

Developing the Patient Falls Risk Report:
A tool for sharing falls-related clinical information from home care with
primary care providers

by

Amanda Aguilar da Nova

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Author's declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Abstract

Background. Due to inadequate information sharing systems, primary care and home care providers in Ontario have some of the lowest rates of communication in Canada and among all OECD countries. As a result, clinicians are frustrated, resources are wasted, and vulnerable patients are put at risk for adverse events such as falls. Introducing a home care-to-primary care information sharing system that prompts primary care providers to address falls risk, namely, the Patient Falls Risk Report may be effective for supporting clinical practices.

Research Questions. The research questions in this study are as follows: (1) what are primary care providers views on integrating the Patient Falls Risk Report into their workflow; (2) what impacts do primary care providers believe that the Patient Falls Risk Report would have on patient care; (3) what criticisms, suggestions for improvement, or future developments do primary care providers suggest for the Patient Falls Risk Report; and (4) how usable is the Patient Falls Risk Report?

Methods. This mixed-methods intervention development study examined if the Patient Falls Risk Report, a one-page document for sharing falls-related clinical information from the interRAI-HC, is useful to primary care providers using the Behaviour Change Wheel theoretical framework and elements of usability testing. In Phase One, one-on-one qualitative interviews were conducted, and a constructivist approach to thematic analysis was used to answer research questions one, two, and three, and inform revisions of the Patient Falls Risk Report. In Phase Two, self-report surveys based on the System Usability Scale (SUS) were conducted on Qualtrics and the quantitative data was descriptively analyzed with Excel 2004 and SAS University Edition to answer research question four.

Results. A sample of 9 interview participants and 27 survey participants was obtained. In the interviews, barriers in opportunity, capability, and motivation were identified which contributed to increased reliance on patient self-report, intuition, and reactive approaches to identifying falls risk. Thus, all participants stated that they would integrate use of the Patient Falls Risk Report in their practices. Due to its utility and usability, most interview participants believed that the Patient Falls Risk Report could support patient care by sharing relevant falls-related information and reminding providers of best-practice falls prevention guidelines. However, various criticisms were identified including lack of clarity in language, insufficient detail, and limited support for shared care planning. After two rounds of revisions and integrating interview participants' suggestions for improvement, the surveys determined that the Patient Falls Risk Report was highly usable with an overall SUS score of 83.4 (95% CI = 78.7, 88.2).

Discussion. Primary care culture, structure, and tradition have a substantial influence on falls prevention approaches and influence the views and actions of primary care providers. The current health-system

context, previous implementations, theory, and research suggest that the Patient Falls Risk Report would be feasible to integrate into primary care workflows. However, how and to what extent the report would support a shift toward proactive falls prevention was debated. The ways in which the Patient Falls Risk Report could impact patient care, were examined through an analysis of clinical- and system-level advantages, disadvantages, and limitations. Developments to the Patient Falls Risk Report to enhance its advantages and mitigate disadvantages and limitations included saving space, adding clarity, adding detail, aligning with provider priorities, and emphasizing validity. Some major challenges within the Patient Falls Risk Report could not be mitigated, thus future improvements to the report and health sector overall were suggested. All in all, the Patient Falls Risk Report is useable and will likely support primary care providers in identifying falls-related risk factors and validated care planning options.

Future directions. Future research ought to examine the effectiveness of the Patient Falls Risk Report and expand on some important findings in this study. Implementation of the Patient Falls Risk Report will support information sharing in Ontario's health sector and help keep vulnerable patients from being overlooked.

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List of Abbreviations

AGS/BGS	American Geriatrics Society / British Geriatrics Society
APEASE	Affordable, Practicable, Effective, Acceptable, Low Side-Effects, Equitable
CAP	Clinical Assessment Protocol
CHRIS	Client Health and Related Information System
CI	Confidence Interval
COM-B	Capability, Opportunity, Motivation - Behaviour
EMR	Electronic Medical Record
HC	Home Care
LHIN	Local Health Integration Network
LTCF	Long Term Care Facility
MD	Medical Doctor
NP	Nurse Practitioner
OECD	Organisation for Economic Co-operation and Development
OHIP	Ontario Health Insurance Plan
PDSA	Plan, Do, Study, Act
PHIPA	Personal Health Information Protection Act
SAS	Statistical Analysis System
SBAR	Situation, Background, Assessment, Recommendation
SUS	System Usability Scale
WWLHIN	Waterloo Wellington Local Health Integration Network

*“We have to think outside the box... in fact, we
have to get rid of the boxes altogether”*

Roy Romanow, 2004

Introduction

What is integration? This term has been widely used in discussions and political debates: in 2002, Roy Romanow called on the Canadian government to “support continuing integration of home care services” (1); in 2007, the Director-General of the World Health Organization said that “we need a comprehensive, integrated approach to service delivery” (2); and since their election in 2018, the Conservative Party of Ontario has committed to restructuring the health system for “integration and improved patient flow” (3). While, there is no agreed-upon definition, integration can be thought of as providing the right care, in the right place, at the right time (4,5). It can be implemented to varying degrees and on different levels of the health system, from clinical care to the system level (6). Independent of context, integrated health systems aim to have the following attributes: accessible and comprehensive health services, a patient-focused philosophy, appropriate geographic coverage, standardized and interprofessional care delivery, ongoing evaluation and performance management, efficient information systems, cohesive leadership, and appropriate financial management (4).

Integrated care offers positive health outcomes; a 2014 meta-review found that, compared to usual care, integrated approaches lead to lower mortality, hospital admissions, and readmissions, better patient quality of life, and greater adherence to best-practice treatment guidelines (7). The way in which individual patients experience integration of health services over time is called continuity (8). Continuity of care is vital for a well-functioning health sector (8); it is associated with increased short-term quality of life for patients, greater satisfaction with health services, decreases in preventable hospitalizations, and fewer emergency department visits (9). On the other hand, poor continuity of care, an especially common experience for seniors with chronic illnesses, results in negative health and economic consequences (10). Thus, integration is an ideal approach for health system improvement (11).

The structure of this thesis is as follows. The literature review will begin with a description of home care, primary care, and *shared care planning**, followed by information sharing practices, and barriers to communication. *Falls prevention* will then be explained as an area in which information sharing is especially important. The following section will introduce the research rationale and aims and chapter four will describe methods to assess the Patient Falls Risk Report, an intervention for sharing falls-related clinical information from home care to primary care providers. The results section will summarize primary care providers’ perspectives on the report. The discussion will analyse these perspectives. The final section of this thesis will highlight limitations of the report and demonstrate how examining the *usefulness* of this intervention can create future opportunities to improve *informational continuity* and system integration in the Canadian health sector.

Literature review

1.1 The health settings of interest

1.1.1 Home care

Home care is a rapidly growing health service delivered in homes or residential care settings (12). It primarily offers personal support, home making, and nursing to people with chronic conditions, recovering from acute conditions, or with specialized needs (12,13). The home care population in Ontario is on average 78 years old and 67.7% female (14). As shown in the profile of home care patients from 2017 to 2018 in Appendix A, most of this population is at risk of institutionalization, has poor performance in activities of daily living, and could benefit from interventions to improve mood (14). Contrary to recommendations by Roy Romanow, home care is not a publicly funded health care service under the Canada Health Act (1). Since the 1970s, provinces and territories have been responsible for its delivery (15). As a result, home care across Canada is highly variable in terms of access, quality, funding, comprehensiveness, and eligibility criteria (1). Government-funded home care services in Ontario are delivered by the 14 Local Health Integration Networks (LHINs), who plan, fund, and integrate the health sector (13,16). However, along with several other organizations, the LHINs are being amalgamated under Ontario Health, a centralized health agency (17). Home and community care will soon be provided by Ontario Health Teams, which are groups of organizations and health care providers that bear clinical and financial responsibility to deliver health care services to a specific area (18). The recent growth of home care as a health service is partially attributable to the fact that, to provide care for one patient, home care in Ontario costs on average \$42.00 per day while long-term care and hospital care cost \$126.00 and \$842.00 per day, respectively (13). Home care also allows patients to maintain a higher quality of life compared to institutional care because it provides them with supports to live in the community relatively independently (19,20). Home care aims to prevent or delay admission to long-term care facilities or hospitals (1). In fact, 83% of Canadian home care clients aged 65 and up (or members of their households) state that home care services helped them stay home (21). Hence, home care is an important health setting in Ontario which makes a positive difference in the lives of patients.

One consistency in home care among most provinces and territories across Canada, is implementation of an interRAI Home Care (interRAI-HC or RAI-HC) assessment instrument. The interRAI-HC was developed by interRAI, a not-for-profit international research network, as part of a suite of standardized tools in health care settings, including long-term care homes, mental health facilities, acute care facilities, and community care (22). Each interRAI tool outputs four types of measures: outcome scales report on patient clinical and functional status; clinical assessment protocols (CAPs) guide

care planning by flagging health indicators at risk of decline or with potential for improvement; quality indicators measure organizational quality; and case mix systems group patients by resource use intensity and clinical characteristics (14,23). This valid, reliable, and comprehensive clinical assessment tool is mandated in home care in Ontario for measurement clinical, functional, and care outcomes on an (at least) annual basis (24–27). From 2017 to 2018, 191,528 Ontarians receiving home care services were assessed with the interRAI-HC (14). Use of the interRAI-HC in home care has been shown to lower hospital admissions, increase service use, improve activities of daily living, and decrease total health care costs (28). However, misconceptions on its applicability to health outcomes, the belief that it is too long, and perceptions that it is invalid or unreliable, results in poor clinical utilization of the interRAI-HC (14,23,29). In summary, the interRAI-HC is an underused source of rich clinical knowledge.

1.1.2 Primary care

Primary care is a publicly funded, privately managed health service provided by a nurse practitioner, general practitioner, or family physician, who routinely practices health promotion, prevention, and chronic disease management (30,31). In 2016, 94.1% of Ontarians had access to a primary care provider and Ontario has 51 nurse practitioners and 107 family physicians per 100,000 people (32). In 2014, 46.1% of family physicians were in group practices, 15.0% were in solo practices, and the 19.1% were in interdisciplinary settings (such as family health teams) (33). Access to primary care reduces the need for redundant testing and unnecessary use of hospitals and emergency services (1). Primary care is essential for continuity and coordination of patient care on an individual and population level (1).

Primary care providers face various challenges which impact how they provide care. First, primary care providers are very busy (34,35). Nearly 15% of Canadian seniors aged 65 and over state that their primary care provider sometimes, rarely, or never spends enough time with them (21). In fact, about half of primary care providers in Ontario do not have the capacity to accept new patients, because they carry such a large workload (36). Similarly, primary care providers are limited in their ability to provide preventative services (35). In the United States, a primary care physician with a roster of 2500 patients would need to dedicate 7.4 hours per work day to fully engage in all recommended preventative services (37). Therefore, they usually prioritize a patient's immediate and ongoing medical needs (37). Taking time to engage in prevention is important, especially for patients with chronic conditions. When primary care providers limit care to a small number of problems, it can lead to missed diagnoses, poor outcomes, and preventable emergency department visits (38). In fact, almost 30% of Canadians aged 65 and over stated that the last time they visited the emergency department, it was for a condition that they believe

could have been addressed in their usual place of care if it had been available (21). In summary, time constraints and large workloads are both important barriers to comprehensive primary care provision.

1.2 Health information exchange

1.2.1 Information management and communication in primary care

To effectively coordinate and provide care, while avoiding bias and errors in judgement, primary care providers must manage large amounts of information (39–43). Consequently, over the past decade there has been a push to implement electronic medical records (EMRs) in primary care settings to support information management (44). In 2016, 78% of primary care doctors in Ontario used an EMR in their practice (44). However, many EMRs used across Ontario do not offer interoperable hardware or software (45). At nearly half the international average of 55.6%, only 28% of physicians in Ontario have EMRs that support the exchange of clinical summary reports with other health providers (45). Extracting or manipulating EMR-collected clinical data to improve information exchange is challenging and unaffordable since the data is often unstructured and non-standardized (41,46). As a result, clinicians often rely on phone call, fax, or patients and caregivers for health information exchange with other health providers (47). Beyond inhibiting effective shared care planning, these communication methods have limitations such as full or blocked voicemail systems, lost or illegible faxes, low patient or caregiver comfort and knowledge, and lack of structure and standardization (34,47–50). Information management practices in Ontario have important impacts on information exchange practices. Primary care and home care providers in Ontario have some of the lowest rates of information exchange in Canada and out of all 11 OECD countries (40). Only 41% of Ontario primary care providers are routinely notified by home care providers when there are relevant changes to a patient’s health status or conditions (44), and, as shown in Figure 1, only 29% of family doctors in Ontario say that they, or a person in their practice, communicates

routinely with home care providers about the services and needs of their patients (40).

Suboptimal information sharing does not go unnoticed; 41% of Ontario home care clients are not confident that their health care providers have all the necessary information related to their health at the point of care (51). Ontario primary care providers need improved information management systems to enhance information exchange with other providers and support patient care.

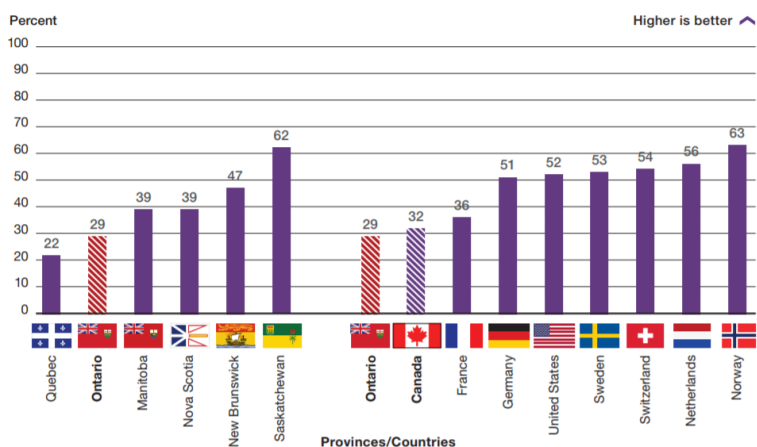


Figure 1: Percentage of family doctors (with patients receiving home care) reporting that they, or others in their practice, communicate routinely with case managers or home care providers about patient needs and services provided, 2015

1.2.2 Consequences of poor information exchange

Poor information exchange ultimately harms quality of care, especially among patients with high clinical severity, multimorbidity, or cognitive impairment (47,52,53). It often results in missed opportunities to prevent clinical decline, leads to unnecessary repeat testing, delayed care provision, wasted resources, and patient burden (10,40,41,50,51,54,55). One American study found that 96.3% of home care providers felt that their inability to obtain outside clinical information was problematic (56). Additionally, 72.6% said that with access to outside clinical information, they would need to make fewer referrals to emergency departments (56). Shifting towards a more structured and standardized approach to information management may be effective in reducing fragmentation, increasing effective information exchange, and providing a realistic view of issues often overlooked in primary care (29).

1.2.3 Current information sharing approaches

Effective communication within primary care requires mutual respect, joint problem-solving, and a shared understanding of patient health and goals of care (57). Developing and integrating electronic information systems which support informational continuity is complex, time-consuming, and expensive, but important for clinical decision-making, care planning, and monitoring system cost-effectiveness (4). Various approaches have been implemented to improve health information exchange in health care. The SBAR (situation, background, assessment, recommendation) format of sharing information has been shown to improve communication and collaboration between nurses, improve the actionability of clinical reports for physicians, and decrease unexpected deaths in hospital (58,59). Its structure and standardization allows for more regularity, transparency, consistency, and conciseness of information sharing (57). Additionally, appropriate use of the interRAI-LTCF in long term care facilities has been shown to improve cooperation between health providers and staff, quality of multidisciplinary meetings, clinician understanding of residents' needs, and quality of care (60). Since they are *third generation assessment* instruments, interRAI systems also have the capacity support patient transitions of care between settings, support a common understanding of patient needs, and reduce assessment duplication (53). A third example in Ontario home and community care is CHRIS (Client Health and Related Information System), a web-based electronic decision support and document management system (61). To support care planning and coordination, CHRIS integrates the interRAI-HC and allows health care providers to send, receive, and accept referrals or patient records in real-time (62). As illustrated in figure 2, CHRIS is used to fax a one-page Patient Summary Report, attached in Appendix B, to primary care providers in the Waterloo-Wellington LHIN (WWLHIN). The Patient Summary Report currently includes no medical information, but has been described by primary care providers as helpful for understanding the

home care plan (49). On average, nearly 800 Patient Summary Reports are sent throughout Waterloo-Wellington every month (63). Approaches like these listed will continue to support information sharing in Ontario.

1.3 Falls prevention

1.3.1 Falls

A fall is an unintended change in position from a higher to lower level (64). In Canada, 20% to 30% of seniors fall annually (65).

The number of people in the WWLHIN who triggered the interRAI Falls CAP is shown in Appendix A. Although the likelihood of falling increases with age, falls are not a normal part of ageing (66). In fact, falls are considered a geriatric syndrome, are independently linked to frailty, and have been referred to as a “manifestation of complex system failure” (67,68). Most falls are multifactorial, resulting from interactions between multiple risk factors (69), including having had a previous fall; problems with balance, gait, strength and endurance; low physical activity levels; physical impairment; orthostatic hypotension; pain; cognitive impairment; taking antipsychotic medications; vitamin D deficiency; environmental factors; and having a disease that increases falls risk (e.g. alcoholism) (64). Fear of falling can also contribute to falls risk (70). About one third of Canadian seniors are fearful of a future fall and about one in five overestimate their fear of falling (71). Because of this fear, 44% of Canadian seniors stop engaging in some activities they previously enjoyed, often including those that contributed to balance, strength, and confidence (72). At a system level, research also shows that poor communication and fragmentation are associated with some of the primary causes of falls in home care patients (68). Other potential system level contributors include low experience, training, and knowledge around falls in clinicians; high workload; medication errors; polypharmacy; and insufficient screening (68). In summary, when risk factors interact and stressors accumulate, it can lead to failure in complex physiological systems (i.e., muscular, skeletal, and nervous systems) and a fall can occur (67).

1.3.2 Consequences of falls

There are individual and system-level consequences of falls. Falls are the top cause of injury in Canadian seniors and can lead to disability, reduced independence, worse quality of life, chronic pain, hospitalization, and even death, as illustrated in Table 1 (65,73). But, the consequences of falls reach beyond individuals. Hospitalizations due to falls are twice as long as any-cause hospitalizations and

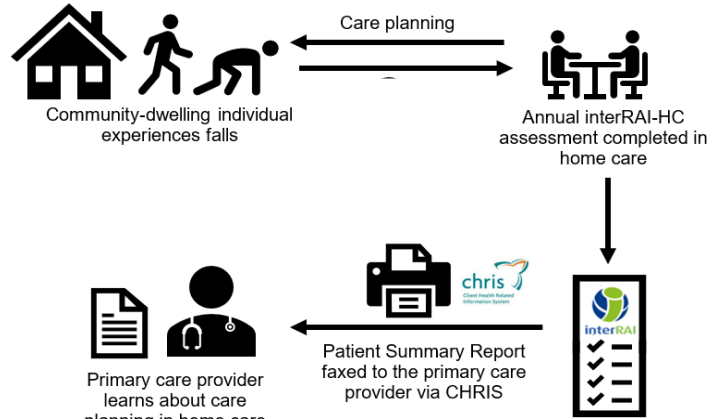


Figure 2: Current information sharing between home care and primary care providers

contribute significantly to hallway medicine, a growing concern in Ontario (73,74). Injuries due to falls are also very expensive. In 2010, Ontario paid \$5.1 billion in direct costs and \$713 million in indirect costs as a result of falls-related injuries (75). In summary, falls are expensive and have serious impacts on individual wellbeing and the greater health system.

1.3.3 Recommendations for falls prevention

Consequences of Falls	Value
Percent of falls that cause injury (76)	40% to 60%
Broken or fractured bones (65)	35%
Sprains or strains (65)	30%
Scrapes, bruises, or blisters (65)	19%
Percent of falls that lead to hospitalization (65)	1.4%
Percent of falls-related injuries in which treatment is first sought in emergency room (65)	67%
Average number of days hospitalized after a fall (65)	21
Falls-related disability adjusted life years per 100,000 population (77)	622.7
Number of deaths due to falls in Canada in 2008 (65)	2,691 deaths
Number of deaths due to falls in Canada in 2003 (65)	1,631 deaths

Table 1: Individual health consequences of falls in Canada

Falls are highly preventable when clinicians conduct timely screening and take appropriate falls-prevention measures (78,79). For clinicians, the American Geriatrics Society/British Geriatrics Society (AGS/BGS) Clinical Practice Guideline for Prevention of Falls in Older Persons and Recommendations is a highly cited and easy to use algorithm that can guide clinical *falls screening* and prevention (80). It includes a list of seven valid recommendations, including exercise. Exercise is a pleiotropic intervention, meaning that it affects multiple types of cells and tissues within multiple physiological systems (67,81). High-quality evidence shows that the most effective exercise interventions for reducing falls in community-dwelling seniors are balance and functional exercises, which lower the rate of falls by 24% (82). Mixed and low-quality findings also show that vitamin D supplementation, environmental changes, medication management, and psychological interventions provide falls-related benefits to community-dwelling seniors (83). Similarly, weekly balance or strength training, tai-chi, and cognitive behavioural therapy can reduce fear of falling (84). In summary, a variety of effective approaches have been identified to address falls risk.

1.3.4 Falls prevention in primary care

To the detriment of patient health, falls prevention is not implemented consistently in primary care across Ontario. The Falls Prevention Strategy Required Organizational Practice was implemented in Canada in 2008, mandating that a falls prevention strategy be put in place and evaluated in acute care, home care, long term care, and mental health facilities, but not primary care (73). Instead, primary care providers are recommended to regularly ask patients over age 65 if they have fallen or tripped in the last year and if they fear falling (85). Following these recommendations is essential because patients are more

likely to engage in falls prevention when recommended by primary care providers (86). Although 87% of primary care providers believe that they can help reduce falls risk in their patients and 96% believe that falls screening should be conducted on all seniors (87), one English survey found that only 29.7% of primary care providers routinely ask older adult patients about falls and only 18.9% ask about fear of falling during office visits (88). Similar findings in the United States show that 62.9% of primary care physicians only screen for falls risk when the patient expresses concern and only 7.5% base screening on clinical guidelines (89). Relying on patients to begin the conversation around falls is problematic. Many patients underreport falls because they are not seen by a primary care provider after a fall, they forget or ignore falls, or they are avoiding being placed in more intensive care settings (90). Consequently, many primary care providers do not know when one of their patients has fallen. Mueller et al conducted standardized geriatric assessments with 189 elderly patients in a primary care setting and determined that general practitioners were unaware of 83% of recent falls identified (91). Falls ranked second to alcohol misuse in undisclosed conditions (91). Unfortunately, even after the general practitioners learned about falls in this study, interventions were planned for only 1 in 7 patients (91). While geriatric assessments are useful to draw attention to health problems previously overlooked, many barriers to falls prevention impact falls screening, assessment, and care planning. Barriers include conflicting priorities, time and workload constraints, absence of educational materials, lack of clinical expertise on how to address falls, limited awareness on available supportive community resources, and patient's refusing to discuss falls risk (41,87–90,92). Although the importance of falls screening and prevention is recognized, lack of standardization and various barriers to lead to inconsistent falls prevention in primary care.

Rationale and aims

3.1 Rationale

The Behaviour Change Wheel was used to provide rationale and guide intervention development in this study. Many interventions fail to produce their intended outcomes because they are developed from ‘common sense’ analysis, which often neglects the contexts, needs, and preferences of end-users (93,94). The Behaviour Change Wheel, shown in Appendix C, is a theoretical framework developed to guide the design of behaviour change interventions comprehensively and coherently (94). It is grounded in the COM-B model for understanding behaviour, which explains that for an individual to engage in a specific Behaviour, they must have the Capability, Opportunity, and Motivation to do so (94).

