so, this complicates who is in charge to coordinate care. Ideally, in a

patient-centred care approach, the patient should have the authority to choose his/her care coordinator from either team. The other apparent issue is related to funding challenges. An example of a conflicting situation is as follows: Primary care might request that a task be completed by a home care provider. The home care coordinator determines the frequency of visits and the type of provider who will provide services based on funding models. The requested task is not supported by home care due to the limited funding that is available. Such issues can create significant conflicts between sectors unless there are clear policies around who can approve what 'tasks' between sectors.

The second major theme that was identified in this study is taking a patient safety approach such as reviewing patient's medications, lab values, vital signs and diet, looking at other providers' visit notes, and proper attention to alerts. There are many patient safety issues described in the literature which are related to deficits in continuity of care and inefficient collaboration and communication between different health care settings [18]. Lack of meaningful communication at patient's transition points, between acute care, home care and primary care is the cause for most of the information discontinuity. Information could be about changes in diagnoses, medication and treatment. An example of ineffective information exchange between primary care and home care is described in a Pan-Canadian home care safety study [18]. It described an elderly patient with MCCs and multiple associated medications who lived alone. "The patient experienced urinary urgency, possibly related to a change in medication, which resulted in multiple visits to the bathroom. A fall occurred on one of these bathroom visits resulting in a hip fracture. Because the primary care provider and the pharmacist neglected to alert the HC providers of the potential safety risks related to the medication change a care plan to reduce the potential for harm was not implemented" [18]. Therefore evidence suggests that accurate information (such as medication information) review and documentation for each patient visit, and sharing information with all patient's health care providers are important and effective factors in preventing some adverse events for elderly patients [80].

Another study [81] that took a participatory design approach for development of a health information system also found that taking a patient safety approach such as a patient's medication management is important. Their study participants mentioned that

home care providers need to receive electronic messages/updates within the information system about changes in a patient's medication list including changes in dosage, directions or considerations from the primary care setting similar to how it was requested by the participants in this thesis study. Kitson and her colleagues conducted a study to identify requirements for a medication communication framework across the patient's circle of care with the goal of enhancing patient safety [82]. The patient was placed in the centre of his/her own circle of care, and all caregivers and providers were around the patient and engaged in medication communication activities. The collected data, and study analysis [82] revealed that coordination of sharing medication information between all involved health care sectors and providers plays a significant role in improving quality of care for patients. Electronic information systems accessible by multiple settings and providers could help in achieving quality care and patient safety.

Linkage and referral to community resources and programs outside of health care settings is required for chronic conditions management and prevention [83]. Being referred and having access to community resources is very important for the elderly population especially for those with MCCs. Therefore, the patient's circle of care including home care and primary care could take the responsibility of assisting such linkages. Facilitation of referral to community services and resources was another theme extracted from the participants' stories in this thesis study. We understood that linkage to community services might include referral to a local immigrant working centre or Meals on Wheels – a food access program.

A patient-centred care approach helps in better streaming information flow between different health care settings and consequently eliminating unrequested services as the patient is seated in the centre of attention. If all patient's providers have access to a mutual sufficient level of information such as patient's medication list, allergies, vital signs, lab values and each other's visit notes, this could enhance decision making and care planning [48]. Information technology and eHealth Apps have the potential to enable this innovation. For example, diverse professionals can become aware of required information and help patients from different perspectives in achieving his/her goals. Goal-oriented care is a very well-structured patient-centred care approach which enormously

emphasizes the importance of involvement of all those in the circle of care (in this study, the circle of care includes patients and their caregivers, as well as home care, and primary care teams) in goal setting and shared decision making [84]. In addition, patient-driven care might also help in solving issues related to health care providers' responsibilities (for example patient's care coordination across settings) because the patient will have the power to request preferred individuals taking care of specific tasks and participating in his/her care team meetings. Patient-centred care, and specifically goal setting with the patient, was another identified theme in this thesis study, and its value is well supported by research [84].

IT system integration is another key finding of this study where participants desired medication lists and lab values to be automatically pushed from their clinic's electronic medical record (EMR) system over to MyST 2 App. An integrated calendar and reminder system between the clinic EMR and MyST 2 was another important item under this theme. A recently published article [85] described the value of integration between systems in different settings and identified challenges in implementation. Three community mental health centres (CMHCs) and eight primary care practices participated in this study [85]. All experienced some similar challenges with their EHR systems. One of the identified challenges was that their systems were not sufficiently supportive of communication and collaboration among integrated teams (combined of providers from different settings). One of the workarounds utilized by study participants for overcoming this challenge was duplicate documentation in two different systems. However, duplication is a frustrating and time consuming solution. Similarly, duplication and manual data entry is suggested as a backup solution in our study given that further investigation is needed related to integration between primary care EMR systems and MyST 2 App. For example, it was mentioned in one of the scenarios that patient's lab values should be accessible in both clinic's EMR and MyST 2. If the integration is not possible, primary care has to add it manually into MyST 2. However, it is important to find out what home care providers want to see regarding lab values. If home care providers do not need to review lab values, and primary care providers have access to review them in the EMR, what is the potential that primary care will be willing to add it into MyST 2? Such important process issues did not come up

in the persona scenario sessions and should be clarified before further development and implementation. In addition, given the importance of patient-centred care, it will be essential to conduct a persona scenario session with patients and their caregivers to explore their views related to expanding MyST to include primary care into the circle of care.

As practices are evolving and moving towards extensive integrated models of care, the need for more stable eHealth solutions such as unified EHR systems becomes evident [85]. HIT vendors should cooperate with health care providers to design systems that support integration with other settings electronic systems. In addition, a broader collaboration among EHR venders, health care settings, government and regulators, and educators plus financial support need to be in place for development of integrated systems that fit different settings needs [85]. We identified that participants in almost all their scenarios mentioned several times that their personas created reminders and messages for themselves in their primary care clinic EMR to login to check MyST 2, and look for new updates and information. This created a separate theme called clinic EMR as a complementary tool in this study's analysis. We realised that EMR systems will be used as a tool in response to some of the system integration limitations. However, such workarounds cannot overcome all possible challenges that might occur due to existence of independent electronic systems.

Last but not least, implementation considerations was another identified theme. We found six high level items that need to be considered in the MyST 2 implementation process: hardware requirements, health care system policy, implementation policy and procedure, teams' responsibility, patient's preference, and patient's privacy. While all technical issues related to systems interoperability and functionally have to be fully considered, managerial issues such as cultural and sociological concerns require more attention in system implementation [86]. In electronic health care systems implementation, system or Apps have to adapt legal requirements, and follow well-defined interoperability standards. A workshop [86] about health IT and its related implementation issues and recommendations was conducted by American Medical Informatics Association (AMIA) in 2006. One of the workshop's questions was "What ethical, legal, social, regulatory, and

policy issues need be considered relating to “failure”?” [86]. Workshop participants discussed difficulties communicating across multiple settings and a lack of knowledge about different settings and workflow as some of the existing challenges in the implementation of efficient shared HIT systems. Collected answers to a set of workshop questions were grouped together into themes. Two of their identified themes are well-aligned with our study analysis for MyST 2 implementation considerations:

1. The need to consider and incorporate all aspects of practice environments, and policy and regulatory requirements
2. The challenge of harmonizing all involved roles and sectors [86].

It has been recommended to identify different types of risks related to IT, leadership, social, and user privacy prior to system implementation, and find possible solutions to mitigate them. Risk detection and mitigation should become a part of new HIT systems implementation policy and regulation [86]. In this thesis study, all potential implementation risks were extracted from created stories, and implementation specifications which were solutions for risk mitigation have been offered for consideration in MyST 2 implementation.

The other recommendation made by AMIA workshop participants [86] was the importance of training in HIT implementation [86]. Sufficient resources and appropriate time are required for successful system implementation. In addition to initial hands-on training, on-going training could be a potential facilitator for effective implementation. On-going training could be monthly refresher training sessions, online Q&A forums, and online YouTube training videos. The significance of training is well-considered in our study, and some training strategies and considerations for both primary care and home care team has been explicitly identified and described that possibly facilitate the efficient implementation of MyST 2 in practice.

