COMMUNITY-BASED, SLOW-STREAM REHABILITATION FOR OLDER ADULTS

Community-Based, Slow-Stream Rehabilitation, Hospital-To-Home Transition Program for Older Adults

By

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TITLE: Community-Based, Slow-Stream, Hospital-to-Home Transition Program for Older Adults: A Program Evaluation

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Lay Abstract

Hospital-to-home transition care models do not often include a rehabilitation 'lens' which led to this thesis. Chapter 2 was a scoping review of slow-stream rehabilitation (SSR) for older adults; Chapter 3 looked at exercises older adults completed during an SSR hospital-to-home program; and, Chapter 4 studied facilitators and barriers to enhancing a current community-based, SSR, hospital-to-home program.

These studies found: 1) SSR programs in healthcare systems like Canada were geared towards older adults with many health problems, only took place in hospital or long-term care settings, and were of benefit; 2) Older adults participating in a SSR hospital-to-home program should exercise at the appropriate intensity, time and frequency to see gains in function; 3) The current program's services e.g., rehabilitation, education, and nursing care were beneficial, but barriers to enhancing the program were out of the participants' control.

Community-based, SSR, hospital-to-home transition models of care that include rehabilitation are very important for older adults.

Abstract

Current models of hospital-to-home transitions for older adults do not typically include a rehabilitation perspective, which led to the endeavor of this thesis. Chapter 2 (Paper 1) is a scoping review that summarized current literature related to slow-stream rehabilitation (SSR) for older adults. Chapter 3 (Paper 2) was a descriptive prospective cohort study that examined frequency, intensity, type and time (FITT) parameters for cardiovascular and resistance exercises completed by older adult participants in a community-based, SSR, hospital-to-home transition program; and to compare FITT parameters of completed exercises to established guidelines. Chapter 4 (Paper 3) was a qualitative study that examined perspectives of those working in or referring to the community-based, SSR, hospital-to-home transition program to identify factors that act as barriers or facilitators to successful implementation and function of an enhanced, community-based, SSR, hospital-to-home transition program.

The scoping review found that SSR programs in single payer healthcare systems improved physical and functional outcomes, decreased hospital readmission and institutionalization for older adults with complex healthcare needs. SSR programs were multidisciplinary, ranged in program and session length, and only took place in institutional settings. The prospective cohort study found that older adults with complex healthcare needs participating in a community-based, SSR, hospital-to-home transition program were able to meet many of the cardiovascular and resistance frequency, intensity, and time (FIT) guideline parameters for community-dwelling older adults. Exercise interventions should be tailored to older adult needs and preferences, at the appropriate FIT to allow for functional gains. The qualitative study found the current program's services e.g., rehabilitation, education, and nursing

care were of benefit. Most of the stated barriers were at a macro or meso level and were out of the study participants' control, while all the facilitators were at a micro level.

Community-based, SSR, hospital-to-home transition programs can serve as a holistic model of care that address identified gaps in the literature.

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Completing my PhD has been a journey led by my desire to continue to learn and experience a diversity of inter-related research methods. What started off as my participation in a small part of a program evaluation project in my Master's program led to a whole new interest in research, rehabilitation, and community-based programing that not only resulted in this thesis today, but also sparked a whole new passion for advocating for the health and well-being of older adults. My desire to continue to conduct research in the areas of geriatrics and community-based programs and my final thesis document would not be what it is without the many meetings, words of advice, discussions, encouragement and support I have received throughout the whole process.

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Chapter 2

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List of Abbreviations

ABI- Acquired Brain Injury

ACSM- American College of Sports Medicine

ADL- Activities of Daily Living

ALC- Alternate Level of Care

BBS -Berg Balance Scale

CCC- Complex Continuing Care

FIM- Functional Independence Measure

FIT- Frequency, Intensity, Time

FITT- Frequency, Intensity, Time, Type

GDS- Geriatric Depression Scale

HAD – Hospital Acquired Deconditioning

LHIN- Local Health Integrated Network

LLFDI- Late Life Functional Disability Index

LOS- Length of Stay

MOCA- Montreal Cognitive Assessment

OT- Occupational therapy

PSW- Personal Support Worker

PT- Physiotherapy

RCT- Randomized Control Trials

RM- Repetition Max

SLP- Speech Language Pathology

SSR- Slow-Stream Rehabilitation

WHO- World Health Organization

Declaration Of Academic Achievement

This thesis is structured as a sandwich thesis and consists of three papers/manuscripts (Chapter 2, 3 and 4). Each manuscript is presented according to the submission requirements for the target peer-reviewed journal or in accordance with the journal in which it has been published. My contributions, co-author contributions and funding acknowledgements are explained in the preface section of each thesis chapter. I, Melody Maximos, confirm that I have made significant, original contributions to all co-authored studies in this thesis; and I am the first author of all three included manuscripts/papers.

Chapter 1: Thesis Introduction

Background

Canada's older adult population is increasing rapidly with over 16.9 % of the entire population over 65 years of age or older, up from 14% in 2012 and those 85 years or older increasing at the fastest rate (Canadian Medical Association, 2016). Approximately 75% to 80% of older adults report having at least one chronic condition that affects their health, and 50% of these individuals having three or more chronic conditions (Canadian Medical Association, 2016). Older adults account for 45% of provincial healthcare spending and 22% of emergency visits; and, are two to three times more likely to be admitted to hospital compared to those less than 65 years old (Canadian Institute of Health Information, 2015). During hospitalization, older adults spend approximately 90% of their time in bed which contributes to social isolation, decrease in muscle mass, and new difficulties with Activities of Daily Living (ADL) (C. J. Brown et al., 2009b; Covinsky et al., 2003). Thirty percent of older adults discharged from hospital have a new functional limitations that puts them at increased risk of falls, hospital readmission and institutionalization (Loyd et al., 2020).

The Canada Health Act was originally established to provide care for acute episodic events for a relatively young, non-complex population, but is not well structured for addressing multiple chronic health conditions (Canadian Medical Association, 2016). While the Health Act covers medical and hospital services for Canadians, the provincial and municipal government are responsible for distributing funds to community and social support programs (Peckham et al., 2018). At a provincial and municipal level competing political agendas generally lead to fragmentation within the community and social care

subsectors (Russell et al., 2019). Thus, more often than not, community initiatives are motivated by a single funding injection leading to difficulties in long-term sustainability and building of community capacity when funding is withdrawn (Peckham et al., 2018; Russell et al., 2019).

In 2007, the government of Ontario proposed a provincial 'Aging in Place' initiative that would enable older adults to continue leading healthy, independent lives in their own home. The goals were to improve coordination of services from hospital to community and support community initiatives that would decrease emergency department and alternative level of care usage. Yet, more than a decade has passed since proposing these 'Aging In Place' initiatives and a gap in the care transition literature still remains – current care transition models do not include rehabilitation in general or rehabilitation professionals, specifically physiotherapists or occupational therapists (Kalu et al., 2019). The need for development of future hospital-to-home rehabilitation focused transition programs and evaluation of current interventions, frameworks and models led to the endeavor of this thesis.

Thesis purpose

The purpose of the thesis was to build upon current hospital-to-home transition literature and address the gaps related to community-based, slow-stream rehabilitation (SSR) for older adults who are returning home after hospitalization. This thesis is a manuscript style thesis that is comprised of five chapters, with three stand-alone papers. Each of the standalone papers have been formatted according to the requirements of the journal that the manuscript has been published in or will be submitted to; because of the manuscript style thesis there may be some areas of overlap in the thesis introduction,

chapter introduction, description of the program and in the thesis discussion. The first standalone chapter (Chapter 2 (Paper 1)) was published in 2019 (Maximos, M., Seng-iad, S., Tang, A., Stratford, P., & Dal Bello-Haas, V. (2019). Slow Stream Rehabilitation for Older Adults: A Scoping Review. *Canadian Journal on Aging/La Revue Canadienne Du Vieillissement*, *38*(3), 328–349), and is a scoping review that summarizes the current body of literature related to SSR for older adults in single-payer health care systems, where "single payer" or "single payer–like" refers to health care funded by the government either through government or quasi-government organizations (World Health Organization, 2018). Chapter 3 (Paper 2) was a descriptive prospective cohort study that aimed to describe the frequency, intensity, type and time (FITT) parameters for cardiovascular and resistance exercises completed by older adult participants in a community-based SSR, hospital-to-home transition program; and to compare the FITT parameters of completed exercises to established exercise guidelines for community-dwelling older adults (American College of Sports Medicine, 2017). The second purpose of chapter 3 was to assess whether there was a difference in function between older adult participants in a community-based, SSR, hospital-to-home transition program who met American College of Sports Medicine (ACSM) cardiovascular and resistance exercise guidelines for community-dwelling older adults compared to those who did not meet the guidelines. Chapter 4 (Paper 3) used qualitative methods to examine perceptions and perspectives of care providers working in or referring to this program in order to identify factors that may act as barriers or facilitators to successful implementation and functioning of an enhanced, community-based, SSR, hospital-to-home transition program.

The purpose of this introduction chapter is to: provide an overview of the literature related to hospital-to-home transition; describe the role of rehabilitation post-hospitalization for older adults; and, review literature about rehabilitation models of care (day hospital and adult day programs) and exercise interventions for older adults with complex healthcare needs. Gaps in the literature that led to the papers that comprise this thesis are discussed.

Hospital-to-Home Transition for Older Adults

This body of literature includes frameworks, models or interventions that can decrease hospital readmission rates, emergency department visits, and improve older adults' quality of life (Naylor et al., 2011; Verhaegh et al., 2014). A "transition intervention" has been defined as any intervention that promotes safe and timely transfer of patients between levels of care and across care settings (Allen et al., 2014).

An examination of interventions aimed at decreasing 30-day readmission rates noted that interventions typically occurred at three distinct timepoints: pre-discharge (i.e. patient education, discharge planning, medication reconciliation), post-discharge (i.e. timely follow-up, telephone follow up, patient hotlines, home visits) and interventions that bridge the transition (i.e. transition coach, patient centered discharge instructions and provider continuity) (Hansen et al., 2011). The review by Hansen et al. (2011) found a large amount of heterogeneity between the individual studies with respect to how interventions were implemented and often a description of the intervention was absent. Follow-up either through phone call or home visits was determined to be vital to the continued success of older adults transitioning from hospital-to-home (Hansen et al., 2011). As well, interventions directed at providing patient-centered information to the

older adult and their family decreased 30-day readmission rate and improved community resource use (Hansen et al., 2011). Involving patients and family in the care plan at discharge has been supported by other literature as well; a meta-review assessing discharge interventions in developed countries found that patient and caregiver education were the most beneficial facets for improving older adults' emotional status and decreasing hospital readmission rates (Mistiaen et al., 2007). Another facet found to be important was the incorporation of multidisciplinary healthcare teams in the hospital-to-home transition process which led to decreased hospital readmission rates and improvements in older adults' quality of life (Allen et al. (2014)).

There has been an attempt to describe hospital-to-home transition through theories, frameworks and models. A scoping review conducted by Kalu et al. (2019) found two theories and six conceptual models for hospital-to-home transition. Both theories had a nursing or physician focus as the team lead and discussed the importance of considering the older adult's experience and perspective in the transition process and continuing to work collaboratively with them. Yet, the System of Care Philosophy theory had an additional focus on the importance of communication across service delivery levels (Kalu et al., 2019). All the models included actionable steps and had more information regarding providing older adults with self-management skills, including caregiver and family in the transition process, and follow-up with community healthcare provider, however most of these models were still either nursing or physician led. Essential components for hospital-to-home transition included: discharge assessment and care planning that takes into consideration the older adult's values and experiences, communication between providers, education for the person and care provider,

reconciliation of medications at transition, and community-based follow-up (Allen et al., 2014; Hansen et al., 2011; Kalu et al., 2019; Mistiaen et al., 2007).

The functional and health ramifications that extend post-hospitalization for older adults and the need for better communication across the care continuum have led to an increase need in the hospital-to-home transition research. Hospital-to-home transition interventions have been found to have notable benefit in decreasing health care costs and length of stay (Mistiaen et al., 2007; Allen et al., 2014). More recent research indicates that mobility- and function-related deficits represent independent risk factors for hospital readmission and institutionalization, and are addressable through rehabilitation interventions (Falvey et al., 2016; Verhaegh et al., 2014). According to Watkin et al. (2012) and Falvey et al. (2016), transition programs often lack some of the necessary coordination and provision of post-discharge services that may bridge the gap between hospital discharge and initiation of community services. Specifically, nutrition support, transportation, and the provision of support services for instrumental ADL are typically absent (Watkin et al., 2012). As well, there has been a lack of incorporation of physiotherapist's or occupational therapists' expertise in the hospital-to-home transition process to improve older adult function post-hospitalization (Falvey et al., 2016).

Role of Rehabilitation for Older Adults Post-Hospitalization

Even though there is a gap in current literature regarding the role of rehabilitation and community supports in hospital-to-home transition, rehabilitation has been shown to be successful in mitigating hospital-acquired deconditioning, rehospitalization, institutionalization and complications experienced by older adults post-hospital stay (Kortebein, 2009). Generally, rehabilitation programs for older adults have similar goals:

to maximize functional recovery and independence post-hospitalization in a safe and cost-effective manner, and to decrease re-hospitalization (Kortebein, 2009).

There are four relatively distinct models of rehabilitation intended to assist people with returning to pre-illness function; traditional inpatient rehabilitation, slow-stream rehabilitation, home-based rehabilitation, and outpatient rehabilitation (Kortebein, 2009). Factors considered by healthcare providers when making decisions about rehabilitation settings that are most appropriate for individuals include; functional status, home environment (e.g., single *vs.* multi-level dwelling), social support available (e.g., family/friends), complexity of medical conditions, rehabilitation tolerance, cognitive status, and potential for functional recovery in a defined period of time (Kortebein, 2009).

Traditional rehabilitation programs are considered to be more intense and shorter in duration (Stott & Quinn, 2013). In Ontario, the typical length of traditional rehabilitation programs for older adults is two to eight weeks, with rehabilitation sessions taking place five to seven days a week for 120 minutes per day. These programs are generally offered in the hospital (in-patient rehabilitation) (GTA Rehab Network, 2008). Previous research has shown that traditional rehabilitation programs are beneficial for older adults transitioning from hospital-to-home and have a positive impact on physical function (e.g., gait speed, balance), ADLs, psychological health, and disease management abilities (Hirvensalo, Rantanen, & Heikkinen, 2000). However, an evaluation study by Ottenbacher et al. (2004) found that while 71% of older adults participating in a traditional rehabilitation program returned to living in the community, 29% were either admitted to institutionalized care or re-admitted to the hospital post-rehabilitation due to

being unable to make functional gains during traditional rehabilitation program. It is thought that older adults with complex health problems such as multiple co-morbidities, severe stroke, dementia, and frailty may not be able to withstand the typical shorter duration and higher intensity of traditional rehabilitation programs, and may struggle to rehabilitate back to independent living (GTA Rehab Network, 2008) and may benefit more from slow-stream rehabilitation (SSR).

SSR programs tend to be lower intensity and longer duration, and target older adults who have multiple complex health problems and who may not tolerate or benefit from traditional rehabilitation (GTA Rehab Network, 2008). The only literature review completed prior to our scoping review on the topic of SSR (Chapter 2) was a grey literature scoping review exploring SSR for people with acquired brain injury (ABI) (Piccenna, Knox, & Jacinta, 2016). The authors found SSR to be beneficial for adults and older adults with ABI, and described SSR as being multidisciplinary, person-centered, outcome driven, and aimed to provide a holistic perspective of health and wellbeing.

To date, research related to programs defined as SSR in countries with similar health care systems to Canada indicate that these types of programs are offered in inpatient settings (Chapter 2/Paper 1, Maximos et al., (2019)) and there is a dearth of literature related to community-based SSR programs.

Day Hospital, and Adults Day Programs for Older Adults

Since the late 1950s, there have been a variety of programs developed or adapted for older adults with chronic conditions, disability, severe functional limitations and frailty to improve quality of life and ability to maintain community living, including community-based rehabilitation programs, day hospital programs, and adult day

programs. The term “day hospital” emerged in 1960 and was intended to provide multidisciplinary assessment and rehabilitation for older adults in an outpatient setting and served as a bridge in hospital-to-home transition (Forster A et al., 1999). In contrast, adult day program were defined as a community-based programs where older adults engage in supervised social, recreational, educational and therapeutic activities during the day, these have similar features to day hospitals but do not necessarily have a hospital-to-home rehabilitation focus (Kelly, 2015).

Two systematic reviews (L. Brown et al., 2015; Forster A et al., 1999) and one large scale study (Kelly, 2015) examined day hospitals or adult day programs that focus on rehabilitation and improving physical and functional outcomes for older adults. Forester et al. (1999) found day hospitals, compared to programs that did not incorporate rehabilitation focused care, were able to delay institutionalization. Older adult participants also demonstrated better function scores and decreased hospital visits. Compared to comprehensive care or home-based rehabilitation, day hospitals had similar benefits related to improved function, delayed institutionalization and decreased acute hospital bed usage (Forster et al., 1999). In 2015, Brown et al. (2015) conducted an updated search but only included four additional studies (L. Brown et al., 2015). Brown et al (2015) emphasized that there is a lack of available evidence on the benefits of day hospitals. Finally a recent large scale study in Canada assessed the benefits of adult day programs for older adults with frailty, multiple chronic conditions and functional or cognitive deficits (Kelly, 2015). The authors found that the adult day programs decreased hospital readmission within the first 30 days post hospitalization, and emergency department visits (Kelly, 2015).

In summary, there have been very few articles included in the two systematic reviews that have focused on day hospitals as models of care to improve older adult function or facilitate the transition from hospital-to-home. Even though some of these programs have been shown to be beneficial in decreasing institutionalization and hospital readmission, and improving function, there is a lack of program descriptions in the literature (L. Brown et al., 2015).

Exercise Interventions for Older Adults Post-hospitalization and Frail Older Adults

Exercise interventions can improve older adults' ability to maintain or return to pre-admission function following hospitalization (Courtney et al., 2012; Theou et al., 2011). For gains to be made however, the exercise intervention must be physiologically adequate and needs to align with the older adult's abilities and goals to address specific needs such as fall risk, frailty, and multimorbidity (White et al., 2015). The literature on how exercise interventions should be structured according to type, intensity, time and frequency for older adults with complex healthcare needs post-acute hospital stay is scarce, making future exercise intervention optimization and implementation difficult.

One recent systematic review examined exercise interventions for older adults post-acute medical illness (Kanach et al., 2018); and, additional systematic reviews have investigated the benefits of exercise interventions on physical function in frail older adult (Cadore et al., 2013), and the management of frailty (de Labra et al., 2015; Theou et al., 2011).

Kanach and colleagues (2018) included 12 articles that were comprised of 11 different studies - aerobic exercise alone (n = 4), aerobic and resistance exercise (n = 3), and aerobic, resistance, balance, and/or flexibility exercises (n = 4) (Kanach et al., 2018).

The settings varied across studies and included inpatient, home, and outpatient settings (Kanach et al., 2018). The studies included in the systematic review had mixed results dependent upon the study outcome and the exercise intervention design (Kanach et al., 2018). Of the four studies that measured mobility, two studies found significant findings. Both were multicomponent and included resistance and balance/flexibility exercises (Kanach et al., 2018). Of the three studies that measured function, two found significant improvements (Kanach et al., 2018). Twenty percent of studies assessing role of exercise interventions on hospital readmission rates and length of stay found significant reduction in length of stay and hospital readmission rate for those participating in exercise compared to control interventions (Kanach et al., 2018). Last, most of the studies that measured quality of life found significant improvements (Kanach et al., 2018). Multicomponent exercise interventions were found to have greater benefits than one type of exercise alone. Because of the heterogeneity of exercise interventions across studies, the authors were unable to draw any conclusions about optimal exercise interventions for older adults post-acute hospital stay (Kanach et al., 2018).

The two systematic reviews that examined exercise interventions for the management of frailty also found multicomponent exercise interventions led to improvements in function (de Labra et al., 2015; Theou et al., 2011). The most commonly reported frequency of exercise intervention across both systematic reviews was 2-3 times a week (de Labra et al., 2015; Theou et al., 2011). Theou and colleagues found that exercises interventions that occurred at a minimum of three times a week were more likely to have significant physical and functional outcomes changes (Theou et al., 2011). The total intervention duration ranged greatly from one to 18 months (de Labra et

al., 2015; Theou et al., 2011), with those longer than five months showing fewer hospital readmission and health complications (Theou et al., 2011). Duration for each exercise session that produced the most physical and functional gains ranged from 30–45 minutes (Theou et al., 2011). De Labra and colleagues (2015) found approximately half of the included randomized control trials (RCTs) reported significant improvements in ADLs and physical outcomes. Due to the lack of specific descriptions of the exercises, both Theou et al (2011) and de Labra et al (2105) were unable to make any conclusions regarding the optimal exercise program for older adults with frailty.

A systematic review Cadore et al. (2013) aimed to recommends exercise strategies that improve the functional capacity in physically frail older adults on risk of falls, gait and balance in frail older adults. Cadore et al. (2013) found that multicomponent exercise interventions that included resistance, cardiovascular and balance exercises had the most benefits on gait, balance, and reducing the risk of falls. Based on included literature, Cadore et al. (2013) provided further information regarding recommendations for specific exercise frequency and intensities. The authors recommended that frail older adults should engage in resistance exercise three times a week, with three sets of eight to 12 repetitions at an intensity starting at 20% to 30%, progressing to 80% of one-repetition maximum. Cardiovascular exercise duration should be five to 10 minutes initially, progressing to 15 to 30 minutes, at an intensity of 12 to 14 on a 20-point Borg Scale.

However, details of exercise components and parameters are currently not clearly reported or justified across studies, making replication of exercise interventions in different settings and modifications to improve current exercise interventions very

difficult. This difficulty is not unique to research, international clinical practice guidelines for identification and management of frailty identified that physical activity is an important component in the management of frailty and recommended that older adults with frailty should be offered multicomponent physical activity program. Nonetheless, the recommendations stated that there is currently insufficient evidence available to identify the optimal frequency, intensity time and type of exercise that should be incorporated for the management and treatment of frailty (Dent et al., 2019). This concern has also been brought forward by the American Physical Therapy Association recommendations in 2015, where they stated that having clear and appropriate frequency, intensity and time guidelines for each exercise type is important to ensuring exercises are being completed at a level that will physiologically lead to functional gains (White et al., 2015).