In the literature review, two behaviour-related problems were identified. First, information exchange between home care and primary care is limited in Ontario. According to the Behaviour Change Wheel, lack of physical opportunity may be one source of this behaviour (95). Primary care providers do not have the resources (i.e. time, communication systems) (37,47,50), or physical proximity with home care providers to support effective information exchange between the two. Second, there is often insufficient falls prevention in primary care in Ontario. This behaviour may stem from limited physical opportunity and psychological capability (i.e. knowledge of guidelines) (95). Lack of time, heavy workloads, and low knowledge of clinical guidelines can lead to insufficient falls risk prevention (87–89). An intervention that would theoretically be effective in addressing physical opportunity and psychological capability limitations would be environmental restructuring of falls-related health communication and education on falls prevention guidelines (95). Moreover, the policy categories that can be used to engage in environmental restructuring and education are social planning and communication of best-practice guidelines (95). The sources of behaviour, intervention functions, and policy categories identified by the Behaviour Change Wheel have been confirmed, not only by the background literature, but also by clinicians themselves. Research published in 2020 by Nova, Zarrin, and Heckman found that Ontario physicians find current methods of information sharing with home care limited (49). Implementing a computerized decision support system based on the interRAI-HC for home care information exchange was described by physicians as potentially beneficial (29,49). That is, beneficial if the system is EMR integrated, concisely informs on relevant changes to patient health, and clearly outlines evidence-based recommendations to action (49). A need for future work in health information exchange and decision support systems for primary care providers in Ontario was identified. Overall, the Behaviour Change Wheel, literature review, and preliminary research support the hypothesis that development and implementation of a home care-to-primary care interRAI-HC-derived information exchange system,

which informs and prompts on falls-related health information and best-practice falls prevention guidelines, would be useful for primary care providers.

3.2 Aims

Literature and theory offer guidance on effective strategies to improve communication from home care to primary care. However, research for developing and evaluating information exchange tools, that considers the contexts, needs, challenges, and preferences of end-users, carries great importance. There is no research that evaluates the usefulness a tool for sharing falls-related clinical information from home care to primary care providers, or examines the usefulness of sharing interRAI-derived information with primary care providers. Thus, the overall goal of this research is to inform development and evaluate the usefulness of the Patient Falls Risk Report, an evidence-informed intervention developed for sharing standardized falls-related clinical information from the interRAI-HC with primary care providers.

3.2.1 Research questions

The overarching research question is as follows: is the Patient Falls Risk Report useful to primary care providers? Three possible conclusions can be made from this question: (a) yes, primary care providers find the report useful; (b) the report needs further modifications to become useful; or, (c) no, primary care providers do not find the report useful. To achieve the goal of this study, Phase one aims to answer the following research questions:

1. What are primary care providers' views on integrating the Patient Falls Risk Report into their workflow?
2. What impacts do primary care providers believe that the Patient Falls Risk Report would have on patient care?
3. What criticisms, suggestions for improvement, or future developments do primary care providers suggest for the Patient Falls Risk Report?

Phase two aims to address one final research question:

4. How usable is the Patient Falls Risk Report?

The answers to these research questions will guide development of the Patient Falls Risk Report and determine if it is a useful tool to consider implementing in primary care settings.

Methods

4.1 Study Design

For this thesis, a mixed-method intervention development study was conducted. That is, qualitative semi-structured interviews and quantitative surveys were used to answer the research questions of interest. Mixed methods and method triangulation strengthen the reliability of results by providing complimentary perspectives on a phenomenon of interest (96). Additionally, to ensure transparency and rigour in intervention development, intervention development studies investigate the decision-making, rationale, methods, and findings behind refinement of an early-stage intervention (97). The following sections of this thesis will explain the methods used to conduct the interviews and surveys in this study.

4.1.1 Phase One: Interviews

4.1.1.1 Research approach

Constructivism was the theoretical approach used for the qualitative interviews, and informed the research questions, data collection procedures, and approach to analysis. The ontological position for the constructivist approach is relativist, which posits that reality, including knowledge and truth, exists relative to social, historical, and cultural context (98,99). Moreover, the epistemological position was transactional or subjectivist, meaning that the findings for this research were jointly constructed through interactions between the researcher and participants (98). Through consideration of participant contexts and co-creation of knowledge, this theoretical approach was considered appropriate for achieving the goals of Phase one.

Various strategies described by Nowell et al were used to enhance trustworthiness of interview data collection and thematic analysis (100). First of all, thick description of the research methods and contexts informed on potential transferability or generalizability of the findings (100,101). Second, to increase *credibility*, there was extensive engagement with audio-recordings and transcripts (101), method and data collection triangulation (96), and post-analysis member checking (101). Third, to ensure dependability of the research process, raw data (i.e. date collected, location, length, and file name) was carefully documented; there was reflexive journaling on researcher thoughts, insights, and potential biases or assumptions; and insights, ideas, and interpretations discussed in committee meetings were recorded (101,102). Fourth, confirmability and establishing that researcher interpretations came from the data required explaining how and why decisions were made in the analysis process (102). Overall, these four strategies improved transparency and trustworthiness of this research.

4.1.1.2 Sampling and recruitment

The researchers aimed to recruit a sample of approximately 10 self-identified primary care providers since they are the end-users for which the report was designed; according to Kushniruk and Patel, 10 participants is enough to recognise up to 80% of basic *usability* issues (103). However, if, during the *iterative* analysis of each interview, the researchers believed that there was or was not a need to explore a greater diversity of responses, then sampling more or fewer than 10 participants was acceptable. In other words, a flexible, iterative approach to sampling was taken. For recruitment, maximum variation purposive sampling was used in combination with *snowball sampling* and *convenience sampling* (104). *Maximum variation sampling* allowed for an analysis of shared patterns and inconsistencies between participants with different experiences and in different contexts (104). On the other hand, snowball and convenience sampling were valuable methods since recruitment of primary care providers for research is often challenging (104,105). Although snowball and convenience sampling may have limited sample variability (104), other health services research has demonstrated that recruitment is streamlined when a physician or opinion leader invites other health providers to participate in research (105). Out of the 10 participants, I aimed to include at least one nurse practitioner, one rural primary care provider, one primary care provider not in an interprofessional team, and one family health team provider. There were no exclusion criteria because exclusion would have limited sample variation.

4.1.1.3 Data sources and procedures

Throughout recruitment, interested primary care providers were emailed recruitment and information letters, found in Appendix D and E, respectively. These letters outlined details of the study, and invited those interested to reply with questions they may have about the study, three potential interview dates and times, if they would prefer an in-person or telephone interview, and, if applicable, their preferred interview location. Each participant chose the location and format of their interview so that they could feel more comfortable to speak openly. Telephone interviews also provided high-quality data and were more convenient for some participants (106). Immediately prior to the interviews, participants were handed or emailed a consent form, attached in Appendix E. The consent form was complimented with a verbal explanation of the study and an opportunity to ask questions before the interview. Participants were also informed that they could withdraw from the study at any time up until results were submitted for publication. If they chose to withdraw, all their data would be erased. Data for this study was collected with 20-minute one-on-one semi-structured interviews that were audio-recorded by a fingerprint-locked smart phone then stored on a password-locked computer. To obtain in-depth responses while avoiding researcher influence on the data, participants were asked a set of open-ended questions, attached in Appendix F, with probing questions asked as necessary. The interview questions were

influenced by usability testing methods, as described by Carol M. Barnum (93). Once the interview ended, participants were thanked and emailed an appreciation letter, attached in Appendix G.

There were three parts to interviews. Part one explored falls prevention practices, barriers, and facilitators, and introduced participants to the Patient Falls Risk Report, attached in Appendix H. To increase participant comfort with the interview process and the Patient Falls Risk Report, broad questions were asked in part one at the beginning of the interviews. Part two was comprised of a task-based scenario, which used a think-aloud approach to examine the usability of the Patient Falls Risk Report. Research suggests that the think-aloud approach improves participant satisfaction with the interview experience and does not impact the accuracy of an interviewee’s thoughts (93). In this task-based scenario, participants were asked to read a mock Patient Falls Risk Report and identify care planning options for a hypothetical patient. In general, the participant should have identified a medication review and a meeting with the patient as important care planning options. Review of cardiovascular health or bone health, and referral to exercise or other relevant interventions were also appropriate. Likewise, requests for additional or redundant information during the task-based scenario were highlighted. Finally, challenges encountered while participants used report were recorded and classified to inform priorities for refinement of the Patient Falls Risk Report. There were four potential categories of challenges: (a) Showstopper, for which there are no practical workarounds or there is an unacceptable impact on users; (b) Major, when there are potential workarounds, but a negative impact on user experience, efficiency, or quality of user response; (c) Minor, for lower priority issues with potential solutions; and (d) Cosmetic, for cosmetic issues or preferences that can be changed without drastic changes to the tool (95). Finally, Part three of the interview questions explored more specific topics, including what effects the Patient Falls Risk Report can have on primary care workflows and patient care, challenges and barriers to using it, and how it can better meet user needs. The purpose of each interview question is listed in Table 2.

Interview Question (*for full list see Appendix F)	Purpose (corresponding research question)
1. How do you usually find out if a patient is at risk of falling?	To identify current practices, informational goals, barriers and facilitators to falls risk screening in primary care (1)
2. What is your first impression of this report?	To allow initial views to be voiced on any topic and for participants to get comfortable with the report (1, 2, 3)
3. What thoughts or feelings did you have about using this report?	To allow more in-depth views to be voiced on any topic (1, 2, 3)
4. Would you use the Patient Falls Risk Report in your practice? Why?	To identify views on integrating the report into their workflow and how it may impact practice (1, 2)
5. Would the Patient Falls Risk Report change what you would normally do in a patient encounter? If yes, how? If no, why not?	To identify views on changes or consistencies in patient care provision, office visits, and care planning (2)
5. What barriers might keep you from implementing the report in your practice?	To look at challenges in integrating the report into workflows, including possible social and legal consequences (1,2)
6. What changes would you like to see made to the Patient Falls Risk Report	To attain direct feedback and recommendations for changing the report to better suit primary care provider needs (3)

Table 2: Primary interview questions with purpose

Data was deidentified and transcribed within two weeks after each interview. Audio recordings and transcripts were assigned code names (i.e. MD1, MD2, NP1, ... etc.) attached to real names in a key only accessible to the researchers of this study. Three transcripts were transcribed by hand and the remaining were transcribed with Nvivo 12 or Rev.com. The most informative interviews and interviews from deviant cases offering atypical responses were transcribed by hand to improve researcher understanding of findings (104). Transcription with Nvivo and Rev.com was used for efficiency. Nonetheless, the researcher listened to all interviews and re-read transcripts to ensure accuracy of transcription and familiarity with the data.

4.1.1.4 Analysis

Each round of data collection and analysis deepened researcher understanding of the data and informed adaptations needed to improve the sampling approach, research approach, and Patient Falls Risk Report (107). Thematic analysis for this study was informed by Nowell et al (100). Analysis began with a combination of theory-driven deductive coding, in which a codebook was used to label and organize parts of the transcripts when appropriate (attached in Appendix I) (108), and data-driven open coding, defined as attaching labels to sections of the data without a pre-existing coding frame (109). The codebook guided and organized, but did not confine data analysis and was modified as necessary. Inductive codes were applied when a distinct type of information was identified separate from or under the umbrella of a deductive code. Next, useful codes were listed and grouped into sophisticated themes, and each theme was carefully reviewed to ensure a relationship to the overarching research question. Mind-mapping on paper was a useful tool used to identify relationships with the research questions, between themes, and between interviews. For instance, similarities and differences between physicians and nurse practitioners were identified. Based on this analysis, findings were summarized and linked to direct quotes. As a final step, participants were each sent a one-page summary of the synthesized findings via email to enhance credibility of the results (110). Comments from the member check would be considered when confirming the final version of the report after Phase two. The results from Phase one were used to inform iterative refinement of the Patient Falls Risk Report after the fifth interview and before Phase two.

4.1.2 Phase Two: Surveys

4.1.2.1 Research approach

In Phase two of this study, a survey based on the System Usability Scale (SUS) was used to check the usability of the revised Patient Falls Risk Report and answer the fourth research question, “how usable is the Patient Falls Risk Report?”. The SUS is a survey which asks participants to rate how much they agree or disagree with ten statements around the usability of a system. In the end, an overall score

between zero (worst usability) and 100 (perfect usability) is assigned to the system being evaluated (111). Although higher scores do not guarantee acceptability in the real world, research has demonstrated that they correlate with greater task success with the product being tested (111,112). Responses to individual items on the SUS are meaningless (111). The SUS was chosen for various reasons. First, the tool is a robust, reliable, and valid industry standard that has been widely used by usability practitioners internationally (111,113). Specifically, the *internal consistency* of the SUS is over 0.85 in small data pools and over 0.90 in large data pools (Cronbach's alpha over 0.70 is the minimum acceptable level) (113). Second, the SUS is quick to complete, so it will not be overly burdensome for primary care providers to participate in Phase two (111,114). Third, the SUS is a free tool that can measure the usability of a wide range of systems (111,115).

4.1.2.2 Sampling and recruitment

We aimed to recruit an anonymous sample of at least 20 and at most 71 primary care providers or primary care residents for Phase two. A sample size of 20 allowed for a margin of error of ± 10 points with a 95% confidence interval (116). With a sample of 71 participants, a 95% confidence interval and margin of error of ± 5 points would have been achieved (116). This sample size range was calculated with Equation 1 in Appendix J. The sampling strategy used was non-random voluntary response sampling. Recruitment involved sharing a recruitment letter, attached in Appendix K, and survey link via a newsletter for local medical residents, over email, and on Twitter. This approach, while preventing generalization and increasing bias, was chosen due to limited resources, opportunities, and time (117). The chosen sample also offered views from primary care providers and prospective primary care providers with a variety of clinical and classroom experiences.

4.1.2.3 Data sources and procedures

Surveys were only offered on Qualtrics XM due to physical distancing requirements during the COVID-19 pandemic. Once potential participants opened the survey link, they were shown information letter outlining the purpose of the study, what participation entails, contact details, and a consent question. Participants were informed that the survey should take about five minutes to complete and that they could withdraw consent by closing the browser and not completing the survey. The information and consent letter are attached in Appendix L. To improve accuracy of responses, participants are normally asked to complete the SUS after using the product in a representative context (114,118). Thus, on page two participants were shown a refined version of the mock Patient Falls Risk Report, attached in Appendix M, and asked to identify at least two care planning options to discuss with a mock patient. Had a participant not completed the activity, their SUS scores would have still been used; first impressions of usability tend

to be stable and, in the worst cases, not completing the representative task only impacts SUS scores by 15% (113). Participants were then asked to complete an adapted SUS survey (114), shown in Appendix N. Two acceptable changes were made to the original SUS survey to improve clarity of the statements (111,119); the word ‘cumbersome’ in statement 8 was changed to ‘awkward’ and the word ‘system’ throughout the SUS was changed to ‘report’. Participants were asked to respond to every statement on the survey and to select the centre of the scale if they felt that they could not respond (114). Finally, participants were given the opportunity to provide comments, feedback, and explanation for their responses in a box below the survey. All raw data for this study was organized and stored in a .csv file on a password locked laptop. Once participants completed the survey, they were shown an appreciation letter attached in Appendix G.

4.1.2.4 Analysis

Analysis began with a review of the survey responses to check for missing values. If a survey had a single missing value, the multiplier used to calculate the SUS score would have been changed from 2.5 to 2.7778 (113). If there were two missing values, the multiplier was be changed from 2.5 to 3.125 (113). If there were three or more missing values, the survey response would have been erased (113). There were various steps taken to calculate individual and average SUS scores using excel version 2004 (120). First, the researcher identified the scale position for each response (114). A scale position on the SUS ranges from zero to four, with zero at strongly disagree and four at strongly agree (114). Next, the score contribution was calculated. For odd-numbered items the score contribution is the scale position minus one, and for even-numbered items the score position is five minus the scale position (114). Next, the score positions for each item were added and multiplied by 2.5 to calculate individual SUS scores (114). The mean of all individual SUS scores is the overall SUS score. Although median was reported, mean has more appropriate statistical characteristics for use with the SUS (113,114).

If the sample size was below 30, research recommended a check of the normality of the individual SUS scores prior to analysis (113). Within SAS University Edition (121), PROC UNIVARIATE was used to create a histogram, box-and-whisker, and probability plot as exploratory data analysis (113), and to test normality with a Shapiro-Wilk test (122). The Shapiro-Wilk test generates a W statistic with a p-value to test the hypothesis (H_1), that the sample was selected from a population with a distribution that is not normal (122). If the W statistic is below 0.05, the standard cut-off, and the p-value is less than $\alpha=0.05$, the null hypothesis (H_0) is rejected and it would be concluded that the sample was selected from a population with a distribution that is not normal (122). If the scores were not normal, then there would have been concern around reporting percentile ranks, confidence intervals, and error (113). In

this case, sampling would continue until a sample size of 30 (113). If the null hypothesis (H_0) was not rejected, analysis and benchmarking would follow.

After determining the overall SUS score and testing normality, benchmarking of the overall SUS score was conducted. The SUS curved grading scale, shown in Table 3, is valid for evaluating usability relative to thousands of other systems (123). In this study, the aim was to achieve an average SUS score grade B- or above, as recommended by Bangor et al (111). A score below B- indicated that more work would be needed to improve usability of the Patient Falls Risk Report. Maximum, minimum, and range of individual SUS scores, and standard deviation and confidence intervals of the overall SUS score were calculated for descriptive purposes. Confidence intervals were calculated with Equation 2 in Appendix J. Responses to the care planning activity and comments were also reported for descriptive purposes, but would be analyzed more thoroughly if benchmarking indicated a need to improve usability of the Patient Falls Risk Report. In this situation, comments would be analyzed with thematic analysis, using procedures like those described in Phase one.

Grade	SUS	Percentile
A+	84.1 – 100	96 – 100
A	80.8 – 84.0	90 – 95
A-	78.9 – 80.7	85 – 89
B+	77.2 – 78.8	80 – 84
B	74.1 – 77.1	70 – 79
B-	72.6 – 74.0	65 – 69
C+	71.1 – 72.5	60 – 64
C	65.0 – 71.0	41 – 59
C-	62.7 – 64.9	35 – 40
D	51.7 – 62.6	15 – 34
F	0 – 51.6	0 – 14

Table 3: SUS curved grading scale (123)

4.1.3 Privacy and consent

The data collected for this study will be retained for five years on a password-locked laptop following the conclusion of this study. Only researchers associated with this project will have access to the data. There were no known or anticipated risks to participants in this study and no real, perceived, or potential conflicts of interest by any member of the research team. This study was reviewed for ethics clearance through the University of Waterloo Research Ethics Committee (ORE#41215).

4.2 Intervention Design

The Patient Falls Risk Report, attached in Appendix H, was designed as an addendum to the Patient Summary Report, attached in Appendix B. In the case that a home care client triggers the falls CAP during an interRAI-HC assessment, the Patient Falls Risk Report would be faxed as a second page. Since medical information is sensitive, it is important to consider privacy in this process. The Personal Health Information Protection Act (PHIPA) of 2004 outlines how health information can be collected, used, and disclosed (124). Any person in Ontario seeking home and community care is asked for consent to receive care and have their information shared (61). If the Patient Falls Risk Report is implemented in practice, unless a patient has expressed withheld or withdrawn consent, patient consent would be implied because the clinical information is being shared between two health information custodians to support

health care provision for the patient to whom it relates (124). The following sections will describe the rationale which informed development of the original Patient Falls Risk Report.

4.2.1 Rationale for intervention content

The proposed Patient Falls Risk Report intervention met, to a reasonable degree, the APEASE (Affordable, Practicable, Effective, Acceptable, Low Side-Effects, Equitable) criteria for designing and evaluating interventions (95). First, it harnessed existing streams of standardized information sharing that regularly reaches a large population of primary care providers in the WWLHIN. Therefore, the report was determined to be affordable, practicable, and equitable at a local level. However, the acceptability, effectiveness, and unintended consequences of the intervention functions were unclear and warranted further investigation. As long as the Patient Falls Risk Report was no longer than one page and provided relevant, actionable information in an understandable clinical language (49), it was anticipated that time saved from falls risk screening and assessment, and improved information sharing with home care would contribute to high acceptability and effectiveness of the Patient Falls Risk Report. This section will justify each actionable component of the Patient Falls Risk Report: cognitive performance, pain, foot problems, inappropriate medications, physical activity levels, and the AGS/BGS clinical practice guidelines. In general, justifications included relevance to falls risk, limited detection or understanding of a condition or component, high impact on patient wellbeing, and actionability in primary care.

The first interRAI-HC outcome scale included in the Patient Falls Risk Report was the Cognitive Performance Scale. Four out of five home care patients have some form of cognitive impairment (14). Yet, cognitive impairment often goes undetected or misdiagnosed (125). In fact, one study found that 73% of seniors undergoing comprehensive geriatric assessment had cognitive impairment which their general practitioner did not know about (91). Moreover, around 60% to 80% of seniors with moderate to severe cognitive impairment fall each year (126). That is twice the rate for seniors without cognitive impairment because problems with executive function, memory, and paying attention to environmental stimuli affect gait speed and cause instability (126,127). In addition, in many cases, individuals with cognitive impairment have a worsened ability to relay clinical information between providers (52). The need for clinical information sharing without reliance on patients to remember falls and the additional vulnerability of individuals with cognitive impairment supported the inclusion of the Cognitive Performance Scale in the Patient Falls Risk Report.

The second scale on the Patient Falls Risk Report was for pain. Daily pain affects 60.7% of community-dwelling seniors receiving home care and half of people living in pain do so longer than necessary because of lack of early detection (14,128). Pain also costs the Ontario health care system \$2.8

billion each year (129) and is associated with disability, suffering, worse quality of life, poor mental health, and death (130). The literature establishes that seniors experiencing pain have a significantly higher risk of recurrent falls compared to those without pain due to decreases in physical activity (131), joint pathology, and cognitive effects (132). In particular, pain is associated with lowered attentional resources and worse executive function, and can distract from or interfere with the cognitive activities necessary to physically avoid or stop a fall (132,133). Thus, since pain is a risk factor for falls and is often undetected, the interRAI-HC Pain Scale was included in the Patient Falls Risk Report.

The third risk factor, foot problems, is measured with the interRAI-HC foot problems item. About 80% of seniors report one or more foot problems (134). Yet, only 12.4% of seniors with foot problems have ever consulted with a general practitioner about it (135). Foot problems are often deprioritized, overlooked, or undisclosed in health care settings due to preference for self-treating or beliefs that they are not serious (136,137). However, there is an association between foot problems, especially foot pain, and falls in community-dwelling seniors (138). Feet are important for balance, traction, functional ability, gait, and stability on uneven surfaces (139,140). Podiatry is effective in minimizing falls risk (134,141), therefore foot problems were considered important to disclose within the Patient Falls Risk Report.

Fourth, the inappropriate medications CAP was important to include in the report. Psychotropic medication use by Ontario home care clients is 15.4% for antipsychotic or neuroleptic medications, 29.9% for antidepressants, and 39.8% for hypnotic or analgesic medications (14,142). Pressure from health care workers, patients, or caregivers; personal uncertainty; lack of oversight; outdated knowledge; or lack of time can all contribute to inappropriate medication use (143–145). Additionally, almost one in four medication problems are not known by general practitioners until a comprehensive geriatric assessment, like the interRAI-HC is conducted (91). Because of age-related changes in pharmacodynamics and pharmacokinetics (i.e. slower drug clearance), seniors are more susceptible to side effects of medications (146), such as orthostatic hypotension (147), sedation, abnormal muscle movements, and psychomotor impairment (146). Primary care providers' investigation into inappropriate medication use and potential contributions to falls risk is important for patient health. Thus, the inappropriate medications CAP was included in the Patient Falls Risk Report.

Fifth, results from the physical activity promotion CAP were considered important for primary care providers to receive. In Ontario, 35.5% of home care patients would likely benefit from physical activity promotion (14). Even though the number needed to treat in primary care for one adult to meet exercise guidelines is only 12 (148), many primary care providers struggle to incorporate routine screening and physical activity counselling into office visits due to lack of patient interest, knowledge, resources, and time (149,150). As a pleiotropic intervention, exercise programs are effective for

preventing falls through improvements in balance, stability, coordination, flexibility, strength, endurance, range of motion, reaction time, and aerobic capacity (151). Prompting primary care providers may trigger a conversation with patients who would benefit from more physical activity and support prevention of future falls (150). Therefore, the report includes results from the physical activity promotion CAP.

Finally, the AGS/BGS guidelines were important to include in a box at the bottom of the Patient Falls Risk Report. Most primary care providers are unfamiliar with these valid and reliable best-practice guidelines and do not use them regularly to address falls risk (80,87,88,91). Research also shows that primary care providers inadequately engage with patients in clinical decision making (41). In combination with the personalized patient information, the AGS/BGS guidelines support ease of use, actionability, and patient engagement in care planning and clinical decision making. Therefore, the AGS/BGS guidelines were found to be important to include in the Patient Falls Risk Report.

4.2.2 Rationale for intervention delivery

The Patient Falls Risk Report was structured in a concise and intuitive modified SBAR (Situation, Background, Assessment, Recommendations) format. SBAR is commonly used for discharges from hospital across Ontario and has been supported by The Institute for Healthcare Improvement, Health Links, the University Health Network, and the Nurse Practitioners' Association of Ontario (152,153). One systematic review found that SBAR implementations significantly reduced communication errors, patient falls, unplanned nursing home to hospital transfers, admissions to intensive care units, 30-day readmissions to hospitals, and unexpected deaths (154). Primary care providers may be able to use tools following SBAR more effectively since they have knowledge, skill, and familiarity with this communication format (103). Therefore, SBAR format was used within the Patient Falls Risk Report.