12. Study strengths and limitations

Strengths: This study consisted of two persona scenario sessions with five participants from various professions and experience in primary care, and from different primary care practices (family health teams and community health centres). A nurse practitioner, two registered nurses, one social worker, and one dietitian were involved in our design process. Their expertise is typically needed to address comprehensive care needs of stroke survivors and persons with multiple chronic conditions. Therefore, we had a varied sample of primary care providers' end users. There were different contributions from both groups:

- The first group consisting of three nurses raised many patient safety issues and considerations for interdisciplinary team collaboration
- The second group emphasized the importance of patient-centred care such as group goal setting with the patient, and linkage and referral to community services and resources.

We asked participants to use MyST 2 directly in their scenarios and events where their persona interacts with the App. This helped researchers better understand participants' mental models. In addition, the author's supervisor who has experience facilitating several persona scenario sessions for various projects helped in guiding this study's participants toward effective completion of the activity. Therefore, participants were adequately supported to help the researcher gather sufficient and relevant data to inform the design and implementation of MyST 2.

At the end of each session, participants were asked to provide feedback on the conducted persona scenario activity. The first group mentioned that the activity was initially a little confusing, but the guidance from the leader helped the discussion flow. They also emphasized that they knew what they want to do, but they found it hard to properly express their ideas. Participants recommended that they be provided with a patient persona including his/her age, conditions and socio determinants of health before the activity. This will help them in being more focused and organized in creating their stories.

The second group created two different personas together (a social worker, and a dietitian), but found this somewhat difficult and confusing due to their limited knowledge of each other's role and expertise. A possible solution for similar situations in the future is where two participants from different professions are working in a pair, the persona that they might create could be a team persona instead of an individual persona. However, the feasibility and effectiveness of a team persona needs to be tested and evaluated.

In our study, participants were invited to take part in the design of a second version of an existing App. The IT system or App is usually not built before end users' involvement in the design process. However, it is not feasible to completely restructure the App nor was it the purpose of this study to develop it from scratch. Therefore, given that MyST was already built, we formally demonstrated it to participants before the data collection to give them an idea of the App for them to build on. A recommendation related to this was made to improve the quality of a persona scenario session. Some participants wanted hands on play with MyST before the personas and scenarios development rather than to listen to a formal presentation about it. Although this seems to be valuable for participants, the time required for this might be a burden on participants. Moreover, the focus might be shifted to exploring MyST rather than thinking about needed specifications for primary care providers.

Study Limitations:

We did not prompt primary care participants in the persona scenario activity to think about "what are patients and caregivers doing in MyST 2?". This would have added an important dimension about primary care providers concerns or ideas about the level of control a patient and their family caregivers might have. Primary care team's perspectives will need to be investigated in future development of MyST that will focus on greater access and engagement of patients and caregivers in using MyST 2.

MyST and subsequently MyST 2 are designed specifically for stroke survivors with MCCs. As a result, we ran the persona scenario sessions with a stroke survivor in the centre of care. Although, the identified specifications are primarily extracted for enhancing

MyST, and developing its expanded version for stroke to include primary care, it may be applicable to the design of the App for patients with other chronic conditions.

Difficulty in recruiting primary care participants was another study limitation that prevented us from collecting perspectives from other primary care professionals such as physicians, pharmacists and occupational therapists. Therefore, our findings are limited in that some providers' expertise and knowledge might benefit the stroke survivors' care plan as well as answer some design questions. For example, a pharmacist might be able to help with identifying the appropriate way of designing the patient's medication list module in MyST to overcome legality issues.

We learned that snowball sampling technique was neither a satisfactory method to recruit adequate numbers of primary care providers or to obtain input from all disciplines working in primary care (e.g., we could not recruit physicians). Alternative strategies, such as contacting health care practices instead of individual providers and in-person presentations about the study to practice groups, would be needed [87].

Last but not least, researchers served as persona scenario session facilitators and also data evaluators which might have influenced data analysis and design and implementation specifications extraction from created stories [76]. Since the research team prompted participants in creation of their scenarios, and when they were confused, we might have unintentionally biased them. Ideally, two different researchers should fulfil these roles, but it was not possible for this thesis project because of time and resources limitations.

13. Future work

Future studies are needed that engage patients and their caregivers, and home care providers regarding requirements for utilizing MYST 2 with an extended circle of care including primary care. The study could ideally use the persona scenario method to help in effectively combining identified specifications with our study's results. The next step after collection of home care providers' requirements would be sharing extracted design and

development specifications with App programmers to develop a prototype of MyST 2. Running a think aloud session which is a usability testing method in software design and development process, with the MyST 2 end users could help validate the App's functionality and ease of use before testing its implementation in a real world situation.

The final step, would be implementing a pilot study to test the effectiveness of MyST 2 as a communication tool between home care and primary care settings in providing care for stroke survivors with MCCs. All identified implementation specifications from this study and the next, which would involve the home care team, should be considered and built into MyST 3, then tested in a real world setting.

14. Conclusion

Conducted persona scenario activities with primary care providers in this study were identified as a useful methodology for engaging end users in the design process and the collection of their needs and requirements for MyST 2. Two sessions were held for this study: one session with two nurses and a nurse practitioner and another session with one dietitian and one social worker. All participants found the persona scenario exercise a helpful approach for co-designing an eHealth App with end users. Fifty-five unique nodes were identified from the analysis of transcripts from both persona scenario sessions discussions.

All nodes were grouped together under 8 major emerging themes as part of the analysis process: Inter-professional team communication, Patient safety approach, Access to non-medical information, Facilitation of referral to community services and resources, Patient-centred care, System integration, Clinic EMR as a complementary tool, and Implementation considerations. There was much overlap between items relevant to the themes – Inter-professional team communication and Patient safety approach. Under each theme, nodes were classified under 4 categories relevant to the existence of the feature (described in persona stories) in MyST App: 1. Existing feature, 2. Addition to an existing feature, 3. New feature, and 4. Existing or new feature (a category that research

team have to find out whether an existing feature in MyST is sufficient for the described need or a new feature should be specifically created in MyST 2). The list of required features with a description of their functionalities was created under each theme to be used in the development of MyST 2.

In addition, implementation specifications were also created as part of the study analysis. The implementation list included items about hardware requirements, health care system policy, implementation policy and procedure, teams' responsibility, patient's preference, patient's privacy, and comprehensive training for both home care and primary care teams. The identified items for consideration in the MyST 2 implementation process indicate the complexity of this undertaking. Some potential barriers to its implementation are: 1) when home care and primary care cannot agree upon their teams' responsibility in keeping patient's information up to date in MyST 2, 2) who will have the authority to create MyST 2 accounts for the primary care provider, and 3) how will primary care know that their patients' have charts in MyST 2 and what are the related patient's privacy issues.

Major themes and a detailed list of design and implementation specifications that were identified in this study were also supported by other literature. As a result, we were able to support our results, and confirm the importance of the identified themes and categories. In addition, a detailed list of features that could address the identified themes was generated. This list is a valuable addition to the existing literature to illustrate how the themes could be incorporated into the design of future eHealth tools.

Inter-professional communication is an essential part of connectedness between home care and primary care in providing care for mutual patients with MCCs. Features such as instant messenger, team meeting record sharing, task creation, and document sharing could facilitate communication. Patient safety approaches such as reviewing and sharing patient's medications and lab values, and looking at other providers' notes are important factors in preventing some adverse events for elderly patients. In addition, evidence shows that coordination of sharing information related to patient's safety between all involved health care sectors and providers plays a significant role in improving quality of care for patients. However integration between different electronic systems, and

choosing the appropriate individual in charge of care coordination across settings are significant barriers.

Linkage and referral to community resources and services is essential for elderly population's chronic conditions management. Therefore, primary care providers involved in patient's circle of care could take the responsibility of assisting such activities using MyST 2 features. Patient-centred care approach helps in better streaming information flow between different health care settings. Goal-oriented care is a well-structured patient-centred care model that emphasizes on the importance of all circle of care involvement in goal setting and shared decision making. Goal creation is a current feature of MyST, which could be utilized by primary care providers alongside the home care team.

The value of integration between different settings and systems is also recognized by other researchers however integration encompasses many implementation challenges. Health care providers usually create workarounds to overcome lack of systems integration, such as duplication or manual data entry. The need for more stable and integrated systems is inevitable as health care settings move towards integrated models. A broad collaboration among HIT venders, health care settings, policy makers, regulators, and educators plus financial support is needed for development of such integrated systems. In electronic systems and Apps implementation, the system has to adapt legal requirements and follow well-defined interoperability standards. The need to consider and incorporate all aspects of practice environments, privacy, policy and regulatory requirements and sophisticated training in implementation strategies were also identified by other studies. However considering all these elements makes the implementation process very complex.