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CHAPTER 2: Slow-Stream Rehabilitation for Older Adults: A Scoping Review

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Preface

This chapter contains the manuscript entitled "Slow-Stream Rehabilitation for Older Adults: A Scoping Review" The authors are: Melody Maximos, Sirirat Seng-iad, Ada Tang, Paul Stratford, and Vanina Dal Bello-Haas. My contribution to this work includes: study design; developing the research questions; developing the search strategy; conducting the literature search; title, abstract and article screening; data extraction, analysis, and interpretation; and writing the article. An expert health science librarian provided consultation to finalize the search strategy and terms. Co-author Sirirat Seng-iad contributed to title, abstract and article screening; data extraction, analysis and interpretation; and provided feedback on the manuscript. Co-authors Ada Tang and Paul Stratford provided advice on the research questions and data interpretation, and provided feedback on the manuscript. Vanina Dal Bello-Haas contributed to the design of the study, research questions, search strategy, data analysis and interpretation; and provided feedback on the manuscript. The search was performed in 2018 and all published articles and grey literature up to June 2018 were included in the scoping review. This chapter is copied as published in the *Canadian Journal of Aging* in 2019.

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Abstract

Canadian older adults with complex health problems are often considered ineligible for traditional rehabilitation programs, but may benefit from slow stream rehabilitation (SSR). This scoping review summarizes the literature related to SSR for older adults, within single-payer health care systems. **Methods:** Peer-reviewed and grey-literature documents relevant to older adults in SSR were systematically reviewed. **Results:** 1,445 documents were screened independently by two reviewers [Cohen Kappa value of 0.78 (CI = 0.73, 0.83)], and included 18 documents. SSR programs were found to be multidisciplinary with a mean duration ranging from 30 to 141.2 days. SSR participants were more likely to be female, with a mean age range of 72–82 years, multiple co-morbidities and mild-to-moderate cognitive impairments. SSR participants demonstrated improvements in physical and functional measures. **Discussion:** SSR programs have the potential to be an integral part of the continuum of care for older adults with complex medical histories.

Background

Canada has met a critical milestone: As of July 2016, there were a greater number of older adults than there were children under the age of 15 (Canadian Medical Association, 2016). With the increasing number of older adults comes a growing population that presents to the health care system with multiple health challenges. For example, 85 per cent of older adults are living with at least one or more chronic conditions (Patrick et al., 2001), and 25 per cent are living with frailty (Koné Pefoyo et al., 2015). Older adults make up 40 per cent of acute hospital stays and stay in hospital 1.5 times longer than those younger than 65 years of age (Canadian Institute for Health Information Board of Directors, 2011; Summary & The Canadian Medical Association, 2013). Thirty-five per cent of older adults admitted to the hospital every year experience a decline in activities of daily living (ADL) during their hospital stay, which, in turn, leads to difficulty returning and staying at home post-hospital discharge (Covinsky et al., 2003; Kortebein, 2009). Furthermore, 8.5 per cent of older adults discharged from the hospital return to the hospital within the first 30 days post-discharge (Pathipvanich et al., 2013). Those with a greater number of co-morbidities, frailty, cognitive decline, and dementia have the highest rates of readmission (Covinsky et al., 2003; Kortebein, 2009).

Canada's Medicare system was developed to address acute, episodic care for a fairly independent and healthy population (Canadian Medical Association, 2016). Older adults are often unprepared for transitions home from hospital and are not always physically or emotionally able to live independently, leading to increased caregiver stress, health care expenditures, and pressure on health care providers (Bauer, Fitzgerald, Haesler, & Manfrin, 2009). Despite the discussions and debates regarding the use of and need for

transitional rehabilitation programs and continuity of care for older adults living in the community, there continues to be a gap in providing an effective and efficient continuum of health care services for older adults that will keep older adults at home and out of hospitals. This gap has occurred in part due to the lack of availability of post-acute services, such as services to address chronic illness, medication management, disability adjustment, and transitional and community care needs (Koné Pefoyo et al., 2015).

Rehabilitation for Older Adults Post-hospitalization

There are a variety of rehabilitation program models intended to assist older adults to return to pre-illness function post-hospitalization, and programs vary in practice across the provinces. For example, in Ontario an older adult needing rehabilitation, but deemed not eligible for rehabilitation in the community, may enter a complex continuing care (CCC) unit or be considered for an alternate level of care (ALC), a level of care geared for patients who are medically stable but not ready to be discharged home due to loss of ability to perform ADL (Nord, 2009). Older adults undergoing rehabilitation in CCC or ALC tend to be frail, live alone, have multiple co-morbidities, and to be deemed to have low to no rehabilitative capacity, which is not always the case (Sutherland & Trafford Crump, 2013; Walker, Morris, & Frood, 2009).

Generally, rehabilitation programs for older adults have similar goals: to maximize functional recovery and independence post-hospitalization in a safe and cost-effective manner, and to decrease re-hospitalization (Kortebein, 2009). Traditional rehabilitation programs are considered to be shorter in duration and higher in intensity (Stott & Quinn, 2013). In Ontario, the typical length of traditional rehabilitation programs for older adults is two to eight weeks and with rehabilitation sessions taking place five to seven days a

week for 120 minutes a day. These programs are offered in the hospital (in-patient rehabilitation) or are delivered on an outpatient basis (GTA Rehab Network, 2008). Previous research has shown that traditional rehabilitation programs are beneficial for older adults transitioning from hospital to home and have a positive impact on physical function (gait speed, balance), ADL, and psychological health as well as disease management (Hirvensalo, Rantanen, & Heikkinen, 2000). A 2015 randomized control trial assessing physical function and hospital readmission rates in older adults with deconditioning undergoing hospital-based rehabilitation found a decrease in readmission rates 30 days post-hospital discharge (Kim et al., 2015). However, these older adults did not demonstrate significant improvements in ADL as measured by the Katz ADL Index, which may be due to the short duration of rehabilitation (Kim et al., 2015).

Kortebein (2009) conducted a literature review that examined the benefits of a multidisciplinary, traditional rehabilitation program model (subacute and acute rehabilitation wards) for older adults with *hospital-acquired deconditioning* (HAD) resulting from a prolonged stay. Improvements in function were found, and these older adults were able to successfully transition home. Kortebein suggested that patients should be assigned to their rehabilitation program depending on the amount of rehabilitation the older adult patient is able to withstand per session. An evaluation study by Ottenbacher et al. (2004) found that while 71 per cent of older adults participating in a traditional rehabilitation program returned to living in the community, 29 per cent were either admitted into institutionalized care or re-admitted to the hospital post-rehabilitation. Thus, it seems that not all older adults are able to benefit from the shorter duration and

higher intensity traditional rehabilitation program model to the same extent and may require a different model of care.

Slow-Stream Rehabilitation

Older adults with a greater number of co-morbidities and more serious health conditions tend to make smaller functional gains and require longer lengths of hospital stays (Patrick et al., 2001). It is thought that older adults with complex health problems such as multiple co-morbidities, severe stroke, dementia, and frailty may not be able to withstand the typical shorter duration and higher intensity of traditional rehabilitation programs, and may struggle to rehabilitate back to independent living (GTA Rehab Network, 2008). A review assessing the prognosis for functional recovery of older adults in Canadian hospitals found that older adults who are discharged from hospital with new or additional disability in ADL require a longer duration of rehabilitation than current traditional rehabilitation programs (Kortebein, 2009).

Due to decreased therapeutic gains, the rising number of older adults with complex health problems, and the need to address the problems of traditional rehabilitation for a complex older adult population, some countries have introduced slow stream rehabilitation (SSR) programs into CCC units, stroke rehabilitation units, in-patient rehabilitation units, and nursing homes (South West LHIN, 2009; Sutherland & Trafford Crump, 2013). SSR programs were first introduced in Australia in nursing homes in 1987 as a way of maintaining function for severely deconditioned older adults who resided in nursing homes (O'Neill, McCarthy, & Newton, 1987). SSR programs tend to be lower intensity and of longer duration, and to target older adults who have multiple complex health problems and who may not tolerate or benefit from traditional rehabilitation (GTA

Rehab Network, 2008). The only literature review completed to date on the topic of SSR is a grey literature scoping review exploring SSR for people with acquired brain injury (ABI) (Piccenna, Knox, & Jacinta, 2016). The authors, who found SSR to be beneficial for adults and older adults with ABI, described SSR as being multidisciplinary (based on personally relevant goals and the needs of the individual), outcome driven, and bridging an integrated model of functioning disability and health.

Despite the growing body of research on the benefits of rehabilitation for older adults, we found a large variation in rehabilitation programs that are offered and no clear parameters of who may benefit the most from different models of care. No literature to date has attempted to explore the characteristics of older adults attending SSR programs, SSR program characteristics (e.g., duration [total number of days spent in SSR]; SSR intensity [frequency and amount of time spent in an individual rehabilitation session]; or health professionals involved in SSR), and the benefits of SSR for older adults.

The primary purpose of the scoping review we conducted was to summarize the current body of literature related to SSR for older adults in single-payer health care systems, where "single payer" or "single payer–like" refers to health care funded by the government either through government or quasi-government organizations (World Health Organization, 2018).

Methods

The Canadian Institute of Health Research defines a scoping review as a methodology that aims to explore the breadth of literature on a topic of interest; systematically map the findings; and identify key concepts, theories, gaps, and future direction (Hidalgo Landa, Szabo, Le Brun, Owen, & Fletcher, 2011). We used the framework proposed by Arksey

and O'Malley, and the suggestions proposed by Levac et al. (2010), to guide the current scoping review steps and processes (Levac et al., 2010). This framework entails five methodological steps: (a) identify the research question, (b) identify relevant studies, (c) select the studies, (d) chart the data, and (e) collate, summarise, and report the results (Levac et al., 2010).

Step 1: Identify the Research Question

We developed the following research questions with a focus on SSR programs that are available for older adults in single-payer or single payer–like health care systems: What are the characteristics of the older adult patient population (aged 60 years and older) participating in SSR programs? What are the characteristics of SSR programs for older adults with regards to program duration, intensity, setting/location, and clinical practitioners involved? What are the functional, physical, and other outcomes of SSR programs for older adults? To reduce the confounders related to privatized health care systems and to ensure that the results had direct application to the Canadian health care system, we chose to focus on countries with single-payer or single payer–like health care systems.

Step 2: Identify Relevant Studies

The search terms we identified were based upon review of relevant literature and consensus between two authors (MM, SS) (Table 1). We subsequently conducted a three-step search strategy to identify all relevant journal articles and grey literature documents. The first search involved two databases, CINAHL and OVID, in order to identify terms that were synonymous with SSR. Phrases from titles, abstracts, and search terms were then included in the search strategy. Prior to a second search, we consulted with an expert

health science librarian for finalization of search terms and search strategy. The second search using all identified search terms and combinations (Table 1) occurred in five primary literature databases (CINAHL, Cochrane, Web of Science, OVID Medline, and OVID Embase), and three grey literature databases (Canadian Public Policy Collection and Global Health, Global Health, and Public Affairs Information Services [PAIS]), in order to cast a wide net and to encompass a variety of settings in which rehabilitation takes place – for example, community, hospital, and nursing homes. The third search we conducted involved reference lists of selected articles that we searched to identify any missing resources. For purposes of searching the databases, all sources of information were potentially eligible in order to capture a broad breadth of primary and grey literature, including policy papers. No date restrictions were applied in order to understand the manifestation and history of SSR (Table 2). Literature sources had to be written in English or published with English translation.

Step 3: Select the Studies

Because the intent of the scoping review was to capture a wide breadth of literature, we used the following inclusion criteria:

(1) Population included were older adult participants aged 60 years and older (World Health Organization [WHO], 2002). We used the WHO definition of *older adult*, anticipating that literature and documents would originate from different countries.

(2) Any health condition or diagnosis, except ABI or end-stage degenerative disease.

(3) Rehabilitation had to be described as one or more of the following: slow-stream, low intensity, long duration, low tolerance, slow to recover. These terms were chosen based upon a review of the literature and the Toronto Rehabilitation Framework (GTA

Rehab Network, 2008). Intensity was considered in the context of the amount of rehabilitation time for sessions – for example, amount of time for an individual session and frequency per week, whereas duration was considered as the total number of days within the SSR program. No cut-off values for either were considered due to the current lack of available operational definitions or empirical values;

(4) All types of rehabilitation settings.

(5) Health care systems similar to that of Canada – for example, single payer or single payer–like. We did not have an a priori list of countries with single-payer health care systems, rather countries as identified in articles and documents were deemed eligible for inclusion through further research of the health care system;

(6) All publication dates to June 2018.

(7) Peer-reviewed papers (quantitative and qualitative methodologies), case studies, conference abstracts, dissertations, hospital reports, policy papers.

To keep the patient population consistent (Mlinac & Feng, 2016), we did not include papers or documents that described SSR (a) years after initial onset of health condition or diagnosis; (b) for end-stage degenerative conditions, as the focus would be palliative care; (c) as programs whose primary purpose was caregiver relief. We did not include ABI, as Piccenna et al. (2016) conducted a scoping review related to this diagnosis. Last, we also did not include textbooks or book chapters. Table 2 shows the complete list of document inclusion and exclusion criteria.

Titles and abstracts were imported into Mendeley Version 1.19.2 (2008–2018 Mendeley Ltd.), and duplicates were automatically removed by the Mendeley program. Titles and abstracts were then independently reviewed by two author reviewers (MM, SS)

based upon the inclusion and exclusion criteria. Disagreements were resolved via discussion with a third author reviewer (VBDH). Full-text data extraction was independently undertaken. A Kappa value was calculated using SPSS version 24. We did not determine the Kappa value a priori, but we were looking for substantial agreement. It is suggested that Kappa results be interpreted as following: values ≤ 0 as no agreement, 0.01–0.20 as slight agreement, 0.21–0.40 as fair, 0.41–0.60 as moderate, 0.61–0.80 as substantial, and 0.81–1.00 as almost perfect agreement (McHugh, 2012), thus anything above 0.61 would have been deemed acceptable.

Steps 4 and 5: Chart, Collate, Summarise, and Report the Results

To document information from the included published articles and grey literature, an Excel spreadsheet was created and securely hosted online, so that all research team members had access. We extracted details regarding publication year, country of publication, methodology, objective(s), sample size, participant characteristics (e.g., age, sex, number of co-morbidities), program description, length of stay, outcome measures used (e.g., physical outcomes, ADL measures) and discharge destination.

According to Levac et al. (2010), part of collating, summarizing, and reporting of the results is to map the findings and produce a numerical analysis of the extent and nature of studies using tables and charts. Accordingly, we included tables and reported the range of means. To answer the first research question, we reported the range of means for the following across the literature documents: age, number of co-morbidities, sex percentage, diagnosis, or reason for rehabilitation. To answer the second research question, we reported the range of means across the literature documents for total SSR program duration (length of stay, or LOS), intensity – frequency (number of individual sessions

per week), and amount of time spent in an individual session. In addition, we extracted the composition of the SSR team. To address the benefits of SSR programs for older adults, we also extracted (e.g., means reported) the outcome measures used and results.

Results

A total of 1,445 literature documents were screened by two reviewers (MM, SS) with a Cohen Kappa value of 0.78, (CI = 0.73, 0.83), which is indicative of substantial agreement. Sixty-four articles and documents remained after assessment for eligibility. Reasons for exclusion at this point were as follows: the program was not an SSR program (n = 32); government did not fund the program – the older adult individuals had to pay out of pocket for rehabilitation; all four programs were conducted in the United States whose health care system is not single payer (n = 4); and age, health condition, or diagnosis did not meet the inclusion criteria (n = 7; for example, ABI in young adults; diagnosis of stroke 10 years ago; Down syndrome) (Figure 1).

After initial and full text review, we included 21 primary articles and grey literature documents: 11 peer-reviewed articles, five conference abstracts, and five report documents. Three documents (Englund, 1987; Raymond, Winter, & Holland, 2015; Wilson & Ballentyne, 2017) did not describe the SSR program or outcomes of the program, and therefore we later excluded them in the data extraction phase: (a) one of the three excluded documents was a measurement study aimed at validating an activity monitor in a hospital-based SSR setting (Raymond, Winter, & Holland, 2015; peer-reviewed); (b) one of three excluded was a critique of the methodology used in O'Neill et al.'s 1987 article and a response to the critique in 1987 (Englund, 1987; peer-reviewed); and (c) the last excluded document was a description of the role of occupational

therapists in SSR (Wilson & Ballentyne, 2017; conference abstract). Ultimately, 18 included literature documents remained – nine peer-reviewed articles, four conference abstracts, and five report documents.

The final 18 literature documents were published in four different countries: Australia (O'Neill et al., 1987; Parker, Hill, Cobden, Davidson, & McBurney, 2015; Salgado et al., 1995); Canada (ALC Expert Panel, 2006; Berall, Naglie, Katz, Chang, & Leung, 2013; GTA Rehab Network, 2008; Katz et al., 2013; Kubilius, Rose, Pettit, & St. Amant, 2016; Leung et al., 2014; Leung et al., 2016; Ontario Hospital Association, 2006; Ontario Stroke Network, 2013; South West LHIN, 2009; Teasell, Foley, Bhogal, Chakravertty, & Bluvol, 2005; Tourangeau et al., 2011); Singapore (Chong, Empensando, Ding, & Tan, 2012; Zhang, Ang, & Kwek, 2015); and the Netherlands (Spruit-van Eijk, Zuidema, Buijck, Koopmans, & Geurts, 2012) (Table 3).

SSR research originated in Australia in 1987 and publications continued until 1995. From 1995 to 2005, there were no SSR-related publications. In 2005, the first Canadian SSR paper was published, describing SSR in the hospital setting for older adults with severe stroke who could not withstand traditional hospital rehabilitation (Teasell et al., 2005). Since 2005, there have been 12 Canadian SSR-related documents published (Table 3). Of the 13 peer-reviewed articles and conference abstract included, 10 (76.9%) were cohort studies – three retrospective cohort studies (Chong et al., 2012; Kubilius et al., 2016; Teasell et al., 2005) and seven prospective cohort studies (Berall et al., 2013; Katz et al., 2013; Leung et al., 2014; Leung et al., 2016; O'Neill et al., 1987; Spruit-van Eijk et al., 2012; Tourangeau et al., 2011). There were three randomized control trials (RCT) conducted to compare SSR to different models of care (Parker et al., 2015;

Salgado et al., 1995; Zhang et al., 2015). Refer to Table 3 for the list of literature documented and their methodology.

Within the five report documents, there was one report describing a hospital framework (GTA Rehab Network, 2008), three hospital evaluation reports (ALC Expert Panel, 2006; Ontario Hospital Association, 2006; South West LHIN, 2009), and one stroke rehabilitation recommendation report (Ontario Stroke Network, 2013). The geriatric rehabilitation framework report published by the Greater Toronto Area (GTA) Rehab Network discussed the differing types of geriatric in-patient rehabilitation units available to older adult patients and gave guidelines as to when an SSR program should be used and what an SSR program should entail (GTA Rehab Network, 2008). Two of the three hospital evaluation reports assessed hospital-based rehabilitation in CCC units in Ontario (South West LHIN, 2009; Ontario Hospital Association, 2006) and reported lack of clarity, lack of information, and lack of resources available for health care practitioners when making rehabilitation decisions regarding CCC rehabilitation for older adult patients. The report by the LHIN concluded that many CCC programs and rehabilitation programs were not appropriately utilized and that transition and referral processes need to be enhanced (South West LHIN, 2009). The last hospital report, written by an expert panel, was ALC focused with the aim of assessing levels of care and flow of care into in-patient SSR units (ALC Expert Panel, 2006). The ALC panel reported that patient flow to SSR occurred following specialized rehabilitation when an older adult was considered stable but unable to return to community living (ALC Expert Panel, 2006).

Finally, the report conducted by the Ontario Stroke Network compared the use of SSR in CCC hospital units to an active stroke rehabilitation unit for patients with stroke. The

Ontario Stroke Network found that older adult individuals with severe stroke who were admitted to an active stroke rehabilitation program had a shorter length of stay and similar functional outcomes. The Ontario Stroke Network (2013) recommended that older adult patients, who could potentially withstand active stroke rehabilitation, would be better served by admission to active stroke in-patient rehabilitation than by an SSR program in CCC.

Characteristics of SSR Program for Older Adults

Of all 18 reported literature documents, 15 described staff available in SSR programs (ALC Expert Panel, 2006; Berall et al., 2013; GTA Rehab Network, 2008; Katz et al., 2013; Leung et al., 2014; Leung et al., 2016; O'Neill et al., 1987; Ontario Stroke Network, 2013; Ontario Hospital Association, 2006; Parker et al., 2015; Salgado et al., 1995; South West LHIN, 2009; Spruit-van Eijk et al., 2012; Teasell et al., 2005; Zhang et al., 2015) (Table 4). All 15 described SSR programs as multidisciplinary, and included a physiotherapist, occupational therapist, and nurse practitioner or physician as part of the rehabilitation team. Other health care professionals included on SSR teams were as follows: physiotherapy assistant in six of the 15 programs, an occupational therapy assistant in four of the 15 programs, social worker in five of the 15 programs, speech language pathologist in eight of the 15 programs, dietician in seven of the 15 programs, and recreational therapist in three of the 15 programs.

Total SSR program duration (LOS) was recorded for 15 of the 18 (83%) literature documents, with a range across literature documents of 30 days to 141.2 days (Berall et al., 2013; Chong et al., 2012; Katz et al., 2013; Kubilius et al., 2016; Leung et al., 2014; Leung et al., 2016; O'Neill et al., 1987; Ontario Stroke Network, 2013; Salgado et al.,

1995; South West LHIN, 2009; Spruit-van Eijk et al., 2012; Teasell et al., 2005; Tourangeau et al., 2011; Zhang et al., 2015). Only 10 of 18 (55%) included documents described the SSR session intensity (Berall et al., 2013; GTA Rehab Network, 2008; Katz et al., 2013; Leung et al., 2014; Leung et al., 2016; Parker et al., 2015; Salgado et al.,1995; Spruit-van Eijk et al., 2012; Teasell et al., 2005; Tourangeau et al., 2011). The number of rehabilitation sessions attended by participants per week varied from once a week (Salgado et al.,1995) to five times per week (Berall et al., 2013; GTA Rehab Network, 2008; Katz et al., 2013; Leung et al., 2014; Leung et al., 2016; Teasell et al., 2005; Tourangeau et al., 2011).