Delivering Patient Falls Risk Report via EMRs, online portal, and faxing with CHRIS were compared using the APEASE criteria (95). Sharing information with EMRs would have been effective, practicable, and acceptable due to easier integration of information into primary care workflows (49). However, relying on EMRs was seen as unaffordable and inequitable since information sharing is an expensive functionality, limited to few vendors (46). Ontario's primary care sector needs more standardized data collection and management before EMR-collected information exchange becomes feasible (46). Next, an online portal, while equitable, would likely have been unaffordable and impractical since logging onto a portal is time consuming. The issue of time, in turn, may reduce acceptability and effectiveness. Finally, fax is widely used in Ontario, accepted for information sharing, inexpensive, and equitable. On the other hand, faxes can be ignored or sent to the wrong address (49). Overall, faxing the Patient Falls Risk Report was determined to be the most appropriate intervention delivery method.

Results

5.1 Phase One: Interviews

5.1.1 Participant characteristics

There were nine participants recruited for Phase one of this study, listed in Table 4. The sample had practiced primary care for an average of 21.7 years (*Median* = 19, *Max* = 40, *Min* = 4). Four out of nine participants were nurse practitioners, one had worked in a rural practice, most practiced or had previously practiced as part of a family health team, and at least one had worked in a practice without an interprofessional team. Saturation appeared to be reached both at the end of Round 1 with five participants and the end of Round 2 with four participants.

Interview round	Participant code name	Years of practice
Round 1	MD1	40
	MD2	37
	MD3	10
	NP1	19
	NP2	4
Round 2	MD4	35
	MD5	31
	NP3	11
	NP4	8

Table 4: Participant characteristics

5.1.2 Approaches to falls prevention in primary care

Theme one corresponds with the research question, ‘what are primary care providers’ views on integrating the Patient Falls Risk Report into their workflow?’. All participants stated that they would use the Patient Falls Risk Report in their practice, although some were more enthusiastic than others. To identify why this was the case, currently used approaches to uncovering falls risk in primary care were explored, and barriers and facilitators to falls prevention were identified.

5.1.2.1 Uncovering falls risk

Participants identified various approaches to uncovering falls risk including screening, patient self-report, use of intuition, and reacting to falls. A few participants with practices in family health teams described some level of screening for previous falls. This ranged from simple screening, like asking “if they had a fall within the last three months” (NP2), to screening as part of a complex program, like the C5-75 (155). However, the majority of participants reported taking more reactive approaches to uncovering falls risk. The most common approach to uncovering falls risk was reliance on patient self-report: “I’m depending on self-reporting or reporting from a spouse or a family member” (MD2). The issue that participants reported with this approach was that patients may avoid disclosing falls: “A lot of time [falls are] not self reported” (MD3). A second approach, described by MD4, was an intuitive approach to uncovering falls risk: “You see them walking. So, obviously, you certainly notice... when they're getting frail and not moving as well. Shuffling, you know, that sort of thing” (MD4). The notion of intuitive practice alludes to the view that, primary care providers “know the patients well” (MD1) and can

use provider perceptions and clinical judgement to make care planning decisions. The third approach that most participants reported using was uncovering falls risk “after [patients have] had a fall” (MD1). For instance, providers may take notice of falls risk when a patient has visited a hospital for an injurious fall: “Most people that fall most often present to emerg than primary care. So, as primary care providers you might hear about it after the fact that Mrs. X was in emerg with a fall and we did these things and now they’re following up at the office” (MD1). In summary, while some participants conducted falls risk screening, many reported using a patient-reliant, intuitive, or reactive approach.

5.1.2.2 Sources of behaviour

Within the ‘sources of behaviour’, a COM-B (Capability, Opportunity, Motivation – Behaviour) structure was used to organize barriers and facilitators to falls prevention.

Capability

Limited ability to gather information on patient history, home environment, or community programs and resources was identified as among the most important barriers to managing falls risk. To illustrate, MD2 explained that “very often as a primary medical provider you're working a little blind and both in the assessment piece and managing, understanding risk factors, but also in terms of execution of a care plan” (MD2). In particular, low awareness, skill level, and stamina to access community resources among patients were thought to sometimes impede primary care provider information gathering. For example, collection of detailed, essential, falls-related information could be limited by patient memory. According to MD1, “often seniors... are vague with their symptoms. So, ‘my heart was palpitating’ ‘was it palpitating before the fall or after the fall?’ ‘I don’t know that’” (MD1). Moreover, MD3 explained that, with complex elderly patients “navigation can be a little bit tricky and often times they may not want to access any of the services that are out there” (MD3). System-navigation challenges were not only exclusive to patients. One participant claimed that primary care providers may not be aware of what resources are available, have up-to-date information on resources, or know how to become more aware through websites like Caredove. In summary, challenges to information gathering were cited as significant barriers to falls prevention.

To overcome these knowledge and information gathering challenges, participants emphasized that, “care planning around the fall prevention [should be] a team approach” (MD2). Connecting with home care providers in particular was seen as important because, “they see more than we do... if they're identifying someone at high risk, we may not identify that as quick as them.” (NP4). Other members of the care team mentioned as playing an important role in falls prevention included informal caregivers, pharmacists, podiatrists, geriatricians, physiotherapists, occupational therapists, social workers and

exercise specialists. Although the importance of shared care planning was undisputed, MD2 explained that it is not always done effectively in practice: “shared care planning and interdisciplinary care, collaborative care means different things to different people. And I think we all think we're doing it, but we don't do it very well” (MD2). More specifically, providers are often not as available, connected, or engaged as needed. NP3 emphasized that, in terms of collaboration with home care providers, “a lot of times you get nothing... So, you have no idea what's going on in the home” (NP3). Many participants agreed that, although there is still work to be done, effective collaboration with home care providers and a care team can enhance provider capability to proactively prevent falls.

Opportunity

The most mentioned barrier to engaging in proactive falls prevention was limited primary care provider opportunity. This barrier was summarized by MD1: “There’s so many reasons that people fall. So, it’s not a quick thing to deal with in primary care... primary care is fast paced and most appointments are 10 minutes, maybe 15 minutes long. So, it’s hard to deal with a fall or falls risk in that time period” (MD1). Risk factors for falls listed by the participants included previous falls or fractures, frailty or declines in health, comorbidities, cognitive impairment, medications, balance issues, and changes in lifestyle or behaviour. The complexity of falls risk, partnered with the heavy workload primary care providers are already carrying, makes addressing the issue challenging within a limited timeframe. In contrast, MD4, a provider who works within a family health team with a mobility clinic, explained that they are better equipped to manage falls:

I think I would see them, I would do the basics, but I would probably refer them in to the mobility clinic where they would have about a one hour appointment and they would see physiotherapy, occupational therapy, they would see the physician, potentially a social worker, and, you know, a family member could come with them as well, and then they could set up some kind of home program and follow up. So, I think in my type of practice, it would probably be too... time consuming (MD4).

However, most participants did not have access to an in-house mobility clinic. NP1 explained that since managing falls risk is time consuming, they would need to schedule multiple visits to address falls risk, even with access to the Patient Falls Risk Report: “I would definitely go through over one, two, maybe three appointments to, sort of, work with them and, uh, bring these recommendations forward” (NP1). Similarly, MD1 made clear that time pressure would determine whether they would use the Patient Falls Risk Report to address falls risk.

In addition, out-of-pocket payment and limited accessibility to community resources were discussed by participants briefly as patient-level opportunity barriers. Podiatry was described as too expensive for some patients to access “because there there's no OHIP covered podiatry anymore” (NP4). Additionally, although home care offers publicly-funded physiotherapy, it is discontinued after a set number of sessions, regardless of patient wishes, needs, or financial situation. In addition, MD1, who has extensive experience practicing in rural settings, emphasized multiple times that many individuals in rural areas cannot reasonably access many falls prevention resources: “there’s not exercise programs everywhere. So, there’s a feasibility factor that you’d have to look into” (MD1). Long wait times were also believed to limit access, particularly in rural areas: “home care [occupational therapy] assessments in our area are very difficult. Like, you wait months for them... Just not a lot of staff for a big geographic area” (MD1). These cost and service availability barriers that affect patients are important factors that many participants took into consideration when discussing the barriers they face to managing falls risk.

Motivation

Provider and patient motivation also played an important role in falls prevention efforts. Different participants had different views on to what extent and with which actions they could make a difference in the falls risk of patients. One common view was explained concisely by NP1: “I think falls are really important. And I think they’re a key indicator of how your patient is declining... I think it’s a thing we can do something about” (NP1). However, other participants said that the likelihood they could make a difference in the health of patients was more circumstantial. For instance, some participants stated that patients or caregivers may not disclose falls because “there’s a big stigma around that sometimes” (MD3). Additionally, convincing patients to engage in falls prevention efforts is challenging: “What are the patient’s wishes?...if she is not concerned about falling then it’s gonna be difficult to make any headway” (MD1). Patient motivation was considered especially limited when it came to allowing occupational therapists or physiotherapists into their homes, getting weaned off medications or other substances, using assistive devices, accepting home modifications, or engaging in exercise programs. NP3 illustrates the power of patient motivation in the following quote: “[the patient will] say, ‘well I’ve done physio it’s not helping me’ and they don’t do the exercises daily” (NP3). Beliefs also dictated participant priorities and what actions they decided to take in response to elevated falls risk in the task-based scenario with the Patient Falls Risk Report: “I don’t like the medications that often are associated with treating osteoporosis. Um, I think they provide a lot of risk for seniors... Maybe you can do things with diet and an exercise program” (NP1). Similarly, beliefs about what an ideal workflow looks like influences which tools providers will integrate: “I am very intuitive and I think it does get me into trouble. [The Patient Falls Risk Report] would certainly help me to be more thorough, but hopefully... it wouldn’t alter the...

way I practice” (MD4). In summary, the participants demonstrated that for primary care providers to prevent falls, their priorities must align with patient goals and patients must be aware that they are at high risk of falling and adhere to appropriate care plans.

5.1.3 Views on impacts of the Patient Falls Risk Report

The second theme corresponds to the research question, ‘what impacts do primary care providers believe that the Patient Falls Risk Report would have on patient care?’. Seven out of the nine participants said that the Patient Falls Risk Report would change what they would normally do in a patient encounter.

5.1.3.1 Utility

Supporting care provision by informing and reminding

Overall, most of the participants felt that they would “like to be more aware of how [their] patients are doing at home, specifically around falls” (NP1). The Patient Falls Risk Report was evaluated positively for the following reasons: it is evidence based, supports the communication of novel information, outlines important contributors to falls risk, and reminds providers of recommended interventions. In other words, the Patient Falls Risk Report was commended for informing primary care providers of patient status and reminding them to investigate falls thoroughly: “It would definitely remind me. Or actually, maybe inform me” (MD3). To illustrate, MD2 described a scenario in which the report would serve these functions and prevent adverse patient outcomes:

I've been trying to manage... recent heart failure. I wouldn't be paying as much attention to foot problems... Next thing you know, I'm trying to treat heart failure by increasing the diuretic and that's dropping the blood pressure in the course. And they're already having a foot deformity and next thing they're falling in the washroom trying to pee in the middle of the night because I'm giving them a diuretic. You could see there that that's a fairly linear relationship... [The Patient Falls Risk Report] would certainly add to the critical thinking around how can I reduce falls (MD2).

The report was also described as a starting point for discussing concerns and opportunities for intervention with patients: “So, I would probably show [my patient] the assessment and say ‘I’m really concerned about this for you... Let’s work together to try and make some changes to... decrease your risk and improve your health’” (NP1). In addition, while some providers on family health teams seemed to have an advantage when it came to collaboration with other health professionals, the Patient Falls Risk Report appeared to prompt the participants to rely on other health professionals and community resources:

Referral to our pharmacist to do a med review... maybe involving the [Community Responsive Behaviour Team] or something like that... if their cognitive performance is moderately impaired. Are they involved in the memory clinic?... the community support connection has a good falls prevention program. So, I like to refer them there... I would do a LHIN referral for an [occupational therapy] home assessment for falls risks (NP4).

In summary, most participants believed that receiving the Patient Falls Risk Report would have *utility* and, in turn, impact patient care positively.

Neutral or negative impacts of insufficient and misplaced utility

Like most interventions, the Patient Falls Risk Report was also subject to criticism. NP3 and MD4 stated that receiving the report would not change what they normally do in a patient encounter because it provides an inappropriate amount of information, they already use the recommendations laid out by the report, and they already have a well-established workflow that covers falls risk. Additional negative evaluations of the report included the following: it tells participants information they would already know, does not inform on resource provision by other care providers, and lacks automatic referral to specific falls prevention programs. To summarize, most of the concerns implied that the Patient Falls Risk Report has insufficient or misplaced utility. To illustrate the former, while MD5 did believe that receiving the report could impact their clinical practice, they preferred the C5-75 frailty case finding initiative which they described as a more comprehensive tool. With the latter, NP3 emphasized that although the Patient Falls Risk Report achieves the goal of sharing information, it does not solve, and may even worsen, what they believe is a more important user need: supporting primary care providers in managing heavy workloads:

It's just another paper to file to be honest with you... It's not helping me get any resources... bottom line is: What does it get you at the end? We already know there's a problem. I didn't need a tool to tell me there's a problem with this person. I just need some help to figure out how I'm going to take care of them (NP3).

This gap identified in the quote by NP3 was discussed by many of the participants. MD4, who has worked with and without a family health team, expanded on why shared care planning mattered to them: “I think if it is more of a community responsibility... you don't feel so alone... you don't feel completely responsible, because often times... it does come back on to you” (MD4). If the Patient Falls Risk Report could effectively support interdisciplinary care by identifying the falls prevention actions taken by home care providers or by automatically referring patients to community services, NP3 explained that primary care providers would be better supported. In conclusion, opportunities for improvement in the utility of

the Patient Falls Risk Report, and unfilled gaps in the health sector were identified by some of the participants in this study.

Impacts on medicolegal risk

It appeared that most of the participants do not actively worry about avoiding medicolegal risk. For instance, MD4 commented, “I try not to think that way... Seeing myself or others sued over the years... it always seems like there's one thing that, you know, if there is some sort of medicolegal situation that you wish always had been in the notes or somebody had recorded it. But it's sometimes so random” (MD4). Instead, participants described medicolegal risk as a motivator for good practice: “I think it would help me provide really good care, so I don't think it increases my risk” (NP1). On the other hand, MD1 stated that if there were ‘punitive consequences’ for not addressing the issues listed in the Patient Falls Risk Report, they would not want to receive it at all: “If everybody gives me a report like this for cognitive impairment, for mental health things, and I've got ‘oh I should be seeing these other patients cause I have a hundred reports’ and I can't do it, then I'd rather have zero reports” (MD1). To summarize, while medicolegal risk can be a motivator to using the Patient Falls Risk Report, it is only helpful when paired with realistic expectations of primary care provider workloads.

5.1.3.2 Usability

Despite some minor and cosmetic criticisms, the usability of the report was evaluated positively overall by the participants: “I like how it's laid out... So, I can glance at it... I could look at this report in less than a minute and find out whether I need to act on it” (MD1). Characteristics of the tool that made it useable included the one-page length, intuitive organization, simplicity of language and content, selection and emphasis of a limited number of key risk factors, and actionability. MD2 emphasized how important usability is when it comes to reports like the Patient Falls Risk Report: “Physicians are pretty simple-minded creatures and it obviously needs to flow well, easy to read, and it then needs to be like one or two things that we really need to think about” (MD2). The interviewer found that participants rarely completed the task-based scenario without stopping to comment on relevant clinical experiences or suggestions for improvement. While this may indicate lack of ‘flow’, participants appeared eager to offer feedback. In one interesting comment, NP3 stated that they would conduct a cognitive assessment on the mock patient as a response to receiving the Patient Falls Risk Report. Once the interviewer explained that the report included a cognitive assessment, NP3 explained, “To be honest with you, I didn't get that they did a full cognitive assessment, because I don't know what they did to get that answer” (NP3). The participants appeared to easily identify what the patient's problems were, but may not have trusted or understood the validity of the assessment results.

Fax delivery is acceptable

All of the participants were open to receiving clinical reports as faxes. When the interviewer asked about providers' views on receiving the report by fax, the overall consensus was that fax is fine. MD2 explained their views on fax: "I still continue to get most of my messaging from other providers by fax. I have a process in place, but I think this is how people feel, that the fax machine is out of date, and they would rather there was electronic messaging. So, if I had a fully integrated EMR. I may choose another method" (MD2). However, tying the Patient Falls Risk Report into an EMR compatible electronic form was generally preferred due to easier workflow integration. Specifically, to scan and upload faxes was seen as requiring relatively more time and energy. Interestingly, providers from one family health team used the Health Report Manager, a tool which automatically uploads faxes into an EMR system. NP2 was one of those providers and explained this process: "Faxes go into our computer actually and then they just upload them in the chart... And then we would get a message... that this was sent" (NP2). While views on fax were slightly varied, the consensus was that using fax for information delivery was acceptable.

5.1.4 Criticisms and suggestions to improve the Patient Falls Risk Report

The theme, 'Criticisms and suggestions to improve the Patient Falls Risk Report' aimed to address the third research question, 'What criticisms, suggestions for improvement, or future developments do primary care providers suggest for the Patient Falls Risk Report?'. Since many comments were repeated during the first five interviews, the Patient Falls Risk Report was modified at the halfway point and end of Phase one. Round one of interviews sought feedback on the original version of the Patient Falls Risk Report, attached in Appendix H. Round two sought feedback on the second version of the Patient Falls Risk Report, attached in Appendix T.

5.1.4.1 Falls overview

The first section of the Patient Falls Risk Report that will be discussed is the falls overview at the top of the report. In round one of interviews, the few participants who commented on the falls overview were looking for clarification, but found the answers to their questions within the report itself. The following quote by MD3 illustrates this pattern: "So, did my patient [pause] have a fall? I'm assuming they probably did- 'high risk is based on report of multiple falls'- So, then I'm assuming my patient did have a fall at least- I guess more than one" (MD3). MD3 also sought more information around falls in this section of the report including loss of consciousness with falls (which indicates neurological issues). In round two, more participants paid attention to this section of the report and requested two changes. The first request for change came from MD4. They wanted more detail around the circumstances of falls to

“tease out the serious falls” (MD4) because they found that sometimes health providers record a fall when there is no need for serious medical concern. Second, NP4 suggested new wording which emphasizes that the report contains valid and reliable assessment results: “Change this wording like ‘your patient has been assessed and they are a high risk for falls.’...because then you're like, okay, ‘they've been assessed and they've been determined to be high risk based on whatever algorithm's being used’... because it kinda looks like a title” (NP4). This suggestion would also benefit providers who, while reading the report did not realize that it was based on a full assessment. In summary, providers requested more detail and clearer language.

5.1.4.2 Contributors to falls risk

The five contributors to falls risk are located in the table in the middle of the Patient Falls Risk Report. These contributors include cognitive performance, foot problems, medications, pain, and physical activity.

Cognitive performance

In round one, while cognitive performance was recognized as an important issue, there was lack of clarity around interRAI jargon, and appropriate interpretation of the Cognitive Performance Scale. MD3 summarized these key concerns:

I guess moderately impaired would mean something, but the 1 beside it means absolutely nothing to me and wouldn't to most primary care providers... most primary care people do not see RAI stuff at all... Is higher score worse or better?... That might want some clarification in case people needed to know (MD3).

In round two, there were no further comments on jargon. However, the written Cognitive Performance Scale results did not satisfy participant information needs. NP3 explained that the mock patient would “probably need a little bit more investigation as to why they have [cognitive impairment]” (NP3). Thus, some participants chose to refer the mock patient to additional testing and assessment (i.e. CT scan, memory clinic assessment). To summarize, there was confusion of interRAI jargon and scoring in round one and round two highlighted a desire for more information around cognitive performance among participants.

Foot problems

Foot problems were seen as important among the participants, however, in round one, they suggested adding more specific information to this item. MD1 explained in the following quote why adding more detail was important to them: “If there's no limitation in walking then how much of a

problem is it? And then when I look here, score of 1 out of 4 based on foot pain, wounds, deformities. Well, pain versus wounds versus deformities are very different things” (MD1). MD1 continued by explaining that wounds can heal quickly while long-term deformities will not improve. Knowing if the foot problem was short-term or long-term was a priority to MD3 because it would influence their treatment decisions. In round two, there were no critiques on the foot problems item. However, in discussions about foot problems, some participants used the words ‘maybe’ and ‘I guess’. NP4 for example said, “I guess we always look at our patients with diabetes and their feet” (NP4). Most participants seemed uncertain or neutral about foot problems. On the other hand, NP3 quickly developed a plan to address the foot problems without additional information: “they need to go somewhere to get a proper foot assessment, footwear that's properly appropriate for them to prevent fall risk. And is there, you know, some device that you could put on their deformities that could help them with their walking?” (NP3). All in all, ensuring treatment or management of foot problems was viewed as vital to preventing falls.

Medications

Medications was a highly discussed topic throughout the interviews. In round one, most critiques targeted language used to describe the Inappropriate Medications CAP. For instance, the word ‘inappropriate’ was seen as a “judgemental term” (MD1) because it implies blame on a clinician for prescribing a medication and ignores contextual factors which may make the situation appropriate (e.g. preventing long-term care admission, maintaining quality of life). MD2 suggested using alternative language: “Polypharmacy might be something that's softer language that may be easier to understand.” (MD2). Additionally, the word ‘triggered’ caused some confusion: “triggered... I don't quite know what that means for me” (NP1). ‘Triggered’ is used to describe the Inappropriate Medications CAP results, but the participants were unfamiliar with this interRAI terminology. Moreover, during round one, there was a suggestion to add more detail on which class of high-risk medications the patient is taking (i.e. cardiac medications, antihypertensives, psychoactive medications, or anticoagulant medications). After changes were made, there were no criticisms on the medication section of the report in round two. The only suggestion in round two regarding medications came from NP3 who wanted to know who had prescribed the medications. Thus, there were clear improvements made to the medications section by the end of the interviews.

Pain

The next section of the report discussed by participants was the Pain Scale. In round one, lack of detail in this section was problematic since pain was seen as a complex problem. To be able to develop

more effective care plans, participants wanted to know the following: “Where’s the pain? When does it happen? What makes it better? What makes it worse?” (MD1). Pain was also described as time consuming to address. In round two, the physicians did not discuss pain. On the other hand, NP3 expressed various follow-up questions that they would have around pain management: “is their pain well managed?... how is it managed? Does it manage through physiotherapy?” (NP3). Nonetheless, pain was considered a valuable item on the Patient Falls Risk Report.

Physical activity

In round one of interviews, all of the participants had questions on how the physical activities CAP was generated or what the CAP meant. In round one, these questions included the following: “if a patient was sedentary and would benefit from exercise, but didn’t really know if they would do it or not, would you get alerted to that?” (MD3), “they’re motivated to participate in an exercise program?” (NP1), and “what does this mean physical activity levels?” (NP2). Based on the same confusion, the usefulness of the Physical Activities CAP was doubted by some participants because of the belief that (1) all patients would benefit from more exercise and (2) the CAP might not capture individuals who would be not be willing to participate in a group exercise program, but may consider other forms of physical activity. In round two, there were no questions asked on the meaning of the Physical Activities CAP.

5.1.4.3 Recommendations to action

Although the participants believed that the recommendations to action would be time consuming to go through, all of them were happy with its inclusion. In fact, the only comment in the member check had to do with emphasizing the recommendations to action. Strengths of the recommendations that were identified included that it is evidence-based, appropriate, and facilitates action. However, some participants suggested adding more detail to the list of recommendations, including a list of local falls-prevention services or health providers who could be referred to, numerical figures such as bone mineral density and orthostatic vitals thresholds, and the actions home care has taken. MD2 expanded on the latter in the following except: “I would ask myself, ‘Why haven’t [the home care case coordinators] done that already?’ Or, ‘Why haven’t they referred to home care [occupational therapy]?... [or] a community exercise program?’... I would just be very careful, I suppose, in how it’s messaged to the physician. Whether it’s party for information, but it’s partly an invitation to contribute to the care plan” (MD2). During round two, NP3 expressed additional frustration because they found that this section offers suggestions without directly offering support: “So, what have you done? So, you’re telling me all these things that you think should be done... They’ll be nice if they had then said we’ve referred to, we’ve done this, we’ve done that” (NP3). To facilitate access to outside support, NP4 suggested emphasizing the

reference to CareDove “because I think people forget that you can go onto CareDove and actually find the falls programs in our area” (NP4). In summary, various participants described struggling to obtain falls-prevention support, however, the recommendations to action themselves were evaluated positively.