The results of this thesis study could be utilized for MyST 2 development and its implementation in a pilot study. This includes all identified themes along with the detailed list of design (modules and features) and implementation (policy and training) specifications. Ideally, the recommended future pilot study could practically examine this study's findings and prove the efficiency of MyST 2 as a tool to facilitate collaboration and two-way communication between home care and primary care settings, and subsequently, improve the quality of provided care for stroke survivors with MCCs.

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Appendix I
LETTER OF INFORMATION / CONSENT – Primary Care Providers

Study Title: Enhancing an eHealth application for stroke survivors with multiple chronic conditions and the home care team – Co-design to bring primary care into the circle of care

Investigators:

Local Principal Investigator:

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You are invited to participate in a persona-scenario session to help in co-designing and enhancing an eHealth application called MyST to bring primary care into the circle of care in providing care for stroke survivors.

In order to decide whether or not you want to be a part of this research study, you should understand what is involved and the potential risks and benefits. This form gives detailed information about the research study which will be discussed with you. After you have read this form, you will be asked to sign it if you wish to participate.

Your participation in this research is completely voluntary and you may withdraw from the study for any reason, at any time, without penalty of any sort, and you may refuse to answer any question.

WHY IS THIS STUDY BEING DONE?

Meaningful communication between primary care and home care, especially at transition points is essential. The purpose of this master thesis study is to identify primary care team requirements for an eHealth App (MyST) which is for stroke survivors with multiple chronic conditions with their family caregivers as well as their home care providers. We are interested in your opinions about specifications for the design and implementation of the

enhanced version of MyST - named MyST 2 - to bring primary care into the circle of care to help improving communication and integration between home care and primary care teams through mobile health technology.

HOW MANY PARTICIPANTS WILL BE IN THIS STUDY?

We hope to hold one or two persona scenario sessions with primary care providers. In total, a mix of 5 to 8 primary care providers such as physicians, nurses, nurse practitioners, dietitians, mental health workers, social workers, pharmacists, or occupational therapists will participate in the study.

WHAT WILL MY RESPONSIBILITIES BE IF I TAKE PART IN THE STUDY?

If you volunteer to take part in this study, we will ask you to attend a 2-hour long group session, to be held at a mutually convenient location in Hamilton, Ontario. During the session a brief introduction to MyST functions and the main components of the intervention that MyST supports will be shared. The session will be divided into two stages. First, you will be asked to create a persona and scenario in a small group or pairs (see Appendix II). An assistant will facilitate the conversation by clarifying questions and giving directions regarding completion of the exercise. Next, your small group (or pair) will be asked to report on your personas and scenarios in the large group, while you will have access to the notes taken by the assistant about the decisions made for the persona scenario. We may contact you again after the exercise only if needed to clarify results.

WHAT ARE THE POSSIBLE RISKS AND DISCOMFORTS?

We do not anticipate that there will be any harms or discomforts from taking part in this study. Some participants may feel uncomfortable sharing their opinions; however you do not need to answer any questions that you do not want to.

WHAT ARE THE POSSIBLE BENEFITS FOR ME AND/OR FOR SOCIETY?

We cannot promise any personal benefits to you from your participation in this study. However, we hope that the result of this study will help in designing and implementing an eHealth App to improve communication and integration between home care and primary care teams involved in providing care for older adults.

WILL I BE PAID TO PARITICPATE IN THIS STUDY?

If you agree to take part in the study, you can choose to receive a $200.00 gift card or cheque as a token of appreciation for sharing your time, experience and ideas. You will have some light refreshments at the session. We will also reimburse you for parking charges.

WILL THERE BE ANY COSTS TO ME IN THIS STUDY?
There will be no costs for participation in this study except for your time.

WHAT INFORMATION WILL BE KEPT PRIVATE?
Your data will not be shared with anyone except with your consent or as required by law. All personal information such as your name or phone number will be removed from the information that is gathered and will be replaced with a number. The discussion group will be conducted by researchers from McMaster University. The last part of the session where report backs occur will be audio recorded. This recording will go to a transcriber who will type out the discussion, and your name or other identifying information will not be included in the transcription. It will be replaced with a participant ID number or will be deleted. Individuals' responses will not be linked with personal identifiers. Demographics will also be collected such as discipline, gender, experience in primary care, and level of comfort in stroke care as well as e-health applications. The data will be securely stored in a locked office at McMaster University until the end of the study, and for no longer than 7 years. Information stored on computers will be protected by a password. If the results of the study are published, your name will not be used and no information that discloses your identity will be released or published without your specific consent to the disclosure.

IF I DO NOT WANT TO TAKE PART IN THE STUDY, ARE THERE OTHER CHOICES?
It is important for you to know that you can choose not to take part in the study.

CAN PARTICIPATION IN THE STUDY END EARLY?
Your participation in this study is voluntary and you may withdraw at any time. You have the option of removing your data from the study if it has not yet been integrated into the study. You may also refuse to answer any question you do not want to answer or makes you feel uncomfortable and still remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so.

IF I HAVE QUESTIONS ABOUT THIS STUDY, WHO SHOULD I CALL?
If you have any questions about the research now or later, please contact the Local Principal Investigator, Dr. Ruta Valaitis at McMaster University, 905-525-9140, ext. 22298 or the Student Investigator, Rojin Karimi at karimir@mcmaster.ca.

This study has been reviewed by the Hamilton Integrated Research Ethics Board (HiREB). The HiREB is responsible for ensuring that participants are informed of the risks associated with the research, and that participants are free to decide if participation is right for them. If you have any questions about your rights as a research participant, please call the Office of the Chair, HiREB, at 905.521.2100 x 42013.

CONSENT

I have read the information presented in the information letter. I have had the opportunity to ask questions about my involvement in this study and to receive additional details I requested. I understand that if I agree to participate in this study, I may withdraw from the study at any time. I agree to participate in this study. I understand that I will receive a signed copy of this form.

Name of Participant (Printed)	Signature	Date

Consent form explained in person by:

Name and Role (Printed)	Signature	Date

Appendix II
Persona Scenario Development and Discussion Guide - for Primary Care Providers

MyST (My Stroke Team) is a web-based e-Health App. It was created by a team in the Aging Community Health Research Unit at McMaster University. The App is aimed to support stroke survivors with multiple chronic conditions and their home care team to enhance their communication and planning with those in the patient's circle of care. Home care providers (e.g. care coordinator, nurse, occupational therapist, physiotherapist and personal support workers) as well as patients with their family caregivers have access to the application. Access is restricted dependent on the role of the user. For example, while care coordinators have access to all MyST features, patients with their family caregivers can only view some MyST documentation and have no permission to write or document anything in the application. At this stage in development, primary care has not been included in the current design of the MyST application.

The aim of this activity is for you to assist in the co-design of an enhanced MyST 2 App to bring primary care into the circle of care and to help improve communication and integration between home care and primary care teams. This should ultimately enhance the quality of care for patients.

MyST supports:

1. **Patient-centered care** – goal setting with patient
2. **Collaborative practice** – real-time communication and information exchange among health care providers and decision making among providers and patient and family caregivers
3. **Evidence-based care** – the use of best practices for community-based stroke rehabilitation
4. **A proactive comprehensive approach** – focus on health promotion and disease prevention
5. **Facilitation of referral to community agencies and other resources** – according to patient's priorities for community reintegration
6. **A strength-based approach** – understanding and developing a patient's strengths to meet their goals
7. **Patient's empowerment (self-management approach)** – to take a lead role in management of their health and stroke recovery

Note: your scenarios may involve **all or some** of the above components.

Based on your knowledge and experience as a **primary care provider**, create an imaginary (but believable) **"persona"** and **at least two "scenarios"** for each "persona" **interacting with the home care team and primary care team using MyST 2**. Report back to the larger group.