The amount of time of each rehabilitation session ranged from 20 minutes (GTA Rehab Network, 2008) to 60 minutes (Tourangeau et al., 2011). For all 18 included documents, SSR programs were offered as in-patient programs, meaning the older adult stayed overnight at the rehabilitation location. Nine (50%) of the 18 SSR programs took place in in-patient hospital rehabilitation wards (Berall et al., 2013; GTA Rehab Network, 2008; Katz et al., 2013; Leung et al., 2014; Leung et al., 2016; Parker et al., 2015; Teasell et al., 2005; Zhang et al., 2015; Ontario Stroke Network, 2013); five (27.8%) in CCC units (ALC Expert Panel, 2006; Ontario Hospital Association, 2006; South West LHIN, 2009; Tourangeau et al., 2011); three (16.7%) in nursing homes (O'Neill et al., 1987; Salgado et al., 1995; Spruit-van Eijk et al., 2012); and one (5.5%) in a subacute rehabilitation (Chong et al., 2012). Table 4 lists characteristics of SSR programs.

Characteristics of Older Adults Participating in SSR Programs

Age was reported in 16 of the 18 literature documents, with youngest reported mean age being 72 years (Teasell et al., 2005) and oldest reported mean age being 82 years

(Berall et al., 2013; Katz et al., 2013; Leung et al., 2014; Salgado et al., 1995). Eleven (61.1%) of 18 included documents provided information regarding sex distribution of SSR participants (Berall et al., 2013; Chong et al., 2012; Katz et al., 2013; Leung et al., 2014; Leung et al., 2016; O'Neill et al., 1987; Parker et al., 2015; Spruit-van Eijk et al., 2012; Teasell et al., 2005; Tourangeau et al., 2011; Zhang et al., 2015). The percentage of female participants ranged from 47 per cent (Teasell et al., 2005) to 81 per cent (Zhang et al., 2015). Across all 18 included literature documents, six (Chong et al., 2012; Leung et al., 2016; Parker et al., 2015; South West LHIN, 2009; Zhang et al., 2015) reported patients' co-morbidities, with the lowest mean number of co-morbidities being 1.7 (Chong et al., 2012) and the highest mean being 7.3 (Parker et al., 2015). Primary diagnosis was reported in all 18 literature documents. Multiple primary diagnoses were reported with the most common primary diagnoses of older adult SSR participants being stroke, deconditioning, orthopaedic conditions, chronic complex health conditions, surgery, cognitive impairments, frailty, and falls. Secondary diagnosis was reported in nine of the 18 literature documents and included multiple chronic complex conditions, cognitive impairment, and frailty. See Table 5 for demographics and health history of older adults attending SSR programs.

Cognitive Ability

Four literature documents used a measure of cognitive ability at baseline, and these documents reported that most of the older adult participants had some level of cognitive impairment or delirium (Berall et al., 2013; Katz et al., 2013; Leung et al., 2016; Spruit-van et al., 2012). Leung et al. (2016) reported that 72 per cent of participants had some cognitive impairment, and 83 per cent had some level of delirium (Leung et al., 2016).

Similarly, Berall et al. reported that 85 per cent of participants had mild to moderate cognitive impairment on admission (Berall et al., 2013). Spruit-van et al. (2012) reported a mean Mini-Mental State Exam (MMSE) score of 23, indicative of mild cognitive impairment.

Outcome Measures Used in Slow Stream Rehabilitation for Older Adult Participants

For a summary of included documents, outcome measures used, and reported findings, see Tables 6a and 6b. The majority of documents (13 of the 18, 72.2%) used outcome measures to describe or assess the SSR program (Berall et al., 2013; Chong et al., 2012; Katz et al., 2013; Kubilius et al., 2016; Leung et al., 2014; Leung et al., 2016; O'Neill et al., 1987; Parker et al., 2015; Salgado et al.,1995; Spruit-van Eijk et al., 2012; Teasell et al., 2005; Tourangeau et al., 2011; Zhang et al., 2015). Over three quarters (76.9%, 10 of 13) of the literature documents that used outcome measures used a measure of ADL or function to assess change from baseline to discharge (Berall et al., 2013; Katz et al., 2013; Kubilius et al., 2016; Leung et al., 2014; Leung et al., 2016; O'Neill et al., 1987; Parker et al., 2015; Spruit-van Eijk et al., 2012; Teasell et al., 2005; Tourangeau et al., 2011). The most commonly used measure was the Functional Independence Measure (60%, 6 of 10) (Berall et al., 2013; Katz et al., 2013; Kubilius et al., 2016; Leung et al., 2014; Leung et al., 2016; Teasell et al., 2005), but others included the ADL hierarchy (Tourangeau et al., 2011), de Morton Mobility Index (DEMMI) (Parker et al., 2015), Barthel Index (BI) (Spruit-van Eijk et al., 2012), and one tool created by the authors to measure dependency level for completion of ADL (O'Neill et al., 1987).

Researchers used physical outcome measures to assess change from SSR admission to discharge in seven of 13 (53.8%) literature documents (Berall et al., 2013; Katz et al., 2013; Leung et al., 2016; O'Neill et al., 1987; Parker et al., 2015; Spruit-van Eijk et al., 2012; Zhang et al., 2015). The most often-used measure was the Berg Balance Scale (71.4%), accounting for five of the seven literature documents examining physical outcomes (Berall et al., 2013; Katz et al., 2013; Leung et al., 2016; Parker et al., 2015; Spruit-van Eijk et al., 2012). Other physical outcome measures applied included the Parker Mobility Score (Zhang et al., 2015), Modified Harris Hip Score (Zhang et al., 2015), five times sit-to-stand test (Parker et al., 2015), ambulation ability or speed (Berall et al., 2013; Katz et al., 2013; Leung et al., 2016), grip strength (Leung et al., 2016), and a researcher-designed mobility score (O'Neill et al., 1987).

Only three of the 13 (23.1%) included literature documents included psychological or other outcome measures including (a) the patient Health Questionnaire (Leung et al., 2016), which includes questions about mental and emotional status, such as feelings of depression; (b) Geriatric Depression Scale (GDS) (Tourangeau et al., 2011; Spruit-van Eijk et al., 2012), and (c) a measure of social engagement (Leung et al., 2016)

Outcomes of Slow Stream Rehabilitation for Older Adults

Changes in Function and Activities of Daily Living

Baseline mean total FIM scores across the six literature documents (Berall et al., 2013; Katz et al., 2013; Kubilius et al., 2016; Leung et al., 2014; Leung et al., 2016; Teasell et al., 2005) ranged from 46 (Teasell et al., 2005) to 55.8 (Leung et al., 2016). Discharge mean FIM scores across the six literature documents (Berall et al., 2013; Katz et al., 2013; Leung et al., 2014; Leung et al., 2016; Teasell et al., 2005) ranged from 70 (Teasell

et al., 2005) to 78 (Leung et al., 2016), with all the changes from baseline to discharge being reported as both clinically and statistically significant. Other ADL measures used such as the Barthel Index (Spruit-van Eijk et al., 2012), the ADL hierarchy scale (Tourangeau et al., 2011), the de Morton Mobility Index (Parker et al., 2015), and dependency rating (O'Neill et al., 1987) all showed improvements from baseline to discharge.

Changes in Physical Outcomes

The five literature documents (Berall et al., 2013; Katz et al., 2013; Spruit-Van Eijk et al., 2012; Leung et al., 2016; Parker et al., 2015) that used the Berg Balance Score (BBS) as a physical outcome measure reported an increase in the BBS from baseline to post-SSR. The mean change in BBS score from baseline to discharge ranged, in points, from three (Parker et al., 2015) to 10 (Leung et al., 2016). Older adult participants with the greatest increase in BBS score completed SSR in an in-patient hospital rehabilitation unit and had the lowest mean BBS baseline scores: 9.2 (Leung et al., 2016). Older adult participants showing the smallest mean change in BBS had a higher baseline mean score (44), greater functional ability, and were participating in an RCT study wherein SSR as standard care was compared to SSR plus additional functional exercises (Parker et al. 2015) – SSR-only participants scored a 3-point mean increase in BBS whereas those in the SSR plus additional functional exercise had a 7-point mean increase. All other literature documents that applied physical outcome measures (walking speed, grip strength, or mobility measures) found statistically significant increases in scores from baseline to discharge of SSR, but none reported whether a clinically significant change was achieved (Leung et al., 2014; Leung et al., 2016; Zhang et al., 2015).

Of all included literature documents assessing SSR programs, only one literature document examined the long-term benefits. Zhang et al. (2015) conducted a quasi-RCT comparing home rehabilitation, intensive rehabilitation, and SSR for older adults at 3, 6, and 12 months post-femoral fracture. Zhang et al. (2015) found that there were no differences in walking ability (Parker Mobility scores) between home care and SSR at any time point, but intensive rehabilitation was effective in improving walking ability (Parker Mobility scores) and function (Mod Harris Hip score) at all-time points.

Changes in Psychological Measures

Of the three literature documents that assessed changes in emotional or psychological states, two found a decrease in depression scores from baseline to discharge using a Depression Rating Scale (Tourangeau et al., 2011) and the Patient Health Questionnaire (Leung et al., 2016). Spruit-van Eijk (2012) found that those discharged home were less likely to have depression (23% with depression as measured by the Geriatric Depression Scale, GDS) in comparison to those discharged to long-term care (40% with depression as measured by the GDS).

Discharge Destination

Ten (55.6%) of the 18 literature documents included discharge destination (Berall et al., 2013; Chong et al., 2012; Kubilius et al., 2016; Leung et al., 2014; Leung et al., 2016; O'Neill et al., 1987; Parker et al., 2015; Salgado et al.,1995; Spruit-van Eijk et al., 2012 Tourangeau et al., 2011). The reported range across literature documents of mean percentage of older adult participants who were discharged back into the community after SSR were 44 per cent to 70 per cent. The literature documents with the highest discharge rates to home described SSR programs based in in-patient units with an average LOS of

85–88 days (Berall et al., 2013; Spruit-van Eijk et al., 2012). Older adult participants had an average age range of 79–82 years and also had cognitive impairment. The lowest discharge rates to home were from nursing home–based SSR programs, with an average LOS of 81 days. Older adults had an average age of 78 years, and 81 per cent were considered to have neurological deficits and an average dependency rate of 2.1 out of 4, meaning that they required light assistance with ADL (O'Neill et al., 1987).

Discussion

The aim of this scoping review was to develop a greater understanding of the available literature on SSR programs, within single-payer or single payer–like health care systems. Through report documents, empirical literature, and research abstracts, this scoping review illustrates the similarities between SSR programs, highlights the differences and areas for improvement, discusses the benefits for older adults participating in SSR, identifies the role of SSR programs in Canadian health care, and proposes a need for continued research.

Slow Stream Rehabilitation Programs

Similarities across Current SSR Programs. We can surmise from the included literature documents that SSR programs are typically not disease- or health condition-specific, but instead target community-living older adult patients who may be struggling with independent living, have HAD, complex health problems, or cannot be discharged home even after participating in a condition-specific rehabilitation program. SSR programs are offered as in-patient rehabilitation programs or are integrated into hospitals (ALC, CCC, hospital in-patient rehabilitation) and nursing homes, with the goal of discharging the older adult back into the community and avoiding institutionalized care.

SSR programs are multidisciplinary, encompassing a physiotherapist (PT), occupational therapist (OT), and physician or nursing staff, and in some cases include other health professionals for some SSR models – for instance, PT or OT assistants, dieticians, speech language pathologists (SLP), and recreational therapists. The most common rehabilitation set-up for SSR programs is five times a week for 30 minutes a day with a two- to three-month length of stay (Berall et al., 2013; GTA Rehab Network, 2008; Leung et al., 2014; Leung et al., 2016; Teasell et al., 2005; Tourangeau et al., 2011). SSR programs that focused on functional exercises and had dieticians, SLP, and recreational therapists in addition to PT, OT, and a physician or nurse on the team tended to show the greatest benefits.

Differences and Shortcomings of Current SSR Programs. The major differences we found in the SSR programs that were included in this scoping review relate to (a) the frequency and duration of the individual sessions, (b) the total length of the program, and (c) the various SSR program locations: for example, in-patient acute ward, CCC units, and nursing homes. The available resources and demands of particular SSR programs included may play a role in how the program is structured in terms of length of stay, extent of daily rehabilitation received, and the composition of the rehabilitation team. SSR programs that took place in nursing home or stroke units tended to have the longest LOS, as the patients presented with greater disability according to baseline scores and could not as readily be discharged home (Salgado et al.,1995; Spruit-van Eijk et al., 2012; Tourangeau et al., 2011). In comparison, programs that took place in subacute care units had the shortest LOS (Chong et al., 2012). The duration of SSR should be dependent upon the older adults' progression and meeting of goals. Thus, location for SSR programs

should be one that can offer longer durations and fewer pressures for health care providers to discharge the patient as quickly as possible.

The major limitation of the included documents was the lack of specific information regarding the SSR program as to whether it comprised (for example) specific exercises (type or intensity); specific interventions such as PT, OT, SLP, nursing or recreation therapy interventions; the referral process; goals specific to the older adult patient and knowledge regarding SSR programs offered for older adults; the discharge process; and so on. None of the 18 included literature documents included specific information regarding the details of a rehabilitation program, which poses barriers for (a) implementing it in community programs or hospitals that wish to introduce SSR programs into their organizations; (b) ensuring fidelity of the interventions; and (c) comparing the benefits of SSR programs to other programs, such as home rehabilitation or traditional rehabilitation. The lack of information regarding the referral process may lead to suboptimal patient flow and health care provider confusion. The ALC Expert Panel (2006), Ontario Stroke Network (2013), and South West LHIN (2009) documents all indicated that hospitals need to increase education about available rehabilitation programs and their use, develop a standard definition for the various components within the continuum of care, and identify where different rehabilitation programs fit within the continuum of health care.

In the absence of these strategies, issues related to improper program implementation and lack of appropriate pathways for the older adult patient could lead to older adults with complex health needs being more likely to be discharged into institutionalized care (ALC Expert Panel, 2006; Ontario Stroke Network, 2013; South

West LHIN, 2009), rather than benefitting from a longer-duration, low-intensity program. Last, none of the 18 articles or documents reported the older adult patients' personal goals. This could be an issue because older adults may meet the program goals or goals set by the health care professional, but may be discharged home without having their own goals met. For example, if an older adult's specific goal is to return to attending a weekly community-based social gathering, she may experience isolation, depression, and decreased quality of life if she did not achieve her personal goal even though her scores on functional measures improved prior to discharge home. Furthermore, research has shown that when patients are involved with setting their own goals and set goals they perceive as important, they are more likely to be more independent (Reuben & Tinetti, 2012; Schulman-Green, Naik, Bradley, McCorkle, & Bogardus, 2006).

SSR Programs and Older Adults

Similarities of Older Adults Participating in SSR Programs. According to our findings, SSR programs most often serve older adults who are in their 70s and 80s, have the lower baseline physical function scores compared to age-normative values (Heinemann, Linacre, Wright, Hamilton, & Granger, 1993; Long et al., 1994), have multiple co-morbidities, some level of cognitive impairment, and have HAD (Berall et al., 2013; Chong et al., 2012; Katz et al., 2013; Leung et al., 2014; Leung et al., 2016; O'Neill et al., 1987; Parker et al., 2015; Salgado et al.,1995). Essentially, SSR programs have demonstrated benefits for older adults who would typically be considered as having low rehabilitative potential by health care professionals (Burton, Horne, Woodward-Nutt, Bowen, & Tyrrell, 2015; GTA Rehab Network, 2008; Kortebein, 2009; Patrick et al., 2001).

We found that 44 per cent to 70 per cent of older adult patients attending SSR programs returned back to independent living in the community. Approximately 75 per cent of older adults' experience HAD, with HAD being more common in older adults with multi-morbidity, cognitive decline, and low physical function (Covinsky et al., 2003). Rehabilitation programs that target older adults with HAD have been shown to improve long-term survival and function, with most programs being offered in a sub-acute in-patient rehabilitation (low intensity, long duration) setting where the goal is to maximize functional recovery (Kortebein, 2009).

In SSR programs that reported on a specialized rehabilitation population (stroke and post-femoral surgery), the subpopulation that benefited the most from SSR involved older adults with multiple co-morbidities and low physical function (Tourangeau et al., 2011; Zhang et al., 2015). The findings of this scoping review align with the findings of systematic reviews of rehabilitation post-femoral surgery (Beaupre et al., 2013; McGilton et al., 2012), wherein older adults with complex health problems, low discharge probability, and cognitive impairment were found to benefit from longer duration, low intensity rehabilitation. Similar trends were found in the stroke literature. Tourangeau et al. (2011) found that older adults with severe stroke admitted to CCC were more likely to have mild cognitive impairment, depression, require assistance with ADL, and were considered to have low rehabilitative potential; however, they were also more likely to make significant physical gains during SSR. What remains unknown is the longer-term benefits of SSR in terms of physical improvements and the ability to remain at home.

Differences in Benefits of Older Adults Participating in SSR Programs

Our scoping review found that not all older adults benefit from SSR over traditional rehabilitation (GTA Rehab Network, 2008; Ontario Stroke Network, 2013; Zhang et al., 2015). Older adults who are considered healthier, have a low number of co-morbidities, little cognitive decline, are fairly independent in ADL, and require only specialized rehabilitation may benefit more from more traditional rehabilitation programs. A quasi-randomized trial comparing SSR to intensive specialized rehabilitation for older adults post-hemiarthroplasty found that the short, intensive rehabilitation program was more beneficial than SSR when the older adult participant had fewer co-morbidities, lower mortality scores, and were younger (Zhang et al., 2015). Consequently, not all older adults may benefit equally from SSR and there may be a sub-group of older adults who can withstand and can benefit more from traditional rehabilitation programs.

Similar conclusions can be made regarding SSR for older adults' post-stroke. Older adults who attended a specialized stroke rehabilitation program were more likely to be readmitted to rehabilitation if they were older, female, unable to complete ADL, and had other complex health issues (Canadian Institute for Health Information, 2009). One of the reports included in this scoping review, an evaluation and recommendations report by the Ontario Stroke Network, indicated that patients with severe stroke who were originally thought to benefit more from rehabilitation in an SSR program actually had better outcomes in more intensive rehabilitation programs, but arguably this meant only those individuals who have the ability to readily be discharged home (Ontario Stroke Network, 2013).

Integrating SSR Programs into Canada's Current Health Care System

As previously mentioned, all SSR programs included were offered within in-patient settings, yet that may not be Canada's best option. Housing SSR programs within hospitals places a burden on the health care system and decreases hospital resources. Housing these programs in nursing homes and assisted living facilities may result in increased wait times for patients unable to live independently, or who are waiting for assisted living or long-term care. A more economical model may be to house SSR programs in the community. Bean, Vora, and Frontera, (2004) and Tuntland, Aaslund, Espehaug, Førland, and Kjeken (2015) found that community programs were effective in decreasing mortality, enhancing physiological capacity, increasing overall function, increasing overall health-related quality of life, and preserving the older adult's ability to live independently. Two reviews conducted a cost-effective analysis of community programs across Australia and the United States and found that programs housed in the community are 20 per cent more cost-effective than in-patient rehabilitation programs (Brown et al., 2015; Kjerstad & Tuntland, 2016).

With the growing number of older adults with multiple co-morbidities and complex health problems living in the community (Canadian Medical Association, 2016), the demand for effective rehabilitation models, including SSR models, will only increase. In order to address the burden this will place on hospitals and nursing homes, Canada's health care system should develop more initiatives focused on community-based rehabilitation that includes physical activity, chronic disease management, and support for older adults to remain in the community post-hospital discharge. Implementation of these programs has great potential to support healthy aging and "aging-in-place" post-

hospitalization, as well as the potential to decrease the need for the number of long-term care beds and assisted-living wait times, in addition to the use of ALC and hospital re-admissions.

Future Direction

From this scoping review, we have begun to understand which older adults benefit from SSR programs, where SSR programs are currently housed and, in broad terms, what they encompass. However, there still remain many unanswered questions. More studies and focused program evaluations need to be conducted in order to further understand, better define, and optimize SSR program design. Future studies should assess specifics of program design – for example, the optimal amount of rehabilitation time, optimal length of stay for rehabilitation-related gains, details regarding individual rehabilitation sessions, and specific interventions in order to produce best-practice guidelines for SSR programs. Very few studies to date have compared SSR to other rehabilitation models. In our current search, only one of the three randomized control trials assessed the benefits of adding additional non-supervised exercises to their current SSR programs (Parker et al., 2015). Parker et al. (2015) did find some improvement in physical function, but the improvements were not statistically significant; this finding may be a result of not having a method to measure adherence in the intervention group. More RCTs need to be conducted in order to assess whether SSR programs have an equivalent or greater effect on increasing functional independence for older adults with complex needs following prolonged hospital compared to more intensive rehabilitation, standard hospital rehabilitation, or home care.

Furthermore, no research has assessed patient-specific goals for SSR programs and how those program goals may compare to the types of patient specific goals being set in traditional rehabilitation programs. There is also no research related to the long-term benefits of SSR programs. Most studies and grey literature documents examined whether older adults were discharged home, or to long-term care or assisted-living facilities post-rehabilitation; however, there was no longer-term follow-up with these older adults. Future research should assess the benefits of SSR programs via long-term follow up – for instance, three months, six months, and one-year post discharge.

Finally, in order to effectively implement SSR programs into the community and to support healthy aging and 'Aging in Place' post-hospitalization, evidence is needed to guide future SSR program model development and implementation. As well, evidence related to which older-adult profiles would most benefit from SSR programs is also required to guide the referral process. Researchers, health professionals, and government need to come together to develop a common understanding of – and language related to – SSR and expectations of SSR models of care.

Limitations

A common limitation of scoping reviews, including ours, is that although efforts were made to conduct a thorough scan of both empirical and grey literature, it is possible that not all relevant literature documents were identified in our search process. In order to define and assess SSR programs, we narrowed the search terms to literature documents that explicitly defined their rehabilitation as slow stream or long duration and low intensity. Older adult day programs, and day hospital programs that could have potentially been identified or classified as low intensity, long duration rehabilitation, but

that did not define themselves as slow stream, were excluded. Thus, there is a possibility that this scoping review did not capture community-based programs or day hospitals that are using a similar model to programs but do not define themselves as SSR.