5.1.4.4 Other

Within both rounds of the interviews, a few participants described other information that they wanted incorporated in the Patient Falls Risk Report. First, including fracture risk was suggested by MD1 and MD3. Second, MD2 discussed adding more information on interRAI since primary care providers are often unfamiliar with it: “where do you explain [interRAI]? Is it separate knowledge product or do you have the back side that explains the scores that we’re using and the fact that they’re validated?” In round two, the physician participants made multiple suggestions on other information to add, including age, living status, narrative notes, if falls were injurious, and patient ability to stand, sit, and walk around. NP3, on the other hand, suggested the addition of drug and alcohol use, presence of relevant chronic diseases (i.e. heart failure), and the state of the home environment. All of the ‘other’ information addition suggestions were relevant to falls and falls risk.

5.2 Phase Two: Surveys

The sample size achieved in Phase two of this study was 27 and there were no missing values in the data. However, due to the small sample size, it was important to analyze if the data were normally distributed. A histogram and probability plot, shown in Appendix O, were created for the purpose of exploratory data analysis. These plots suggest that the data are normally distributed. To confirm if the distribution of SUS scores was normal, a Shapiro-Wilk test was conducted (W-Statistic = 0.94) (113). The calculated p-value (p-value = .12) for the Shapiro-Wilk test was greater than $\alpha=.05$. Therefore, the null hypothesis (H_0) was retained.

5.2.1 Survey data

Phase two of this study addresses the fourth research question, “How usable is the Patient Falls Risk Report?” The overall SUS of the Patient Falls Risk Report was 83.4 which can be considered an A on the SUS benchmarking scale at the 90th to 95th percentile (123). In other words, they survey results determined that the Patient Falls Risk Report is usable. Descriptive statistics for the individual and overall SUS scores are shown in Table 5.

Mean	83.4
Median	82.5
Mode	100.0
Max	100.0
Min	62.5
Range	37.5
Standard Deviation	11.99
95% CI	78.7, 88.2

Table 5: Descriptive statistics for SUS scores

All participants completed the representative task by suggesting care planning options in response to the mock Patient Falls Risk Report. The most popular interventions were medication reviews or

pharmacy referral and referral to an exercise or balance program. The options considered are shown in Appendix P.

There were also a range of opinions about the report. The following additional comments were made on the survey:

1. From my understanding, the first chart had 5 common categories of falls risk listed with your own patient situational factors listed next to them. Then at the bottom it had roughly 5-10 listed suggestions. My question is, were the recommendations lists at the bottom just general suggestions for everyone or were they specifically recommended for my patient situation?
2. A good start - I think the boxes with information about YOUR patient need to be more concise, just the facts, no analysis (don't bother saying "moderate impairment" - just say what it is, or say NONE)
3. Great report!
4. Very thorough and concise information. Would love to have this tool in practice
5. Comprehensive and facilitates good review. Question who would complete this? Pharmacy nurse or in collaboration with MD/NP?
6. Good appearance and flow to report
7. Nice summary of the specific areas contributing to falls
8. Very helpful report
9. Excellent form, information is presented in a forthright manner, user friendly

These comments ranged from simple positive evaluations, to questions about the report and suggestions for improvement.

Discussion

6.1 Summary of findings

The results of this study suggest that, if implemented, the revised Patient Falls Risk Report may be useful for primary care providers to address barriers they face in falls prevention. Participants described barriers to preventing falls all along the care pathway, depicted in Appendix Q. These barriers, which can lead to delayed or reduced quality of care, include difficulty collecting information, limited time or resources, and challenges with determining how and to what extent falls should be prioritized and managed. According to the participants of this study, receiving the Patient Falls Risk Report could mitigate barriers in primary care practices by providing opportunities for providers to stay informed about important risk factors and reminding them about recommended *falls management* interventions. In terms of the Behaviour Change Wheel, the report was regarded as a potentially useful intervention which harnesses the policy categories of communication, guidelines, and environmental/social planning, to restructure the primary care-to-home care social environment and educate providers in a way that influences capability, opportunity, and motivation. Opportunities to improve the Patient Falls Risk Report, such as through changes in wording or level of detail, were also identified. After two rounds of thoughtful revisions, the Patient Falls Risk Report has become a more concise, useable, and useful tool.

6.2 Phase One: Interviews

6.2.1 Theme One: The Patient Falls Risk Report can fill gaps in primary care workflows

6.2.1.1 Sources of behaviour

According to the Behaviour Change Wheel model, behaviours are complex, interact with each other, are influenced by broader systems. In this study, the health system clearly shaped participants' capability, opportunity, and motivation in regards to falls prevention (95). Through environmental restructuring via automated information sharing, education on best-practices for falls prevention, and offering support to identify and respond to falls, the Patient Falls Risk Report has the ability to support primary care providers and mitigate some of the system-level challenges they face.

Capability

Slow change in medical culture has led to suboptimal capability for primary care providers to manage patient complexity. Around 60 to 70 years ago, the Canadian health sector was designed to effectively address episodic and acute problems (156). But, with the growing burden of chronic disease, there has been slow change to medical education, and, often, unwillingness of professional groups and providers to deviate from the status quo (156). The present study has demonstrated that standard

approaches are often applied to complex, chronic problems like falls. One explanation for this behaviour may be that many primary care physicians receive little training in geriatrics and, in turn, have knowledge gaps and biases in how they gather and interpret data (157). Training and education have a significant influence on capability, which encompasses knowledge, skills, and decision processes (95). Take medical reasoning. The hypotheticodeductive method and has been the most common and efficient medical reasoning pattern for the assessment of non-complex patients (158). This process is an 'intuitive' approach, which involves quick comparisons between immediate patient problems and the past experiences of clinicians (158). When health problems are straightforward and acute, traditional medical reasoning is appropriate. However, in the case of managing falls, an analytical approach is vital. Research shows that not all falls-related symptoms are immediately noticeable in primary care offices (91). Additionally, at home care discharge, there is no process to ensure follow-up with primary care by home care providers, and home care clients and their caregivers are left with limited knowledge around what health conditions were identified and what health services were provided (159); patients often do not seek out that information, even if there are unaddressed health concerns (159). Primary care providers' dependence on their own senses, patients, and home care providers to relay information is insufficient. Without slower analytical reasoning, based on sound clinical judgement, critical thinking, and effective collaboration (160), falls can go unnoticed or disregarded until serious injury with lifelong consequences occurs (65,73). Inadequate geriatric training and slow-changing medical tradition leads to reduced capability for primary care providers to manage complex conditions like falls.

Opportunity

The way in which clinicians provide care is highly influenced by opportunity-related barriers to care provision. In contrast with original predictions, no participant stated that the Patient Falls Risk Report would save them time on falls risk assessment. This was surprising since limited time was described as one of the most prominent barriers to preventing falls and the Patient Falls Risk Report shared information that primary care providers would not need to collect themselves. One explanation to consider is that many participants, especially those not within family health teams, rarely conducted regular falls screening or structured falls risk assessment in the first place. While primary care providers often report being highly invested in prevention, the literature confirms that the degree to which preventive care and screening is actually performed is relatively low (161). Participants who did report regularly screening for falls risk also tended to have more supportive resources, such as easy access to a mobility clinic or family health team (162). According to the Behaviour Change Wheel model, social environments which facilitate access to supportive resources offer more opportunities for positive behaviour (95). For instance, one family health team physician in this study stated that information

provided by the Patient Falls Risk Report would be redundant since they use the C5-75 frailty screening and case finding tool. The full C5-75 relies on a 37-minute team-based interprofessional approach and is, therefore, unrealistic for use in busy primary care practices without easy access to an allied health team (163). More isolated providers need greater reliance on community referrals to manage their workloads.

For providers with fewer connections to supportive community resources and allied health providers, time saved by the Patient Falls Risk Report in screening and initial assessment may be ‘cancelled out’ by time spent in additional falls management. Since the Patient Falls Risk Report flags falls as a health concern, primary care providers would have the medicolegal responsibility to provide a reasonable level of care; inaction can result in a claim for negligence (164). The fact that most of the participants saw medicolegal risk in a neutral or positive light, suggests they are confident about their ability to provide a reasonable level of medical care. However, addressing falls risk can be time-consuming. It requires collecting information from patients, who may be uninformed; communication with a siloed circle of care via inefficient communication methods; and coordinating services which may be inaccessible to patients or unfamiliar to providers (41,49,92). As a result of the complexity of falls management, some providers explained that they would need to schedule multiple 10- to 15-minute appointments with a single patient to address the concerns in the Patient Falls Risk Report. This approach is less efficient for the management of complex conditions and more cumbersome for both patients and primary care providers. In summary, competing time demands influence opportunities for action (95). Therefore, information sharing tools like the Patient Falls Risk Report should support prioritization of patient problems such that time is spent on the most important health issues.

Motivation

Whether a provider takes a proactive or reactive approach to care is also shaped by the history of their profession and overall professional motivation. The nurse practitioners in this study appeared to be less prone to a reactive mindset than the physicians. One explanation may be that nurse practitioner profession has a different foundational philosophy (165). Contrary to popular belief, on average, nurse practitioners do not spend more time with patients than physicians, but instead set themselves apart by taking a holistic and relational approach to health care (165,166). Nurse practitioners focus their efforts on health promotion, education, and counselling, beyond the biomedical approach of treating disease (165). Conversely, the biomedical model of illness has been the foundational philosophy of medical practice over the last century (167). The biomedical approach has substantially improved health care through its emphasis on discovering and treating pathology (167). On the other hand, in the case of falls management, this style of practice can lead to overemphasis on physiological causes of falls, such as medication errors, and failure to consider external circumstances (such as the home environment), mental

health (such as alcohol dependence), and emotional state (such as fear of falling) (167). A primary care provider who takes a purely biomedical approach may disregard highly effective interventions, like finding ways to integrate exercise into a patient's lifestyle (82,167). However, over the last 40 years, the biopsychosocial model, which recognizes the influence of psychological and social factors, has challenged the biomedical model and become more mainstream (167). This shift is apparent in the present study since exercise was one of the most common falls management interventions cited by participants. However, the physicians in this study still appeared more attracted to biomedical risk factors, like medication errors, rather than psychological or social risk factors, like heavy alcohol use or lifestyle. In summary, the professional foundations influence present primary care behaviours.

Another potential historical influence on provider motivation and behaviour can relate to power and trust. Over hundreds of years, physicians have held professional dominance over nurses in income and status (168). According to psychiatrist Leonard Stein, physicians and nurses traditionally played a 'doctor-nurse game', in which nurses influenced physicians' clinical decision making through subtle suggestions (169). They did so while appearing passive to avoid open disagreement and make it seem like the physician had made the decision autonomously (169). With the Patient Falls Risk Report, there is no opportunity for this self-censorship. Thus, the history of power differences may create tension when, for instance, a home care nurse identifies patient health problems which may have been previously overlooked and recommends a list of actions a primary care provider should take. In this study, one physician was not confident that a fall reported by home care providers would always constitute a 'serious fall' and, in turn, requested detail around the circumstances of the falls. Requests for more information or patient re-assessment suggest scepticism of the Patient Falls Risk Report. Despite the extensive training of nurses, trust and interprofessional collaboration continues to be a challenge (168). Ensuring clear roles and responsibilities and encouraging more frequent collaboration may mitigate these power influences on provider motivations over time (168). This issue offers a potential avenue for future research as the motivational barriers to interprofessional collaboration are important to acknowledge and address.

6.2.1.2 Integrating other behaviour change interventions

Some behaviour change interventions are already being implemented in the health sector to enhance primary care provider capability, opportunity, and motivation in using the Patient Falls Risk Report. With increasing complexity of patients and a growing body of medical literature, providers are adapting by using checklists and decision support tools to free up cognitive space and address complex patient needs analytically (160). The participants in this study demonstrated a high level of comfort with using the Patient Falls Risk Report, possibly because of previous experiences with electronic medical records and other decision support tools such as the C5-75. Moreover, the creation of interprofessional

teams may have increased collaboration potential. Family health teams are often more patient-centered, provide higher quality chronic disease management, offer quick access to a greater range of health services, have better coordination of internal services, and, overall, provide a better patient experience compared to other models of primary care (170). However, there is still room for improvement in these teams. Compared to other primary care models, family health teams care for people who are healthier and of higher-income (162). Additionally, research shows that family health teams tend to be ‘physician-centric’ and take a suboptimal shared care approach (156). Another behaviour change intervention in the health sector has been a shift from volume-based to value-based primary care payment models (171). In 2017-2018, 34% of Canadian family physicians were paid primarily through non-fee-for-service methods, such as salary, capitation, or contract-based payments (171). Solo providers and family health groups still make most of their income through fee-for-service, but family health teams and community health centres are usually paid with a salary (172). When primary care providers are paid in a pure fee-for-service arrangement, in which payment is tied to the quantity of services provided, they are sometimes compelled to limit patients to only discuss one problem per visit (173). As the participants this study recognized, falls are multifactorial and should not be treated in isolation from other health problems (69). However, some participants still reported that they would schedule multiple appointments to address the issues outlined in the Patient Falls Risk Report rather than one lengthy appointment. Further changes in payment systems may create more opportunities for primary care providers to choose proactive approaches. The listed health system changes all contribute to effectiveness of chronic condition care and pave the way for success of the Patient Falls Risk Report.

6.2.1.3 Integrating the Patient Falls Risk Report

A 2014 study by Guthrie et al has shown that sharing falls-related information from the RAI-HC with clinicians via fax is feasible (174). In their study, home care case coordinators manually faxed a referral package to trained rehabilitation service providers to help them support clients who had experienced a recent fall (174). The referral package included a client information summary, care coordinator consultation notes, a two-page personal health profile that included results from 35 interRAI items and scales, a key for scale interpretation, a summary of relevant interRAI CAPs, a MAPLe (method for assigning priority levels) score, and a one-page falls checklist (174). Service providers found this package to be lengthy, but helpful. Those that received the intervention reported increased communication and feeling more supported to solve complex health issues, but would have liked more training on how the RAI-HC results should be interpreted and used (174). The Patient Falls Risk Report is shorter than the intervention in Guthrie et al study (albeit less comprehensive), has high usability, and requires no additional training to be understood by primary care providers. This was made clear by the

evaluations of interview participants, who found that the report had an appropriate length, survey participants, who gave the report an A for usability, and the participants overall, who were able to use the report to identify care planning options for a mock patient. Although the target audiences and interventions are different, the promising results of the Guthrie et al study suggest that integrating the Patient Falls Risk Report into primary care provider workflows would be feasible.

6.2.2 Theme two: The Patient Falls Risk Report can impact patient care

6.2.2.1 Advantages of the Patient Falls Risk Report

This study identified various advantages to implementing the Patient Falls Risk Report. Most of the participants recognized that, through these interventions, Patient Falls Risk Report can impact their behaviour and alter patient care. On a clinical level, if primary care providers are only uncovering falls risk after an injurious fall, it may be ‘too late’ for many clients. Injurious falls increase odds of admission to long-term care by 30% and odds of death by 27% (175). Reducing risk and incidence of injurious falls could significantly reduce adverse outcomes in home care clients (175). It is also beneficial to inform primary care providers about falls risk to create an opportunity for home care clients to have unmet needs addressed. From 2015 to 2016, about one in three community-dwelling adults with self-reported home care needs did not have their needs met (176). Surprisingly, home care clients with a regular health care provider were significantly more likely to report unmet needs than those without (176). One explanation for this problem may be that the professional boundaries of health care providers are blurred (177). On the Patient Falls Risk Report, some participants perceived some of the recommendations to action as the responsibility of home care providers. On the other hand, home care providers may worry about ‘stepping on toes’ or overextending their scope of practice (177). In addition, before a doctor evaluates need for a certain service, it is imperative that they are informed of the patient’s health needs. Patients may not report falls due to stigma or lack of motivation, and primary care providers may not have had the opportunity to conduct screening, gather sufficient information, and identify a need. Data from the 2015-2016 Canadian Community Health Survey shows that 14.4% of home care clients with an unmet need could not fulfill these needs because a doctor said it was not necessary or that the client did not qualify for the service (176). It is imperative that someone on a patient’s health team notices their needs, becomes informed, and acts. Some ways in which the Patient Falls Risk Report can support primary care providers are shown in Table 6.

COM-B reference	Source of behaviour	Solution offered by the Patient Falls Risk Report
Capability	Gathering information is challenging	The report offers information on patient status that primary care providers do not need to collect themselves. It can be treated as a starting point for assessment and care planning.
Opportunity	Not enough time to screen, assess, and address falls risk	Falls risk screening and assessment has already been conducted, so providers can spend more time managing falls risk.
Motivation	Uncertainty around their ability to make a difference; belief that care should be provided ‘their way’	Recommendations to action lay out reliable and valid ways that providers can make a difference in falls risk. This way, they do not need to recall best-practices or what community resources are available by memory.

Table 6: How the Patient Falls Risk Report can support primary care providers

At a system level, another advantage of the Patient Falls Risk Report is that it can gently introduce primary care providers to interRAI, support information gathering, and enhance collaboration. Clinicians often perceive the interRAI assessment instruments as an imposition rather than a means to enhance holistic clinical practice, measure health system integration, and improve quality of the health sector (178). Since interRAI offers a widely used suite of third generation assessment instruments, they can enhance primary care provider capability to connect with the rest of the health system. However, many primary care providers in Canada have never heard of the interRAI instruments (29). In the first round of interviews, interRAI jargon and numerical scale scores created confusion among the participants. While numerical scores would likely have increased utility of the report for those who understand them, they also decreased usability and created confusion for those who did not. Using primary care language to ‘translate’ the assessment results, made it easier for participants to use and learn about results from the interRAI-HC. Once providers become more accustomed to interRAI results through the Patient Falls Risk Report, convincing them to change their workflows may, in theory, be less challenging. In other words, the Patient Falls Risk Report can act as a ‘foot in the door’ for future interRAI use in primary care. This is important because interRAI instruments offer a means to engage in primary care *quality assurance* (178). When clinicians get measurable and actionable feedback on their performance based on how well they meet quality indicators, they can identify the areas in which patient care needs to be improved (178). Feedback from the quality indicators and standardization in interRAI instruments have the potential to improve quality of care, and should therefore, be used throughout the health system where appropriate.

6.2.2.2 Disadvantages and limitations of the Patient Falls Risk Report

There are also some disadvantages to implementing the Patient Falls Risk Report without making simultaneous changes to the health sector. Because the report provides primary care providers information without offering or providing direct support to address falls risk, some participants felt a strain in opportunity and like work was being “dumped” on them. Providing more work without finding ways to minimize workload can lead to loss of motivation, dissatisfaction, or burnout (179). One qualitative study

on primary care physicians, nurse practitioners, and physician assistants in the United States identified various contributors to low professional fulfillment and burnout, including an insurmountable workload, growing demands to take more responsibility, inadequate EMR support, and feeling demoralized when they cannot do it all (179). When it comes to falls prevention, shared responsibility for care between patients, primary care providers, pharmacists, physiotherapists, occupational therapists, exercise therapists, and more, would be ideal. Only sending the Patient Falls Risk Report to primary care providers, rather than reporting relevant information to entire care teams, may increase risk of primary care provider burnout. Potential system-level burnout prevention strategies to consider include off-loading work (e.g. automatic referrals, offering nurses greater professional autonomy and independence, reducing ‘office work’ and documentation requirements), addressing pain points in primary care workflows (e.g. aligning EMRs with provider needs), and recalibrating expectations of providers (e.g. defining a manageable scope of responsibility) (179). EMR integration of the Patient Falls Risk Report allowing for a real-time check-box and commenting feature, or offering primary care providers direct, easy-to-access support from other health providers, such as pharmacists, physiotherapists, and occupational therapists may mitigate the potential of the Patient Falls Risk Report to overload primary care providers.

Another concern around implementing the Patient Falls Risk Report is that it could act as a band-aid for a large and complex health system issue, siloing between home care and primary care. Claims were made that the report has insufficient or misplaced utility. However, these comments tended to focus on the shortcomings of the health sector and not on the report itself. In other words, participants identified that while it may be useful for primary care providers to help individual patients, the report does not address many root problems identified in this study, including lack of shared care planning, fragmentation, inequity, and inefficiency. Solving these problems were not the purpose of the Patient Falls Risk Report. In fact, isolated, single-condition interventions are often unsustainable and only offer short-term advances in health system improvement (180). Instead, change must occur at a macro level; primary care reform is currently underway in Ontario (181). System reform, implemented by committed and prepared health system leaders (180), and anchored in a robust quality assurance framework (178), would be a broader and more sustainable solution. Specifically, a quality assurance framework can guide health system reform such that priorities are set and changes are made based on evidence.

6.2.3 Theme three: The Patient Falls Risk Report can be improved to support falls prevention

In terms of usability and utility, the original Patient Falls Risk Report was evaluated positively with room for improvement. The primary concern was achieving an optimal balance of information: too much and providers may feel overwhelmed, overburdened, and risk medicolegal consequences; not enough and providers may feel uninformed about the patient’s condition. In other words, the report

needed to be designed to support clinical judgement while considering time constraints. It was also essential for providers know why falls risk information is being sent to them and how they can use that information to make a difference in the health of patients.

6.2.3.1 Addressing minor and cosmetic criticisms

Participant comments directed the changes made to the Patient Falls Risk Report at the midpoint (after 5 interviews) and conclusion (after 9 interviews) of Phase one. These changes are listed in Appendix R. While some criticisms of the Patient Falls Risk Report highlighted major issues with need for important modifications, most criticisms were minor or cosmetic, corrected with relatively insignificant changes. There were no showstopper issues. Five types of changes were made: saving space, adding clarity, adding detail, aligning with provider priorities, and emphasizing validity. First, rearranging information to condense the report without changing content was thought to increase usability since primary care providers prefer reports that are one page or less in length (49). It also allowed for the addition of detail to the report without a significant increase in length. Second, areas of the report that appeared confusing to providers were modified to improve usability, utility, and overall clarity. One change under this category was removing the numerical scores for the scales. An alternative solution would have been adding a guide to scales and CAPs as a second page and leaving the standardized format alone. However, providers may choose to not read this guide since it would add length (49). Third, adding detail was important to increase utility of the report and better support normal decision-making processes. Changes included adding information around balance, medications, cognitive performance, and pain which mirrored normal provider workflows. A sub-category for adding detail was to open options for interventions in the recommendations box as appropriate. For example, a foot examination in primary care would be a possible free alternative to podiatry. This change also reflected the desire for clinicians to provide equitable care (156). Fourth, changes were made to better align the report with participant priorities. For instance, the word ‘inappropriate’ was removed from ‘inappropriate medications’ because it was perceived as a term that applied judgement without fair consideration of patient context. Fifth, changes were made to emphasize validity of the report since some providers did not understand or trust the quality of the assessment results. Changes made to emphasize validity were small and may have had a small impact on perceived validity. Lack of trust is a broad cultural issue in the health sector and is slow to change (182). The final version of the Patient Falls Risk Report is in Appendix S. Changes made in all five categories contributed in some way to improving usefulness of the Patient Falls Risk Report.

6.2.3.2 Unaddressed major issues

A few of the criticisms highlighted by participants were major issues that could not be fully addressed. These issues, which negatively impact user experience, efficiency, or quality, included, (a) lack of information on what falls-related interventions have been carried out by other providers (i.e. home care providers), and (b) insufficient detail on foot problems, fracture risk, and bone mineral density. Regarding the former, understanding which services are in place is important because it reduces the number of repeated referrals and allows physicians to gain a more holistic view of their patients (27). Regarding the latter, further detail on foot problems, fracture risk, and bone mineral density is not presently collected by the interRAI-HC. Directly solving the major issues may require home care providers to manually input information, check boxes on the recommendations to action, and/or manually fax the Patient Falls Risk Report. In Waterloo-Wellington, this approach was not considered reasonable since home care providers already send their care plans to primary care providers via the Patient Summary Report. To compensate for both of the major issues, primary care providers may need to reach out to home care providers for more information, which can be challenging to do (49). Alternatively, they can visit with patients to conduct their own assessments and offer interventions independently. While unnecessary testing and assessment can be burdensome to patients and, in some cases, lead to adverse outcomes (54), visiting with a patient to ask follow-up questions, discuss issues identified by the Patient Falls Risk Report, and identify patient goals of care would be beneficial. In the future, sharing the Patient Falls Risk Report through an interoperable EMR system with options for auto-population, interactivity, and multidirectional communication may correct these issues and enhance the tool.