Step 1: **Create a Persona (10 minutes)**

Your persona will be a primary care team member who is using MyST 2 to communicate with the home care provider circle of care for stroke survivors living at home. Give your "Persona" some personality. Briefly describe the following:

1. a name, age, gender
2. discipline
3. years of working in primary care
4. experience in communicating with home care team (e.g. care coordinator, nurse, occupational therapist, physiotherapist and personal support workers) in providing care for patients receiving home care services
5. experience and attitudes around technology and/or eHealth Apps
6. experience with stroke rehabilitation and prevention

Step 2: **Create at least two scenarios (30- 40 minutes)**

Create at least two scenarios for your persona who is using the MyST 2 application to interact with the primary care and home care teams. Consider the following questions to create your story for your persona:

1. How did your persona get involved in using MyST 2?
2. What is the situation that brings your persona to use MyST 2?
3. What are primary care providers, home care providers, patients and their caregivers and any other important characters doing in the scenario? (What, When, How?)
4. How was your persona trained to use MyST 2?
5. How is MyST 2 (which include the main components of MyST, e.g., collaborative practice, patient-centered care, proactive comprehensive approach, strength-based approach, and evidence-based care) utilized by the primary care team in the scenario?

6. What happens when home care and primary care providers interact using MyST 2? Who starts the interaction and what, if anything, is expected from others in return?
7. What happens after the interaction?
8. What are the results of this interaction for primary care providers, home care providers and patients? How does the story end?

Step 3: **Report back to larger group a high level summary of your persona and scenarios. (8-10 minutes per small group).**

The group presentations will be audio taped for analysis.

Appendix III
Personas and Scenarios created during the sessions

Session 1:

Persona 1:

Lucy is a mid-20s primary care nurse (RN) in a family doctor's office working alongside a physician. She has 2-5 years of experience in home care. Lucy usually talks to home care nurses dealing with their clinic patients at the time. She is proficient and open to technology use. She does not have many experiences with stroke rehabilitation and prevention and is a novice in this area. She received MyST 2 training as part of her orientation to the family health team, or a nursing in service. Also, online content was available for her reference. She uses a laptop in the office to get access to MyST 2.

Scenario 1:

It was a typical Friday afternoon, and Lucy received a call from CCAC home care nurse requesting medication changes for the client. She had to find out the list of client's medications from their clinic's EHR system. Also, she had to go into the MyST 2 and look at when the last medication review was done (i.e. it was done last week), is there a way of finding out if the medication was up to date? By dosette? Renewals? Ideally, somehow primary care med record is linked to MyST 2. If there are any changes by the primary care provider, the changes will automatically be reflected in MyST 2 somewhere (i.e. MyST 2 has a hyperlink that links to the EHR).

Lucy can have access to MyST 2 to do a med review and reflect the changes. Lucy needs to give as much information to the home care nurse, and the provider as to why the medication change is occurring. The med list, vital signs, and abnormal values should be duplicated into MyST 2 (from clinic's EHR).

Lucy should be able to put up alerts for other providers involved. The PSW may be at the patient's house the day before, remind them to go to Life Labs the next day. If we are changing positions and have changed the patient's medication, Lucy can write and send an alert to the PSW for the next day to place the patient out of bed slowly to prevent

syncope. Lucy will need to call back the home care nurse to tell the coordinator to schedule another nurse home care visit to follow up within the next few days. Lucy should be able to write an alert.

Every primary care office should have a tablet with MyST that receives alerts of top priority to signal everyone (i.e. the client needs to be seen today). MyST 2 has an indicator (red, green, yellow) to indicate how imminently the client needs to be seen. For Example: red = now, in person, Yellow= 3-5 days with a phone call, Green = this is what the nurse needs to check in with a week.

After the above interaction, someone has to reassess what has been changed and report back to the health care provider as to what has worked. Home care nurse does the follow-up, gets the information, and inputs it through MyST 2. Lucy can then use clinic's EHR system to set an alert (reminder) for herself to check back into MyST 2 for the follow-up. Optimally, the reported documents in MyST 2 will automatically be saved and transferred into EHR (the patient's chart) to have an integrated system. Lucy can also send an instant message to the home care nurse to get an immediate response back (so that she is not waiting for the home care nurse to call back).

Scenario 2:

Lucy notices that A1C is 10 as part of the patient's 6 month checkup in primary care clinic (it was 5 the last time), and receives a report from the nurse that the patient's mood is down, and he's not taking his insulin regularly anymore. The patient hasn't been in the clinic yet. She wants to find out what causes this change. Lucy will send a message through MyST 2 to the home care team to find out more about the patient and the reason for this change. In the message, she will ask about what has been changed about the patient? She might also ask/request the following: Can you do a PHQ-2? Can you check for medication compliance? Is there a change in dexterity? Check the med reconciliation? Have medications changed? Are you noticing some hoarding for medications? How is the patient's mood? What is his lifestyle (any changes)? What is his quality of life? Is it the choice of food?

The PSW should have more say (voice), a platform to document "this is what I have noticed with a specific level of concern": "I've noticed 6 O Henry bars in the garbage can in the last week", and "He's just a little more tired". There needs to be some trust and appreciation of disciplines in the team. The primary care providers need to respect the input of the PSW. Lucy will check in MyST 2 to see whether there is a different PSW that is buying the food for the patient? She will also review the PSW assessment checklist.

Lucy will send an alert to relevant home care providers to inform them about the situation. Lucy will also write tasks in MyST 2 for each discipline based on the issue (i.e. mobility → PT, ADLS and feeding → PSW). Then she will check back in MyST 2 on the timeline in a couple of days to see if the medications have changed. She can again use clinic's EHR system to set a reminder for herself to check back into MyST 2 to keep up with the responses and follow-up with home care providers. Lucy can also send an alert to the home care coordinator to coordinate all of the above concerns, and respond back to her with a message within few days. For example, the coordinator might send a message to Lucy indicating that we need to put nursing in more often because the patient is not checking his blood sugar.

Having a direct "primary care and care coordinator" tab (or feature) in MyST 2 for direct communication and linkage between home care and primary care might facilitate the whole collaboration between these two setting.

Lucy might ideally attend the team meetings if the physician trusts her to represent the primary care. However, it might be unrealistic to assume that the physician or nurse to attend from primary care. The alternative is that primary care can read the team meeting record summary on MyST 2 afterwards, and acknowledge it. There will be a notification when the primary care has acknowledged (with a check) the summary. Primary care can also arrange a conference call with home care team or only coordinator to follow-up at the end of each team meeting.

Session 2:

Persona 1:

Karen is a 40ish primary care social worker (SW). She has at least 5 years' experience of social counselling. She rarely communicates with home care team. She has a reasonable and competent level of experience in working with technology such as electronic medical records (EMR) system. Karen has a very limited experience of working with stroke survivors. She received MyST 2 training during Tuesdays' lunch and learn for MyST 2 program in a group training session.

Scenario 1:

The patient was overtaking his Blood Pressure (BP) meds due to his poor English language, and BP got low, and he fainted. Kids became upset and torn strip off the nurse in primary care. The nurse also has been told by family that the patient is on home care program. The nurse asked Karen to help with finding translation services for the patient and his circle of care.

SW thought that they need a better information flow system. She went to the IT tech support person in the office to see if one of their existing systems called TAPESTRY is good to be used for better communication with this patient's home care team and specially his PSW. The techy person suggested Karen use a new app called MyST 2 which is specifically built for stroke cases. They searched the patient's name in MyST 2, and they saw that he is already signed up with MyST 2, and therefore they can use the system. They thought that MyST 2 might be useful in the following areas: having access to the data entered by PSW, accessing the circle of care info, adding community services, viewing translator's name, adding/viewing community resources (could put in immigrant working centre name and phone number to get the translation). For example, if the PSW comes in and the wife who knows English better was not home, and the PSW needs translation, they can use the added number.

Nurse practitioner asks SW to go into the home for a visit. Karen will go with NP or someone else from primary care to the patient's home, and will find out what is the situation like, and make recommendations for community resources, and family involvement. Karen would like to improve the circle of care.

Karen will look at some medical and nonmedical info available on MyST 2 before the visit. For example patient's address, patient's diet and other home care providers including PSWs' home visits info. She will also put some information about community services and also concerns (patient is sitting in his chair all day) after the visit on MyST 2 for everyone's view. She might also upload some pdf documents about community resources for patient and home care providers. A scenario would be that Karen is in close communication with PSW and checks all PSW's concern on MyST 2 and finds out that PSW has a concern about patient's food and drink. Therefore, Karen will find out that a dietitian might need to go in. She will leave a message or alert on MyST 2 for home care dietitian and SW to call Karen, or she will directly call them using the info from the circle of care section. Karen will also look at the summary of home care dietitian and social worker's visit on MyST 2. The role of SW might be different between home care and primary care. Karen will ask home care SW about what resources have you used? What have you tried for translation services? Who are the supports in the family? Has there been a family meeting? Is there anything we can do to support what you are doing? Karen will put a summary of the phone conversation in MyST 2.