Furthermore, since we wanted to capture SSR programs in health care systems that were similar to those of Canada so that findings could be more readily integrated into our health care system, many countries with differing health care systems were excluded, such as the United States. Because the purpose of this scoping review was to obtain a broad understanding of the availability and research on SSR programs, we did not consider the quality of the literature and studies and did not assess it as part of the methodology.

Conclusion

Older adult patients, who are medically complex, cognitively impaired, and are considered to be of low rehabilitation potential, can make significant gains in both physical and ADL-related outcome measures through participating in a lower-intensity, longer-duration rehabilitation program. With further research, standardization of programs, standardization of referral processes, and integration of SSR programs into the community, SSR has the potential to be an integral part of Canada's health care system. Although yet to be determined, community-based SSR may be economically beneficial and would provide opportunities to allow older adults with HAD and complex health and other needs to adjust to community living. Participating in lower intensity and longer duration rehabilitation (slow stream) upon returning to the community may also result in decreased hospital re-admission rates and decrease institutionalization.

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Figure 2-1:Flow diagram of process of identification and selection of relevant studies and documents, including the number of studies screened and excluded at each stage

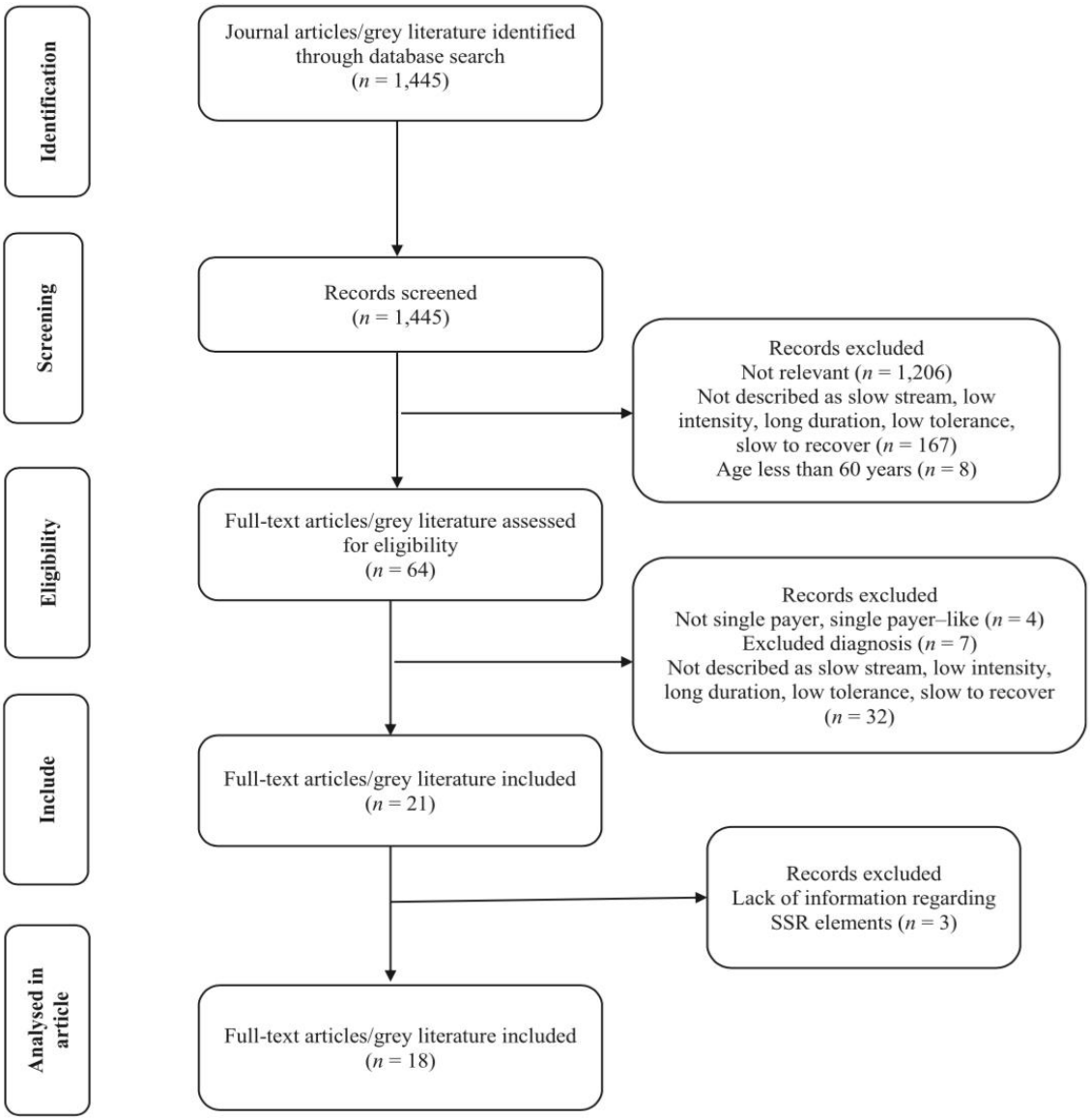

Table 2-1-Chapter 2-Table 1: Example of search strategy used across all databases

#	Searches	Results
1	exp Rehabilitation/	274288
2	Rehabilitation Centers/	7790
3	rehab*.mp.	292699
4	1 or 2 or 3	477912
5	exp Aged/	2821516
6	elder*.mp.	240159
7	senior*.mp.	35232
8	geriatric*.mp.	93232
9	5 or 6 or 7 or 8	2934858
10	4 and 9	121080
11	slow* stream.mp.	73
12	((long or extend*) adj2 (duration or "lengths of stay")).mp.	16520
13	"low intensity".mp.	13221
14	((slow* or extend*) adj3 (pace* or recover*)).mp.	7598
15	Long-Term Care/	24426
16	11 or 12 or 13 or 14 or 15	61598
17	10 and 16	2346
18	11 or 12 or 13 or 14	37227
19	10 and 18	598

Note. *used in search databases as a wildcard to broaden the search by finding all derivations of the word "age".

Table 2-2 - Document inclusion and exclusion criteria for screening and full-text phases

Criteria	Included	Excluded
Year of publication	All available years to June 2018	No years excluded
Age	60 years of age or older	Less than 60 years of age
Program description	• slow-stream • low intensity • long duration • low tolerance • slow to recover	Programs described as rehabilitation not being the focus of the program – e.g., caregiver burden relief program
Setting	• hospital • community • day hospital • long-term care • complex continuing care • nursing home	No settings excluded
Literature type	• Peer reviewed articles • Case studies • Hospital reports • Dissertations • Conference abstracts • Policy papers or reports	• Textbooks • Book chapters

Health condition or diagnosis	All conditions other than excluded	Acquired brain injury Late-stage degenerative condition – e.g., end-stage dementia
Health care system funding	Single payer Single payer–like	Private health insurance Employment-based insurance Out of pocket

Table 2-3: Characteristics of literature documents included in scoping review

Literature Document	Country	Methodology	Sample Size (*n* = participants, unless otherwise specified)
Published Peer-Reviewed Articles			
Leung et al., 2016	Canada	Prospective cohort study	104
Zhang et al., 2015	Singapore	Quasi-randomized control trial	Total = 133 Home = 18 Intensive = 39 SSR= 76
Parker et al., 2015	Australia	Randomized control trial	Total = 60 SSR = 32 FIT and SSR= 28
Spruit-van Eijk et al., 2012	Netherlands	Prospective cohort study	186
Chong et al., 2012	Singapore	Retrospective cohort study	183
Tourangeau et al., 2011	Canada	Prospective cohort study	81
Teasell et al., 2005	Canada	Retrospective cohort study	196
Salgado et al., 1995	Australia	Randomized control trial	SSR = 33 Control = 22
O'Neill et al., 1987	Australia	Prospective cohort study	52
Peer Reviewed Conference Abstracts			
Kubilius et al., 2016	Canada	Retrospective cohort study	81
Leung et al., 2014	Canada	Prospective cohort study	104
Katz et al., 2013	Canada	Prospective cohort study	95
Berall et al., 2013	Canada	Prospective cohort study	105
Hospital and Government Reports			
GTA REHAB Network, 2008	Canada	Framework	N/R
Ontario Hospital Association, 2006	Canada	Evaluation report	N/R
ALC Expert Panel, 2006	Canada	Evaluation report	N/R
Ontario Stroke Network, 2013	Canada	Recommendations report	11 regional stroke networks 14 hospitals
South West LHIN, 2009	Canada	Evaluation report	N/R

Note. FIT = functional individual training, N/R = not reported, SSR = slow stream rehabilitation.

Table 2-4: Characteristics of slow-stream rehabilitation programs

Literature Documents	Description of Rehabilitation Program	Intensity of Physical Rehabilitation	Frequency (time/wk)	Intensity (minutes)	Mean LOS (days) *Range	Rehabilitation Team Members (if number provided indicate FTE)	Location
Published Peer-Reviewed Articles							
Leung et al., 2016	N/R	N/R	3-5 time/wk	30	120	2 OT, 1 OTA, 2 PT, 2 PTA, 0.5 Dietician, 0.5 SLP, 0.5 RT, 1 SW	Hospital, in-patient rehabilitation
Zhang et al., 2015	N/R	N/R	N/R	N/R	60	OT, PT, PTA	Hospital, in-patient rehabilitation
Parker et al., 2015	N/R for SSR FIT: activities of daily living done daily on own	N/R	SSR= 2 (time/wk SSR+FIT = 2 time/wk SSR and 4 times daily FIT	SSR= 30min SSR + FIT= 4 times/day+ 30min SSR	SSR = 63.7 SSR + FIT = 65.7	PT, OT, PTA, Nurse	Hospital, in-patient rehabilitation
Spruit-van Eijk et al., 2012	N/R	N/R	3-5 times/week	60	85	PT, OT, Nurse	Nursing home
Chong et al., 2012	N/R	N/R	N/R	N/R	30	N/R	Subacute rehabilitation
Tourangeau et al., 2011	N/R	N/R	5 time/wk	60	113	N/R	Stroke, complex continuing care units
Teasell et al., 2005	Physical, behavioral, and functional exercise- details not specified	N/R	5 time/wk	As needed	80	1 PT, 1 OT, 1 SLP, 1 SW, 1 RT, 0.5 Dietician	Hospital, in-patient rehabilitation
Salgado et al., 1995	Increase independence and avoid institutionalized care- details not specified	N/R	1 time/wk	N/R	Range= 72 to 210	PT, Nurses, Physicians, OT, SW	Nursing home
O'Neil et al., 1987	Increase independence- details not specified	N/R	N/R	N/R	81	1 Nurse, 2 PT, 2 OT, 1 SW; Psychiatrist, SLP Dietician as needed	Nursing home

Peer Reviewed Conference Abstracts							
Kubilius et al., 2016	N/R	N/R	N/R	N/R	Range= 95.9 to 141.2	N/R	Hospital, Complex Continuing Care
Leung et al., 2014	Individual and group exercise-details not specified	N/R	5 time/wk	30	82.5	OT, PT, OTA, PTA, Nurse	Hospital, in-patient rehabilitation
Katz et al, 2013	Individual and group exercise- details not specified	N/R	5 time/wk	30	72	OT, PT, OTA, PTA, Nurse	Hospital, in-patient rehabilitation
Berall et al., 2013	Individual and group exercise- details not specified	N/R	5 time/wk	30	88	OT, PT, OTA, PTA, Nurse	Hospital, in-patient rehabilitation
Hospital and Government Reports							
GTA REHAB Network, 2008	Increase independence and avoid institutionalized care- details not specified	N/R	5 time/wk	20	N/R	Physician, Nurse, PT, OT, SW, SLP, Dietician, RT	Hospital, in-patient rehabilitation
Ontario Hospital Association, 2006	Reactivation and transitional care- details not specified	N/R	N/R	N/R	N/R	Physicians, Physiatrists, OT, PT, SLP	Hospitals, complex continuing care
ALC Expert Panel, 2006	Reactivation and transitional care-- details not specified	N/R	N/R	N/R	N/R	Physicians, Physiatrists, OT, PT, SLP, Dietician	Hospitals, complex continuing care and alternative level of care
Ontario Stroke Network, 2013	Provide transitional care – details not specified	N/R	N/R	N/R	95	Physicians, Physiatrists, OT, PT, SLP, Dietician	Hospital, in-patient rehabilitation units
South West LHIN, 2009	Reactivation and transitional care- details not specified	N/R	N/R	N/R	Range = 12.9 to 38.4	physicians, Physiatrists, OT, PT, SLP, Dietician	Hospitals, complex continuing care and in-patient rehabilitation units

Note. ALC = Alternative Level of Care, FIT = functional individual training, FTE = full time equivalent, LIHN = Local Health Integrated Network, LOS = length of stay, N/R = not reported, OT = occupational therapist, OTA = occupational therapist assistant, PT = physiotherapist, PTA = physiotherapist assistant, RT = recreational therapist, SLP = speech language pathologist, SW = social workers, SSR = slow stream rehabilitation, wk = week.

Table 2-5: Demographics and health history of older adult population attending slow-stream rehabilitation programs according to demographics provided in included literature documents

Literature Documents	Primary Diagnosis	Secondary Diagnosis	No. of Co-morbidities (SD) or Other Description	MOCA Mean Scores, or % with cognitive impairment, or CAM % Delirium, or MMSE	Mean Age, Years (*SD*) or Minimum Maximum	Sex, Mean Female Percentage (%) or Minimum % Maximum %
Published Peer-Reviewed Articles						
Leung et al., 2016	Deconditioning	N/R	6.8 (2.5)	83% having some level of delirium (CAM) 72% had a MOCA score less than 23 showing mild to moderate cognitive impairment.	81.6 (8.4)	68.3
Zhang et al., 2015	Femoral hip surgery	Cardiovascular diseases	5.4 (1.6)	N/R	79.9 (7.9)	81.9
Parker et al., 2015	Orthopedics (40%) Medical (28%) Frail (18%)	N/R	7.3 (3.2)	N/R	78.2 (11.7)	60
Raymond et al., 2015	Falls Post-surgery General medicine	N/R	N/R	N/R	79.8(7.3)	N/R
Spruit -van Eijk et al., 2012	Stroke	Diabetes, multi-morbidity	N/R	23 (MMSE)	79 (10)	54
Chong et al., 2012	Sepsis (32.6%) Fall (19.6%) Impaired cognition (2.2%) Fracture (2.8%) Medical reasons (34.4%)	Frail	1.7 (1.7)	N/R	80 (8.5)	52.2
Tourangeau et al., 2011	Stroke	Vascular disease Cognitive impairment	N/R	N/R	74 (10.5)	59.3
Teasell et al., 2005	Stroke	Aphasia MCI due to stroke	N/R	N/R	72 (11)	47

Salgado et al., 1995	Deconditioning	N/R	N/R	N/R	82	N/R
O'Neil, 1987	Neurological (71%) Orthopedic (14%) Amputations (9%) Other (6%) Dementia (26%)	Multiple diagnosis General deconditioning	25% of discharge population had multiple diagnoses	N/R	78 (7)	68
Peer Reviewed Conference Abstracts						
Kubilius et al., 2016	Stroke	N/R	N/R	N/R	N/R	N/R
Leung et al., 2014	Deconditioning	N/R	N/R	N/R	82 (8.4)	68.3
Katz et al, 2013	Stroke Orthopedic surgery	Frail MCI	N/R	17 (MOCA)	82 (7.9)	68.4
Berall et al., 2013	Deconditioning	CI (85%) Frail (78.5%)	N/R	85% had mild/moderate to severe cognitive impairment	82	N/R
Hospital and Government Reports						
GTA REHAB Network, 2008	Chronic/complex condition	N/R	N/R	N/R	Minimum = 65	N/R
Ontario Hospital Association, 2006	Orthopedic conditions Stroke	Medically complex MCI deconditioning	N/R	N/R	N/R	N/R
ALC Expert Panel, 2006	Frailty Co-morbidity MCI	N/R	N/R	N/R	Minimum = 65	N/R
Ontario Stroke Network, 2013	Stroke	Multiple co-morbidities	N/R	N/R	Minimum = 65	N/R
South West LHIN, 2009	Chronic/complex conditions	N/R	67% clinically complex	N/R	Minimum = 68 Maximum = 81	Minimum = 48 Maximum = 71

Note. ALC = alternate level of care, CAM = confusion assessment method, CI = cognitive impairment, LIHN = Local Health Integrated Network, MC = mild cognitive impairment, MMSE = Mini Mental State Exam, MOCA = Montreal Cognitive Assessment, N/R = not reported in the literature document, SD = standard deviation.

Table 2-6: Summary of published peer-reviewed articles and conference abstracts included in the scoping review

Literature Document	Stated Aim	Outcome Measures Used	Stated Results
Published Peer-Reviewed Articles			
Leung et al., 2016	To provide a detailed description of patients admitted to an SSR program after acute hospitalization	**Function:** Functional independence measure FIM **Physical:** Grip strength, gait speed, Berg Balance Scale (BBS) **Psychological:** The Patient Health Questionnaire (PHQ-9) **Other:** Discharge destination (%)	**Function:** Baseline mean motor FIM score was 33.0 (*SD* = 13.4) with a mean increase of 21 points at discharge**. Baseline mean total FIM score was 55.8(*SD* = 18.8) with a mean increase of 22.6 points at discharge**. **Physical:** Grip strength mean baseline score was 12.5 kg (*SD* = 6.8) with a mean increased of 0.8 kg at discharge; walking speed mean baseline was 0.081m/s (*SD* = 0.2) with a mean increase of 0.3 m/s*; BBS mean baseline score was 9.2 (*SD* = 8.8) with a mean increase of 10.4*. **Psychological:** Baseline mean PHQ-9 score was 6.2 (*SD* = 5.7) with a mean decreased of 1.5 at discharge*. **Other, Discharge Status:** 61.5% returned to preadmission living; 8.6% went to live with family caregivers; 16.3% transferred to long-term nursing home, 13.4% transferred to acute hospital care
Zhang et al., 2015	To assess the effect of three different rehabilitation approaches (high intensity, SSR, and home-based) on mobility outcomes of elderly patients after hip surgery	**Physical:** Parker Mobility Score (PMS), Modified Harris Hip Score (MHHS)	**Physical:** According to PMS home rehabilitation, intensive rehabilitation and SSR were all below mortality at 3 month and means differed across the groups (home = 4[*SD* = 1], intensive = 4.5[*SD* = 2], SSR = 4[*SD* = 2]) *, at 6 month ((home = 5[*SD* = 2], intensive = 6[*SD* = 1], SSR = 4[*SD* = 2])*, and 12 month (home = 5[*SD* = 1], intensive = 6[*SD* = 1], SSR = 5[*SD* = 3])*. MHHS mean scores also differed across groups at 3 month (home = 70[*SD* = 12], intensive = 72.5[*SD* = 17], SSR = 67 [*SD* = 19])*, 6 month (home = 78[*SD* = 12], intensive = 77.5[*SD* = 14.5], SSR = 69[*SD* = 9])* and 12 month (home = 77 [*SD* = 12], intensive = 80[*SD* = 17.5], SSR = 70[*SD* = 19])*

Parker et al., 2015	To examine whether adding FIT (functional individual training) to the standard SSR would increase number of people returning home	**Function:** de Morton Mobility Index (DEMMI) **Physical:** Berg Balance Scale (BBS), 5 times sit-to-stand test (FTSTS). **Other**- Discharge destination (%)	**Function:** Mean DEMMI baseline score for SSR+FIT program was 51.4 (*SD* = 17.3) with a mean increase of 10.5 points at discharge**, for SSR mean DEMMI baseline score was 64.3 (*SD* = 17.2) with a mean increase of 5 point at discharge*. There was no statistical difference between SSR+FIT and SSR only. **Physical:** Mean BBS baseline score for SSR+FIT program was 34 with a mean increase of 7 points at discharge*, for SSR mean BBS baseline score was 44 with a mean increase of 3 point at discharge*. There was no statistical difference between SSR+FIT and SSR only. Mean FTSTS baseline time (seconds) for SSR+FIT program was 22 with a mean decrease of 0.16 at discharge*, for SSR mean FTSTS baseline time (seconds) was 24.1 with a mean decrease 1.8 at discharge. There was no statistical difference between SSR+FIT and SSR only. **Other:** 63% of SSR was discharged home, 43% of SSR+FIT was discharged home. There was no statistical difference between SSR+FIT and SSR only.
Spruit -van Eijk et al., 2012	To identify demographics and functional characteristics of older adults successfully discharged to independent living post being admitted to skilled nursing facilities after stroke	**Function:** Barthel Index (BI) **Physical:** Berg Balance Scale (BBS) **Psychological:** Geriatric Depression Scale **Other:** Discharge destination (%)	**Function:** The median BI for the entire group of 175 patients was 12 (range 1–20) on admission and 17 (range 1–20) at discharge. The patients who were successfully discharged showed an increase in BI from 14 on admission to 18 at discharge, whereas those who were "unsuccessful" showed a stable BI score of 6. **Physical:** Of those who were able to be discharged home post rehabilitation, mean BBS score was 38; for those who were not discharged home the mean BBS score was 4. **Psychological:** Of those who were able to be discharged home post rehabilitation, 22% had signs of depression according to the GDS; of those not discharged home, 40% had signs of depression according to the GDS score. **Other:** 70% were successfully discharged home
Chong et al., 2012	To examine the number of older adults discharged to different rehabilitation settings post hospitalization	**Other:** % discharged to SSR from acute care	**Other**-23.5% of subacute unit were discharged to slow stream rehabilitation (SSR) facility
Tourangeau et al., 2011	To describe health-related outcomes of patients participating in SSR in CCC units across Ontario post-acute stroke	**Function:** Activities of daily living (ADL) hierarchy **Psychological:** Social engagement measure, Depression rating scale	***Note*:** There were 6 different CCC units with SSR that were included in analysis and the following is the means of each outcome measure across all 6 sites. **Function:** Mean ADL hierarchy score 3.3 (*SD* = 1.4), with statistically different means across the 6 sites. **Psychological:** Mean depression score 0.9 (*SD* = 1.1), with no statistical

		Other: Discharge status, Patient satisfaction, pain scale (RAI-MDS)	difference across the 6 sites. Mean social engagement 3.6 (*SD* = 1.9) with statistically significant different means across the 6 sites. **Other:** Mean discharge status percentage: 48% were discharged to independent or semi-independent. 35% went to long-term care and 17% went to a higher level of care, with statistically significant difference in mean percentage for discharge status across the 6 sites. Mean patient satisfaction with care 71(*SD* = 31), with statistically significant different means across the 6 sites. Mean Pain scale 1.1 (*SD* = 0.8), with no statistical difference across the 6 sites.
Teasell et al., 2005	To describe rehabilitation progress and develop a logistic regression model to predict patients that are more likely to be discharged home	**Function:** Functional Independence Measure (FIM)	**Function:** The mean baseline total FIM score was 46, with a mean discharge score of 70, and mean change of 22 points**. Baseline FIM measures were statistically significant in developing a model predicting who will be discharged home, with higher baseline being more likely to be discharged home.
Salgado et al., 1995	To implement a mobile rehabilitation team (SSR program) in nursing homes	**Other:** Discharge home (%)	**Other:** 64% of the non-control/SSR group were discharged home and 9% of the control group were discharged home*.
O'Neil et al., 1987	To evaluate the efficacy of slow stream rehabilitation	**Function:** Dependency rating 1 = independent: requires no assistance 2 = light assistance: requires supervision 3 = moderate assistance: requires considerable help 4 = full assistance; requires total care **Physical:** Mobility rating 1 = independently mobile 2 = not independently mobile **Other:** discharge destination (%)	**Function:** Mean dependency rating at baseline was 3.2 and 2.1 at discharge. **Physical**: Mean mobility rating at baseline was 1.8 and 1.2 at discharge. **Other**: 14% of patients discharged home, living independently; 30% of patients discharged to community living with caregiver
Peer Reviewed Conference Abstracts			
Kubilius et al., 2016	To understand discharge barriers of a low tolerance long duration hospital stroke rehabilitation unit	**Function:** FIM **Other:** Discharge destination (%)	**Function:** Mean change of total FIM score ranged from 19 to 23 points. **Other:** 66.6–85% is of older adults are discharged back into the community
Leung et al.,	To identify predictors of	**Function:** FIM	**Function:** The mean change in motor FIM was 21.03 (*SD* = 12.2)**.