The major issues for which an acceptable potential workaround can be used, included (a) that many providers do not understand or are not comfortable using interRAI scales and CAPs and (b) many EMRs between home care and primary care are incompatible. Changing the wording of the report to be more familiar to primary care providers and sending the report via fax were both acceptable workarounds. These changes will likely not affect user experience significantly but are intended as temporary solutions. Once EMR infrastructure becomes more sophisticated in Ontario and primary care providers become familiar with interRAI scales and CAPs, these major issues can be corrected with better solutions.

6.3 Phase Two: Surveys

6.3.1 Usability of the Patient Falls Risk Report

The final version Patient Falls Risk Report was identified as highly usable. High scores on the System Usability Scale correlate with greater task success (111,112). Usability leads to ease of learning, ease of use, and intuitiveness which, in turn, saves users time and increases satisfaction with a product (93). In other words, the Patient Falls Risk Report will likely support primary care providers in

identifying important falls-related risk factors and validated care planning options for their patients receiving home care. Comments and questions by survey participants on the revised Patient Falls Risk Report were positive overall. However, it was not fully clear that the recommendations box held the AGS/BGS guidelines (not personalized recommendations) and that the results came from an assessment conducted in home care. Both of these concerns are answered within the Patient Falls Risk Report; therefore, no further changes were made in response. Another comment showed preference for the results of individual items, rather than the Cognitive Performance Scale. Since the Cognitive Performance Scale is a global measure, more predictive of cognitive impairment than individual items, the researcher did not make changes based on this comment (183). The rest of the comments were positive feedback and suggested that the Patient Falls Risk Report was usable.

6.4 Strengths and limitations

6.4.1 Strengths

Strengths of this study included method triangulation, end-user involvement, and, overall trustworthiness. In terms of methods, the qualitative interviews offered rich information on individual perspectives, exploration of real-world experiences, and flexibility in data collection (96). On the other hand, survey data allowed for a quick and easy way to confirm and quantify some results from the interviews in a valid and reliable way (111,114). By mirroring how humans naturally collect information, the combination of qualitative and quantitative data offered a more comprehensive story in this study that would not have been possible otherwise (184). Next, rather than designing the report based on a set of pre-defined requirements and then conducting a summative evaluation, this research focused on end-users and allowed them to co-design the Patient Falls Risk Report. This user-focused approach allowed for an improved understanding of needs and expectations, offered insight into important cognitive processes and resulting behaviours, created a greater sense of product ownership, and thus, allowed for development of a better product that would be more acceptable and useful (93,103,185). Finally, many steps were taken in this study to make the results more trustworthy including comprehensive documentation, high levels of transparency, and iterative analysis (100,101). These steps to improve trustworthiness helped to mitigate some of the barriers which will be discussed in the following paragraphs. All in all, these three broad strengths improved the quality of this research.

6.4.2 Limitations

In contrast, there were four notable limitations to this study. The first limitation was small sample size. Recruitment was challenging throughout this study due to limited time, resources, and motivation among primary care providers to participate in research, exacerbated by the COVID-19 pandemic (186).

These recruitment challenges pertained to many health services research studies conducted during COVID-19 pandemic because of social distancing guidelines and competing priorities for the time of health providers. To mitigate this limitation in Phase one (which occurred before the pandemic), snowball and convenience sampling were used. In Phase two, the surveys were short, advertised by a variety of health professionals over Twitter, and offered online for completion a volunteer basis. Alternative sampling strategies for Phase two, such as setting up a booth at a medical centre or conference, could have yielded a larger and possibly more diverse sample, but these strategies were not possible due to COVID-19. The mitigation efforts to the aforementioned recruitment challenges pose their own limitations: short surveys can limit depth of responses, social media advertisement (if done inappropriately) could lead to unintended coercion, remote survey completion may offer insufficient guidance (117). To mitigate these limitations, a comment box was included in the surveys, it was emphasized that the potential participant had the final decision on whether they would like to participate in the study, and an information letter with contact information was offered to participants.

Second, this research was susceptible to multiple types of participant bias. As a first example, this study was susceptible to volunteer bias due to nonprobability sampling. The participants of this study were likely to be more interested in falls, reporting, or system integration (187), thus, this study lacks external validity (188). In other words, there is no certainty that the data collected reflects the views of primary care providers as a whole; thus, statistical theory does not apply (117,188). Since most of the participants in Phase one were in family health teams, there may be an overestimation of primary care providers' knowledge of, connectedness with, and trust in community resources. Additionally, in Phase two, the average SUS score might have been lower if probability sampling was conducted. Primary care providers engaged in the Twitter medical community may be more confident and willing to use decision support tools like the Patient Falls Risk Report. While volunteer bias could not be realistically avoided in this study with purposive sampling and recruitment over Twitter, newsletter, and email, steps were taken to increase the trustworthiness of the findings. The maximum variation approach to interview recruitment, attempts to recruit broadly and from multiple avenues, and assurance of anonymity or confidentiality allowed for a wider variety and greater number of participants (188). Additionally, as part of Phase two, normality checks were conducted to see if the data reflected what one would expect to see from a population. Nonetheless, claims generalizing the results of this study to the greater population were avoided. Moreover, as with much qualitative research, participants may have wanted to please the interviewer or recruiter and modified their responses accordingly (189). This potential bias, which implicates power imbalances, was mitigated by a request for honest responses, having the interview location chosen by participants, and avoidance of non-verbal expressions by the interviewer.

Finally, as a limitation exclusive to the qualitative interviews, data quality may have been influenced by personal biases of the researcher conducting the analysis (189). A researcher's intuition and judgement in identifying patterns is central to inductive coding and analysis (190). Acknowledging the subjectivity of qualitative research and using strategies to improve trustworthiness are important to minimize researcher bias (190). Thus, there are plans to involve a second student researcher to code and analyze the data in the future. Having more than one researcher code the data using clear methods would mitigate this bias and improve reliability and construct validity (191,192). As an added benefit, discussions between multiple coders in analysis can deepen *richness* of the findings (193). In the meantime, member checking, despite its use being controversial (110) and limited, was relied upon to increase the credibility of analysis and ensure that participant views were represented as accurately as possible.

6.5 Implications

Involvement in this study may have benefitted participants. Improving primary care provider awareness of falls risk and related conditions with the Patient Falls Risk Report may support their future decision-making and, in turn, improve patient outcomes. In fact, research suggests that providing clinicians with evidence and demonstrations on how to conduct effective falls prevention in their practices can reduce rates of falls-related injury in their patients (79).

6.6.1 Implications for future research

On a broader level, this study also offers conceptual contributions to the health information exchange research field. The feedback collected in this study has allowed the researchers to identify areas in which the Patient Falls Risk Report could be refined and further developed to meet primary care provider needs. One important opportunity for future research is to examine the effectiveness of the Patient Falls Risk Report and explore its impacts on patient outcomes. Specifically, research may be conducted in the form of a controlled trial, observational study, or *PDSA (plan, do, study, act) cycle* that analyzes the impact of the Patient Falls Risk Report on the clinical actions or referral behaviours of primary care providers, incidence of falls among patients whose clinicians received the Patient Falls Risk Report, and/or clinician and patient satisfaction with care processes. More broadly, research should continue to expand on some of the findings in this study and investigate system integration strategies. To illustrate, participants in this study discussed topics outside the scope of the posed research questions, including patient-level barriers to engagement in falls prevention (e.g. equity), differences between primary care models, frustrations with shared care planning, and usability of the interRAI assessment instruments. Exploring the roles of other stakeholders in falls prevention (i.e. patients, occupational

therapists, home care providers, etc.); examining the impacts of different primary care models on primary care workflows, patient care, and falls prevention; evaluating methods to increase shared care planning and interdisciplinary trust within the current health care context; and evaluating clinical usability of interRAI implementations in-depth could offer insight into the state of falls prevention and system integration. Finally, the methods and findings of this study can contribute to research on the development of future interRAI reporting tools for other health conditions or providers. There are many ways in which interRAI assessment results are reported within Ontario and across the world. Investigating an optimal approach to reporting interRAI information would support interRAI information sharing between health providers, thus decreasing assessment duplication and increasing efficiency in the health sector (194).

6.6.2 Implications for practice

The Patient Falls Risk Report is not a comprehensive solution to falls prevention. It is a single step towards improved information sharing, collaboration, and integration in Ontario's health sector. Nonetheless, through the creation and evaluation of a new stream of information sharing, which requires little additional cost or oversight, this study can positively impact primary care practices and the broader health sector. Interested policymakers at different LHINs in Ontario and in Newfoundland have been informed on the potential benefits of implementing the Patient Falls Risk Report and have expressed interest in using it to support falls prevention within primary care. Most notably, the WWLHIN took steps towards implementing the Patient Falls Risk Report within CHRIS in March 2020. However, this process has since been paused. During this time of COVID-19, frailty-associated conditions like falls have been deemed non-urgent and chronic disease prevention has been de-prioritized (186). At-risk patients may be avoiding interactions with the health system because they worry about contracting COVID-19 (195); many of the home and community support programs that were in place to prevent falls (such as exercise programs) have been suspended to prevent the spread of COVID-19 (186); and home care workers are only providing 'essential services', thus leaving patients under-supported (196–198). In fact, it is believed many medically-complex Canadians may be avoiding hospitals for severe health issues like falls-related fractures (195). As a result of service changes and decreases in overall activity levels (due to physical isolation), many individuals at risk of falling will decompensate rapidly. Falls risk will increase and, when COVID-19 restrictions are lifted, patient needs will be high. If an interRAI assessment were conducted and primary care providers were automatically informed about falls risk (or other health conditions), patients may receive support in primary care which they would not have received otherwise. It would also create an opportunity to prioritize the needs of patients and triage these individuals such that those most in need receive care in a timely manner. Thus, especially during COVID-19, implementation of the Patient Falls Risk Report and similar chronic disease management tools would be beneficial.

References

1. Romanow RJ. Building on values: The future of health care in Canada [Internet]. Saskatoon, Canada; 2002 Nov. Available from: <http://publications.gc.ca/collections/Collection/CP32-85-2002E.pdf>
2. Waddington C, Egger D. Integrated health services - what and why? [Internet]. World Health Organization; 2008 May p. 10. Report No.: 1. Available from: https://www.who.int/healthsystems/technical_brief_final.pdf
3. Ontario Ministry of Health. Ontario Taking Another Step to Integrate the Health Care System [Internet]. [cited 2020 Apr 2]. Available from: <https://news.ontario.ca/mohlhc/en/2020/03/ontario-taking-another-step-to-integrate-the-health-care-system.html>
4. Suter E, Oelke ND, Adair CE, Armitage GD. Ten Key Principles for Successful Health Systems Integration. *Healthc Q Tor Ont.* 2009;13(Spec No):16–23.
5. Goodwin N. Understanding integrated care: a complex process, a fundamental principle. *Int J Integr Care* [Internet]. 2013 Mar 22 [cited 2020 Apr 2];13. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3653279/>
6. Raus K, Mortier E, Eeckloo K. Challenges in turning a great idea into great health policy: the case of integrated care. *BMC Health Serv Res* [Internet]. 2020 Feb 21 [cited 2020 Apr 2];20. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7035709/>
7. Martínez-González NA, Berchtold P, Ullman K, Busato A, Egger M. Integrated care programmes for adults with chronic conditions: a meta-review. *Int J Qual Health Care.* 2014 Oct;26(5):561–70.
8. Haggerty JL, Reid RJ, Freeman GK, Starfield BH, Adair CE, McKendry R. Continuity of care: a multidisciplinary review. *BMJ.* 2003 Nov 22;327(7425):1219–21.
9. Naylor MD, Brooten DA, Campbell RL, Maislin G, McCauley KM, Schwartz JS. Transitional care of older adults hospitalized with heart failure: a randomized, controlled trial. *J Am Geriatr Soc.* 2004 May;52(5):675–84.
10. Naylor M, Berlinger N. Transitional Care: A Priority for Health Care Organizational Ethics. *Hastings Cent Rep.* 2016;46(S1):S39–42.
11. Suter E, Oelke ND, da Silva Lima MAD, Stiphout M, Janke R, Witt RR, et al. Indicators and Measurement Tools for Health Systems Integration: A Knowledge Synthesis. *Int J Integr Care* [Internet]. [cited 2020 Apr 2];17(6). Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5854167/>
12. Canadian Institute for Health Information. Home Care [Internet]. [cited 2019 May 28]. Available from: <https://www.cihi.ca/en/home-care>
13. Home Care Ontario. Facts & Figures [Internet]. 2014 [cited 2019 May 28]. Available from: <https://www.homecareontario.ca/home-care-services/facts-figures/publiclyfundedhomecare>

14. Canadian Institute for Health Information. Profile of Clients in Home Care, 2017–2018 [Internet]. 2018 Nov. Available from: <https://www.cihi.ca/sites/default/files/.../hcrs-quickstats-2017-2018-en-web.xlsx>
15. Government of Canada. Home and community health care [Internet]. 2016 [cited 2020 Apr 6]. Available from: <https://www.canada.ca/en/health-canada/services/home-continuing-care/home-community-care.html>
16. Government of Ontario. Local Health Integration Networks (LHINs) plan, integrate and fund local health care, improving access and patient experience. [Internet]. Ontario's LHINs. 2014 [cited 2019 May 28]. Available from: <http://www.lhins.on.ca/>
17. Ontario Ministry of Health. Ontario Health Agency [Internet]. 2019 [cited 2020 Apr 6]. Available from: <https://www.ontario.ca/page/ontario-health-agency>
18. Ontario Ministry of Health, Ontario Ministry of Long Term Care. Ontario Health Teams: Guidance for Health Care Providers and Organizations. Ontario, Canada: Queens Printer for Ontario; 2019 p. 33.
19. World Health Organization Centre for Health Development. A glossary of terms for community health care and services for older persons. Geneva, Switzerland; 2004. Report No.: 5.
20. Vanleerberghe P, De Witte N, Claes C, Schalock RL, Verté D. The quality of life of older people aging in place: a literature review. *Qual Life Res Dordr*. 2017 Nov;26(11):2899–907.
21. Canadian Institute for Health Information. How Canada Compares: Results from the Commonwealth Fund's 2017 International Health Policy Survey of Older Adults in 11 Countries — Data Tables [Internet]. 2018. Available from: <https://secure.cihi.ca/estore/productFamily.htm?pf=PFC3650&lang=en&media=0>
22. The interRAI Organization: Who We Are [Internet]. 2019 [cited 2019 May 28]. Available from: <http://www.interrai.org/organization/>
23. Canadian Institute for Health Information. Home Care Reporting System and RAI–Home Care. Washington, D.C.: interRAI Corporation; 2001.
24. Mello JDA, Hermans K, Van Audenhove C, Macq J, Declercq A. Evaluations of Home Care Interventions for Frail Older Persons Using the interRAI Home Care Instrument: A Systematic Review of the Literature. *J Am Med Dir Assoc*. 2015 Feb 1;16(2):173.e1-173.e10.
25. Landi F, Tua E, Onder G, Carrara B, Sgadari A, Rinaldi C, et al. Minimum data set for home care: a valid instrument to assess frail older people living in the community. *Med Care*. 2000 Dec;38(12):1184–90.
26. Morris JN, Fries BE, Steel K, Ikegami N, Bernabei R, Carpenter GI, et al. Comprehensive clinical assessment in community setting: applicability of the MDS-HC. *J Am Geriatr Soc*. 1997 Aug;45(8):1017–24.
27. Heckman GA, Hillier L, Manderson B, McKinnon-Wilson J, Santi SM, Stolee P. Developing an integrated system of care for frail seniors. *Healthc Manage Forum*. 2013;26(4):200–8.

28. Landi F, Onder G, Tua E, Carrara B, Zuccalá G, Gambassi G, et al. Impact of a New Assessment System, the MDS-HC, on Function and Hospitalization of Homebound Older People: A Controlled Clinical Trial. *J Am Geriatr Soc*. 2001 Oct 1;49(10):1288–93.
29. Nova AA, Zarrin A, Heckman GAW. Physician Views on the Resident Assessment Instrument for Home Care Information Exchange. *J Am Med Dir Assoc*. 2020 Mar 1;21(3):428-429.e1.
30. Canadian Institute for Health Information. Primary Health Care [Internet]. 2019 [cited 2019 Jun 10]. Available from: <https://www.cihi.ca/en/primary-health-care>
31. Hutchison B, Levesque J-F, Strumpf E, Coyle N. Primary Health Care in Canada: Systems in Motion. *Milbank Q*. 2011 Jun;89(2):256–88.
32. Canadian Institute for Health Information. Primary Health Care in Canada: A Chartbook of Selected Indicator Results, 2016 [Internet]. Ottawa, ON; 2016 Apr [cited 2019 Jul 24] p. 63. Available from: https://secure.cihi.ca/estore/productFamily.htm?locale=en&pf=PFC3137&lang=en&_ga=2.45727588.173334126.1563990489-1315832637.1563990489
33. National Physician Survey. 2014 Results for Family Physicians. [Internet]. National Physician Survey. 2014 [cited 2020 Apr 24]. Available from: <http://nationalphysiciansurvey.ca/result/2014-results-family-physicians/>
34. Ruggiano N, Shtompel N, Hristidis V, Roberts L, Grochowski J, Brown EL. Need and Potential Use of Information Technology for Case Manager–Physician Communication in Home Care. *Home Health Care Manag Pract*. 2012 Dec 1;24(6):292–7.
35. Konrad TR, Link CL, Shackelton RJ, Marceau LD, Knesebeck OVD, Siegrist J, et al. It’s about time: Physicians’ perceptions of time constraints in primary care medical practice in three national healthcare systems. *Med Care*. 2010 Feb;48(2):95–100.
36. Canadian Institute for Health Information. How Canada Compares: Results From the Commonwealth Fund’s 2019 International Health Policy Survey of Primary Care Physicians in 11 Countries — Quick Stats [Internet]. 2019. Available from: <https://www.cihi.ca/en/quick-stats>
37. Yarnall KSH, Pollak KI, Østbye T, Krause KM, Michener JL. Primary Care: Is There Enough Time for Prevention? *Am J Public Health*. 2003 Apr;93(4):635–41.
38. Fullerton M. Understanding and improving on 1 problem per visit. *CMAJ*. 2008 Sep 23;179(7):623–623.
39. Weiner SJ, Barnet B, Cheng TL, Daaleman TP. Processes for Effective Communication in Primary Care. *Ann Intern Med*. 2005 Apr 19;142(8):709.
40. Health Quality Ontario. Connecting the Dots for Patients: Family Doctors’ Views on Coordinating Patient Care in Ontario’s Health System. [Internet]. Toronto: Queens Printer for Ontario; 2016 [cited 2019 May 29]. Available from: http://books.scholarsportal.info/viewdoc.html?id=/ebooks/ebooks0/gibson_cpcc-chrc/2017-10-02/7/10088712

41. Elliott J, Stolee P, Boscart V, Giangregorio L, Heckman G. Coordinating care for older adults in primary care settings: Understanding the current context. *BMC Fam Pract.* 2018 Aug 7;19(1):137.
42. Phua DH, Tan NCK. Cognitive aspect of diagnostic errors. *Ann Acad Med Singapore.* 2013 Jan;42(1):33–41.
43. Montgomery K. *How doctors think: clinical judgment and the practice of medicine.* New York: Oxford University Press; 2006.
44. Canadian Institute for Health Information. *How Canada Compares: Results From The Commonwealth Fund 2015 International Health Policy Survey of Primary Care Physicians.* Ottawa, ON; 2016 Jan p. 65.
45. eHealth Centre of Excellence. *Improving care: The present and future of digital health in Ontario [Internet].* Ontario; p. 10. Available from: https://files.ontario.ca/3_ehealth_centre_of_excellence.pdf
46. Canadian Institute for Health Information. *Insights and Lessons Learned From the PHC VRS Prototype.* Ottawa, ON; 2013 p. 16.
47. Stolee P, Steeves B, Manderson BL, Toscan JL, Glenny C, Berg K. Health Information Use in Home Care: Brainstorming Barriers, Facilitators, and Recommendations. *Home Health Care Serv Q.* 2010;29(1):37–53.
48. Musselman L. *Home Care Paper [Internet].* Ontario, Canada: Ontario Medical Association; 2014 Jun p. 1–27. Available from: <https://www.oma.org/wp-content/uploads/homecarepaper-june2014.pdf>
49. Nova AA, Zarrin A, Heckman GAW. Physician Views on a Computerized Decision Support System for Home Care Information Exchange. *J Am Med Dir Assoc.* 2020 Mar;21(3):426–8.
50. Toscan J, Mairs K, Hinton S, Stolee P, InfoRehab Research Team. Integrated transitional care: patient, informal caregiver and health care provider perspectives on care transitions for older persons with hip fracture. *Int J Integr Care.* 2012;12:e13–e13.
51. Santi SM, Hinton S, Berg K, Stolee P. Bridging the information divide: health information sharing in home care. *Can J Nurs Res.* 2013 Mar;45(1):16–35.
52. Naylor MD, Hirschman KB, Bowles KH, Bixby MB, Konick-McMahan J, Stephens C. Care Coordination for Cognitively Impaired Older Adults and Their Caregivers. *Home Health Care Serv Q.* 2007;26(4):57–78.
53. Gray LC, Berg K, Fries BE, Henrard J-C, Hirdes JP, Steel K, et al. Sharing clinical information across care settings: the birth of an integrated assessment system. *BMC Health Serv Res.* 2009 Apr 29;9:71.
54. Hickner J, Graham DG, Elder NC, Brandt E, Emsermann CB, Dovey S, et al. Testing process errors and their harms and consequences reported from family medicine practices: A study of the American Academy of Family Physicians National Research Network. *Qual Saf Health Care.* 2008;17(3):194–200.

55. Introduction to Health Information Exchange [Internet]. Medscape. [cited 2019 Jul 4]. Available from: <http://www.medscape.org/viewarticle/829539>
56. Vaidya SR, Shapiro JS, Papa AV, Kuperman G, Ali N, Check T, et al. Perceptions of Health Information Exchange in Home Healthcare. *CIN*. 2012 Sep;30(9):503–9.
57. Kim LY, Giannitrapani KF, Huynh AK, Ganz DA, Hamilton AB, Yano EM, et al. What makes team communication effective: a qualitative analysis of interprofessional primary care team members' perspectives. *J Interprof Care*. 2019 Nov 2;33(6):836–8.
58. De Meester K, Verspuyl M, Monsieurs KG, Van Bogaert P. SBAR improves nurse-physician communication and reduces unexpected death: a pre and post intervention study. *Resuscitation*. 2013 Sep;84(9):1192–6.
59. Compton J, Copeland K, Flanders S, Cassity C, Spetman M, Xiao Y, et al. Implementing SBAR across a large multihospital health system. *Jt Comm J Qual Patient Saf*. 2012 Jun;38(6):261–8.
60. Boorsma M, Langedijk E, Frijters DH, Nijpels G, Elfring T, van Hout HP. Implementation of geriatric assessment and decision support in residential care homes: facilitating and impeding factors during initial and maintenance phase. *BMC Health Serv Res*. 2013 Jan 5;13:8.
61. Ontario Association of Community Care Access Centres. Connecting Care: OACCAC's eHealth Assets [Internet]. 2016 p. 1–7. Available from: https://files.ontario.ca/9._ontario_association_of_community_care_access_centres.pdf
62. Health Shared Services Ontario. Meet CHRIS [Internet]. 2017. Available from: <https://hssontario.ca/News/Pages/Meet-CHRIS.aspx>
63. Belben. A. Update: Patient summary report - falls risk addition. 2019.
64. Morris JN, Berg K, Bjorkgren M, Finne-Soveri H, Fries BE, Frijters D, et al. interRAI Clinical Assessment Protocols (CAPs) for Use with Community and Long-Term Care Assessment Instruments. 9.1. interRAI; 2010.
65. Public Health Agency of Canada. Seniors' falls in Canada: second report. [Internet]. Ottawa, ON; 2014 [cited 2019 Jun 13] p. 53. Available from: http://epe.lac-bac.gc.ca/100/201/301/weekly_checklist/2014/internet/w14-36-U-E.html/collections/collection_2014/aspc-phac/HP25-1-2014-eng.pdf
66. The Scottish Government. Causes of falls [Internet]. NHS inform. 2020 [cited 2019 Jun 25]. Available from: <https://www.nhsinform.scot/healthy-living/preventing-falls/causes-of-falls>
67. Nowak A, Hubbard RE. Falls and frailty: lessons from complex systems. *J R Soc Med*. 2009 Mar 1;102(3):98–102.
68. Masotti P, McColl MA, Green M. Adverse events experienced by homecare patients: a scoping review of the literature. *Int J Qual Health Care*. 2010;22(2):115–25.
69. Berry SD, Miller R. Falls: Epidemiology, Pathophysiology, and Relationship to Fracture. *Curr Osteoporos Rep*. 2008 Dec;6(4):149–54.