The home care OT would also go in to conduct an assessment at home, and communicate it back with PC SW. Primary care would follow up with the family, and SW work with the family, and specifically patient to identify how he sees the rest of his life, and what are his dreams and goals. Then they will create goals, and follow up plans on MyST 2. SW will work with the family to implement the recommendations and patient's goals.

The primary care would see the patient probably once a month, and the nurse will check MyST 2 before the patient's visit to see what is going on. Also, the primary care nurse is usually the one who receives and follows alerts in MyST 2, and might inform the other PC members if necessary. On the other side, Karen will also create a reminder in the clinic's EMR to check back in MyST 2.

Primary care would not continue to use MyST 2 to communicate with the team when home care is completed. Ideally, MyST 2 would make a virtual team to communicate as they currently do in the hallway.

Persona 2:

Jennifer is 24 years old dietitian. She works part-time in a primary care clinic for about 2 years. She also works part-time in the hospital stroke clinic. She has a very limited experience of collaboration with home care team. Jennifer is very good in working with modern technology.

Scenario 2:

CCAC coordinator came into the clinic and asked for a French dietitian for a patient with dysphagia, and also informed the PC clinic about the MyST 2 app, and that the patient is already signed up with MyST 2. Jennifer might play with MyST 2 to learn how to use it. A better scenario would be going to YouTube, and watch a 2 min overview video, and longer- modular videos for training (max 15).

She will use task module in MyST 2 for creating tasks for other providers in the patient's circle of care. She needs to communicate with home care OT more often. She will also communicate and follow up with the patient depending on progression few days the first week, and then once a week. She communicates with patient's family to find out about the patient's diet, and put on some goals for example about recommended type of meals and diet guide resources on MyST 2. She will upload such nutrition guide documents on MyST 2 for the patient and his family, as well as home care providers as a reference.

Patient's family will leave a message on MyST 2 for the dietitian in a less urgent case. The whole primary care team involved in patient's care will have access to MyST 2. Jennifer will use a calendar feature in MyST 2 to set up some reminders for herself to check back in MyST 2 for patient's status. The reminder is linked to her email or their clinic's EMR. She would follow up until diet issues are resolved. Or more realistically, she will create a reminder in the clinic's EMR to check back in MyST 2.

Appendix IV
Detailed results table

Theme/Category *(existing addition to or a new feature)*	Item (node)	Sources	References	Feasibility	Specification – Design	Specification – Implementation	feature
Inter-professional team communication			21				
Existing feature			5				
	Primary care dietitian creates task for home care providers (for example for OT)	3	1	feasible	1. Primary care team has access to task module of MyST and is able to create tasks for home care team	1. Training for primary care team about how to create a task for home care team 2. Training for home care team about how to complete each task	task
	Primary care NP sends an alert in MyST 2 to circle of care about the updated medication list and all required considerations	1	1	feasible	1. Primary care provider has access to alert functionality of MyST and is able to create alert for circle of care	1. Training for primary care team about how and when to create an alert for homecare team, and what to include in their alert 2. Training for home care team about how regularly check the alerts they received	Alert
	Primary care SW creates an alert for home care SW and dietitian to call her to discuss the patient's status	2	1	feasible	**Same as above*	**Same as above*	alert
	Primary care SW creates goal with patient and call on other providers for achieving the goal	2	1	feasible	1. Primary care team has access to goal creation module of MyST to create a goal with patient for patient	1. Training for primary care team about how and when to create goals with patients	goal

Theme/Category *(existing addition to or a new feature)*	Item (node)	Sources	References	Feasibility	Specification – Design	Specification – Implementation	feature
	Primary care dietitian creates goal about recommended type of meals and resources for patient and call on other providers for achieving the goal	3	1	feasible	*Same as above	*Same as above	goal
Addition to an existing feature			2				
	Primary care NP creates task for home care team with different priorities (green/yellow/red) in the MyST 2 following the med change	1	1	feasible	1. Primary care team has access to task module of MyST and is able to create tasks for home care team 2. The task module in MyST 2 has an additional feature that the task creator can prioritize task (maybe with different color codes)	1. Training for primary care team about how to create a task for home care team 2. Training for home care team about how to complete each task 3. Creation of some policy about how to prioritize tasks	task
	Primary care team checks and acknowledges each homecare team meeting record	1	1	feasible	1. A new feature in the existing team meeting record module of MyST, where primary care team can easily acknowledge the team meeting record summary by clicking on a check sign 2. Primary care team has access to completed team meeting record, and can acknowledge the summary	1. Training for primary care team about where to acknowledge the home care team meeting summary	team meeting record
	Ideally one primary care provider will be able to attend the meeting, or to have a short conference call with home care team or only care coordinator after the home care team meeting about the patient's overall status	1	1	needs more investigation	1. The list of people attending the team meeting which is placed in the "Team meeting record" action item to include all primary care providers involved in the patient's circle of care 2. It needs to be differentiate that this person is from primary care not home care	1. Feasibility of having a primary care provider attending the homecare team meeting or having a short conference call with them should be investigated from the healthcare system policy point of view	team meeting record

Theme/Category *(existing addition to or a new feature)*	Item (node)	Sources	References	Feasibility	Specification – Design	Specification – Implementation	feature
New feature			7				
	MyST 2 has an instant messenger which allows primary care NP to do a quick follow up with home care nurse if she is available	1	1	feasible/needs more investigation	1. A new module in MyST 2 which is an instant messenger 2. Both primary care and homecare teams have access to the module and they can send an instant message for each other	1. Feasibility of adding this new module should be investigated from the policy point of view 2. If it was feasible, there should be some policy around the use cases of it by each team	messenger
	Primary care SW might create an instant message (push) instead of an alert (pull) for home care SW and dietitian to call her to discuss the patient's status	2	1	feasible/needs more investigation	**Same as above*	**Same as above*	messenger
	Home care coordinator sends an electronic update on MyST 2 about the actions taken by home care team following the primary care NP's update about a lab report	1	1	feasible	1. A new module in MyST 2 (additional to existing action items) for the home care team (or maybe only care coordinator) and primary care team direct and asynchronous communication via MyST 2 2. Care coordinator adds any updates regarding actions taken by home care team following a primary care team request for home care team review in this module (spot) 3. This module might also be completed (new updates to be added) by primary care team 4. Primary care team has access to view such updates (maybe by accessing the whole module, or maybe by viewing the item in MyST's existing timeline)	1. Training for care coordinator about when and how to complete this module 2. Training for primary care team about where and how to view such updates	home care and primary care direct communication action item

Theme/Category *(existing addition to or a new feature)*	Item (node)	Sources	References	Feasibility	Specification – Design	Specification – Implementation	feature
	Home care team shares a picture relevant to patient's context (e.g., skin condition, stairs that are difficult to navigate) with primary care team, and this might help in adding additional information related to the context of the patient in the home environment	1	1	feasible	1. A new feature in MyST 2 for uploading documents including images and annotating it, and sharing it with other providers in the circle of care 2. Both primary care and home care team have access to upload documents and share it with each other and add a comment about it	1. Training about the use cases of this feature	document upload
	Primary care SW uploads some community resources pdf files for patient and homecare providers review	2	1	feasible	**Same as above*	**Same as above*	document upload
	Primary care dietitian uploads some diet reference files for patient and home care providers review	3	1	feasible	**Same as above*	**Same as above*	document upload
	Home care provider starts a video conference (if necessary) with primary care team while visiting patient in the home	1	1	Likely not feasible	1. A new feature in MyST 2 for conducting video conference (telehealth) 2. Home care team has access to this feature to start a video conference 3. Primary care team is notified somehow when a video conference call is requested, and answer the request	1. Feasibility of adding this new feature should be investigated from the health care system policy and technology capability development point of view	video conference
Existing or new feature			6				
	Home care nurse requests medication change including the reason for change by phone (author suggests to use MyST 2 instead)	1	1	feasible	1. A new module in MyST 2 for creation of a time sensitive request (maybe same as task with an urgency rating and a push feature potentially to email)	1. A specific training for teams about how to write the request with sufficient explanation 2. A specific training for teams about how to view the request	request (task) with urgency rating