2014	rehabilitation outcomes in a hospital SSR unit	**Other:** Discharge destination (%)	**Other:** 64% of the patients discharged home, 17% discharged to long-term care.
Katz et al, 2013	To describe patient characteristics at baseline of patients attending SSR	**Functional:** FIM **Physical:** Berg Balance Scale **Other:** independence level	**Function:** Mean baseline total FIM score was 58. **Physical:** Mean baseline BBS score was 8.7 **Other**: 20% required assistance and 6% dependent with feeding; 73% required assistance and 25 % dependent with bathing; 69% required assistance and 22% dependent with dressing; 47% required assistance and 28% dependent with toileting.
Berall et al., 2013	To examine the change in function and discharge destination of patients admitted to SSR	**Function:** FIM **Physical:** Berg Balance Scale, ambulation ability **Other:** Discharge destination (%)	**Function:** Mean baseline total FIM score was 51, mean discharge total FIM score was 74*. **Physical:** Mean BBS baseline score was 10, mean discharge was 19.7*; At baseline, 51% could ambulate >10 steps with a device, at discharge 80.4% could ambulate >10 steps*. **Other:** 68% were discharged home or to other community residences; 24% to long-term care and 9% to acute care.

Note. * statistically significant result according to study, ** clinically significant result according to study. *SD* = standard deviation.

Table 2-7: Summary of report documents included in the scoping review

Report Author	Stated Aim of Report	Findings and Recommendations
GTA REHAB Network, 2008	To provide a framework for different rehabilitation programs available in Toronto hospitals with the aim of increasing clarity and consistency of rehabilitation definitions across a continuum of care	**Recommendation for SSR:** To be utilized for a geriatric population in need of an interdisciplinary rehab team/service who may also have a chronic/complex condition requiring 24-hour hospital care over an extended period of time and who are expected to benefit from low-intensity, long-duration rehab. Aimed to increase functional ability and reactivation of older adult patients who have the capacity to return home.
Ontario Hospital Association, 2006	To summarize the changes that have taken place in both rehabilitation and complex continuing care over the past decade and recommend better integration and health policy planning	**Findings:** There is an increase in acceptance of the importance of rehabilitation in contributing to functional improvement. Yet there is a lack of information with respect to definitions of CCC and rehabilitation, and issues with transitioning between care that are arising from the introduction of new types of programs without proper education for staff. There are also variations in the use of CCC and rehabilitation beds across the province. The lack of policy direction in the CCC and rehabilitation sectors have contributed to the lack of recognition of the role these sectors play in enhancing access to appropriate care and improving outcomes for specific population groups. **Recommendation**: Increase in education, development of standard definition across continuum of care and enhancement of slow-stream rehabilitation (SSR), and reactivation services in rehabilitation and complex continuing care is needed for patients with complex health needs in order to ensure better outcomes for these patients.
ALC Expert Panel, 2006	To examine continuum of care and the use of ALC beds and make recommendations	**Findings Regarding SSR:** This report states that SSR is on a secondary level in hospital and residential services. SSR is defined as a service to meet specialized needs of post-acute patients when continued specialized rehabilitation is needed. **Recommendations:** Define and expand the role and capacity of health systems in the community to provide care or rehabilitation services. Increase the balance and availability of supportive services for older adults returning home. Develop awareness and education of rehabilitation programs and future care needs of patient to caregiver and health care teams.
Ontario Stroke Network, 2013	To compare discharge and LOS for patients in an SSR program compared to those in an active stroke rehabilitation program post severe stroke.	**Findings:** Individuals with severe stroke who were admitted to an active stroke rehabilitation program had a shorter length of stay (by almost 50 days) and similar (or slightly better) functional outcomes as compared to a similar population who were admitted to a slow-stream stroke rehabilitation program. **Recommendations**: Patients currently admitted to CCC or SSR would be better served by admission to an active stroke in-patient rehabilitation.

South West LHIN, 2009	To summarize CCC and rehabilitation resources in the South West LHIN, describe how they are used and make recommendation	**Recommendation:** Clear definition of CCC and rehabilitation, including admission and discharge criteria, that reflects patient need and available human resources.

Note. ALC = alternate level of care; CCC = complex continuing care; LHIN = Local Health Integrated Network; LOS = length of stay; SSR = slow stream rehabilitation.

CHAPTER 3: A Description and Benefits of Frequency, Intensity, Type and Time of Exercises Completed by Older Adults in a Community-Based, Slow-Stream Rehabilitation, Hospital-to-Home Transition Program

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Preface

This chapter contains the manuscript entitled "A Description and Benefits of Frequency, Intensity, Type and Time of Exercises Completed by Older Adults in a Community-Based, Slow-Stream Rehabilitation, Hospital-to-Home Transition Program" The authors are: Melody Maximos, Ada Tang, Paul Stratford, and Vanina Dal Bello-Haas.

My contribution to this work includes: designing the study, developing the research questions, data collection, data analysis and interpretation, and writing the manuscript. Research assistants aided with data collection and data input. Co-authors Ada Tang and Paul Stratford contributed advice regarding research questions, and data analysis and interpretation, and provided feedback on the manuscript. Co-author Paul Stratford also contributed to statistical analyses. Co-author Vanina Dal Bello-Haas contributed to the design of the study, research questions, methods, data analysis and interpretation; and provided feedback on the manuscript. The manuscript is written to the following standards of the *Journal of Aging and Physical Activity*, and is expected to be submitted by December 2020.

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Abstract

Purpose: To: describe exercise parameters for cardiovascular and resistance exercises completed by older adults in a community-based, slow-stream rehabilitation (SSR), hospital-to-home transition program; compare parameters to established exercise guidelines; and, assess whether there was a difference in function between older adults who met the American College of Sports Medicine (ACSM) guidelines for community-dwelling older adults and those who did not.

Methods: This was a prospective cohort study of 64 older adults (40 (62.5%) female, mean age 78.4 years (SD= 9.8)) recently discharged from the hospital. A demographic questionnaire and the Late Life Function and Disability Index (LLFDI)-Function Component were administered. Descriptive statistics and Factorial ANCOVA were conducted.

Results: Regarding ACSM guidelines for cardiovascular exercise, 38 (59.3%) participants met frequency, 47 (73.4%) met intensity and 23 (35.9%) met time. Regarding guidelines for resistance exercise, 43 (67.2%)met frequency, 27 (42.2%) met intensity and 49 (76.6%) number of repetitions. Those who met both frequency and time for cardiovascular exercise had higher LLFDI-function component scores at discharge; and those who met intensity and/or number of repetitions for resistance exercise had higher LLFDI-function component scores at discharge.

Conclusion: Older adults completing an SSR hospital-to-home transition program were able to meet ACSM guidelines for community-dwelling older adults.

Keywords: Frequency, intensity, time, type, exercise, older adult, slow-stream rehabilitation, community-based, hospital to home transition

Background

Approximately 30% to 60% of older adults experience difficulties completing activities of daily living (ADL), and have an increased risk of falls, hospital readmission and institutionalization post-hospital discharge (Covinsky et al., 2003; Kortebein, 2009). Research has found that one third of older adults have not recovered to their pre-admission status one year after hospitalization (Paolucci et al., 2001; Zisberg et al., 2015). These challenges are thought to be related to rehabilitation goals not being met prior to discharge, reduced mobility, decrease in muscle mass, diminished caloric intake, depressed mood and social isolation older adults experience during hospitalization (Cress et al., 2006; Rimmer, 2005); which often lead to a long-term decrease in quality of life (Rimmer et al 2005).

Exercise interventions have been shown to substantially improve older adults' ability to maintain or return to pre-admission function following hospitalization (Courtney et al., 2012; Theou et al., 2011). For gains to be made however, the exercise intervention must be physiologically adequate to cause gains in muscle strength and endurance, and be matched to the older adult's abilities and goals to address specific needs such as fall risk, frailty and multimorbidity (White et al., 2015)

Findings from two systematic reviews examining the effects of exercise interventions for management of frailty in older adults with frailty and complex healthcare needs have found that interventions aimed at improving strength, endurance and balance have been associated with improved mobility, ability to complete activities of daily living (ADLs) without assistance, and quality of life compared to usual care in institutionalized care, community and hospital rehabilitation settings (de Labra et al., 2015; Theou et al., 2011). Multicomponent exercise

interventions were also found to result in more physical gains compared to engaging in one specific type of exercise alone (De Labra et al., 2015; Theou et al., 2011).

A 'traditional' rehabilitation program typically takes place in a hospital setting, is shorter in overall program length of time, and comprised of sessions that are longer in duration and higher in intensity (Kortebein, 2009) than slow-stream rehabilitation (SSR) programs which are typically longer in program length with shorter individual sessions at lower intensity, and thus are intended for patients with multiple and complex health problems, including frailty and severe injury (Maximos et al., 2019). Currently, SSR programs in Canada are typically housed within complex continuing care, alternate level of care or long-term care settings and none have been in outpatient setting (Maximos et al, 2019). Community-based programs have been found to decrease hospital burden and to be more cost-effective than institution-based interventions (Kjerstad & Tuntland, 2016). Increasing the availability of community-based SSR programs would allow older adults discharged from hospital and who are unable to withstand traditional rehabilitation to participate in interventions that are better matched with their abilities and health status during the day while returning to their home in the evening. This model of care may better facilitate the transition from hospital-to-home.

A recent scoping review found that SSR programs are beneficial for increasing function and decreasing institutionalization (Maximos et al., 2019). But little has been documented about specific SSR exercise interventions and their components and parameters (Maximos et al., 2019). Despite programs being referred to as SSR in the literature, exercise interventions vary and no clear exercise parameters have been described within published literature (Maximos et al., 2019) and there is a lack of research that has focused on guidelines. Descriptions of exercise parameters and development of SSR exercise guidelines would limit the heterogeneity of SSR exercise

interventions such as the characterization of specific exercise components e.g., type of exercises, and duration, intensity, and frequency of exercises (Maximos et al., 2019). Details of exercise components and parameters for existing SSR programs should be clearly reported and justified, enabling replication of exercise interventions in different settings and modifications to improve current programs. This rigor would guide the implementation of guidelines that meet the needs and goals of the older adults in the program.

Currently, exercise guidelines that exist for community-dwelling older adults (American College of Sports Medicine, 2017, p. 188), individuals with hypertension (American College of Sports Medicine, 2017, pp. 279–281), and older adults with frailty (Mols Bayles et al., 2009) may be applicable to older adults in SSR programs; refer to Table 1 for more information and a comparison. Community-dwelling older adult exercise guidelines are intended for older adults aged 65 years and older and provide specific details for frequency, intensity and time for cardiovascular and resistance exercise (American College of Sports Medicine, 2017, p. 188). Exercise guidelines for individuals with hypertension are intended to guide adults over the age of 20 years old with resting blood pressure of 140/90 or above with recommendations for frequency, intensity and time of resistance and cardiovascular exercise to reduce systolic blood pressure (American College of Sports Medicine, 2017, pp. 279–281). Frailty exercise guidelines are intended for older adults with decreased physiological reserve and multisystem dysregulation. Compared to non-frail older adults, frail older adults are more dependent and recover more slowly from illness (Mols Bayles et al., 2009) . The frailty exercise guidelines suggest a multicomponent exercise program with a frequency of at least a three times a week minimum for both cardiovascular and resistance exercise(Mols Bayles et al., 2009). However, frailty exercise guidelines do not specify intensity for cardiovascular or resistance exercises, do

not specify the number of resistance exercises or repetitions for resistance exercises, and provide a wide range for cardiovascular exercise time, from five to 60 minutes.

The ACSM exercise guidelines for community-dwelling older adults were chosen for this study because they were applicable to our program population (e.g., community-dwelling, older adult participants) and they provide specific details regarding frequency, intensity and time parameters for both cardiovascular and resistance exercises (American College of Sports Medicine, 2017, p. 188). Having clear and appropriate frequency, intensity and time guidelines for each exercise type is important to ensuring exercises are being completed at a level that will physiologically lead to functional gains (White et al., 2015).

The primary purpose of this study was to describe the frequency, intensity, type and time (FITT) parameters for cardiovascular and resistance exercises completed by older adult participants in a community-based SSR, hospital-to-home transition program; and to compare the FITT parameters of completed exercises to established exercise guidelines for community-dwelling older adults (American College of Sports Medicine, 2017). The second purpose was to assess whether there was a difference in function, as measured by the Late Life Function and Disability Index-Function Component, between older adult participants in a community-based, SSR, hospital-to-home transition program who met American College of Sports Medicine (ACSM) cardiovascular and resistance exercise guidelines for community-dwelling older adults compared to those who did not meet the guidelines.

Methods

Study Setting

The community-based, SSR hospital-to-home transition program is located in one of the 14 Local Health Integration Networks (LHINs) in the province of Ontario. The aim of the

program is to assist community-living older adults transitioning from hospital-to-home through the provision of nursing, physiotherapy, recreation therapy, nutrition and support services as needed. At the time of the study, participants attended the program five days a week for one month from 9:00am to 3:00 pm, with transportation and lunch provided. Participants typically engaged in individual exercise programs, cognitive and social activities, and education sessions.

Study Design and Participants

This study was a prospective cohort study of male and female adults 60 years of age and older who were recently discharged from the hospital and were taking part in the program. This study was approved by the Hamilton Integrated Research Ethics Board (HiREB # 15-089), and participants provided written informed consent. Older adult participants completed a 4-week SSR program. At baseline, a demographic questionnaire, the Montreal Cognitive Assessment (MOCA) and the Late Life Function and Disability Index (LLFDI)- Function Components were completed. The MOCA is a 30-question test that evaluates seven domains of cognitive ability: orientation, short-term memory, executive function, visuospatial ability, language ability, abstraction, animal naming and attention (Nasreddine et al., 2005). Scores range from 0 to 30 and a cut-off score of less than 26 indicates cognitive impairment (Nasreddine et al., 2005). During the program a research assistant observed the older adults exercise program and asked them to rate their intensity on two exercises by random draw. At discharge the LLFDI- function component was administered.

Late Life Function and Disability Index. The Late Life Function and Disability Index (LLFDI)- Function Components was administered by a research assistant at baseline and discharge (4-week point) from the program. The LLFDI is a patient reported outcome measure that has two distinct domains: a Disability Component and a Function Component (Jette et al.,

2002). The Disability component assesses an older person's ability to participate in socially defined life tasks, such as keeping in touch with others, and visiting friends and family (Jette et al., 2002). The Function Component assesses functional limitation, defined as the difficulty an older adult individual experiences completing discrete actions or activities, such as putting on and taking off a coat, or going up and down a flight of stairs using a handrail (Jette et al., 2002). For the purpose of this study, we examined the Function Component only because we were interested in determining whether meeting exercise guidelines made a difference in older adult participants' ability to complete physical activities, such as climbing stairs. The LLFDI-Function Component consists of 32 questions (three subscales) that ask about: basic lower extremity function, advanced lower extremity function, and upper extremity function (Jette et al., 2002). LLFDI-Function Component scores range from 0 and 100 and lower scores indicate greater difficulty in performing physical activities (Sayers et al., 2004). Test-retest reliability for the LLFDI-Function Component in community-dwelling older adult populations was found to range from 0.82 to 0.96 (Beauchamp et al., 2014); and, the LLFDI-Function Component was found to have moderate to high correlation with the 10-item Physical Function Scale (Beauchamp et al., 2014) in community-dwelling older adults.

Frequency, Intensity, Type and Time (FITT) Parameters. participants were observed during their exercise program by the research assistant and the types of exercises completed, the amount of time for each exercise, and the number of times exercises were completed per week (frequency) were recorded in a log book. For cardiovascular exercise, time was measured as duration of time spent engaging in cardiovascular exercise. All cardiovascular exercises were completed using either a NuStep® recumbent cross trainer, an arm cycle ergometer, or both. For resistance exercise, time was measured as the number of repetitions completed for each muscle

group. All upper and lower body resistance exercises were completed using strength training equipment in a seated position. Flexibility and balance exercises prescribed as part of a home exercise program were not included as part of the study, as they were not observed during the program. Any balance exercises completed by some participants one-on-one with a rehabilitation professional were also not recorded as part of this study.

CR-10 Borg Scale® Rate of Perceived Exertion (RPE). The CR-10 Borg Scale® was administered to each participant during one upper body resistance exercise, one lower body resistance exercise, and a cardiovascular exercise for the duration of their program. The CR-10 Borg Scale® is a 11-point, category-ratio scale that measures perceived exertion (Borg, 1982). According to Borg (1962), perceived exertion is the level of fatigue and/or effort in working muscles during resistance exercise or breathlessness and/or fatigue felt by the individual during cardiovascular exercise (Borg 1962). The CR-10 Borg Scale® is broken down into five verbal descriptors of perceived exertion: 0-2 = *weak*, 3-4 = *moderate*, 5-6 = *strong or heavy*, 7-8 = *very strong or heavy;* and, 9-10 = extremely *strong or maximal* (Buckley & Borg, 2011). Participants were asked by a research assistant to rate their perceived exertion (intensity) during the exercises using the CR-10 Borg Scale ® Rate of Perceived Exertion (RPE) (Borg, 1990). Perceived exertion rating was also recorded in a log book. The CR-10 Borg Scale® has been used to establish safe levels of exercise and parallel physiological variables for community-dwelling older adults (Eston & Thompson, 1997). Previous studies have shown that the CR-10 Borg Scale® is a valid and useful measure for measuring exercise intensity for older adults with a variety of chronic conditions engaging in cardiovascular and resistance exercise; and, correlates with heart rate during cardiovascular exercise (Donath et al., 2013) and repetition maximum (RM) for resistance exercise in older adults (Buckley & Borg, 2011).

Exercise Guidelines. According to the ACSM guidelines for community-dwelling older adult, older adults should be engaging in: 1) cardiovascular exercise three to five times a week, for 20 to 60 minutes, at a moderate (3 to 4, CR-10 Borg Scale ®, Borg, 1990) to vigorous intensity (7 to 8, CR-10 Borg Scale ®, Borg, 1990) (American College of Sports Medicine, 2017, p. 193); and, 2) resistance exercise two or more times a week at an intensity of 60 to 80% of 1-RM. Older adults should aim to complete resistance exercises for eight to 10 muscle groups, with one to three sets of eight to 12 repetitions (8 to 36 repetitions total) for each muscle group, for each exercise session (American College of Sports Medicine, 2017, p. 193). According to literature assessing the CR-10 Borg Scale ® use for resistance exercise in older adults, 60-80% of 1-RM is equivalent to 5 to 8 on CR-10 Borg Scale ®- *strong or heavy to very strong* (Morishita et al., 2019).

Analysis

All statistical analyses were completed using Stata 14.0, with a *p*-value for significance set to < 0.05. Means, standard deviations, minimum and maximum values were calculated for continuous variables (Age, MOCA, number of chronic conditions, LLFDI-Function Component Score, FIT parameters (frequency, intensity, and time parameters for cardiovascular and resistance exercise) and frequencies were calculated for nominal variables (use of assistive devices, living arrangement and sex). To compare ACSM guidelines and the exercises completed by the older adult participants during their exercise sessions, the number of older adult participants who met and who did not meet the guidelines for frequency, intensity and time parameters for cardiovascular and resistance exercises were tallied and percentages were calculated. Sample size was based on convenience and no a priori sample size for analysis was calculated.

For cardiovascular exercise, a Factorial ANCOVA was conducted to determine whether there was a statistically significant difference for function, as measured by the LLFDI- Function Component (dependent variable), for the following independent variables: cardiovascular exercise frequency (met/ not met), time (met/not met), intensity (met/not met) and their interactions; with age and baseline LLFDI-Function Component score as covariates.

For resistance exercise, a Factorial ANCOVA was conducted to determine whether there was a statistically significant difference for function, as measured by the LLFDI-Function Component (dependent variable), for the following independent variables: resistance exercise frequency (met/ not met), time (met/not met), intensity (met/not met) and their interactions; with age and baseline LLFDI-Function Component score as covariates.

Results

Descriptive Statistics

Participants. A total of 64 participants completed the community-based, SSR program during the study time-frame. The mean age of the participants was 78.4 years (SD= 9.8, minimum= 60, maximum= 98), and 40 participants (62.5%) were female. The mean number of chronic conditions was 3.2 (SD= 2.0, minimum= 0, maximum= 10). Fifty-three (82.8 %) participants used a walker to ambulate. Most of the older adult participants either lived alone (n= 31, 48.4%,) or with their spouse (n= 20, 31.2%). The mean MOCA score was 21.8 (SD= 5.21, minimum= 9, maximum= 30), indicating mild cognitive impairment (Nasreddine et al., 2005). The mean baseline LLFDI-Function Component score was 44.5 (SD= 9.7, minimum= 25.9, maximum= 63.2), and the mean discharge LLFDI-Function Component score was 46.2 (SD= 6.5, minimum= 24.1, maximum= 59.5), indicating that participants had severe limitations or difficulties completing physical activities (Haley et al., 2002).