70. Friedman SM, Munoz B, West SK, Rubin GS, Fried LP. Falls and fear of falling: which comes first? A longitudinal prediction model suggests strategies for primary and secondary prevention. *J Am Geriatr Soc.* 2002 Aug;50(8):1329–35.
71. Pearson C, St-Arnaud J, Geran L. Understanding seniors' risk of falling and their perception of risk [Internet]. Statistics Canada; 2014 Oct [cited 2019 Jul 24] p. 13. (Health at a Glance). Available from: <https://www150.statcan.gc.ca/n1/pub/82-624-x/2014001/article/14010-eng.htm#n17>
72. Adkin AL, Frank JS, Carpenter MG, Peysar GW. Fear of falling modifies anticipatory postural control. *Exp Brain Res.* 2002 Mar;143(2):160–70.
73. Accreditation Canada, Canadian Institute for Health Information, Canadian Patient Safety Institute. Preventing Falls: From Evidence to Improvement in Canadian Health Care. Ottawa, ON: Canadian Institute for Health Information; 2014 p. 42.
74. Devlin R, Brown A, Clerici C, Collins B, Decter M, Filion S, et al. Hallway Health Care: A System Under Strain [Internet]. Ontario; 2019 Jan p. 35. (Report from the Premier's Council on Improving Healthcare and Ending Hallway Medicine). Report No.: 1. Available from: http://www.health.gov.on.ca/en/public/publications/premiers_council/report.aspx
75. Parachute. The cost of injury in Canada. Toronto, ON: Parachute; 2015 Jun.
76. Masud T, Morris RO. Epidemiology of falls. *Age Ageing.* 2001 Nov 1;30(suppl 4):3–7.
77. Institute for Health Metrics and Evaluation. Global Burden of Disease Compare [Internet]. 2017 [cited 2019 Jul 24]. Available from: <http://vizhub.healthdata.org/gbd-compare>
78. Tricco AC, Thomas SM, Veroniki AA, Hamid JS, Cogo E, Striffler L, et al. Quality improvement strategies to prevent falls in older adults: a systematic review and network meta-analysis. *Age Ageing.* 2018;(April 2017):1–10.
79. Tinetti ME, Baker DI, King M, Gottschalk M, Murphy TE, Acampora D, et al. Effect of Dissemination of Evidence in Reducing Injuries from Falls. *N Engl J Med.* 2008 Jul 17;359(3):252–61.
80. Panel on Prevention of Falls in Older Persons, American Geriatrics Society, British Geriatrics Society. Summary of the Updated American Geriatrics Society/British Geriatrics Society Clinical Practice Guideline for Prevention of Falls in Older Persons. *J Am Geriatr Soc.* 2011;59(1):148–57.
81. Inouye SK, Studenski S, Tinetti ME, Kuchel GA. Geriatric Syndromes: Clinical, Research and Policy Implications of a Core Geriatric Concept. *J Am Geriatr Soc.* 2007 May;55(5):780–91.
82. Sherrington C, Fairhall NJ, Wallbank GK, Tiedemann A, Michaleff ZA, Howard K, et al. Exercise for preventing falls in older people living in the community. *Cochrane Database Syst Rev* [Internet]. 2019 [cited 2019 Sep 6];(1). Available from: <https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD012424.pub2/abstract>
83. Guirguis-Blake JM, Michael YL, Perdue LA, Coppola EL, Beil TL, Thompson JH. Interventions to Prevent Falls in Community-Dwelling Older Adults: A Systematic Review for the U.S. Preventive Services Task Force [Internet]. Rockville, MD: Agency for Healthcare Research and

- Quality (US); 2018 [cited 2019 Sep 6]. (U.S. Preventive Services Task Force Evidence Syntheses, formerly Systematic Evidence Reviews). Available from: <http://www.ncbi.nlm.nih.gov/books/NBK525700/>
84. Whipple MO, Hamel AV, Talley KMC. Fear of Falling Among Community-Dwelling Older Adults: A Scoping Review to Identify Effective Evidence-Based Interventions. *Geriatr Nurs N Y N*. 2018;39(2):170–7.
 85. Bouchard M, Shimizu T, Mavriplis C. *Prevention and Screening in Family Practice in 2016*. 2016; Ottawa, ON.
 86. Booth ML, Bauman A, Owen N, Gore CJ. Physical activity preferences, preferred sources of assistance, and perceived barriers to increased activity among physically inactive Australians. *Prev Med*. 1997 Feb;26(1):131–7.
 87. Howland J, Hackman H, Taylor A, O'Hara K, Liu J, Bruschi J. Older adult fall prevention practices among primary care providers at accountable care organizations: A pilot study. *PloS One*. 2018;13(10):e0205279.
 88. Mackenzie L, McIntyre A. How Do General Practitioners (GPs) Engage in Falls Prevention With Older People? A Pilot Survey of GPs in NHS England Suggests a Gap in Routine Practice to Address Falls Prevention. *Front Public Health* [Internet]. 2019 Mar 11 [cited 2019 Jun 12];7. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6421941/>
 89. Jones TS, Ghosh TS, Horn K, Smith J, Vogt RL. Primary care physicians perceptions and practices regarding fall prevention in adult's 65 years and over. *Accid Anal Prev*. 2011 Sep 1;43(5):1605–9.
 90. Landis SE, Galvin SL. Implementation and Assessment of a Fall Screening Program in Primary Care Practices. *J Am Geriatr Soc*. 2014;62(12):2408–14.
 91. Mueller CA, Klaassen-Mielke R, Penner E, Junius-Walker U, Hummers-Pradier E, Theile G. Disclosure of New Health Problems and Intervention Planning Using a Geriatric Assessment in a Primary Care Setting. *Croat Med J*. 2010 Dec;51(6):493–500.
 92. Spears GV, Roth CP, Miake-Lye IM, Saliba D, Shekelle PG, Ganz DA. Redesign of an Electronic Clinical Reminder to Prevent Falls in Older Adults. *Med Care*. 2013 Mar;51:S37.
 93. Barnum CM. *Usability Testing Essentials: Ready, Set... Test!* Burlington, MA: Elsevier; 2011. 382 p.
 94. Michie S, van Stralen MM, West R. The behaviour change wheel: A new method for characterising and designing behaviour change interventions. *Implement Sci*. 2011;6(42):11.
 95. Michie S, Atkins L, West R. *The Behaviour Change Wheel: A Guide to Designing Interventions*. Great Britain: Silverback Publishing; 2014. 329 p.
 96. Carter N, Bryant-Lukosius D, DiCenso A, Blythe J, Neville AJ. The use of triangulation in qualitative research. *Oncol Nurs Forum*. 2014 Sep;41(5):545+.

97. Hoddinott P. A new era for intervention development studies. *Pilot Feasibility Stud.* 2015 Oct 26;1(1):36.
98. Guba E, Lincoln Y. Competing paradigms in qualitative research. *Handbook of qualitative research.* 1994;2(163–194):105.
99. Mills J, Bonner A, Francis K. The Development of Constructivist Grounded Theory. *Int J Qual Methods.* 2006 Mar;5(1):25–35.
100. Nowell LS, Norris JM, White DE, Moules NJ. Thematic Analysis: Striving to Meet the Trustworthiness Criteria. *Int J Qual Methods* [Internet]. 2017 Oct 2 [cited 2019 Sep 10]; Available from: <https://journals.sagepub.com/eprint/9WWRAR95hQrtt5b7mjzz/full>
101. Lincoln YS, Guba EG. *Naturalistic Inquiry.* SAGE; 1985. 422 p.
102. Tobin GA, Begley CM. Methodological rigour within a qualitative framework. *J Adv Nurs.* 2004 Nov;48(4):388–96.
103. Kushniruk AW, Patel VL. Cognitive and usability engineering methods for the evaluation of clinical information systems. *J Biomed Inform.* 2004 Feb;37(1):56–76.
104. Palinkas LA, Horwitz SM, Green CA, Wisdom JP, Duan N, Hoagwood K. Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Adm Policy Ment Health.* 2015 Sep;42(5):533–44.
105. Johnston S, Liddy C, Hogg W, Donskov M, Russell G, Gyorfi-Dyke E. Barriers and facilitators to recruitment of physicians and practices for primary care health services research at one centre. *BMC Med Res Methodol.* 2010 Dec 13;10(1):109.
106. Sturges JE, Hanrahan KJ. Comparing Telephone and Face-to-Face Qualitative Interviewing: a Research Note. *Qual Res.* 2004 Apr 1;4(1):107–18.
107. Mills AJ, Durepos G, Wiebe E. Iterative. In: *Encyclopedia of Case Study Research* [Internet]. SAGE Publications; 2010 [cited 2019 Oct 7]. p. 504–5. Available from: <https://methods-sagepub-com.proxy.lib.uwaterloo.ca/reference/encyc-of-case-study-research/n185.xml>
108. Fereday J, Muir-Cochrane E. Demonstrating Rigor Using Thematic Analysis: A Hybrid Approach of Inductive and Deductive Coding and Theme Development. *IJQM* [Internet]. 2006 [cited 2019 Oct 7];5(1). Available from: <https://journals.sagepub.com/doi/10.1177/160940690600500107>
109. Green J, Thorogood N. *Qualitative methods for health research.* 3rd ed. London, UK: SAGE Publications; 2014.
110. Birt L, Scott S, Cavers D, Campbell C, Walter F. Member Checking: A Tool to Enhance Trustworthiness or Merely a Nod to Validation? *Qual Health Res.* 2016 Nov 1;26(13):1802–11.
111. Bangor A, Kortum PT, Miller JT. An Empirical Evaluation of the System Usability Scale. *Int J Human–Computer Interact.* 2008 Jul 29;24(6):574–94.

112. Kortum P, Peres SC. The Relationship Between System Effectiveness and Subjective Usability Scores Using the System Usability Scale. *Int J Human–Computer Interact.* 2014 Jul 3;30(7):575–84.
113. Sauro J. *A Practical Guide to the System Usability Scale: Background, Benchmarks & Best Practices.* Denver, CO: CreateSpace Independent Publishing Platform; 2011. 162 p.
114. Brooke J. SUS - A quick and dirty usability scale. In: *Usability Evaluation in Industry.* London, UK: Taylor and Francis; 1996. p. 7.
115. Kortum PT, Bangor A. Usability Ratings for Everyday Products Measured With the System Usability Scale. *Int J Human–Computer Interact.* 2013 Jan 1;29(2):67–76.
116. Sauro J. *MeasuringU: SUS Guide & Calculator Package* [Internet]. 2011 [cited 2019 Sep 20]. Available from: <https://measuringu.com/product/suspack/>
117. Volunteer Sampling. In: *The SAGE Dictionary of Social Research Methods* [Internet]. 1 Oliver’s Yard, 55 City Road, London England EC1Y 1SP United Kingdom: SAGE Publications, Ltd; 2006 [cited 2020 May 1]. Available from: <http://methods.sagepub.com/reference/the-sage-dictionary-of-social-research-methods/n223.xml>
118. International Organization for Standardization (ISO). *Ergonomic requirements for office work with visual display terminal (VDT’s)–Part 11: Guidance on usability.* Geneva, Switzerland; 1998.
119. Lewis JR, Sauro J. The Factor Structure of the System Usability Scale. In: Kurosu M, editor. *Human Centered Design.* Berlin, Germany: Springer; 2009. p. 94–103. (Lecture Notes in Computer Science).
120. Excel 2004. Microsoft; (Microsoft 365 for enterprise).
121. SAS University Edition [Internet]. SAS Institute Inc.; [cited 2020 Jun 12]. Available from: https://www.sas.com/en_ca/software/university-edition.html
122. Hatcher. *Step-by-step Basic Statistics Using SAS: Student Guide.* Cary, NC: SAS Institute Inc.; 2003. 708 p.
123. Sauro J, Lewis JR. *Quantifying the User Experience: Practical Statistics for User Research.* 2nd ed. Amsterdam: Morgan Kaufmann; 2016. 312 p.
124. Information and Privacy Commissioner of Ontario. *Circle of Care: Sharing Personal Health Information for Health-Care Purposes* [Internet]. Toronto, ON; 2015 Aug. Available from: <https://www.ipc.on.ca/wp-content/uploads/Resources/circle-of-care.pdf>
125. Inouye SK. The dilemma of delirium: clinical and research controversies regarding diagnosis and evaluation of delirium in hospitalized elderly medical patients. *Am J Med.* 1994 Sep;97(3):278–88.
126. Tinetti ME, Speechley M, Ginter SF. Risk factors for falls among elderly persons living in the community. *N Engl J Med.* 1988 Dec 29;319(26):1701–7.

127. Montero-Odasso M, Verghese J, Beauchet O, Hausdorff JM. Gait and Cognition: A Complementary Approach to Understanding Brain Function and the Risk of Falling. *J Am Geriatr Soc*. 2012 Nov;60(11):2127–36.
128. Schofield P. The Assessment of Pain in Older People: UK National Guidelines. *Age Ageing*. 2018 Mar 1;47(suppl_1):i1–22.
129. Hogan M-E, Taddio A, Katz J, Shah V, Krahn M. Incremental health care costs for chronic pain in Ontario, Canada: a population-based matched cohort study of adolescents and adults using administrative data. *Pain*. 2016 Aug 1;157(8):1626–33.
130. Lynch ME. The need for a Canadian pain strategy. *Pain Res Manag J Can Pain Soc*. 2011;16(2):77–80.
131. Stubbs B, Schofield P, Binnekade T, Patchay S, Sepehry A, Eggermont L. Pain Is Associated with Recurrent Falls in Community-Dwelling Older Adults: Evidence from a Systematic Review and Meta-Analysis. *Pain Med*. 2014 Jul 1;15(7):1115–28.
132. Leveille SG, Jones RN, Kiely DK, Hausdorff JM, Shmerling RH, Guralnik JM, et al. Chronic Musculoskeletal Pain and the Occurrence of Falls in an Older Population. *JAMA*. 2009 Nov 25;302(20):2214–21.
133. Pain Demands Attention: A Cognitive-Affective Model of the Interruptive Function of Pain - PubMed [Internet]. [cited 2020 Jun 24]. Available from: <https://pubmed.ncbi.nlm.nih.gov/10349356/>
134. Nazarko L. Falls prevention in primary care. *Lond J Prim Care*. 2009;2(2):158–63.
135. Menz HB, Jordan KP, Roddy E, Croft PR. Musculoskeletal foot problems in primary care: what influences older people to consult? *Rheumatol Oxf Engl*. 2010 Nov;49(11):2109–16.
136. Williams AE, Blake A, Cherry L, Alcacer-Pitarch B, Edwards CJ, Hopkinson N, et al. Patients' experiences of lupus-related foot problems: a qualitative investigation. *Lupus*. 2017 Oct 1;26(11):1174–81.
137. Wilson O, Kirwan J, Dures E, Quest E, Hewlett S. The experience of foot problems and decisions to access foot care in patients with rheumatoid arthritis: a qualitative study. *J Foot Ankle Res* [Internet]. 2017 Jan 25 [cited 2019 Jun 18];10. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5264322/>
138. Menz HB, Auhl M, Spink MJ. Foot problems as a risk factor for falls in community-dwelling older people: A systematic review and meta-analysis. *Maturitas*. 2018 Dec 1;118:7–14.
139. Chan CW, Rudins A. Foot Biomechanics During Walking and Running. *Mayo Clin Proc*. 1994 May 1;69(5):448–61.
140. Menz H, Lord S. Foot problems, functional impairment, and falls in older people. *J Am Podiatr Med Assoc*. 1999 Sep 1;89(9):458–67.

141. Spink MJ, Menz HB, Fotoohabadi MR, Wee E, Landorf KB, Hill KD, et al. Effectiveness of a multifaceted podiatry intervention to prevent falls in community dwelling older people with disabling foot pain: randomised controlled trial. *BMJ*. 2011 Jun 16;342:d3411.
142. Park H, Satoh H, Miki A, Urushihara H, Sawada Y. Medications associated with falls in older people: systematic review of publications from a recent 5-year period. *Eur J Clin Pharmacol*. 2015 Dec 1;71(12):1429–40.
143. Soumerai SB, McLaughlin TJ, Avorn J. Improving Drug Prescribing in Primary Care: A Critical Analysis of the Experimental Literature. *Milbank Q* [Internet]. 2005 Dec [cited 2019 Jun 18];83(4). Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2690287/>
144. McDonald CJ. Protocol-based computer reminders, the quality of care and the non-perfectability of man. *N Engl J Med*. 1976 Dec 9;295(24):1351–5.
145. Tune LE. Anticholinergic effects of medication in elderly patients. *J Clin Psychiatry*. 2001;62 Suppl 21:11–4.
146. Lindsey PL. Psychotropic Medication Use among Older Adults: What All Nurses Need to Know. *J Gerontol Nurs*. 2009 Sep;35(9):28–38.
147. Pepersack T, Gilles C, Petrovic M, Spinnewine A, Baeyens H, Beyer I, et al. Prevalence of orthostatic hypotension and relationship with drug use amongst older patients. *Acta Clin Belg*. 2013 Apr;68(2):107–12.
148. Orrow G, Kinmonth A-L, Sanderson S, Sutton S. Effectiveness of physical activity promotion based in primary care: systematic review and meta-analysis of randomised controlled trials. *BMJ* [Internet]. 2012 Mar 26 [cited 2019 Jun 19];344. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3312793/>
149. O'Brien MW, Shields CA, Oh PI, Fowles JR. Health care provider confidence and exercise prescription practices of Exercise is Medicine Canada workshop attendees. *Appl Physiol Nutr Metab*. 2017 Apr;42(4):384–90.
150. AuYoung M, Linke SE, Pagoto S, Buman MP, Craft LL, Richardson CR, et al. Integrating Physical Activity in Primary Care Practice. *Am J Med*. 2016;129(10):1022–9.
151. Stevens JA, Burns E. A CDC Compendium of Effective Fall Interventions: What Works for Community-Dwelling Older Adults [Internet]. Atlanta, Georgia: Centers for Disease Control and Prevention; 2015 p. 216. Report No.: 3. Available from: https://www.cdc.gov/homeandrecreationalsafety/pdf/falls/CDC_Falls_Compendium-2015-a.pdf
152. Health Links. Close to Time of Discharge: Ensure Personal Clinician to Clinician Information Transfer [Internet]. 2016 Sep p. 1–3. (Transitions between hospital and home). Available from: <http://www.hqontario.ca/Portals/0/documents/qi/health-links/ensure-personal-clinician-to-clinician-information-transfer-en.pdf>
153. Nurse Practitioners' Association of Ontario. SBAR NP guidelines [Internet]. 2018 [cited 2020 May 1]. Available from: <https://npao.org/communities-of-practice/hospital-based-nps/sbar-np-guidelines/>

154. Müller M, Jürgens J, Redaelli M, Klingberg K, Hautz WE, Stock S. Impact of the communication and patient hand-off tool SBAR on patient safety: a systematic review. *BMJ Open* [Internet]. 2018 Aug 23 [cited 2020 May 1];8(8). Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6112409/>
155. Lee L, Jones A, Costa A, Hillier LM, Patel T, Milligan J, et al. The C5-75 Program: Meeting the Need for Efficient, Pragmatic Frailty Screening and Management in Primary Care. *Can J Aging Rev Can Vieil.* undefined/ed;1–13.
156. Canadian Foundation for Healthcare Improvement. *Healthcare Priorities in Canada: A Backgrounder.* Ottawa, ON; 2014.
157. Heckman GA, Molnar FJ, Lee L. Geriatric Medicine Leadership of Health Care Transformation: To Be or Not To Be? *Can Geriatr J.* 2013 Dec 3;16(4):192–5.
158. Norman G, Young M, Brooks L. Non-analytical models of clinical reasoning: the role of experience. *Med Educ.* 2007 Dec;41(12):1140–5.
159. Malik A. *Exploring long-stay seniors' transitions from home care services to self- management.* [Waterloo, ON]: University of Waterloo; 2014.
160. Dhaliwal G, Detsky AS. The Evolution of the Master Diagnostician. *JAMA.* 2013 Aug 14;310(6):579–80.
161. McGlynn EA, Asch SM, Adams J, Keesey J, Hicks J, DeCristofaro A, et al. The Quality of Health Care Delivered to Adults in the United States [Internet]. <http://dx.doi.org/10.1056/NEJMsa022615>. Massachusetts Medical Society; 2009 [cited 2020 May 21]. Available from: https://www.nejm.org/doi/10.1056/NEJMsa022615?url_ver=Z39.88-2003&rfr_id=ori%3Arid%3Acrossref.org&rfr_dat=cr_pub++0www.ncbi.nlm.nih.gov
162. McMaster Health Forum. *Building a primary care “home” for every Ontarian.* Hamilton, ON: McMaster University; 2016 Mar p. 84.
163. Lee L, Patel T, Hillier LM, Locklin J, Milligan J, Pefanis J, et al. Frailty Screening and Case-Finding for Complex Chronic Conditions in Older Adults in Primary Care. *Geriatrics* [Internet]. 2018 Jul 7 [cited 2020 Apr 24];3(3). Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6319211/>
164. Mutai VK. Legal risks in medical practice. *Community Eye Health.* 2019;32(106):31.
165. Judge-Ellis T (Tess), Wilson TR. Time and NP Practice: Naming, Claiming, and Explaining the Role of Nurse Practitioners. *J Nurse Pract.* 2017 Oct;13(9):583–9.
166. Morgan P, Everett CM, Hing E. Time spent with patients by physicians, nurse practitioners, and physician assistants in community health centers, 2006–2010. *Healthcare.* 2014 Dec 1;2(4):232–7.
167. Wade DT, Halligan PW. Do biomedical models of illness make for good healthcare systems? *BMJ.* 2004 Dec 11;329(7479):1398–401.
168. Collier R. Verdict still out on family health teams. *CMAJ.* 2011 Jul 12;183(10):1131–2.

169. Stein LI. The Doctor-Nurse Game. *Arch Gen Psychiatry*. 1967 Jun 1;16(6):699–703.
170. The Conference Board of Canada. Final Report: An External Evaluation of the Family Health Team (FHT) Initiative. Ottawa, ON; 2014 p. 326.
171. Canadian Institute for Health Information. Physicians in Canada, 2018. Ottawa, ON; 2019 p. 58.
172. Ministry of Health and Long-Term Care. Family Medicine Compensation and Practice Models in Ontario. HealthForceOntario Marketing and Recruitment Agency; 2019.
173. Adhopia V. Canadian health care’s “one issue per visit” problem. *CBC News* [Internet]. 2019 Mar 20 [cited 2020 May 19]; Available from: <https://www.cbc.ca/news/health/second-opinion-one-problem-visit-1.5061506>
174. Guthrie DM, Pitman R, Fletcher PC, Hirdes JP, Stolee P, Poss JW, et al. Data sharing between home care professionals: a feasibility study using the RAI Home Care instrument. *BMC Geriatr*. 2014 Jun 30;14:81.
175. Adverse events among Ontario home care clients associated with emergency room visit or hospitalization: a retrospective cohort study | *BMC Health Services Research* | Full Text. [cited 2020 May 19]; Available from: <https://bmchealthservres.biomedcentral.com/articles/10.1186/1472-6963-13-227>
176. Government of Canada, Statistics Canada. Unmet home care needs in Canada [Internet]. 2018 [cited 2020 May 21]. Available from: <https://www150.statcan.gc.ca/n1/pub/82-003-x/2018011/article/00002-eng.htm>
177. Oxtoby K. Professional roles are blurring. *BMJ* [Internet]. 2009 Jan 7 [cited 2020 May 22];338. Available from: <https://www.bmj.com/content/338/bmj.a3163>
178. Heckman GA, Crutchlow L, Boscart V, Hillier L, Franco B, Lee L, et al. Quality assurance as a foundational element for an integrated system of dementia care. *Int J Health Care Qual Assur*. 2019 Jul 8;32(6):978–90.
179. Agarwal SD, Pabo E, Rozenblum R, Sherritt KM. Professional Dissonance and Burnout in Primary Care: A Qualitative Study. *JAMA Intern Med*. 2020 Mar 1;180(3):395–401.
180. World Health Organization. Primary Health Care: Now More Than Ever [Internet]. Geneva, Switzerland: World Health Organization; 2008 p. 119. (The World Health Report). Available from: https://books.google.ca/books?id=q-EGxRjrIo4C&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false
181. Canadian Foundation for Healthcare Improvement. Primary Care Reform and Integration [Internet]. 2018 [cited 2020 May 21]. Available from: <https://www.cfhi-fcass.ca/WhatWeDo/health-system-transformation/primary-care-reform-and-integration>
182. Tang CJ, Chan SW, Zhou WT, Liaw SY. Collaboration between hospital physicians and nurses: an integrated literature review. *Int Nurs Rev*. 2013 Sep;60(3):291–302.
183. Morris JN, Fries BE, Mehr DR, Hawes C, Phillips C, Mor V, et al. MDS Cognitive Performance Scale. *J Gerontol*. 1994 Jul;49(4):M174-182.