Theme/Category (*existing addition to or a new feature*)	Item (node)	Sources	References	Feasibility	Specification – Design	Specification – Implementation	feature
					by home care team for primary care team 2. Primary care team has access to view the request in a timely manner 3. Mechanism to alert PC that the screening has been completed.	and respond to it (take action) in a timely manner 3. Creation of policy about urgent requests, and also a notification if the requested team member/s did not respond within a designated period of time	
	Primary care NP asks home care providers to do a quick screening and/or assessment following seeing a new patient's lab report	1	1	feasible	1. A new module in MyST 2 for creation of a time sensitive request (maybe same as task with an urgency rating and a push feature potentially to email to alert the home care provider of an urgent request) by primary care team for home care team 2. Home care team has access to view the request in a timely manner 3. Mechanism to alert PC that the screening has been completed.	1. Specific training for primary care team about how to write the request with sufficient explanation 2. Specific training for home care team about how to view the request and respond to it (take an action) in a timely manner 3. Creation of policy about time sensitive requests	request (task) with urgency rating
	Primary care NP creates an update about results of the patient's lab report, and creates some tasks for some homecare providers	1	1	feasible	1. A spot (module) in MyST 2 for primary care updates (might be a new module like homecare visit record action item: specifically to be recorded by primary care team, or might be same as adding a new timeline item: this feature already exists in MyST) 2. Homecare team has access to view primary care team's update 3. Primary care team has access to task module of MyST and is	1. Training for primary care team about how create an update in MyST 2 for homecare team view 2. Training for home care team about where to look for primary care updates 3. Training for primary care team about how to create a task for home care team 4. Training for home care team about how to record completion of each task	primary care updates module (or add a new timeline item) task

Theme/Category (*existing addition to or a new feature*)	Item (node)	Sources	References	Feasibility	Specification – Design	Specification – Implementation	feature
					able to create tasks for home care team		
	Primary care SW adds a summary of the patient's visit including her concerns about the patient (for example, patient is sitting in his chair all day)	2	1	feasible	1. A new module in MyST 2 for primary care providers to add a summary of their visit and also their concerns about the patient (might be a new module like a home care visit record action item: specifically to be recorded by the primary care team member, or might be same as adding a new timeline item: this feature already exists in MyST) 2. Primary care has access to add info into this section 3. Home care team has access to view this module or (maybe just timeline item of this module is enough)	1. Training for primary care where to add their visits info and what level of info (e.g. any test has been done during the visit, test results, who else was present with patient during the visit) to add into MyST 2 for sharing with the circle of care 2. Training for home care about where to find primary care visit's info	primary care update (or add a new timeline item)
	Primary care SW adds a summary of her phone call with homecare team on MyST 2	2	1	feasible	*Same as above	*Same as above	primary care update (or add a new timeline item)
	Patient's family are able to leave a message on MyST 2 for dietitian about patient's daily dietary plan	3	1	not feasible	1. Patient's family has access to add a timeline item 2. Primary care team has access to see patient's family's messages (items)	1. This does not seem to be feasible at this stage, however we need to investigate the level of patient and his family's	messenger (or ability to add a new timeline

Theme/Category (*existing addition to or a new feature*)	Item (node)	Sources	References	Feasibility	Specification – Design	Specification – Implementation	feature
						involvement in inputting data into MyST 2	item by patients)
patient safety approach			25				
Existing feature			8				
	Primary care NP checks the last date of medication review which is done by home care nurse and is recorded in MyST 2	1	1	feasible	1. Primary care team (NP and other relevant providers, not all the team) has access to view the medication review module (or maybe just timeline items are enough) of MyST	1. Training for primary care team about how to view medication review updates	med review (or view timeline item)
	Primary care NP checks home care assessments and scores before changing patient's medication	1	1	feasible	1. Primary care team has access to view homecare visit record module of MyST which is including assessments and scores (or maybe just timeline items are enough)	1. Training for primary care team about how to view assessments and scores	home care visit record (or view timeline item)
	Primary care SW will have access to home care providers home visits info	2	1	feasible	**Same as above*	**Same as above*	home care visit record (or view timeline item)
	Primary care NP sends an alert in MyST 2 to circle of care about the updated medication list and all required considerations	1	1	feasible	1. Primary care provider has access to alert functionality of MyST and is able to create alert for all circle of care	1. Training for primary care team about how and when to create an alert for homecare team, and what to include in their alert 2. Training for home care team about how regularly check the alerts they received	alert
	Primary care nurse checks alert before the patient's visit	2	1	feasible	1. Primary care nurse has access to view alerts on MyST 2	1. Training for primary care nurse about when to check alerts, and how to inform rest of primary care team	alert

Theme/Category *(existing addition to or a new feature)*	Item (node)	Sources	References	Feasibility	Specification – Design	Specification – Implementation	feature
	Primary care NP checks PSW checklist to see if she can find any reason for the change in the lab report	1	1	feasible	1. Primary care team has access to view PSW checklist of MyST and relevant timeline items (maybe has access to the whole PSW checklist module, or maybe has access to view it in the timeline)	1. Training for primary care team about how to check PSW checklist while they are looking for reasons for a change in the lab values	PSW checklist (or view timeline item)
	Primary care SW will have access to the data entered by PSW	2	1	feasible	**Same as above*	**Same as above*	PSW checklist (or view timeline item)
	Primary care NP checks timeline to see if any of those tasks that she created for home care are completed or not	1	1	feasible	1. Primary care team has access to view the timeline and tasks' items in the timeline (which is already exists in the MyST) including task that are checked as "completed"	1. Training for primary care team about how to check if any of the created tasks are completed 2. A process established in primary care for regularly checking MyST 2 for updates	timeline
Addition to an existing feature			1				
	Care coordinator checks PSW checklist regularly and apply each PSW's concern to the relevant provider or put it for discussion in the team meeting	1	1	feasible	1. A new feature in the existing PSW checklist module of MyST, where care coordinator can easily click on each concern and apply it to someone in the circle of care for their review 2. Care coordinator has access to completed PSW checklist with concerns, and can apply each concern to the relevant provider (might be in the primary care team)	1. Training for care coordinator about how to apply each concern to each provider, and when to add some of those concerns to the agenda for team meeting discussion	PSW checklist

Theme/Category *(existing addition to or a new feature)*	Item (node)	Sources	References	Feasibility	Specification – Design	Specification – Implementation	feature
	There is a tablet at the primary care clinic which is visible to all practitioners that shows flashing alerts created by home care team in MyST 2 to request a quick clinic patient visit by primary care with priorities (MyST 2 has an indicator (red, green, yellow) to indicate how imminently the client needs to be seen. For Example: red = now, in person, Yellow= 3-5 days with a phone call, Green = this is what the nurse needs to check in with a week.	1	1	feasible/needs more investigation	1. Primary care tablet is connected to MyST 2, and showing alerts created by home care team 2. All alerts created by home care will be pushed over to the tablet 3. Alerts will be prioritized with different colors (level of urgency) flashing 3. The tablet might only shows alert feature of MyST 2 (no other features)	1. Feasibility of having a tablet connected to MyST 2 and showing alerts at a primary care clinic (technology and patient privacy) should be investigated, and some policy need to placed	Alert
New feature			12				
	Primary care NP needs to check the list of patient's medication on primary care EMR or MyST 2	1	1	feasible	1. A new spot (module) in MyST 2 for adding patient's medication list 2. Primary care team has access to view the medication list (module) in MyST 2	1. Training for primary care team about where to look for the most up to date patient's medication list	med list
	list of patient's medication is also available (manually added) in MyST 2	1	1	feasible	1. A new spot (module) in MyST 2 for adding patient's medication list	1. If the list is going to be manually added into the MyST 2, there should be some process (procedure) agreed upon by primary care and home care about who takes responsibility to add the list into MyST 2 and keep it up to date	med list
	list of patient's medications is integrated/updated in the MyST 2 while added/changed	1	1	needs more investigation	1. Medication list is pulled from the clinic's EMR into MyST 2 (new spot for medication list)	1. If list is going to be automatically pulled from clinic's EMR into the MyST 2,	med list synchronization with