Types of Exercise Completed. Cardiovascular exercise was completed by all participants, with 59 (92.2%) of participants completing one cardiovascular exercise, while 5 (7.8%) completed more than one cardiovascular exercise per exercise session. Lower body resistance exercises were completed by 56 (87.5%) participants. Participants completed a mean of 1.7 (SD= 0.7, minimum= 0, maximum= 2) lower body resistance exercises, specifically the following muscle group exercises: hamstring and quadriceps. Upper body resistance exercises were completed by 52 (81.3%) participants. Participants completed a mean of 2.5 (SD= 0.9, minimum= 0, maximum= 3) upper body resistance exercises. Muscle group exercises included: pectoral, deltoid and triceps. Refer to Table 2 for the FITT parameters of completed exercises.

Frequency of Prescribed Exercises. participants completed cardiovascular exercise 3.4 days per week (SD = 1.5, minimum = 0, maximum = 5), lower body resistance exercise 3.0 days per week (SD = 1.8, minimum = 0, maximum = 5), and upper body resistance exercise 2.8 days per week (SD =1.9, minimum =0, maximum =5).

Intensity of Exercises. RPE rating for cardiovascular exercise was 5 (SD = 1.7, minimum = 1, maximum = 9), *strong or heavy* (CR-10 Borg Scale ® RPE verbal descriptor, Borg, 1990), 5.6 (SD = 1.7, minimum = 2, maximum = 10) - *strong or heavy* (CR-10 Borg Scale ® RPE verbal descriptors, Borg, 1990) for lower body resistance exercise, and 4.7 (SD = 1.4, minimum = 2 , maximum = 9) - *moderate to strong* (CR-10 Borg Scale ® RPE verbal descriptor, Borg, 1990) for upper body resistance exercises.

Time of Exercises. Participants engaged in 14.8 (SD= 3.7, minimum= 5, maximum=30) minutes of cardiovascular exercise per session. For lower body resistance exercises, the mean number of repetitions completed was 16.5 (SD = 7.2, minimum = 0, maximum = 25) and For

upper body resistance exercises, the mean number of repetitions was 14.9 (SD = 8.3, minimum = 0, maximum = 20).

Comparison of Exercises Completed by Older Adult Participants to the American College of Sports Medicine Exercise Guidelines

Thirty-eight (59.4%) older adult participants met the ACSM guidelines for frequency of cardiovascular exercise (three to five times per week). Forty-seven (73.4%) older adult participants met the ACSM guidelines for intensity by engaging in cardiovascular exercise at a moderate to vigorous (3 to 8, CR-10 Borg Scale ®, Borg, 1990) intensity. Twenty-three (35.9%) older adult participants met the ACSM guidelines of engaging in cardiovascular exercise for at least 20 minutes.

Forty-three (67.2%) older adult participants met the ACSM guidelines for frequency of resistance exercise by engaging in resistance exercise for a minimum of two times a week. Twenty-seven (42.2%) older adult participants met the ACSM guidelines for resistance exercise intensity by engaging at an intensity between 5-8 on the CR-10 Borg ® RPE scale - *strong or heavy to very strong*. Forty-nine (76.6%) of the older adult participants met the ACSM community-dwelling guidelines for number of repetitions by engaging in each resistance exercise for a range of repetitions between 8 to 36. None of the participants completed resistance exercises for eight to 10 muscle groups.

Difference in LLFDI-Function Component Score Between those who met and did not meet FIT guidelines for Cardiovascular and Resistance Exercise.

The Factorial ANCOVA with LLFDI-Function Component score as the dependent variable; cardiovascular exercise frequency (met/ not met), time (met/not met), intensity (met/not met) as the independent variables; and, age and baseline LLFDI-Function Component score as

covariates. Interaction effect for frequency and intensity, and the three-way interaction between intensity, frequency and times were not calculated due to small number of participants in each cell. baseline LLFDI-Function Component was a significant covariate in the model ($F_{(1,56)}$= 117, p<0.001, n_p^2= *0.67*). Those who had higher LLFDI-Function Component baselines scores also had higher LLFDI-Function Component discharge scores. There were no main effects, however there was a significant interaction effect between frequency and time ($F_{(1,56)}$= 8.4, p= 0.005, n_p^2= *0.13*) . A post-hoc with Sidak multiple comparison analysis showed that older adult participants who met the ACSM guidelines for both frequency and time had statistically greater LLFDI-Function Component discharge scores ($F_{(2,56)}$= 4.60, p = 0.01, $\bar{X}$ = 48.3, CI = 46.9, 49.7), compared to participants who met time guidelines alone ($\bar{X}$ = 43.9, p<0.001, CI = 41.6, 46.2) or met frequency guidelines alone ($\bar{X}$= 44.4, p<0.001, CI = 46.9, 49.7). Refer to Table 4 and Figure1.

The Factorial ANCOVA with LLFDI-Function Component score as the dependent variable; resistance exercise frequency (met/ not met), time (met/not met), intensity (met/not met) as the independent variables; and, age and baseline LLFDI-Function Component score as covariates. Interaction effect for a three-way interaction between intensity, frequency and repetitions was not calculated due to the small number of participants in each cell. The Factorial ANCOVA found that baseline LLFDI- Function Component was a significant covariate in the model ($F_{(1,55)}$= 114.4, p<0.001, n_p^2 = *0.67*). Those who had higher LLFDI-Function Component baselines scores also had higher LLFDI-Function Component discharge scores. There were no main effects, however there was a significant interaction effect between intensity and number of repetitions ($F_{(1,55)}$ = 6.05, p = 0.017, n_p^2= *0.10*). Post-hoc with Sidak multiple comparison analysis showed that older adult participants who met the ACSM guidelines for either intensity

($\bar{X}$ = 47.2, p<0.001, CI = 45.5, 48.9) or repetitions ($\bar{X}$ = 47.9, p<0.001, CI = 45.7, 50.2), or both ($\bar{X}$ = 46.6, p<0.001, CI = 44.2, 47.9) had higher LLFDI-Function Component discharge score in comparison to not meeting either ($\bar{X}$= 37.5). Refer to Table 5 and Figure 2.

Discussion

To be beneficial to older adults transitioning from hospital-to- home, exercise interventions must address the complex needs of this population and should align with relevant exercise recommendations and contraindications accordingly (Guthrie et al., 2012). With the paucity of literature available on specific exercise components in SSR programs (Maximos et al., 2019), the results of this study begin to contextualize FITT exercise parameters and how they may relate to functional gains in older adults recently discharged from hospital.

The demographics (such as age, number of chronic conditions) and functional status (cognitive impairment, ADL and instrumental ADL performance) of participants in this study engaged in community-based SSR are similar to those of older adults completing hospital-based inpatient SSR programs– e.g., mean age range of 72 to 82 years, 47 to 81.5 % female, and the majority had multiple comorbidities and mild cognitive impairment or some amount of delirium (Maximos et al., 2019). These similarities support the notion that older adults with complex healthcare needs requiring SSR can effectively complete their program in the community rather than in institutionalized settings. Housing SSR programs in the community would lead to a decrease in hospital and long-term care expenditures (Kjerstad & Tuntland, 2016), and increase in the number of older adults discharged to community post-hospitalization, and better facilitation of the overall hospital-to-home transition process.

Previous research of exercise-based SSR interventions did not report the specifics of the rehabilitation sessions making comparisons of any exercises difficult (Maximos et al., 2019).

Data from inpatient SSR programs show that participants engaged in 30- to 60-minute sessions two to five times a week (Maximos et al., 2019). Yet, the type of exercises, time of each individual exercise and intensity was not reported and no guidelines for exercise program design was used or discussed within the reported literature. In this study we found that more than half of the participants in the current study completed cardiovascular and resistance exercises at the recommended frequency, met the intensity guidelines for cardiovascular exercise and met the repetition (time) guidelines for resistance exercise.

While we didn't set out to capture frailty, our participants had mild cognitive impairment, multiple chronic conditions, and severe functional limitations. Given this complex presentation of conditions and deficits, our participants could be considered frail according to Rockwood & Mitnitski 's (2007) characterization of frailty as deficit (symptoms, signs, disease, disability) accumulation. Specific FITT parameters are lacking in frailty exercise guidelines (Mols Bayles et al., 2009) which highlight the benefits of multicomponent exercise programs but are not specific with regards to the duration for cardiovascular exercise (range five to 60 minutes), and absent for intensity parameters for both cardiovascular and resistance exercises. The lack of clear guidelines and description of exercise parameters for older adults with multiple chronic conditions, deconditioning and severe limitations in function can result in variability in interpretation of recommendations and in designing and prescribing an effective exercise intervention or program.

Systematic reviews describing exercise interventions for frail older adults found that most resistance and cardiovascular exercise programs were conducted between two to three times per week (Cadore et al., 2013; de Labra et al., 2015; Theou et al., 2011). Resistance exercise intensity ranged from 30%-80% of 1-RM, yet number of repetition were consistent between 8-

12 repetitions with a range of one to three sets (Cadore et al., 2013; de Labra et al., 2015; Theou et al., 2011). Intensity and duration for cardiovascular exercise were not clearly described in two (de Labra et al., 2015; Theou et al., 2011) of the three systematic reviews due to the variation of the interventions. One of the systematic reviews did suggest cardiovascular exercise be done at an intensity of 3-4 RPE starting at five to 10 minutes and increasing to 15-30 minutes (Cadore et al., 2013).

The current literature regarding exercise parameters for people with frailty highlights lack of definitive guidelines, and differences as to whether older adults with complex healthcare needs or who are frail should engage in exercise at higher intensities, for longer durations or at frequencies greater than two to three times per week. This under prescription of exercise FIT parameters may result in FIT parameters not aligning with the physiological ability (e.g. muscle strength, Vo_2 max) of older adults (White et al., 2015), leading to decreased physiological benefit and difficulty returning to independent community living post-hospitalization (Guthrie et al., 2012).

Almost 75% of participants in our study were able to engage in cardiovascular exercise at intensities higher than that recommended by the most recent systematic review published by Cadore el al. (2016), and approximately 60% exercised three or more times a week. However, just over one-third were able to meet the time parameter for cardiovascular exercise, and none completed the recommended eight to 10 resistance exercises. These findings may not have been due solely to the older adults' physical capacity to exercise but rather due to the program structure, constraints on equipment availability due to number of participants and gym capacity, and allotted time in the gym to complete the exercises before needing to return to the other aspects of the SSR program. Therefore, it may be possible that the participants are able to meet

the guidelines for both cardiovascular time and number of resistance exercises targeting the eight to 10 different muscle groups in each session, if there were no constraints.

Participants who met both the ACSM frequency and time guidelines for community-dwelling older adults had statistically higher LLFDI-Function Component scores, however intensity did not have a significant influence on function scores. This suggests that it is the total amount of time of cardiovascular exercise completed over the week that is important. The ACSM guidelines indicate that cardiovascular exercise time can be accumulated over the course of the day, but should be completed in bouts of 10 minutes minimum for physiological gains for a total of 60 to 300 minutes over a week (American College of Sports Medicine, 2017, p. 188). Previous literature for older adults with frailty or complex healthcare needs has not been focused on intensity and duration for cardiovascular exercise but more so on frequency and total time per exercise session, which may include cardiovascular, resistance, balance and other exercise (Theou et al., 2011; de Labra et al., 2015). While a systematic review looking at the effects of low-intensity exercise for older adults included 15 studies and found that 11 of the 15 studies had improved balance, flexibility and lower limb strength and the all studies that reported participant adhere reported high adherence and comfort with the exercise program (Tse et al., 2015). A systematic review looking at the benefits of high versus moderate intensity aerobic exercise found mixed results - eight studies reported similar benefits in physical outcomes between the two exercise groups, and seven reported greater improvement in physical outcomes with higher intensity (Keating et al., 2020). It may be that intensity is not as critical for changes in function, but rather intensity is more important for changes in cardiovascular parameters e.g., VO_2 max. In order to sustain benefits in function, a review by Frankel et al., (2006) suggests increasing

duration of exercise before intensity and ensuring duration is matched to the individual's ability is important.

In this study, participants who met the ACSM guidelines for either intensity or repetitions or both for resistance exercise had higher scores for LLFDI-Function Component at discharge compared to those that did not meet either parameter. Literature assessing intensity and repetitions for resistance exercise has found that physical benefits are dependent on both parameters. Fiatarone et al. (1994) was one of the first to show that high intensity resistance exercises are feasible and effective in improving strength and gait velocity for frail institutionalized older adults. High intensity (80% 1-RM) resistance exercise for frail older adults was more effective at producing gains in physiological and functional outcomes compared to low intensity (40% 1-RM) resistance exercise, while maintaining the same number of repetitions (Seynnes et al., 2004). Resistance exercise programs for older adults comparing higher number of repetitions versus lower number of repetitions at a moderate intensity found superior gains in muscle strength and endurance with higher repetitions (Galvão & Taaffe, 2005). However, in the study by Vincent et al. (2002), groups either completed eight repetitions at 80% 1-RM or 13 repetitions at 50% 1-RM and both had similar improvements in strength, endurance and stair climbing ability, suggesting that there does not appear to be a difference in physical performance as long as adjustments for the number of repetitions was made (Vincent et al., 2002). Therefore, if high-intensity is preferred by and safe for the older adult participant, there is research to support this as an effective and well-tolerated method of resistance exercise for older individuals with complex healthcare needs (Valenzuela, 2012). In contrast, if the older adult prefers lower intensity or there are safety concerns, then a higher number of repetitions at a lower intensity should be completed, and benefits can still be realized (Valenzuela, 2012).

Limitations

This study was observational and part of a larger program evaluation of an operational SSR program. Program closures due to influenza outbreaks, changes in staffing, and participant dropout from the SSR program not related to exercise were beyond the control of researchers and affected data collection and subsequently the sample size. Even though this study found significant differences in LLFDI-Function Component score, there was a small sample size, it is not known whether a larger sample size may have resulted in a larger effect size or differing results. A greater sample size may have resulted in gains seen for intensity and time interaction for cardiovascular exercise, which were not significant in this analysis. Furthermore, since the analysis was based upon observational data and not a randomized control trial with a priori sample size calculation, the number of participants available for each cell of the Factorial ANCOVA was not controlled. This led to some of the two- and three-way interaction analyses not being conducted due to insufficient number of participants in each cell. In order to gain a better understanding of the interaction between frequency, intensity and time guidelines, a randomized study would be required.

Flexibility and balance exercise recommendation are also part of the ACSM guidelines community-dwelling older adults but were not examined in this study. The older adult participants conducted their flexibility exercises outside of the program e.g., at home. Balance exercises were specifically prescribed for some participants and were completed with assistance of a Personal Support Workers during their exercise session or were completed at home. Due to the observational nature of the study, participants were not asked to keep activity logs of other exercises or physical activity conducted outside of the program. Future studies should track home physical activity or exercise to determine whether it would change the older adults' ability

to meet FIT parameter guidelines or act as a covariate to LLFDI-function component discharge scores. The study solely represents a snapshot of what the participants completed during their allotted gym session time within the SSR program.

Conclusion

This is the first study of its kind to describe the frequency, intensity, and time parameters for cardiovascular and resistance exercises completed by older adults in a community-based SSR hospital-to-home transition program, and to compare these parameters to ACSM established guidelines. The findings support that many older adults with multiple chronic conditions, mild cognitive impairment and severe functional limitation are able to meet frequency and intensity guidelines for cardiovascular exercise and frequency and repetition guidelines for resistance exercise. FITT parameter guidelines should be matched to a level that leads to physiological gains and should take into consideration the complex needs of older adults transitioning from hospital-to-home.

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Table 3-1- Chapter3- Table 1. Frequency, Intensity, and Time Parameters for Exercise Type: Comparison of Exercise Guidelines

Exercise Type	FIT parameter	Community-dwelling older adult (American College of Sports Medicine, 2017 pp.188)	Frailty (Mols Bayles et al., 2009)	Hypertension (American College of Sports Medicine, 2017, pp. 279–281)
Cardiovascular	Frequency	3-5 days/week	3-5 days/week	5-7 days/week
	Intensity	Moderate to vigorous intensity[a]	Not described	Moderate intensity[a]
	Time	20-60 minutes	5-60 minutes	30 minutes minimum
Resistance	Frequency	At least 2-3 days/week	3 days/week	2-3 days/week
	Intensity	60-80% 1-RM	Not described	60-80% 1-RM
	Time/ repetitions	1-3 sets of 8–12 repetitions for each exercise	20 minutes	2-4 sets of 8-12 repetitions for each exercise

Note: 1-RM = one repetition maximum; FIT= Frequency, Intensity, Time.
The CR-10 Borg Scale ® (Borg, 1990) was used to measure intensity in the study.
[a] For cardiovascular exercise, moderate intensity is equivalent to a 3 to 4 on the CR-10 Borg Scale ® (Borg, 1990) and vigorous intensity is equivalent to 7 to 8, CR-10 Borg Scale ® (Borg, 1990).
[b]For resistance exercise, 60-80% of one repetition max (intensity) is equivalent to 5 to 8 on CR-10 Borg Scale ® (Morishita et al., 2019)

Table 3-2. Frequency, Intensity Time and Type (FITT) Parameters of Exercises Completed by Participants

Exercise Type	FIT Parameter	Mean	Standard Deviation	Minimum, Maximum	Number of Participants (%)
Cardiovascular	Frequency (days/week)	3.4	1.5	0, 5	12 (18.7%)-once a week 14 (21.9%) - 2 times/week 11(17.2%)- 3 times/week 8 (12.5%) - 4 times/week 19 (29.7%) - 5 times/week
	Intensity (CR-10 Borg ® RPE scale)	5.0	1.7	1, 9	16 (25.0%) - RPE <3 (light) 18 (28.1%) - RPE 3-4 (Moderate) 23 (35.9%) - RPE 5-6 (strong/hard) 6 (9.4%) - RPE 7-8 (very strong) 1 (1.6%) - RPE 9-10 (Maximal)[a]
	Time (minutes)	14.8	3.7	5, 30	20 (31.3%) - <10 minutes 21 (32.8%) - 10 -19 minutes 22 (34.3 %) - 20-25 minutes 1 (1.6%) - 30 minutes
Resistance - lower body	Frequency (days/week)	3	1.8	0, 5	8 (12.5%) - did not do 11(17.2%) - once a week 14 (21.9%)- 2 times/week 10 (15.6%) -3 times/week 4 (6.2%) – 4 times/week 17 (26.6%) - 5 times/week
	Intensity (CR-10 Borg ® RPE scale)	5.6	1.7	2, 10	8 (12.5%) - did not do 8 (12.5%)- RPE <3 (light) 18 (28.1%) - RPE 3-4 (Moderate) 23 (35.9%)- RPE 5-6 (strong/hard) 6 (9.4%)- RPE 7-8 (very strong) 1 (1.6%) - RPE 9-10 (Maximal)[a]
	Time (number of repetitions per exercise)	16.5	7.2	0, 25	8 (12.5%) - no repetitions 5 (7.8 %) < 8 repetitions 51 (79.6%)- 20 to 25 repetitions
Resistance - Upper body	Frequency (days/week)	2.8	1.9	0, 5	12 (18.8%) - did not do 11 (17. 2%) -once a week 9 (14.1%) - 2 times/week 9 (14.1%) - 3 times/week 8 (12.5%) - 4times/week 15 (23.4%) - 5 times
	Intensity (CR-10 Borg® RPE scale)	4.7	1.4	2, 9	12 (18.8%) - did not do 6 (9.3%) - RPE <3 (light) 21 (32.8%) - RPE 3-4 (Moderate) 23 (35.9%) - RPE 5-6 (strong/hard) 1 (1.6%) - RPE 7-8 (very strong)

					1 (1.6% - RPE 9-10 (Maximal)[a]
	Time (number of repetitions per exercise)	14.9	8.3	0, 20	12 (18.8%)- no repetitions 5 (7.8%) < 8 repetitions 47 (73.4%) - 15-20 repetitions

Note: [a]One participant

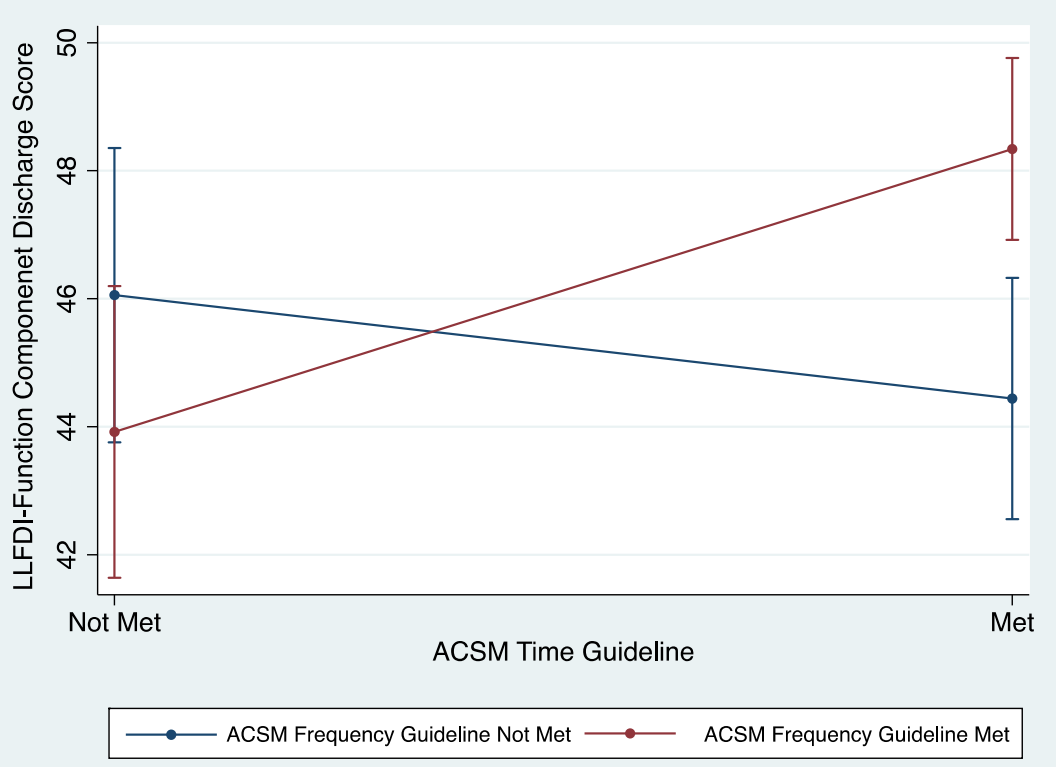
Table 3-3. Factorial ANCOVA for LLFDI- Function Component discharge score and independent variables: Cardiovascular exercise guidelines frequency, intensity and time (met/not met)

Source [a]	Sum of Squares	df	Mean Square	F value	P value
Age	26.4	1	26.4	2.1	0.15
Baseline LLFDI-Function Component	1499	1	1499	117	<0.001**
Frequency	8.9	1	8.9	0.7	0.41
Intensity	18.3	1	18.3	1.4	0.24
Time	0.11	1	0.11	0.01	0.92
Frequency and Time interaction	108.2	1	108.2	8.4	0.005**
Time and Intensity interaction	33.3	1	33	2.6	0.11
Error	717.5	55	12.8		
Total	2620.8	62	41.6		

Note: ** p<0.01

[a] Interaction effect for frequency and intensity and three-way interaction between intensity, frequency and time was not calculated due to number of participants in interaction groups

Figure 3-1. Frequency and Time Interaction for Cardiovascular Exercise on LLFDI-Function Component Discharge Score



According to Factorial ANOVA Post-Hoc Sidak test there was a significant difference in LLFDI-Function Component discharge score when guidelines for both frequency and time were met in comparison to meeting time or frequency only guidelines or meeting none.