184. Wisdom J, Cresswell JW. Mixed Methods: Integrating Quantitative and Qualitative Data Collection and Analysis While Studying Patient-Centered Medical Home Models [Internet]. Rockville, MD: Agency for Healthcare Research and Quality; 2013 Feb [cited 2020 Jun 15]. (Patient Centered Medical Home Research Methods Series). Available from: <https://pcmh.ahrq.gov/page/mixed-methods-integrating-quantitative-and-qualitative-data-collection-and-analysis-while>
185. Abendroth TW. End-user participation in the needs assessment for a clinical information system. *Proc Annu Symp Comput Appl Med Care*. 1991;233–7.
186. Heckman GA, Saari M, McArthur C, Wellens NIH, Hirdes JP. COVID-19 outbreak measures may indirectly lead to greater burden on hospitals. *Can Med Assoc J*. 2020 Apr 6;192(14):E384–E384.
187. Sedgwick P. Questionnaire surveys: sources of bias. *BMJ*. 2013 Aug 30;347:f5265.
188. Volunteer Bias. In: *Encyclopedia of Research Design* [Internet]. 2455 Teller Road, Thousand Oaks California 91320 United States: SAGE Publications, Inc.; 2010 [cited 2020 May 6]. Available from: <http://methods.sagepub.com/reference/encyc-of-research-design/n492.xml>
189. Anderson C. Presenting and evaluating qualitative research. *Am J Pharm Educ*. 2010 Oct;74(8):7.
190. Olson JD, McAllister C, Grinnell LD, Walters KG, Appunn F. Applying Constant Comparative Method with Multiple Investigators and Inter-Coder Reliability. :19.
191. David R. A General Inductive Approach for Analyzing Qualitative Evaluation Data [Internet]. 2006 [cited 2020 May 6]. Available from: <https://journals-sagepub-com.proxy.lib.uwaterloo.ca/doi/abs/10.1177/1098214005283748>
192. Gibbert M, Ruigrok W, Wicki B. What passes as a rigorous case study? *Strateg Manag J*. 2008;29(13):1465–74.
193. Curry LA, Nembhard IM, Bradley EH. Qualitative and mixed methods provide unique contributions to outcomes research. *Circulation*. 2009 Mar 17;119(10):1442–52.
194. LUCAS KU Leuven. 21/03/2019 - From interRAI to BelRAI [Internet]. Leuven, Belgium; [cited 2020 Jan 9]. Available from: <https://www.youtube.com/channel/UCBR8-60-B28hp2BmDPdntcQ>
195. Mitra G. Emergency department visits are down — and this is not a good thing. *CBC News* [Internet]. 2020 Apr 20 [cited 2020 May 6]; Available from: <https://www.cbc.ca/news/canada/british-columbia/emergency-department-visits-are-down-and-this-is-not-a-good-thing-1.5537073>
196. Platt B. As COVID-19 ravages nursing homes, researcher warns that home-care patients can't be forgotten. *National Post* [Internet]. 2020 Apr 17 [cited 2020 May 6]; Available from: <https://nationalpost.com/news/as-covid-19-ravages-nursing-homes-researcher-warns-that-home-care-patients-cant-be-forgotten>
197. Kent F. COVID-19 pandemic means home care workers will only provide essential services. *Global News* [Internet]. 2020 Apr 20 [cited 2020 May 6]; Available from: <https://globalnews.ca/news/6844066/covid-19-alberta-home-care-essential/>

198. Home Care Workers/Clients Frequently Asked Questions [Internet]. Central Health. 2020 [cited 2020 May 6]. Available from: <https://www.centralhealth.nl.ca/covid-19-home-care-workers-faqs>
199. Definition of management. In: Dictionary.com [Internet]. [cited 2020 Jun 12]. Available from: <https://www.dictionary.com/browse/management>
200. Definition of prevent. In: Dictionary.com [Internet]. [cited 2020 Jun 12]. Available from: <https://www.dictionary.com/browse/prevent>
201. Definition of screening. In: Dictionary.com [Internet]. [cited 2020 Jun 12]. Available from: <https://www.dictionary.com/browse/screening>
202. Institute for Healthcare Improvement. Science of Improvement: Testing Changes [Internet]. [cited 2020 Jun 15]. Available from: <http://www.ihi.org:80/resources/Pages/HowtoImprove/ScienceofImprovementTestingChanges.aspx>
203. Rich Data. In: The SAGE Encyclopedia of Qualitative Research Methods [Internet]. 2455 Teller Road, Thousand Oaks California 91320 United States: SAGE Publications, Inc.; 2008 [cited 2020 Jun 15]. Available from: <http://methods.sagepub.com/reference/sage-encyc-qualitative-research-methods/n408.xml>
204. Warren J, Gu Y, Humphrey G. Usage Analysis of a Shared Care Planning System. AMIA Annu Symp Proc. 2012 Nov 3;2012:950–9.
205. Nielsen J. Usefulness, Utility, Usability: 3 Goals of UX Design [Internet]. 2017 [cited 2019 Sep 10]. Available from: <https://www.youtube.com/watch?v=VwgZtqTQzg8>
206. Definition of usefulness. In: Dictionary.com [Internet]. [cited 2019 Sep 11]. Available from: <https://www.dictionary.com/browse/usefulness>

Appendix

Appendix A: Population Characteristics

	<i>Clinical or Care Planning Item</i>	<i>Prevalence (%)</i>
<i>Overall Status</i>	Some indication of health instability	83.9
	Some form of cognitive impairment	81.5
	Some impairment in activities of daily living	60.9
	Daily pain	60.7
	Bladder incontinence	59.1
	Concern with caregiver distress	42.1
<i>Health Conditions</i>	Musculoskeletal disorders	63.1
	Neurological diseases	35.2
	Diabetes	28.6
	Show signs of depression	26.8
	Coronary artery disease	24.0
<i>Types of Formal Care</i>	Home health aides	67.7
	Homemaking services	33.8
	Visiting nurses	26.9
	Occupational therapy	16.9
	Meals	14.1
	Physical therapy	13.4
<i>Triggered Clinical Assessment Protocols (CAPs)</i>	Institutional risk	67.8
	Activities of daily living	57.6
	Instrumental activities of daily living	45.0
	Falls risk	40.5
	Physical activities promotion	35.5

Table 7: Profile of home care patients, 2017 to 2018

(14)

	Not triggered	Medium risk	High risk	Total
January	621	426	171	1221
February	507	326	133	966
March	573	365	146	1084
April	602	379	150	1131
May	588	371	164	1123
June	518	309	128	955
Total	3409	2179	892	6480

Table 8: Falls CAPs triggered in the WWLHIN in 2019

(63)

Appendix B: Patient Summary Report



Patient Summary Report (Coordinated Care Plan)

Patient Name : Surname, Firstname

Attention : Surname, Firstname

Fax/Télééc : (555) 555-5555.

Dedicated Primary Care Phone Line : 1 (844) 388-5541

DOB: DD/Mmm/YY		MRP: Surname, Firstname	
Preferred Language: English		Gender: M, HCN: 5555555555	
Address: Number Streetname, City Prov A1A A1A (Home)		Primary Phone: (555) 555-5555	
Other Patient Contacts	Relationship Role/Legal/Organization	Phone	
Surname, Firstname	Other	(555) 555-5555	
Surname, Firstname	Friend	(555) 555-5555	
Surname, Firstname	Trellis - Supportive Housing	(555) 555-5555 Ext5555	
Patient Goals/Summary: _____			
Focus: Patient Goals			
What is important to the patient right now: To decrease pain and stiffness on left side of body.			
Other community partners involved (including Community Support Services): Mobility Plus			
Additional Care Coordinator comments:			
Clt is feeling depressed due to decrease in function due to increased stiffness and pain on left side of his body. This has also impacted his function and attendance to activities. PT referral was completed. Clt. also requesting to be considered for an idle bed in LTCH in KW area. , Note Created:07-Jun-2019 2:35 PM EDT			
Referral Source: Community - Family		Care Coordinator Name: Surname, Firstname	
Most Recent Care Coordinator Assessment: DD/Mmm/YY		Next Planned Care Coordinator Reassessment: DD/Mmm/YY	
Risks: None			
Capable LTC Decisions: Unknown		On Waitlist for LTC: Y	
On Waitlist for Supportive Housing: N			
Active Home & Community Care Services BRN: 55555555		Start Date	Assigned Provider(s) and Active Frequencies
Personal Support		04/Apr/2014	Provider name
Focus of Intervention: 19-Mar-2019 This client is off-hold, please resume as previous			## hour(s) per week, every week
Personal care, peri care and drsg assist Shaving as required			
Service Plan Goals: With regular PSW assist the client will receive regular personal care, peri care and drsg assist while eligible for CCAC supports			
Treatment Orders:			
Physiotherapy		28/May/2019	Provider name
Focus of Intervention: Assess for in home exercise program to improve strength on left side affected by CVA (2008); Left side is stiff, painful;			## visit(s)
Intervention to maximize function, improve safety/ balance, mobility and gait.			
Service Plan Goals: Clt will be have improved movements, strength on left side; will be supported with appropriate exercise program; will experience reduced pain.			
Treatment Orders:			

For patient related questions, call the Dedicated Primary Care Phone Line 1 (844) 388-5541

For all non-patient related questions, please contact M R @ 519-883-5500 x5555 or m.r@lhins.on.ca

Data as of: 11/Jun/2019 12:29 PM

Appendix C: The Behaviour Change Wheel

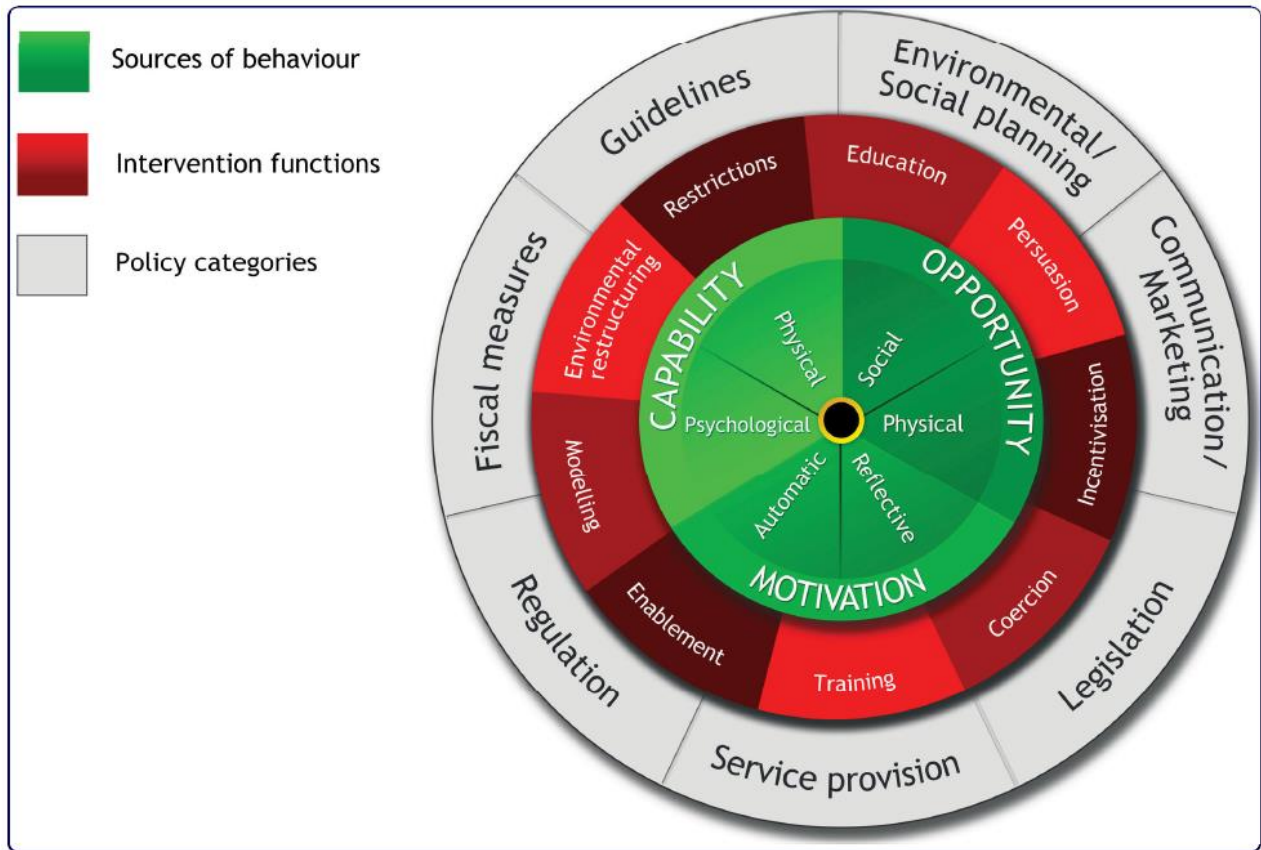


Figure 3: The Behaviour Change Wheel

(95)

Appendix D: Recruitment letter for interview

Hello,

My name is Amanda Nova and I am a master's student working with Dr. George Heckman in the School of Public Health and Health Systems at the University of Waterloo. I am contacting you because we are conducting research that might be of interest to you.

We are in the process of developing the Patient Falls Risk Report, a new tool for sharing falls-related clinical information collected in home care to the primary care providers of home care clients in Ontario. Participation in this study involves answering questions and providing feedback on a sample Patient Falls Risk Report. Participation in this study would take approximately 20 minutes of your time. I would like to assure you that the study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee.

However, the final decision about participation is yours.

If you are interested in participating, please contact me at aanova@uwaterloo.ca and list your top three choices for when and where you would like to meet. I will then send a confirmation email indicating that you have been signed up for one of those times. If you have to cancel your appointment, please email me at aanova@uwaterloo.ca.

Sincerely,

Amanda Nova, BSc

MSc Student
School of Public Health and Health Systems
University of Waterloo
519-580-7174
aanova@uwaterloo.ca

George Heckman, MD

Geriatrician
UW-Schlegel Research Institute for Aging
University of Waterloo
519-888-4567, ext. 31028
ggheckman@uwaterloo.ca

Appendix E: Information and consent form for interview

Development of the patient falls risk report: A tool for sharing falls-related clinical information from home care with primary care providers

Hello,

My name is Amanda Nova and I am a student in the School of Public Health and Health Systems at the University of Waterloo conducting a master's thesis with Dr. George Heckman, MD. I would like to provide you with more information about this project and what involvement would entail if you decide to take part.

The purpose of this study is to assess the *Patient Falls Risk Report*, a new tool which I developed in collaboration with other researchers, clinicians, and policymakers for sharing falls-related information collected in home care with primary care providers. Before introducing the *Patient Falls Risk Report*, we knew it was important to understand and incorporate the primary care provider perspective. This way, we can make it more useful and relevant. I would like to include you as one of several primary care providers to be involved in my study. I believe that because you are actively involved in the medical community, you are best suited to speak to the various issues, such as what challenges may you face when trying to manage falls in your patients.

Participation in this study is voluntary. It will involve an interview where we will ask you to look at a mock Patient Falls Risk Report and answer questions about it. The interview should take around 20 minutes to complete. It will take place in a mutually agreed upon location. You may decline to answer any of the interview questions if you so wish. Further, you may decide to withdraw from this study at any time without any negative consequences by advising the researcher. With your permission, the interview will be audio recorded to facilitate collection of information, and later transcribed for analysis. Your identity will be kept confidential. Your name will not appear in any thesis or report resulting from this study, however, with your permission anonymous quotations may be used. Data collected during this study will be encrypted and retained for a minimum of seven years in a password-locked laptop. Only researchers associated with this project will have access. There are no known or anticipated risks to you as a participant in this study.

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee (ORE#41215). If you have questions for the Committee contact the Office of Research Ethics, at 1-519-888-4567 ext. 36005 or ore-ceo@uwaterloo.ca. For all other questions or if you would like additional information to assist you in reaching a decision about participation, please contact me at 519-580-7174 or aanova@uwaterloo.ca. You can also contact my supervisor, George Heckman at 519-888-4567 ext. 31028 or ggheckman@uwaterloo.ca.

I hope that the results of my study will be of benefit to those primary care providers directly involved in the study, as well as to the broader medical and research community. I very much look forward to speaking with you and thank you in advance for your assistance in this project.

Sincerely,

Amanda Nova, BSc
MSc Student
School of Public Health and Health Systems
University of Waterloo
519-580-7174
aanova@uwaterloo.ca

CONSENT FORM

By signing this consent form, you are not waiving your legal rights or releasing the investigator(s) or involved institution(s) from their legal and professional responsibilities.

I have read the information presented in the information letter about a study being conducted by Amanda Nova in the School of Public Health and Health Systems at the University of Waterloo. I have had the opportunity to ask any questions related to this study, to receive satisfactory answers to my questions, and any additional details I wanted.

I am aware that I have the option of allowing my interview to be audio recorded to ensure an accurate recording of my responses.

I am also aware that excerpts from the interview may be included in the thesis and/or publications to come from this research, with the understanding that the quotations will be anonymous.

I was informed that I may withdraw my consent at any time without penalty by advising the researcher.

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee (ORE#41215). If you have questions for the Committee contact the Office of Research Ethics, at 1-519-888-4567 ext. 36005 or ore-ceo@uwaterloo.ca. For all other questions contact Amanda Nova at aanova@uwaterloo.ca

With full knowledge of all foregoing, I agree, of my own free will, to participate in this study.

YES NO

I agree to have my interview audio recorded.

YES NO

I agree to the use of anonymous quotations in any thesis or publication that comes of this research.

YES NO

Participant Name: _____ (Please print)

Participant Signature: _____

Witness Name: _____ (Please print)

Witness Signature: _____

Appendix F: Interview questions

Interview Questions

Part 1

1. How do you usually find out if a patient is at risk of falling?
 - a. Prompt: What pieces of information do you need to make the call that a patient is at high risk of falling?
 - b. Prompt: What makes it easier or harder to manage falls in your patients?

Scenario 1: Flip over the PFRR

2. What is your first impression of this report?

Scenario 2: Use this form (mock Patient Falls Risk Report) to come up with care planning options for this patient, if you believe it is necessary. If you believe that you need more information or help navigating this document let me know. Also, while going through this scenario, please think out loud (provide report card example on thinking out loud). Flip over the report when you're ready to begin and please let me know when you feel like you're done. What can I clarify about this activity?"

Part 2

3. What thoughts or feelings did you have about using this report?
4. Would you use the Patient Falls Risk Report in your practice? Why?
5. Would the Patient Falls Risk Report change what you would normally do in a patient encounter? If yes, how? If no, why not?
6. What barriers might keep you from implementing the report in your practice?
 - a. Prompt: Do you feel that the report impacts your medicolegal risk? If yes, why?
7. What changes would you like to see made to the Patient Falls Risk Report?
 - a. Prompt: What are your thoughts on the length of the report?
 - b. Prompt: What are your thoughts on the content of the report?
 - c. Prompt: How do you feel about using the fax to get the Patient Falls Risk Report?
8. Are you a family doctor, general practitioner, or nurse practitioner?
9. For how many years have you been a primary care provider?
10. What else would you like to add that we didn't get a chance to talk about in this interview?
11. What questions do you have for me?

Appendix G: Appreciation letter

Hello,

I would like to thank you for your participation in this study entitled “Development of the patient falls risk report: A tool for sharing falls-related clinical information from home care with primary care providers”. As a reminder, the purpose of this study is to assess how the Patient Falls Risk Report, a new tool for sharing falls-related clinical and care planning information, needs to be refined to be more useful to primary care providers. The data collected during interviews will contribute to future improvement of information sharing from home care to primary care providers.

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee (ORE#41215). If you have questions for the Committee contact the Office of Research Ethics, at 1-519-888-4567 ext. 36005 or ore-ceo@uwaterloo.ca. For all other questions contact Amanda Nova at aanova@uwaterloo.ca.

Please remember that any data pertaining to you as an individual participant will be kept confidential. Once all the data are collected and analyzed for this project, I plan on sharing this information with the research community through seminars, conferences, presentations, and journal articles. If you are interested in receiving more information regarding the results of this study, or would like a summary of the results, please let me know, and when the study is completed, anticipated by June 2020, I will send you the information. In the meantime, if you have any questions about the study, please do not hesitate to contact me by email as noted below.

Amanda Nova, BSc

MSc Student
School of Public Health and Health Systems
University of Waterloo
519-580-7174
aanova@uwaterloo.ca

George Heckman, MD

Geriatrician
UW-Schlegel Research Institute for Aging
University of Waterloo
519-888-4567, ext. 31028
ggheckman@uwaterloo.ca

Appendix H: Patient Falls Risk Report – Version 1



Mock Patient Falls Risk Report

Patient Name: Smith, Jane

****Your patient has a high risk of future falls****

High risk: based on prior report of multiple falls

65% of persons with high risk will fall over a 90-day period

Moderate risk: based on prior report of a single fall

40% of persons with moderate risk will fall over a 90-day period

Contributors to Falls in your Patient	Status	Interpretation
Cognitive Performance	Moderately Impaired 1	<i>4 out of 8 on cognitive performance scale</i> Score based on daily decision-making skills, making self understood, and short-term memory
Foot Problems	Foot problems, no limitation in walking	<i>1 out of 4 on foot problems item</i> Score based on foot pain, wounds, or deformities contributing to elevated falls risk
Pain	Less than daily pain	<i>1 out of 4 on pain scale</i> Score based on pain frequency and intensity
Inappropriate Medications	Triggered – high priority	Triggered when patient has <i>9+ medications</i> and <i>cardiovascular symptoms</i> potentially related to elevated falls risk
Physical Activity Levels	Triggered to facilitate improvement	Triggered when patient is likely able to participate in an exercise program

The above contributors to falls were identified as issues of potential importance from an interRAI home care assessment. Please ensure that these are discussed with your patient.

The following are recommendations which may be considered for falls prevention in older persons¹.

1. Conduct a medication review
2. Refer to community exercise program
3. Ensure an eye exam within the last year
4. Review cardiovascular health including orthostatic vitals (lying then standing at 1 and 3 minutes)
5. Review bone health
6. Consider podiatry assessment
7. Consider home occupational therapy assessment

1. Panel on Prevention of Falls in Older Persons, American Geriatrics Society, British Geriatrics Society. Summary of the Updated American Geriatrics Society/British Geriatrics Society Clinical Practice Guideline for Prevention of Falls in Older Persons. *J Am Geriatr Soc.* 2011;59(1):148

Appendix I: Codebook for interview data

Usability: The ability for users to learn, understand, and operate a tool or system

Utility: The quality of having the right features to solve a user need

APEASE criteria:

Affordable: Cost to design and deliver

Practicable: Mode of delivery should allow intervention to be delivered as designed

Effective: Evidence-based (cost) effect size in real world context

Acceptable: Aligned with recipient and political objectives. Deemed appropriate.

Side-Effects: Unintended consequences

Equitable: Effect on disparity in health between different sectors of society

Behaviour Change Wheel:

Source of Behavior: Understanding behaviour in the context that it occurs

Social/Physical Opportunity: Time, resources, location

Reflective/Automatic Motivation: Intentions, beliefs, emotions, desires

Psychological/Physical Capability: Knowledge, Strength, Stamina, Skills

Intervention function: How an intervention can change a behaviour

Education, persuasion, incentives, coercion, training, enablement, modelling, environmental restructuring, restrictions

Policy Categories: Decisions made by authorities that would support delivery of the intervention

Environmental/social planning, communication/marketing, legislation, service provision, regulation, fiscal measures, guidelines

Things to Record in Task-Based Scenario 2:

- 1) Care planning response to discuss with subject matter experts
- 2) Expressed need for additional information or a search for redundant information
- 3) Time between beginning and ending the activity
- 4) Criticisms

Showstopper: there are no practical workarounds or there is an unacceptable impact on users; the tool cannot be implemented until showstoppers are solved

Critical: Potential workarounds to the problem exist, but there is a negative impact on user experience, efficiency, or quality of user response

Major: An acceptable potential workaround which can be temporarily used

Minor: There are cosmetic issues or preferences that can be met without major changes to the tool

Open Codes:

Appendix J: List of equations

Equation 1

$$n = \frac{z^2 s^2}{d^2}$$

Where,

n represents sample size,

z represents the critical value from the normal distribution at a specific confidence interval (1.96 for 95% confidence interval (CI); 1.645 for 90% confidence interval; adjusted with excel function =TINV(1-desired confidence level,n-1) if resulting sample size is below 30),

s represents estimated standard deviation (21 when there is no historical data), and

d represents desired margin of error (113).