Theme/Category *(existing addition to or a new feature)*	Item (node)	Sources	References	Feasibility	Specification – Design	Specification – Implementation	feature
	on the primary care EMR (automatically)				while added/changed on the EMR (automatically)	the feasibility (technology and policy) should be investigated	primary care EMR
	Patient's lab values from primary care clinic is added into MyST 2	1	1	feasible/needs more investigation	1. A new spot (module) in MyST 2 for adding patient's lab values (it might be manually added, or it might be automatically pulled from clinic's EMR)	1. If it is going to be manually added into the MyST 2, there should be some policy or agreement between primary care and homecare about who takes the responsibility to add to the list (maybe PC) into MyST 2 and keep it up to date (it makes sense to have primary care to add it into the MyST 2) 2. If it is going to be automatically pulled from clinic's EMR into the MyST 2, the feasibility (technology and policy) should be investigated	lab values
	Primary care NP checks patient's lab values on the MyST 2	1	1	feasible	1. Primary care team has access to view patient's recent lab values spot (module) in MyST 2	1. Training for primary care team about how to view lab report values in MyST 2	lab values
	Primary care SW looks at patient's diet info before visiting the patient	2	1	feasible	1. A new module in MyST 2 to include patient's diet 2. Primary care has access to view this new module	1. Determine who will be responsible for adding this info into MyST 2, and keeping it up to date 2. Determine what type of dietary information would be valuable to include 3. Training for primary care and home care team about where to find this info	patient's diet
	Primary care dietitian looks at patient's diet on MyST 2 (it might be added by patient and/or his family)	3	1	feasible/needs more investigation	1. A new module in MyST 2 to include patient's diet (it might be added/updated by patient and his family)	1. Determine who will be responsible for adding dietary info into MyST 2, and keeping it up to date 2. Determine what type of	patient's diet

Theme/Category (*existing addition to or a new feature*)	Item (node)	Sources	References	Feasibility	Specification – Design	Specification – Implementation	feature
					2. Primary care has access to view this new module	dietary information would be valuable to include 3. Feasibility of giving permission to patient and his family to add info into this section is not feasible at this stage 4. Training for primary care and home care team about where to find this info	
	Primary care dietitian uploads some diet and nutrition guides files for patient and home care providers review	3	1	feasible	1. A new feature in MyST 2 for uploading documents including images and annotating it, and sharing it with other providers in the circle of care 2. Both primary care and home care team have access to upload documents and share it with each other and add a comment about it	1. Training about the use cases of this feature	document upload
	Vital signs results are available in MyST 2 to be filled by home care team	1	1	feasible	1. A new spot (module) in MyST 2 for adding patient's vital sign results 2. Author's note: consider adding vital signs in module with other current MyST screening tools to show changes over time	1. Training for home care team about where to add and search for past vital signs in MyST 2	vital signs
	Primary care NP checks MyST 2 vital signs and compares it with vital signs results on the clinic EMR (might not be up-to-date)	1	1	feasible	1. Primary care team has access to view vital sign results in the MyST 2	1. Training for primary care team about how to view vital signs and search for past results in MyST 2	vital signs

Theme/Category *(existing addition to or a new feature)*	Item (node)	Sources	References	Feasibility	Specification – Design	Specification – Implementation	feature
	Home care team shares a picture relevant to patient's context (e.g., skin condition, stairs that are difficult to navigate) situation with primary care team, and this might help in adding additional information related to the context of the patient in the home environment	1	1	feasible	1. A new feature in MyST 2 for uploading documents including images and annotating it, and sharing it with other providers in the circle of care 2. Both primary care and home care team have access to upload documents and share it with each other and add a comment about it	1. Training about the use cases of this feature 2. Address patient consent and privacy issues related to sharing such information and managing images that are on staff devices after upload 3. Address staff resource needs to have cameras 4. Develop clear policy on what images can and should be taken and by whom for what purpose	document upload
	Home care provider starts a video conference (if necessary) with primary care team while visiting patient in home	1	1	Likely not feasible	1. A new feature in MyST 2 for conducting video conference (telehealth) 2. Home care team has access to this feature to start a video conference 3. Primary care team is notified somehow when a video conference call is requested, and answer the request	1. Feasibility of adding this new feature should be investigated from the health care system policy and technology capability development point of view 2. Determine if real time videoconferencing would be feasible given the usual work flow of home care and primary care.	video conference
Existing or new feature			3				
	Primary care NP asks home care providers to do a quick screening and/or assessment following seeing a new patient's lab report	1	1	feasible	1. A new module in MyST 2 for creation of a time sensitive request (maybe same as task with an urgency rating and a push feature potentially to email to alert the home care provider of an urgent request) by primary care team for home care team 2. Home care team has access	1. Specific training for primary care team about how to write the request with sufficient explanation 2. Specific training for home care team about how to view the request and respond to it (take an action) in a timely manner	request (task) with urgency rating

Theme/Category *(existing addition to or a new feature)*	Item (node)	Sources	References	Feasibility	Specification – Design	Specification – Implementation	feature
					to view the request in a timely manner 3. Mechanism to alert PC that the screening has been completed.	3. Creation of policy about time sensitive requests	
	Primary care NP creates an update about the patient's new lab report results, and creates some tasks for selected home care providers	1	1	feasible	1. A module in MyST 2 for primary care updates (Authors note: might be a new module like the "Record my visit" which is currently an action item for home care team, specifically to be recorded by primary care team, or might be same as adding a new timeline item: this feature already exists in MyST) 2. Home care team has access to view the primary care team's update 3. Primary care team has access to a task module in MyST and is able to create tasks for home care team	1. Training for primary care team about how to create an update in MyST 2 for home care team viewing 2. Training for home care team about where to look for primary care updates 3. Training for primary care team about how to create a task for home care team 4. Training for home care team about how to complete each task	primary care updates module (or add a new timeline item) task
	Primary care SW adds a summary of the patient's visit including her concerns about the patient (for example, patient is sitting in his chair all day)	2	1	feasible	1. A new module in MyST 2 for primary care providers to add a summary of their visit and also their concerns about the patient (might be a new module like home care visit record action item: specifically to be recorded by primary care team, or might be same as adding a new timeline item: this feature already exists in MyST) 2. Primary care has access to add info into this section 3. Home care team has access to view this module or (maybe	1. Training for primary care where to add their visits info and what type of info to add into MyST 2 to share with the circle of care 2. training for home care about where to find primary care visit's info	primary care update (or add a new timeline item)

Theme/Category *(existing addition to or a new feature)*	Item (node)	Sources	References	Feasibility	Specification – Design	Specification – Implementation	feature
					just timeline item of this module is enough)		
Access to non-medical information			9				
Existing feature			2				
	Primary care team looks at patient's info such as address before conducting a home visit	2	1	feasible	1. Primary care has access to view patient information module	1. Training for primary care team about where to find this info	patient information
	Primary care SW will have access to view patient's circle of care info including their phone numbers	2	1	feasible	1. Primary care has access to view patient's circle of care which includes all providers' phone numbers	1. Training for primary care team about where to find this info	patient's circle of care
Addition to an existing feature			4				
	Patient's physician name, contact info, and hours of operation are available for home care team in MyST 2	1	1	feasible	1. New tab (field) added to the existing "Patient's Information" module of MyST for adding patient's physician information 2. Care coordinator or primary care team have access to add this information into the MyST 2	1. Training for homecare team about where to look for patient's physician information	Patient information
	Patient's pharmacy info is available for home care team in MyST 2	1	1	feasible	**Same as above*	**Same as above*	Patient information

Theme/Category *(existing addition to or a new feature)*	Item (node)	Sources	References	Feasibility	Specification – Design	Specification – Implementation	feature
	Power Of Attorney information is available for home care team in MyST 2	1	1		**Same as above*	**Same as above*	Patient information
	Copy of Delegation Of Authority is available for home care team in MyST 2	1	1		**Same as above*	**Same as above*	Patient information
New feature			3				
	Primary care team searches patient's name in MyST 2 to find out if patient's chart exists in the system, and then request access to his chart	2	1	feasible/needs more investigation	1. A new module in MyST 2 called "search" that is accessible by primary care to look for patient's chart 2. Primary care is able to send a request for accessing patient's chart to the patient's care coordinator that can be authenticated 3. Home care coordinator receives notification when access is requested, and is able to confirm or cancel the request 4. If request is confirmed, MyST 2 accounts need to be created for relevant primary care providers, and they should be added to the patient's circle of care	1. Feasibility of searching MyST 2's database to look for a specific patient's chart needs to be investigated from the privacy point of view 2. Policy developed to determine who will have the responsibility of creating MyST 2 accounts for primary care providers (PC or HC?) and mechanism for authentication. 3. It should be determined whether it is care coordinator's role to confirm or cancel requests 4. The level of access to patient's info for different professionals (e.g., dietitian v.s. social worker) should be decided and built into MyST 2 (similar to the way it is right now, level of access by PSW	patient search function authentication function of primary care team members