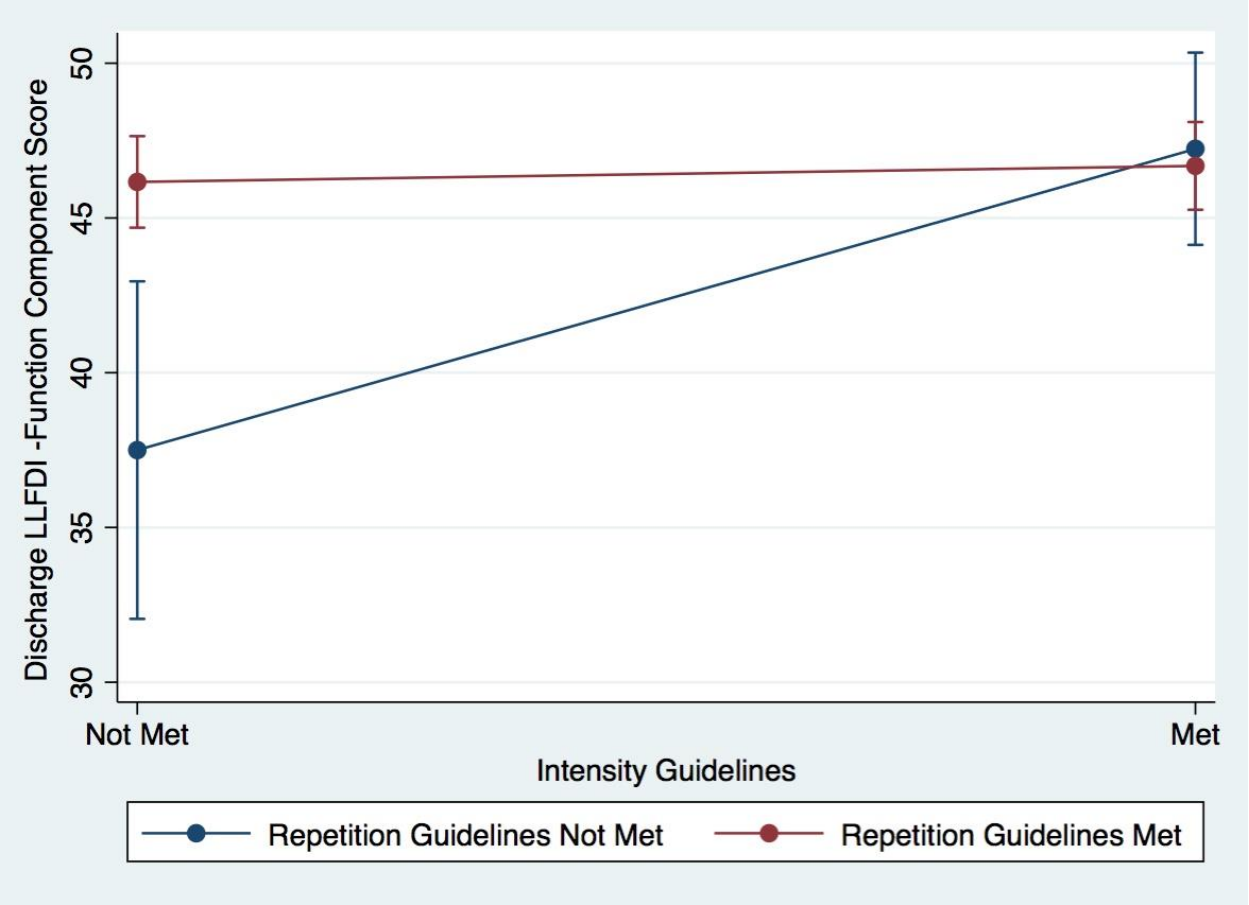
Table 3-4. Factorial ANCOVA for LLFDI-Function Component discharge score and independent variables: Resistance exercise guidelines frequency, intensity and time (met/not met)

Source [a]	Sum of Squares	df	Mean Square	F value	P value
Age	22.8	1	22.8	1.7	0.19
Baseline LLFDI total function score	1527.6	1	1527.6	114.4	<0.001**
Frequency	31.4	1	31.4	2.3	0.13
Intensity	9.6	1	9.6	0.7	0.39
Number of Repetitions (Time)	11	1	11	0.8	0.37
Frequency and Intensity interaction	3.7	1	3.7	0.3	0.66
Frequency and Repetitions (Time) interaction	25.5	1	25.5	1.9	0.17
Intensity and number of repetition (Time) interaction	80.8	1	80.8	6.1	0.017*
Error	734.7	55	13.4		
Total	2620.8	62	41.6		

Note: ** $p<0.01$, * $p < 0.01$

[a] Interaction effect for three-way interaction between intensity, frequency and repetitions was not calculated due to number of participants in interaction groups

Figure 3-2. Frequency and Time Interaction for Resistance Exercise on LLFDI-Function Component Discharge Score



According to Factorial ANOVA Post-Hoc Sidak test there was a significant difference in LLFDI-Function Component discharge score when guidelines are met for both intensity and number of repetitions or intensity alone or number of repetitions alone in comparison to not meeting both intensity and number of repetitions guidelines. Therefore, meeting either intensity or repetition guidelines was as beneficial as meeting both.

CHAPTER 4: Enhancing a Community-Based, Slow-Stream Rehabilitation, Hospital-to-Home Transition Program for Older Adults: Perceptions and Perspectives of a Multidisciplinary Care Team

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Preface

This chapter contains the manuscript entitled "Enhancing a Community-Based, Slow-Stream Rehabilitation, Hospital-to-Home Transition Program for Older Adults: Perceptions and Perspectives of a Multidisciplinary Care Team". The authors are: Melody Maximos, Ada Tang, Paul Stratford, Michael Kalu, Olivia Virag, and Vanina Dal Bello-Haas.

My contribution to this work includes assisting with refinement of the research objectives and development of the semi-structured interview guide; data collection, analysis and interpretation, and writing of the manuscript. Transcripts were transcribed verbatim by a professional transcriber and reviewed by Olivia Virag. I led the data analysis and interpretation and co-author Michael Kalu contributed. Co-author Olivia Virag and the research assistants contributed to data collection, analysis and interpretation. Co-authors Michael Kalu, Olivia Virag, and Vanina Dal Bello-Haas contributed to data triangulation and final themes. Co-author Vanina Dal Bello-Haas conceptualized and designed the study and contributed to data analysis and interpretation. All co-authors provided feedback on the manuscript. The manuscript is written to the following standards of the *Canadian Journal of Aging*, and is expected to be submitted by December 2020.

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Abstract

Purpose: To examine perspectives of care providers working in or referring to a community-based, slow-stream rehabilitation, hospital-to-home transition program in order to identify barriers or facilitators to implementation and functioning of an enhanced program.

Methods: This was a qualitative description study. Twenty-three participants participated in a focus groups or individual semi-structured interview. Transcripts were analyzed using inductive thematic analysis.

Results: Themes were categorized as: 1) macro - gaps while waiting for program, limited program capacity and need for expansion of services, and gaps in service post-program completion; 2) meso - lack of knowledge and awareness of the program, lack of specific referral process and procedures, lack of specific eligibility criteria and need for enhanced communication between care settings; 3) micro - services provided, program participant benefits, person-centered communication, program structure constraints, need for use of outcome measures, and lack of follow-up.

Conclusion: Majority of barriers identified were at the macro and meso level, while all facilitators were at the micro level.

Key Words: Community-based, slow-stream rehabilitation, hospital-to-home transition program, older adult, qualitative description, multidisciplinary care team

Background

Canada's current hospital-focused care system continues to be best suited for acute and short-term use (Allen et al., 2014), despite the exponential increase in the number of older adults and the proportion of older adults living with complex health care needs (Canadian Institute for Health Information, 2011). The mismatch between a growing older adult population with complex care needs and a system focused on singular, acute conditions results in: 1) challenges with ensuring effective discharge processes and the provision of timely and adequate care post hospital stay (Allen et al., 2014); and, 2) older adults typically being discharged prior to full recovery and achievement of rehabilitation potential and without proper supports in the community (Comans et al., 2013). These challenges are reflective, in part, of patient-level factors and healthcare system barriers. Patient-level factors such as new limitations in activities of daily living developed during hospitalization, difficulty in managing chronic conditions, and cognitive impairments often require an increased level of and need for ongoing support and services (Watkins et al., 2012). Health care system barriers such as breakdown in communication between delivery levels, inadequate provision of patient and caregiver information, poor continuity of care and limited access to community service (Watkins et al., 2012) lead to negative consequences including medication errors, increased health care costs, hospital readmission rates and institutionalization rates, and decreased quality of care and quality of life for both the older adults and their caregivers (Allen et al., 2014; Mistiaen et al., 2007; Watkins et al., 2012).

Properly planned and conducted transition care interventions can decrease hospital readmission rates, emergency department visits, and improve older adults' quality of life (Naylor et al., 2011; Verhaegh et al., 2014). A "transition intervention" has been defined as any

intervention that promotes safe and timely transfer of patients between levels of care and across care settings (Allen et al., 2014). Some transition interventions take place when the older adult is in the hospital (pre-discharge strategies), e.g., discharge planning, medication reconciliation; while others target the post-discharge time frame, such as home visits, follow-up phone calls, and education about chronic disease management (Watkins et al., 2012). A meta-review assessing discharge interventions in developed countries found that patient and caregiver education were the most beneficial for improving older adults' emotional status and decreasing hospital readmission rates (Mistiaen et al., 2007). Allen et al. (2014) found interventions led by multidisciplinary teams and involved the patient had the greatest impact on decreasing hospital readmission rates and improving quality of life. Other interventions and elements, including care planning, communication between providers, preparation of the patient and caregiver, reconciliation of medications, community-based follow-up, and patient education about self-management have also been found to be essential to successful transitions (Allen et al., 2014).

According to Watkin et al. (2012) and Falvey et al. (2016), transition programs often lack some of the necessary coordination and provision of post-discharge services that may bridge the gap between hospital discharge and initiation of community services. Specifically, nutrition support, transportation, and the provision of support services for instrumental activities of daily living are typically lacking (Watkin et al., 2012). In addition, there has been a lack of incorporation of occupational or physical therapists' expertise in the hospital-to-home transition process to improve older adult function post-hospitalization (Falvey et al., 2016). Mistiaen et al. (2007) and Allen et al. (2014) found no evidence related to the benefits of addressing physical status or the ability to complete activities of daily living once patients transition to the community. However, more recent research indicates that mobility- and function-related deficits

represent independent risk factors for hospital readmission and are addressable through rehabilitation interventions (Falvey et al., 2016; Verhaegh et al., 2014), Interestingly, research has found that frameworks for transitions of care are lacking specific mention of integrated community programs that include occupational therapy or physiotherapy specifically, or rehabilitation and rehabilitation professionals, in general, in the transition process (Kalu et al., 2019).

In 2009, the government of Ontario recognized the importance of multifaceted restorative programs to assist older adults to return to "highest level of independence" post-hospital discharge (MOHLTC, 2009). Restorative care programs can take place in the hospital or in the community, and focus on improving independent functioning and activities of daily living perceived as important by the participant (Kjerstad & Tuntland, 2016). These programs are time limited, person-centered and delivered by a multidisciplinary team of occupational therapists, physiotherapists, nurses, and assistants (Kjerstad & Tuntland, 2016). An analysis conducted in Australia, the United Kingdom and the United States found that community restorative programs for older adults are 20% more cost-effective than hospital-based programs (Kjerstad & Tuntland, 2016). However, currently very few community-based restorative type programs exist in Canada (GTA Rehab 2008). To our knowledge, there is a dearth of community-based hospital-to-home transitions programs for older adults that encompass and include the strategies and elements found to be beneficial per Mistiaen et al., (2007) and Allen et al. (2014): patient and caregiver education, discharge planning, chronic disease management, while addressing gaps post-discharge identified by Watkins et al., (2012); and incorporating rehabilitation services to maximize potential and address unmet goals and ongoing mobility and function-related deficits.

Community-based, slow-stream rehabilitation (SSR) hospital-to-home transition programs may be a model of care that provides the much needed support for older adults following acute hospital stay. SSR programs are structured to be multidisciplinary, longer in overall program duration, with shorter duration and lower intensity sessions, thus are ideal for older adults who are frail or who have complex multiple health conditions (Maximos et al., 2019). These programs have been shown to improve physical abilities, activities of daily living and instrumental activities of daily living among older adults, as well as decrease hospital readmissions (Maximos et al., 2019). According to Mitchell (1999), community-based programs should be multidisciplinary, and should provide education, support and skills to patients and family. Research has shown that older adult engagement in community-based programs improves quality of life (Comans et al., 2013; Cowan et al., 2009), however there is a paucity of literature specifically related to community-based, SSR, hospital-to-home transition programs.

This research explored the elements deemed beneficial and the perceived gaps and needs of a current program, as a first step in the design of an augmented model of care. As part of a comprehensive evaluation of the program, we were interested in learning more about perceptions and perspectives of the multidisciplinary care team that referred to or was part the program. The purpose of this qualitative descriptive study was to examine perceptions and perspectives of care providers working in or referring to this unique program in order to identify factors that may act as barriers or facilitators to successful implementation and functioning of an enhanced, community-based, SSR, hospital-to-home transition program.

Methods

Study Design

This was a qualitative description study, with methods conducted as described by Sandelowski (2010), that aimed to describe and identify a phenomenon through naturalistic inquiry from a social constructivist view (Bradshaw et al., 2017; Willis et al., 2016). Qualitative description is used when the aim of the researcher is to present facts but not to interpret the data in terms of perceptions, emotions or the philosophical underpinnings of those interviewed (Sandelowski, 2000). Therefore, this study involved categorizing and identifying themes within interview transcripts as explained below.

Study Context

Specific details regarding context elements are not provided within this document for confidentiality reasons. The community-based, SSR, hospital-to-home transition program is located in one of the 14 Local Health Integration Networks (LHINs) in Ontario. The LHINS are responsible for planning, integrating, and funding health care, as well as delivering and coordinating home and community care, based on local needs. The discharge from hospital-to-community process in the LHIN housing the program is facilitated by Case Coordinators who are based in hospital and refer older adults to the program. Community-based care coordinators may also refer eligible adults to this program.

At the time this study was conducted, the SSR program provided nursing, physiotherapy, and recreation-based services, and consulted with and referred to other healthcare services as needed. Older adults attended the program from Monday to Friday for one month and completed a variety of activities each day, including individual and group exercises and social and cognitive activities; and, received one-on-one nursing education on an array of topics, such as falls

prevention, nutrition, managing polypharmacy. Snacks and a mid-day meal were provided, as was transportation to and from the program. Once the 30 days was reached, the older adult was discharged from the program and could be referred to other community-based programs or support services.

Participant Criteria and Recruitment

The aim of qualitative description is to generate a rich descriptive database of different perspectives and major themes (Bradshaw et al., 2017). Therefore, a heterogeneous sample of care providers working within or referring to the program were recruited. Recruitment was conducted through purposive sampling, which is a technique that involves intentionally sampling a group of people that can best inform the researcher about the phenomenon of interest (Creswell & Poth, 2007)**.** Participants were included if they were directly involved with or had experience with the care of older adults in the program or were directly involved with or had experience with referring older adults to the program. Those identified as potential study participants included individuals working within the LHIN as Case Coordinators, individuals working within complex continuing care or convalescent care, and individuals directly working within the program. Potential participants were sent a recruitment letter via email or mail and were asked to contact the project coordinator if interested in setting up a phone or in-person interview or attending a focus group. In keeping with the methodology for qualitative studies, no sample size was calculated (Creswell & Poth, 2007) and participant recruitment was conducted until a wide array of individuals were interviewed and themes occurred more than five times.

Data Collection

Individuals participated in one of two focus groups or an individual semi-structured interview based on personal preference. Focus groups were conducted in person by two

researchers at the program location and were approximately one hour in length; individual semi-structured interviews were conducted either in person or via telephone and were approximately ½ hour to one hour in length. For both data collection methods, researchers used semi-structured interview guides comprised of the same introductory information and the same open-ended and probing questions related to needs, strengths, concerns and challenges with current program services. Interviews and focus groups were audio recorded and transcribed verbatim. Researchers identified themselves as research assistants who were facilitators versus topic experts, in order to allow for neutrality and objectivity when collecting data (Willis et al., 2016). As well, researchers recorded observation notes, field notes and reflexive notes about perspectives, reactions and feelings that arose during focus groups or semi-structured interviews. These notes were also transcribed, and were used to decrease bias and to further enhance the transparency of the analysis.

Data Analysis

All interview transcripts were analyzed using data-driven inductive thematic analysis (Braun & Clarke, 2014), a type of analysis that is free from theoretical frameworks and researchers' analytical preconceptions. This analysis aims to identify, analyze and report patterns within data (Braun & Clarke, 2006). Thematic analysis was completed by six researchers in independent pairs. During the coding process, each researcher kept reflexive journals to document their ideas and thoughts. For each transcript, researchers followed the six steps of thematic analysis guideline described by Braun & Clarke (2006) which involve initially conducting an independent analysis of the transcript consisting of reading the transcript to familiarize themselves with the information, then generating codes through line-by-line reading and then generating themes from the data. If needed, researchers referred to observation, field

and reflexive notes taken during the interviews or focus group to further contextualize codes and themes. Once the researchers reviewed the transcript and generated themes individually, they then met with their pair-partner to review and resolve any discrepancies collaboratively through discussion. All six researchers met midway through the review process and all transcripts were reviewed to discuss findings and resolve discrepancies in code books. This was done to triangulate all codes and themes in order to derive a final coding book. Themes were then presented to the broader multidisciplinary research team members who were not involved in the coding process for further analysis and feedback. The code book was then adjusted according to feedback e.g. fit of themes, potential areas of over interpretation of data. This triangulation process with the larger research team occurred multiple times until a final agreed upon code book was developed.

Ethical considerations

Participants were informed of the research aims and provided written informed consent. This study was approved by the Hamilton Integrated Research Ethics Board (HiREB # 15-089). Specific names and locations that appeared in participants' transcribed comments were replaced with a pseudonym to ensure anonymity.

Results

Twelve semi-structured interviews and two focus groups were conducted with a total of 23 participants (see Table 1 for participant information). Six participants were employed by the LHIN, six were employed by other referral sites and 11 were employed in the program.

An overarching theme was time, with three distinct time points identified by study participants as important: before program admission i.e. before older adults begin the program,

during the program, and following program completion. Some themes extended across all time points, while others were bound to a particular time point (Figure - Overview of themes).

A socio-ecological framework highlights multiple levels of impact, influence and interactions, and was used to organize the data (Table 2 to Table 4). Specifically, the World Health Organization (WHO, World Health Organization, 2002) macro-meso-micro levels of health care systems - patient level (micro), health care organization and community level (meso), policy level (macro); and, Kapiriri et al., (2007) description of healthcare priority setting levels - macro-level (national, provincial), meso-level (regional, institutional) and micro-level (clinical program) were integrated. Macro-meso-micro level terminology and analysis have been used in an array of research including policy research (e.g., Kapiriri et al., 2007), scope of practice research (e.g., Smith et al., 2019) and community intervention research (e.g., Otiso et al., 2017; Valentijn et al., 2013). These qualitative studies aimed to describe and understand a phenomenon of interest using a macro-, meso-, micro- level framework to identify potential areas where barriers and facilitators exist.

For this study, macro-level factors encompassed federal or provincial level factors (Kapiriri et al. 2007) such as policy, resource allocation, funding for supports and services (WHO, 2002); meso level factors included factors that exist at the health care organization and community level (WHO, 2002) or regional level (Kapiriri et al., 2007), and, micro-level factors were considered patient level factors and day-to-day program components (WHO, 2002; Kapiriri et al. 2007). Below is a description of themes at macro, meso and micro level factors and selected representative quotes for each theme. Refer to Tables 2 to 4 for all quotes at each level by theme.

Macro level factors

Macro level factors have been described as federal or provincial level factors (Kapiriri et al. 2007), such as policy, resource allocation, funding for supports and services, and initiatives (WHO, 2002) to support older adults' post-hospitalization. Participants described current lack of resource allocation and funding for hospital-to-home transition supports and services as barriers to further program development and implementing an enhanced model of care. This lack of resource allocation and funding extended across all three time points. While the program provided specific supports and services at a particular point in time post-hospital discharge, what transpired before and after the program were also highlighted as elements important to consider for a comprehensive model of care for hospital-to-home transition for older adults. No macro level facilitators were identified. Macro level themes included: gaps while waiting for program, limited program capacity and need for expansion of program services, and gaps in service following program completion.

Gaps while waiting for the program

Program participant (older adult) needs prior to admission into the program encompassed services that would support the older adult post-hospital discharge and were often unmet. Gaps included home care support, health education, as well as timely and continued rehabilitation including occupational and physiotherapy. Gaps while waiting for the program were discussed by both referral and program staff as being barriers to older adult success in the program. Participants noted that resources, supports, and services were required post-hospital discharge and that they needed to be available while the older adult was waiting to be admitted into the program to prevent loss of any gains made while hospitalized and to prevent loss of independence.