Equation 2

$$\bar{x} \pm t_a \frac{s}{\sqrt{n}}$$

Where,

\bar{x} represents mean SUS score,

n represents sample size,

s represents standard deviation (calculated with excel function =STDEV(SUS scores)),

t_a represents the critical value from the t-distribution at $n-1$ degrees of freedom and a specific confidence interval (calculated with excel function =TINV(1-desired confidence level,n-1), and

$t_a \frac{s}{\sqrt{n}}$ is the margin of error (113).

Appendix K: Survey recruitment letter

Hello,

My name is Amanda Nova and I am a master's student working with Dr. George Heckman in the School of Public Health and Health Systems at the University of Waterloo. We are in the process of developing the Patient Falls Risk Report, a new tool for sharing falls-related clinical information collected in home care to the primary care providers of home care clients in Ontario. Participation in this phase of the study involves answering questions on an online survey and providing feedback on a sample Patient Falls Risk Report. Participation in this study would take approximately 5 minutes of your time. I would like to assure you that the study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee.

However, the final decision about participation is yours.

If you are interested in participating, follow this link to access the survey :

https://uwaterloo.ca/qualtrics.com/jfe/form/SV_bItXV5TJ5y2w7Bz

If you have any questions, please email me at aanova@uwaterloo.ca or call at 519-580-7174.

Sincerely,

Amanda Nova, BSc
MSc Student
School of Public Health and Health Systems
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George Heckman, MD
Geriatrician
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Appendix L: Information and consent form for survey



Development of the patient falls risk report:

A tool for sharing falls-related clinical information from home care with primary care providers

Hello,

My name is Amanda Nova and I am a master's student in the School of Public Health and Health Systems conducting a thesis under the supervision of Dr. George Heckman, MD. I am inviting you to complete the attached five-minute survey about the Patient Falls Risk Report, a new tool which I developed in collaboration with other researchers, clinicians, and policymakers for faxing primary care providers clinical information collected in home care. As you may know, improving communication between home care and primary care is very important for efficiency, continuity, and quality of patient care.

The questions will ask about your thoughts on the usability of the Patient Falls Risk Report. This study will benefit the medical community by identifying if and how the Patient Falls Risk Report should be refined to meet primary care provider needs.

To participate in this study, you must be a primary care provider or primary care provider in training in Ontario. Participation in this study is voluntary. Your participation in this study is confidential. You may decline to answer any questions by leaving them blank and withdraw your participation at any time by not submitting your responses. It is not possible to remove your data from the study once collected because the data collected is considered anonymous. There are no known or anticipated risks from participating in this study.

When information is transmitted over the internet privacy cannot be guaranteed. There is always a risk your responses may be intercepted by a third party (e.g., government agencies, hackers). University of Waterloo researchers will not collect or use internet protocol (IP) addresses or other information which could link your participation to your computer or electronic device without first informing you.

The data will be encrypted and stored on a password-protected computer, maintained for a minimum of seven years, and then erased. This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee (ORE#41215). If you have questions for the Committee contact the Office of Research Ethics, at 1-519-888-4567 ext. 36005 or ore-ceo@uwaterloo.ca. For all other questions about the study, please contact either Amanda Nova at 519-580-7174 or by email at aanova@uwaterloo.ca. If you would like to receive a copy of the results of this study, please contact either investigator.

Thank you for considering participation in this study.

Amanda Nova, BSc

MSc Student
School of Public Health and Health Systems
University of Waterloo
519-580-7174
aanova@uwaterloo.ca

George Heckman, MD

Geriatrician
UW-Schlegel Research Institute for Aging
University of Waterloo
519-888-4567, ext. 31028
gheckman@uwaterloo.ca

By providing your consent, you are not waiving your legal rights or releasing the investigator(s) or involved institution(s) from their legal and professional responsibilities.

Consent to Participate. With full knowledge of all foregoing, I agree, of my own free will, to participate in this study.

- I agree to participate
- I do not wish to participate



Appendix M: Patient Falls Risk Report - Version 2



Patient Falls Risk Report

Patient Name: Smith, Jane

****Your patient has a high risk of future falls****

Moderate Risk: based on prior report of a single fall
40% of persons with moderate risk will fall over a 90-day period

High Risk: based on prior report of multiple falls
65% of persons with high risk will fall over a 90-day period

Contributors to Falls	Status of your Patient	Interpretation
Medications	Identified as a major risk factor Patient has 10 medications including: Antipsychotics	Identified as a major risk factor when patient has 9+ medications and cardiovascular symptoms potentially related to elevated falls risk
Cognitive Performance	Moderately Impaired	Status based on daily decision-making skills, making self understood, and short-term memory
Pain	Less than daily pain	Status based on pain frequency and intensity
Foot Problems	Foot problems causing no limitation in walking	Status based on foot pain, wounds, or deformities contributing to elevated falls risk
Physical Activity	Opportunity to facilitate improvement	Patient has demonstrated willingness and ability to participate in an exercise program

The above contributors to falls were identified as issues of potential importance from a valid interRAI home care assessment. Please ensure that these are discussed with your patient.

The following are validated recommendations which may be considered for falls prevention in older persons¹.

1. Conduct a medication review or refer to pharmacist
2. Refer to home or community exercise program
3. Ensure an eye exam within the last year
4. Review cardiovascular health including orthostatic vitals (lying then standing at 1 and 3 minutes)
5. Review bone health
6. Consider foot examination or podiatry assessment
7. Consider home occupational therapy assessment

1. Panel on Prevention of Falls in Older Persons, American Geriatrics Society, British Geriatrics Society. Summary of the Updated American Geriatrics Society/British Geriatrics Society Clinical Practice Guideline for Prevention of Falls in Older Persons. J Am Geriatr Soc. 2011;59(1):148

Appendix N: Survey



Part 1

Please read the Mock Patient Falls Risk Report on the next page. Then, in the box below, please record at least 2 care planning options for Jane Smith, a mock patient who receives home care and was identified as having a high risk of future falls.

Part 2

For each statement, please assign a score of 1 to 5 from strongly agree to strongly disagree. Please respond to every item. If you feel that you cannot respond to a particular item, please assign a score of 3.

	Strongly Disagree 1	2	3	4	Strongly Agree 5
1. I think that I would like to use this report frequently.					
2. I found the report unnecessarily complex.					
3. I thought the report was easy to use.					
4. I think that I would need the support of a technical person to be able to use this report.					
5. I found the various functions in this report were well integrated.					
6. I thought there was too much inconsistency in this report.					
7. I would imagine that most people would learn to use this report very quickly.					
8. I found the report very awkward to use.					
9. I felt very confident using the report.					
10. I needed to learn a lot of things before I could get going with this report.					

If you have any additional comments, feedback, and explanation, please write your response in the space below.

Appendix O: Histogram and probability plot of SUS scores

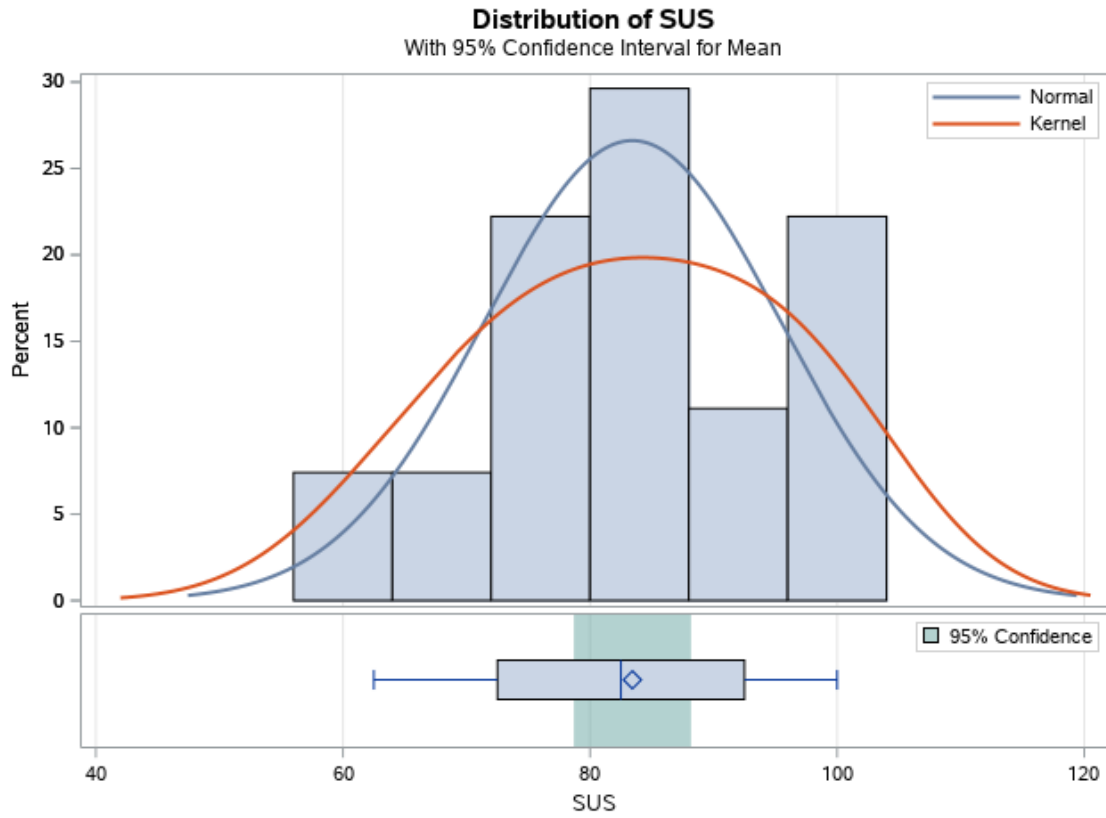


Figure 4: Histogram of SUS scores

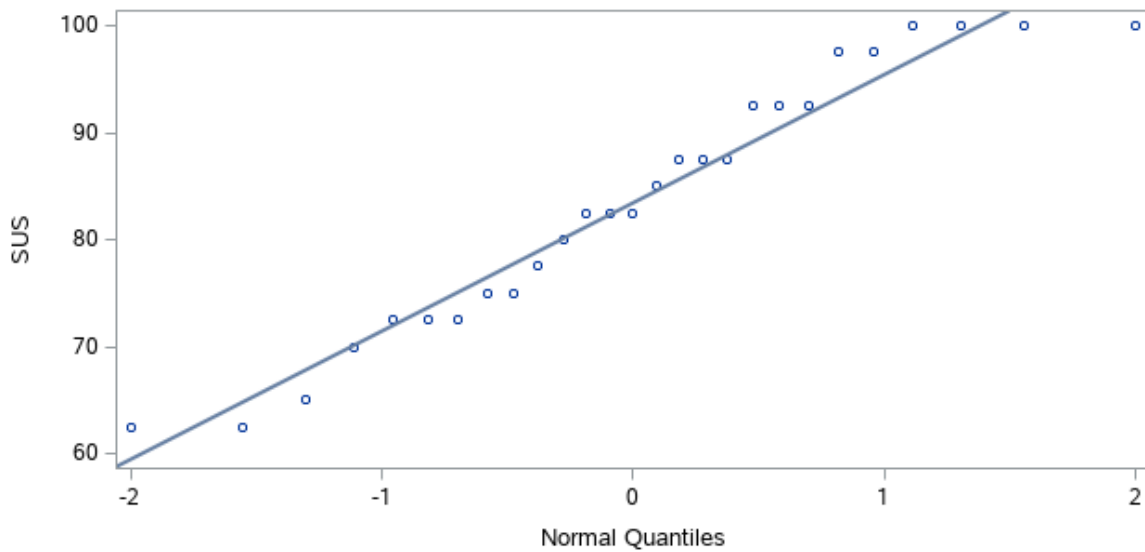


Figure 5: Probability plot of SUS scores

Appendix P: Care planning options suggested by survey participants for the mock patient

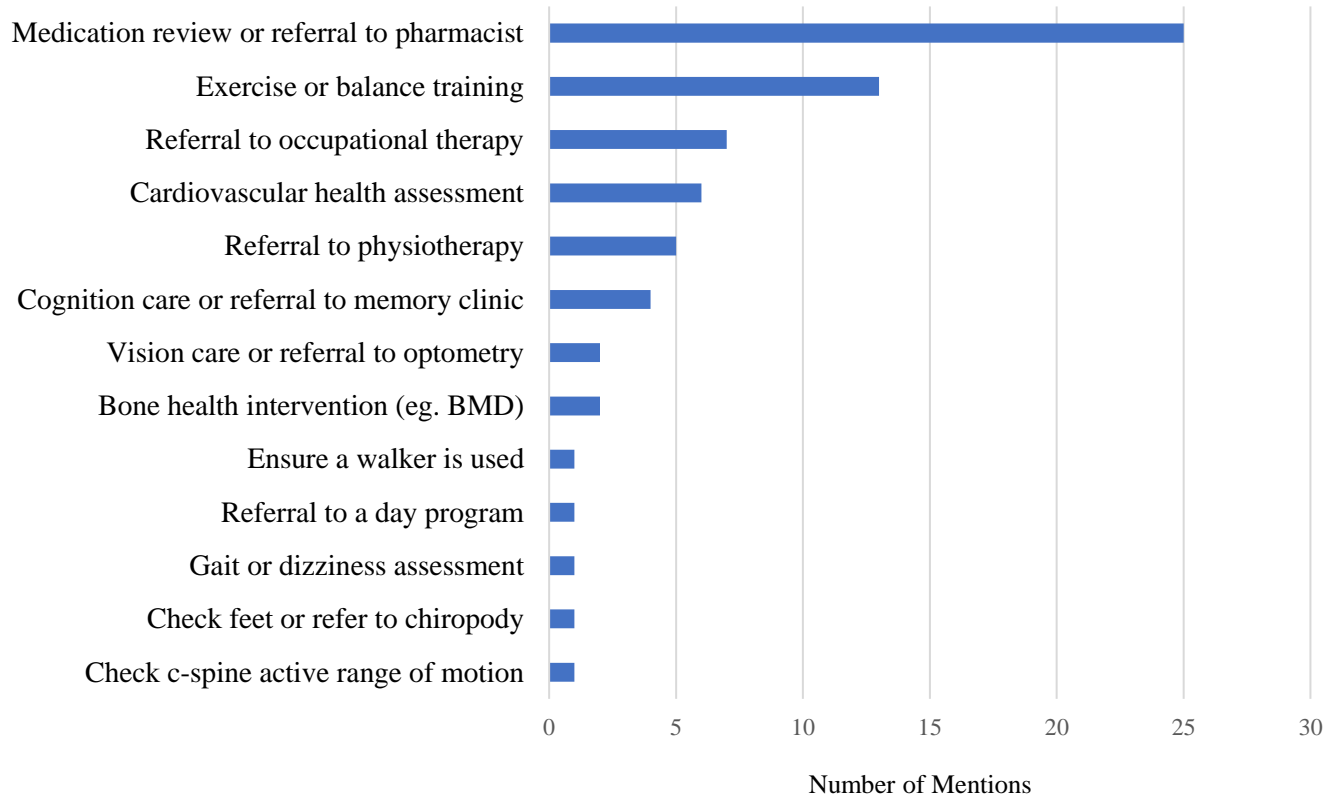


Figure 6: Care planning options suggested by survey participants for the mock patient

Appendix Q: Barriers along the care pathway and the impact of the Patient Falls Risk Report

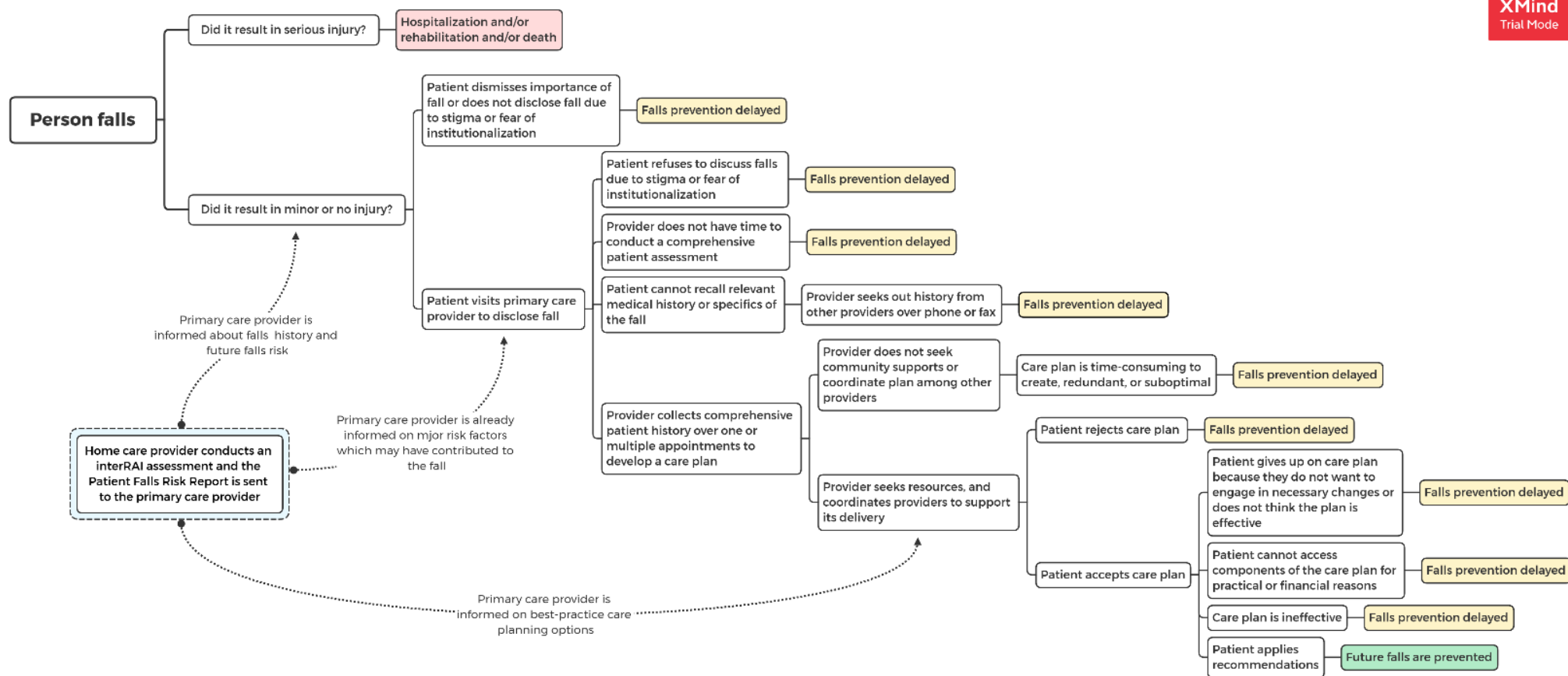


Figure 7: Barriers along the care pathway and the impact of the Patient Falls Risk Report

Appendix R: Midpoint and final changes to the Patient Falls Risk Report

Midpoint changes	Reasoning
Rearranged interpretation of falls CAP from vertical to horizontal	Save space
Removed box around “the above contributors to falls were identified...”	Save space
Removed numerical scores under interpretations	Add clarity
Removed the 1 in ‘moderately impaired 1’ under cognitive performance status	Add clarity
Changed ‘foot problems, no limitation in walking’ to ‘foot problems causing no limitation in walking’	Add clarity
Changed ‘triggered’ to ‘major risk factor’ or ‘opportunity’	Add clarity
Added number of medications and list of high-risk medications to medications status	Add detail
Added “refer to pharmacist” to “conduct a medication review”	Add detail (open options for intervention)
Added “home exercise program” to “refer to community exercise program”	Add detail (open options for intervention)
Added “consider foot examination” to “consider podiatry assessment”	Add detail (open options for intervention)
Moved medications CAP to the top of contributors to falls	Align report with provider priorities
Changed ‘inappropriate medications’ to ‘medications’ in medications CAP	Align report with provider priorities
Added the word ‘valid’ to “the above contributors to falls were identified...”	Emphasize validity
Final changes	Reasoning
Condensed results and interpretation of falls CAP into “your patient is at high risk of future falls based on a prior report of multiple falls”	Save space
Merged interpretation column with contributors to falls column	Save space
Changed CAP name “physical activity” to “physical inactivity”; changed wording of physical inactivity status to what was previously the interpretation; and changed CAP interpretation to list contributors to physical activity CAP	Add clarity
Added areas of impairment under cognitive performance status	Add detail
Added pain control item to pain status and changed “pain” to “pain control”	Add detail
Added “ensure up to date BMD” to “review bone health”	Add detail
Added “for the complete assessment, contact your home care provider”	Add detail (open options for intervention)
Added balance items	Add detail and align with provider priorities
Added box on ways to get more information on community care services in your area	Add detail and align with provider priorities
Changed “the above contributors to falls were identified...” to “A comprehensive interRAI assessment conducted in home care has identified the following issues of potential importance...” and moved to top of the report	Emphasize validity

Table 9: Midpoint and final changes to the Patient Falls Risk Report

Appendix S: Patient Falls Risk Report - Version 3



Patient Falls Risk Report Patient Name: Smith, Jane

A comprehensive interRAI assessment conducted in home care has identified the following issues of potential importance. Please ensure that these issues are discussed with your patient.

****Your patient is at high risk of future falls based on a prior report of multiple falls****

Contributors to Falls	Status of your Patient
Balance Based on difficulty standing or turning around, sensations of dizziness, or gait that increases falls risk	Patient has shown signs of: <i>difficulty turning around, dizziness</i>
Cognitive Performance Based on daily decision-making skills, making themselves understood, and short-term memory	Moderately Impaired. Patient has shown impairment in: <i>daily decision making, short-term memory</i>
Foot Problems Based on foot pain, wounds, or deformities contributing to elevated falls risk	Foot problems causing no limitation in walking
Pain Control Based on pain frequency and intensity	Less than daily pain. <i>Pain intensity acceptable to person, no treatment or change in treatment required</i>
Medications Identified as a risk factor when patient has 9+ medications and cardiovascular symptoms possibly related to falls risk	Identified as a major risk factor. Patient has 10 medications including: <i>Antipsychotics</i>
Physical Inactivity Based on engagement in household tasks, walking, and/or planned exercise programs	Patient has a low level of physical activity and is functionally capable of increased activity

For the complete assessment, contact your home care provider

The following are validated recommendations which may be considered for falls prevention in older persons¹.

1. Conduct medication review or refer to a pharmacist regarding falls risk
2. Refer to home or community exercise program
3. Ensure an eye exam within the last year
4. Review cardiovascular health including orthostatic vitals (lying then standing at 1 and 3 minutes)
5. Review bone health (ensure up to date BMD)
6. Consider foot examination or refer to podiatry
7. Consider home occupational therapy assessment

For more information on community care services in your area, visit or refer to:

1. caredove.com
2. wwhealthline.ca
3. VON or Community Support Connections

1. Panel on Prevention of Falls in Older Persons, American Geriatrics Society, British Geriatrics Society. Summary of the Updated American Geriatrics Society/British Geriatrics Society Clinical Practice Guideline for Prevention of Falls in Older Persons. J Am Geriatr Soc. 2011;59(1):148

Glossary

Credibility: Consistency between respondent views and researcher interpretations (102).

Convenience sampling: A recruitment method in which the researcher invites participants that are easily accessible to them (104).

Falls management: The skillful use of resources to control or address falls risk (199).

Falls prevention: To engage in precautionary actions that will keep future falls from occurring (200).

Falls screening: To systematically examine a group of people with a high probability of having or developing falls risk (201).

Informational continuity: The ability of health providers use accurate and relevant information on a patient's history or circumstances to make appropriate care decisions (8).

Internal consistency: A gauge of reliability; the degree to which participants answer one administration of a questionnaire in the same way (113).

Iterative: A systematic repeated pattern (107).

Maximum variation sampling: A recruitment method which seeks participants with a wide range of experiences (104).

PDSA (Plan, Do, Study, Act) cycle: A form of action-oriented research in which an intervention is planned out, implemented, observed, and improved in an iterative cycle (202).

Quality assurance: An assessment of the degree to which a set of quality standards are met and putting forward quality improvement initiatives where they are needed (178).

Richness: A quality of qualitative data that describes a thorough understanding of multiple dimensions and complexity surrounding a phenomena (203).

Shared care planning: An approach to patient care that emphasizes joint responsibility between empowered and informed health professionals (204).

Snowball sampling: A recruitment method in which key informants introduce other potential participants to the study (104).

Third generation assessments: Clinical assessments which explore multiple domains of health in various care settings to support care panning at individual and organizational levels; tested for reliability, validity, and utility in real-world settings (e.g. interRAI assessments) (53).

Usability: The ability for users to learn, understand, and operate a tool or system (205).

Useful: Being of use for a practical purpose (206); a blend of utility and usability (205).

Utility: The quality of having the right features to solve a user need (205).

Volunteer bias: a bias that occurs when study participants may not be representative of the population of interest (188).