Theme/Category (*existing addition to or a new feature*)	Item (node)	Sources	References	Feasibility	Specification – Design	Specification – Implementation	feature
						is different from the HCP's level of access)	
	Primary care team has access to calendar in MyST 2, and they can create a reminder in MyST 2 for themselves to follow up	3	1	feasible	1. A new feature available in MyST 2 2. Primary care and homecare have access to this feature and they can create reminders in MyST 2 for themselves to follow up on a specific date	1. Training for both primary care and homecare team about how to use this feature	calendar & reminder
	When primary care team creates a reminder on MyST 2 for themselves, it will be automatically sent to their email or linked to their clinic's EMR	3	1	needs more investigation	1. A new feature available in MyST 2 2. Primary care has access to this feature and they can create reminders in MyST 2 and be notified within their clinic's EMR or email	1. Feasibility of this feature should be investigated	calendar & reminder
Facilitation of referral to community services and resources			2				
Existing feature			1				
	Primary care SW is able to add community services and resources (e.g. immigrant working centre name and	2	1	feasible	1. Primary care SW needs to have access to view and add into the community reintegration plan module of MyST	1. Training for primary care team about where to add this info	community reintegration plan

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	phone number to get help with interpretation for non-English speaking clients) in MyST 2 for the patient and circle of care					2. Permissions set to allow for these additions (only home care coordinator is able to add to this currently)	
Addition to an existing feature			1				
	Primary care SW is able to view patient's interpreters name and contact in MyST 2	2	1	feasible	1. Primary care SW needs to have access to view and add into the community reintegration plan module of MyST 2. A new field under "Core Services" of MyST is required for interpreter info	1. Training for primary care team about where to find this info	community reintegration plan
Patient-centred care			2				
Existing feature			2				
	Primary care SW creates goal with patient and call on other providers for achieving the goal	2	1	feasible	1. Primary care team has access to goal creation module of MyST to create a goal with patient for patient	1. Training for primary care team about how and when to create goals with patients	goal
	Primary care dietitian creates goal about recommended type of meals and resources for patient and call on other providers for achieving the goal	3	1	feasible	**Same as above*	**Same as above*	goal
system integration			3				
New feature			3				
	List of patient's medication is integrated/updated in MyST 2 while added/changed on the primary care EMR (automatically)	1	1	needs more investigation	1. Medication list is pulled from the clinic's EMR into MyST 2 (new spot for medication list) while added/changed on the EMR (automatically)	1. If list is going to be automatically pulled from clinic's EMR into the MyST 2, the feasibility (technology and policy) should be investigated	med list

Theme/Category *(existing addition to or a new feature)*	Item (node)	Sources	References	Feasibility	Specification – Design	Specification – Implementation	feature
	Patient's lab values from primary care clinic is added into the MyST 2	1	1	feasible/needs more investigation	1. A new spot (module) in MyST 2 for adding patient's lab values (automatically pulled from clinic's EMR)	1. If it is going to be automatically pulled from clinic's EMR into the MyST 2, the feasibility (technology and policy) should be investigated	lab values
	When the primary care team creates a reminder on MyST 2 for themselves, it will be sent automatically to their email or linked to their clinic's EMR	3	1	needs more investigation	1. A new feature in MyST 2 2. Primary care has access to this feature and they can create reminders in MyST 2 and be notified within their clinic's EMR or email	1. Feasibility of this feature should be investigated	calendar & reminder
Clinic EMR as a complementary tool			4				
	Primary care NP. Social worker and dietitian create a message for themselves in the clinic's EMR to check MyST 2 to see follow up results of actions being taken by home care in response to their requests	1, 2, 3	3	feasible		1. Training for primary care team about creating a reminder for themselves to check MyST 2 (for follow up results) in their clinic EMR	
	When primary care team creates a reminder on MyST 2 for themselves, it will be automatically sent to their email or linked to their clinic's EMR	3	1	needs more investigation	1. A new feature available in MyST 2 2. Primary care has access to this feature and they can create reminders in MyST 2 and be notified within their clinic's EMR or email	1. feasibility of this feature should be investigated	calendar & reminder
implementation considerations			9				

Theme/Category *(existing addition to or a new feature)*	Item (node)	Sources	References	Feasibility	Specification – Design	Specification – Implementation	feature
	There is a tablet at the primary care clinic which is visible to all practitioners that shows flashing alerts created by home care team in MyST 2 to request a quick clinic patient visit by primary care with priorities (MyST 2 has an indicator (red, green, yellow) to indicate how imminently the client needs to be seen. For Example: red = now, in person, Yellow= 3-5 days with a phone call, Green = this is what the nurse needs to check in with a week.	1	1	feasible/needs more investigation		1. Feasibility of having a tablet connected to MyST 2 and showing alerts at a primary care clinic (technology and patient privacy) should be investigated, and some policy need to placed	
	Ideally one primary care provider will be able to attend the meeting, or to have a short conference call with home care team or only care coordinator after the home care team meeting about the patient's overall status	1	1	needs more investigation	1. Add name of primary care provider to MyST to record that this team member attended a team conference 2. OR Module created for a Note in MyST 2 to say that information from the team meeting was shared with primary care provider/s if they are not present at the meeting	1. Feasibility of having a primary care provider attending the home care team meeting or having a short conference call with them should be investigated from the health care system policy point of view	
	Primary care team uses laptop, iPad or computer station to access to MyST 2	1	1	feasible		1. Provide or ensure that primary care has a laptop, iPad or computer station at the clinic connected to internet and link to MyST 2	
	Home care nurse requests medication change including the reason for change (by phone) (author suggests to use MyST 2 instead)	1	1			1. Specific training for home care team about how to write the request with sufficient explanation in MyST 2 2. Specific training for primary care team about how to	

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						respond to it (take an action) in a timely manner 3. Creation of policy related to urgent requests and accountabilities for responding in a timely way.	
	MyST 2 has an instant messenger which allows primary care NP to do a quick follow up with homecare nurse if she is available	1	1	feasible/needs more investigation		1. If adding a messenger module was feasible, there should be a policy around the use cases (which are the cases that user may use this new feature, for example, when PC wants to get a quick update from HC nurse about patient screening) of it by each team	
	List of patient's medication is available (manually added) in the MyST 2	1	1	feasible		1. if the list is going to be manually added into the MyST 2, there should be an agreed upon policy between primary care and home care about who takes responsibility to add the list into MyST 2 and keep it up to date	
	Patient's lab values from primary care clinic is added into MyST 2	1	1	feasible/needs more investigation		1. if it is going to be manually added into the MyST 2, there should be an agreed upon policy between primary care and home care about who takes the responsibility to add the list into MyST 2 and keep it up to date (author suggests that it make most sense to have primary care to add it into the MyST 2 given they tend to request lab results)	

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	Primary care team searches patient's name in MyST 2 to find out if patient's chart exists in the system, and then requests access to his chart	2	1	feasible/needs more investigation		1. Feasibility of searching MyST 2's database to look for a specific patient's chart needs to be investigated from the privacy point of view 2. Who will has the responsibility of creating MyST 2 accounts for primary care providers (PC or HC?) should be determined. 3. It should be determined whether it is care coordinator's role to confirm or cancel requests from primary care 4 the level of access to patient's info for different professionals (e.g. dietitian vs. social worker) should be decided and built into the MyST 2 (similar to the way it is right now, level of access by PSW is different from the HCP's level of access)	
	Home care team shares a picture relevant to patient's context (e.g., skin condition, stairs that are difficult to navigate) situation with primary care team, and this might help in adding additional information related to the context of the patient in the home environment	1	1	feasible	1. A new feature in MyST 2 for uploading documents including images and annotating it, and sharing it with other providers in the circle of care 2. Both primary care and home care team have access to upload documents and share it with each other and add a comment about it	1. Training about the use cases of this feature 2. Address patient consent and privacy issues related to sharing such information and managing images that are on staff devices after upload 3. Address staff resource needs to have cameras 4. Develop clear policy on what images can and should be taken and by whom for what purpose	document upload