"Um, recognition that the service is needed right away and it may be short term but they need it when they leave the hospital, not after a period of time" (P11).

Limited program capacity and need for expansion of program service

The current capacity of the program was limited both in terms of the number of older adults that could be admitted at any one time due to funding and the challenges related to capacity within the program that hindered program delivery e.g., limited exercise equipment resulting in wait times for equipment, having to share equipment with participants in other programs offered by the facility, and staffing ratio. The need for growth in the number of programs across regions was identified by study participants as a method of enhancing the model of care.

"you've got a lot of competing programs that need to use a fixed number of machines, and that can be a challenge for sure" (P2)

"It would be nice if there were more programs like [program], even if the VON could do something like that but it would be great because that program is west [location] and you've got [multiple locations of interest] in this whole area. I don't know about [another location] and all those areas but even in our area there's only one location so somebody in [far location], they're not going to want to do that drive and [program] would not be able to do that, get everybody there on time." (P9)

Gaps in service following program completion

Low cost or no charge community-based programs and services that would support gains made and assist with continuity of care were not available to older adults' post-program completion. Programs were either not available in general, not available in the older adult's community or were too costly. Participants expressed concern about the lack of these important

community resources and what would happen to the older adult's physical and emotional well-being after discharge from the program.

> " [in program] They get exercises, it's free of cost…. Then, at the end of 30 days, you pull the rug out. It tells them that there is hope and things can change, but then many of them do not have the resources to make it happen" (P3)

Meso level factors

Meso level factors exist at the health care organization and community level (WHO, 2002) or regional level (Kapiriri et al., 2007). Kapiriri et al. (2007) described meso level factors as priorities within the organization and its related community sources. Examples of meso level factors can include tools within and between care delivery levels, knowledge and expertise of staff, and values and priorities of the larger organization of interest (Kapiriri et al., 2007; WHO, 2002). Meso level themes identified in this study included: lack of knowledge and awareness of the program, lack of specific referral process and procedures, lack of specific eligibility criteria, and need for enhanced communication between care settings; and, all were deemed as areas of improvement to be implemented to enhance the model of care. No meso level themes were identified as facilitators.

Lack of knowledge and awareness of the program

This theme comprised lack of understanding of the services provided by the program and not having information about the program to distribute to other staff members or potential program participants. Lack of knowledge and awareness were perceived as a barrier mainly by referral staff and program leadership. The study participants indicated they did not have access to information pamphlets and only knew the program existed through 'word of mouth'. Because of the high turnover of Care coordinators, program knowledge and awareness often leaves when the

care coordinator leaves. In addition, those who knew of the program's existence indicated difficulty identifying all the different elements and components of the program or the goals of the program.

> "We have a lot of changes in staff so there's always a possibility that newer staff are not aware of [program]" (FG1)

> "I could use some brochures (Laughter). I steal some from the social worker and physio but typically the physio and the social worker have brochures and give it to them. "(P12)

Lack of specific referral process and procedures

The lack of specific referral processes and procedures was viewed by study participants as an area of improvement. Specifically, the lack of a defined set of actions to be undertaken to transfer participant information from one level of care to the program and the lack of a paper trail for referrals resulted in uncertainty about how to refer to the program, when to refer to the program and whether the referral was actually received by the program. As well, the general referral process used differed based on whether the referral was from community care coordinator or the hospital care coordinator or from individuals from other sites such as convalescent care. The referral process was often dependent on whether the staff referring the prospective older adult participant knew who to contact.

> "…however another negative is that we're not properly instructed there's no referral base in our computer system to indicate that this person has been referred to [program]... " (P10)

Lack of specific eligibility criteria

The need to have a better understanding of the characteristics of potential older adult participants who would most benefit from the program was identified as important by referral

and program staff. Both the program and referral staff discussed the need to use standardized measures and cut-off values as a potential way to ensure appropriateness of referrals. The referral staff noted that they had a general idea of who would most benefit from the program, but did not have clear understanding of any eligibility criteria. This led to confusion and inappropriate referrals at times.

> "So actually looking at the criteria, because it's so wide, "well, you've had to have a hospitalization within the last 3 months", and almost anyone can say "well I've been in the hospital". So I would like to see that the eligibility criteria is more specific to who's appropriate and who's not appropriate."(P2)

> "I think [The program] is designed for people but a certain level of independence and ability to follow through on commands and able to benefit from the program," (P11)

Need for enhanced communication between care settings

Written or verbal communication should take place any time patient information has to be moved from one level of care to another or from a care setting to the program. For example, communication could take place between community level and hospital (e.g., community Case coordinators and hospital discharge staff) or between community settings (eg. program staff and LHIN staff). Study participants discussed the need to enhance methods of communication between service delivery levels to increase knowledge about patient's medical status, decrease lag time for information sharing, and increase clarity of communication. Communication issues were viewed as barriers that needed to be addressed.

> "It's not up to us it's up to the LIHN because I have this conversation with the care coordinator sometimes they are already on the list sometimes they were sent back from another transitional bed program to the hospital that has requirements for our program

so… Or if not, when they are in here they will have a file opened for them and then they go through the same process." (FG3)

Micro level factors

Micro level factors include patient level factors and day-to-day program components that either support or hamper individual empowerment, such as communication with the patient, patient goals and program structure (Kapiriri et al., 2007; WHO, 2002). Most of the participants noted micro level factors as important components to maintain with an enhanced model of care. Themes included services provided, program participant benefits, and person-centered communication. Study participants noted program structure constraints, need for utilization of outcome measures and lack of follow-up as hindering program participant long-term success.

Services provided

A variety of program activities, education, care and supports were provided to older adult participants. In particular the following were considered components that should be retained, built upon and expanded for any enhanced model of care: multidisciplinary care, free transportation to and from the program, provision of meals, health and nutritional education, social activities, and rehabilitation.

"its free, transportations provided, meals provided, physio-focused, they have to have goals, and then I think that they offer some additional services like a shower or foot care." (P11)

Program participant benefits

Study participants identified that program participant benefits were directly related to program activities, and included increased physical function, improved mobility, increased endurance, as well as decreased isolation and depression. Some intrinsic benefits included

renewed sense of meaning, motivation to continue to be active and motivation to be engaged in their community.

> "I think also knowing that they can improve, it just reminds them that hey I can improve later, it's possible that I can keep going so it just gives them more intrinsic motivation to continue on with other programs" (FG1).
>
> "...back to the full body abilities, so there's the rehabilitation piece which takes into account your mind, body, spiritual, all the various assets to helping that rehabilitation model" (P2).

Person-centered communication

Person-centered communication is a method of gathering or providing two-way stream of information sharing between staff and participants or their family in a way that is empathetic, accommodating of individual's beliefs, desires, knowledge and experiences (Williams et al., 2018). Person- centered communication was evident and occurred across all time points by referral and program staff. All study participants discussed the importance of continued person-centered communication as a critical component of any enhanced model of care.

Prior to the start of the program referral, staff met with family and prospective participants about the program and rehabilitation goals. During the program, program staff provided emotional support and developed relationships with the older adult participants. Program staff described being open and a willingness to listen to the older adult program participants' opinions and needs. This openness and willingness to listen continued during discussions of linking older adults and their family with links to community resources.

> "Yes. So we have that family meeting in convalescent care when we discuss the progress and discharge destination…on day 45 you know what, this patient needs to be here for

like, up to 90 days because we don't see that going home sooner than 90 days so the family knows, this is the day that is for potential discharge so they are planning everything ahead…"(T7)

"So the [occupation of program staff member] who's in there, [Name], really takes a real personal approach with each person, really helps make them feel acknowledged and accommodated as best she can. We try to get all the variable information that's necessary to make their experience as positive as possible" (P2)

Program structure constraints

Program structure included elements that comprised the design of the program such as total length of the program, daily schedule, and time spent in the program per day. Program and referral staff discussed that not all older adult program participants progressed at the same rate and that the 30-day program length was a limitation for some older adults. Study participants highlighted the need for more flexibility, such as having a step-down approach where after the 30 days program participants could continue for three times a week and then two times a week and then one time a week for a limited time. Because of individualized needs, some older adult participants would have benefited from being able to attend the program for half days rather than full days. Participants also indicated they would have liked the ability to have older adult participants re-enter the program should issues arise or be able to stay in the program for an extended period of time, beyond the 30 days.

"Timing doesn't work for everyone because it is a morning program. If there were two different streams, a morning and afternoon, it would be beneficial to a lot of the population who's not able to get up so early and have their PSW come and assist them…" (P10)

> "I think it should be tapered maybe, so you get this lovely one month program and then you're done, can you, you know, ween it down to bi-monthly, you know or, like a step-down program so that it sort of prepares them and educates them about other resources in the community um, I don't know if you would want to call it a coach but somebody just to say what's your quality of life? How are things at home? What else would you like to be doing? Sort of the navigator." (T14)

Need for use of outcome measures

Using standardized tools with cut off values that could objectively measure older adults' physical ability, psychological well-being and ability to complete activities of daily living was viewed as important. Study participants stated that the implementation of standardized measures in an enhanced model of care would be beneficial to communicating patient progress and needs between different care settings as well as provide evidence to support the need for the program, to sustain current funding levels, and to advocate for increased expansion and funding in the future.

> "If they generated a mini assessment, like an ADL or some kind of measure of what their abilities were... and then did an ability summary assessment that would be kind of beneficial" (P9)

Need for continued follow-up by program or referral staff

Study participants stated that once the program was completed, there was no further follow-up with the older adults to determine if the recommendations were implemented. Both program and referral staff participants stated that having opportunities to maintain communication with older adult participants after program completion would be beneficial, may

enhance longer-term benefits, and could potentially identify new challenges that arise for older adults' post-program completion sooner rather than later.

> "… I don't know if they have any support that's… I don't really ask and I… I really have no idea what is happening after that one month. Do they have any support? Of course, they have like services if they are eligible from LIHN but what about the physio you know? The physio I think is the key". (P7)

Discussion

SSR programs, designed to provide optimal care for older adults with complex healthcare needs or who are not able to participate in 'traditional' rehabilitation programs, are available in institutionalized settings across Canada (Maximos et al., 2019) to address activities of daily living and mobility problems, prevent institutionalization, and decrease hospital readmission. No study to date has evaluated the transition process from hospital or convalescent care to a community-based, SSR, hospital-to-home transition programs from the perspective of a multidisciplinary care team, which led to this study.

Perhaps not surprising, most of the stated barriers were at a macro or meso level and were out of the study participants' control, while all the facilitators were at a micro level. Study participants emphasized the importance and role that community hospital-to-home transition programs for older adults play in decreasing institutionalization and allowing for return to independent living post-hospitalization. However, macro and meso level factors such as limited government resource allocation, lack of knowledge about the program, need for more well-defined referral processes and communication across service delivery levels were considered barriers that would need to be addressed for the development of an enhanced model of care, and program implementation and success. Many of the barriers to an enhanced model of care

identified in this study are similar to those previously reported by policy researchers, healthcare workers, family caregivers, as well as older adults themselves: break-down between care delivery levels (Mansukhani et al., 2015), lack of community-based follow-up (Russell et al., 2019), limited access to services and resources (Watkins et al., 2012); and specifically in Ontario, lack of timely services and community supports, limitations of funded services and coordination of care (Kiran et al., 2020).

In 2007, the government of Ontario proposed a provincial 'Aging in Place' initiative that would enable older adults to continue leading healthy, independent lives in their own home. This initiative aimed to provide $1.1 billion over four years with an increase of $143.4 million for community-based programming in the first year alone (Peckham et al., 2018). The program goals were to improve coordination of services from hospital to community and support initiatives that would decrease emergency department and alternative level of care usage. This led to multiple LHIN-funded initiatives across different regions of Ontario (Peckham et al., 2018). However these initiatives are at the provincial level and are not part of Canada's Medicare system, and thus lack universal, sustained funding for building capacity in the community (Peckham et al., 2018). Competing political agendas have resulted in fragmentation within the community and social care subsectors (Russell et al., 2019). Community initiatives are often motivated by a single funding injection and thus long-term sustaining of initiatives becomes difficult when funding is withdrawn (Russell et al., 2019). Russell and colleagues (2019) suggest that a top-down approach rather than bottom-up approach to coordination of funding is needed, which would allow for sustained programming and planning with communication and collaboration directly with policy makers. An analysis conducted by Russell et al. (2019) found that in order to

maintain sustainability of community initiatives community champions, multi-disciplinary and cross-sector collaborations, and systemic municipal involvement is required.

In addition to sustainability, communication across system delivery levels requires cross-system talk between different medical record platforms, otherwise sharing of information is difficult to coordinate (Russell et al., 2019). Communication issues across service delivery levels is not unique to Ontario or the Canadian health care system, but has also been highlighted in the United States and in Europe (Mansukhani et al., 2015; Vermeir et al., 2015) and include lack of time for verbal communication or secure systems for indirect communication, such email, referral documents, and availability of assessment information between home care, rehabilitation staff and acute care providers. In the United States, systems and tools have been developed to share patient information across care delivery levels. The Continuity Assessment Records and Evaluation platform is an example of such a tool, intended to provide up-to-date and accurate information at the time of hospital discharge and during the transition of care period (Mansukhani et al., 2015). Platforms such as these have been shown to decrease hospital readmission rates, improve quality of care and patient involvement, and decrease overall healthcare costs (Mansukhani et al., 2015; Vermeir et al., 2015).

In contrast to the barriers, all facilitators were either related to day-to-day program activities or to the program structure. Micro level facilitators identified included the services available to older adult participants, person-centered communication, and extrinsic as well as intrinsic gains directly related program design. According to the study participants, the program was successful because it combines the rehabilitation, nutrition, and education with opportunities for social interactions and the ability to seek guidance from an array of healthcare professionals. Integrated care at a micro level, where a program or clinic provides a multidisciplinary care

team and multifaceted programing to assist older adults with multiple chronic conditions or functional limitations, is an often used as a framework for patient care (Briggs et al., 2018). Many of the facilitators are similar to those documented in the SSR program (Maximos et al ., 2019) and community-based program literature (Leveille et al., 1998; Mitchell, 1999; Wilkins et al., 2003). Yet to date, SSR programs have been solely housed in institutionalized setting such as hospitals and long-term care facilities (Maximos et al. 2019). SSR programs provide an array of services for the older adult with complex health care needs, often via a multidisciplinary care team, and have been shown to successfully improve function, decrease institutionalization and hospital readmission (Maximos et al. 2019). The multidisciplinary structure and array of services are considered important in both SSR and community-based programs, as is the ability to provide the education and skills to both the older adult and their family caregivers needed for independent living (Mitchell, 1999).

Services that study participants described as being important to the success of older adults transitioning back to independent living post-hospitalization and that should continue in any future enhanced program included nutrition, transportation to and from program, socialization opportunities, and rehabilitation services. Previous literature has shown that provision of services such as nutrition, education about chronic conditions and management, transportation or access to community services (e.g., grocery, gyms, coffeeshops) and access to home care supports have been associated with maintained physical function, improved mental health, improved quality of life and a reduction in emergency department use for older adults living independently in their home (Cowan et al., 2009; Jeste et al., 2016). Rehabilitation services such as physiotherapy have also been found to decrease hospital readmission and improve physical function for older adults with complex healthcare needs (Falvey et al., 2016;).

Interventions aimed at to improve functional difficulties and focusing on reducing risk factors related to comorbidities (eg. education or medication management) have been shown to improve health and decrease hospital expenditure (S. M. Smith et al., 2012). These findings, as well as the findings of previous policy statements the WHO, highlight the need for major reforms to health care systems to support an ageing population through the integration of health and social services to address prevention and management of declining functional ability in older adults (Briggs et al., 2018; WHO, 2015, 2016).

The study participants also discussed aspects that were not directly related to program resources but rather were related to communication with older adult clients and their families. Study participants felt that person-centered communication and collaboration with the clients and their families were vital. Person-centered communication that takes into consideration the person and their family's values has been shown to be important to clinicians, clients and their families and improves quality of care and adherence (Kiran et al., 2020). Research related to hospital-to-home transition interventions has found that good communication and collaboration improve quality of life and decrease readmission rates (Verhaegh et al., 2014). Hence, staff training about the importance of and the implementation of person-centered communication and collaboration with program participants to set goals should continue in an enhanced model of care.

Even though there are many policy and structural changes that would need to be implemented at a macro level such as increased funding to expand the program and improve sustainability and a healthcare delivery wide communication system, there are changes that can be made at a micro level that would lead to program enhancement. Barriers such as lack of program knowledge and awareness, communication, referral processes and eligibility criteria

could be addressed through various initiatives. For example, pamphlets, a dedicated website, or orientation videos could be developed for new referring staff. Research has shown that a dedicated platform, such as a website with articles, program information, and printable forms and documents can serve as a centralized repository of resources for healthcare providers, referral staff, older adults, families, and the community can improve awareness of services (Farkas et al., 2003). Farkas et al. (2003) also notes that incorporating tools such as decision aids would improve experience of those using the service and lead to greater uptake of service. For the enhanced model of care an eligibility criterion check list, as well as the availability of referral and standardized assessment forms would be important to have for referring staff to improve their experience and uptake. Online and other tools would be a mechanism for seamless sharing of information across care delivery levels, would assist in reducing inappropriate referrals to the program and could serve to highlight the successes of the program. Although these initiatives would not require policy changes, however funding would be required for implementation.

The current program structure and constraints were considered barriers. The study participants felt that there should be more flexibility e.g., full days or half days, the ability to participate in the program more than 30 days, the ability to gradually taper attendance in the program. Older adults with complex health needs may require longer rehabilitation time to achieve independent living (Kortebein, 2009). On average, SSR program length ranged from two to four months (Maximos et al., 2019), and community-based occupational and functional training programs for older adults ranged from six weeks to three months (Wilkins et al., 2003). The desire to provide longer rehabilitation time or a step-down model to allow older adults to more gradually adjust to independent community living post-hospitalization is supported by literature and would be a unique feature of an enhanced program. However, providing this

program flexibility would require increased funding allocation to support staffing and capacity to accommodate the individualized program structure, and the needs of other programs housed at the facility.

Limitations

Despite the richness of information gathered from this qualitative study, limitations exist. This study assessed one specific program in a LHIN in the province of Ontario; therefore, the extent to which findings about facilitators and barriers are generalizable to different settings, provinces, and countries is not known. With qualitative description methods, researchers developed themes without interpretation, thus an in-depth analysis of phenomena was not conducted. Qualitative description methodology does not often consider the intricacy and complexity of differing perspectives and multiple truths that often emerges in other qualitative methods such as phenomenology or ethnography studies. To ensure rigor and triangulation, and that themes resonated with multiple health professionals involved in the transition process reflexive notes and themes were reviewed with a multidisciplinary research team during and post analysis. However, themes were not revisited by study participants for confirmation. This was mainly done to decrease the demand on participants' time and staff turnover. This meant that we did not have an opportunity to check interpretation of what was said during interview process or correct any misinterpretation or errors that may have occurred directly with the study participants.

Conclusion

This is one of the first studies to examine perceptions and perspectives of care providers working in or referring to a community-based, SSR, hospital-to-home transition program for older adults. Many positives aspects of the program, such as the services provided, the benefits

to older adult clients, and person-centered communications would be vital to the continued success and implementation and functioning of an enhanced program. Yet, many areas that were identified as barriers need to be addressed. Implementation of seamless patient information sharing through platforms or other tools and the use of referral criteria and standardized outcome measures may reduce improper referrals and inaccurate information and may improve knowledge available for referral and program staff. An enhanced model of care should allow for individualized program design to suit the goals and needs of the older adult, but would require changes at the macro level.

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Table 4-1. Employment Location and Occupations of Participants

Employment Location	**Participant Occupation**	**Number of participants**
community-based, slow-stream rehabilitation hospital-to-home transition program	Healthcare professional (nursing staff, Physiotherapy etc.)	2
	Administrative staff	2
	Frontline staff (e.g., personal support workers, activity staff)	7
	Number of Participants	11
Local Health Integrated Network	Community Case Coordinator	2
	Hospital Case Coordinator	2
	Both Hospital and Home Case Coordinator	2
	Number of Participants	6
Convalescent care units/ Retirement home/ Palliative care/ Long-term care	Administrative staff	3
	Frontline staff (e.g., personal support workers, activity staff)	3
	Number of Participants	6
Number of Participants		23

Table 4-2. Facilitators and Barriers to Enhancing and Implementing a Community-Based, Hospital-to-Home Slow-Stream Rehabilitation Program at the Macro Level

Macro Level Factors			
Facilitator/Barrier	**Theme**	**Program Time Point**	**Quotes**
Barrier	Gaps while waiting for the program	Pre Program	"Initially the idea was that while people were waiting the services could be heightened so we could put in physio and OT in the home to bridge and transition." (P8) "Um, recognition that the service is needed right away and it may be short term but they need it when they leave the hospital, not after a period of time." (P11) "During that initial month home from hospital is when the input is needed, not three months or two months or six weeks but its often that initial first month that's critical in determining how people get back into the community and how well they do." (P12) "The challenges would be getting enough home care services in the home in order to transition someone into the program" (P14) "And of course you may have, ummm maybe a little deterioration of their condition you know." (P15) "Maybe if you had more CCAC services that allowed, maybe an assistant a PT assistant or more PT assistant with not only a home program but with equipment." (P15) "I mean in a perfect world I'd like to say there could be like an in between program or a…you know someone who could go in to their home and….like a home care but for that specific…and do exercises with them there." (P16) "I would say the challenges are deterioration, caregiver burden" (P22)
Barrier	Limited Program capacity and need for expansion of program service	During Program	"Funding and long waitlists, so more patients wanting access to it is obviously going to increase the waitlist" (P4) "So right now our ratio is approximately 5:1, if you reduce that ratio you might have more success." (P2) "...so you've got a lot of competing programs trying to use a fixed number of machines, and that can add challenges for sure." (P2) " So let's say you have 2 people sort of keeping eyes and getting people on and off the NuStep and monitoring there time spent and there ability to manage transfers, it means that those people are going to be taken away from your staff pool. They probably wont be

			available to do the prep for the meals, or getting somebody upstairs so you know, so it's really about managing your staff compliment." (P3) "Probably the only challenge is trying to get enough people through all, in one day every day, um sometimes we ran into challenges because it's a shared gym, um specifically with the rehab portion of it, and with that shared gym there's only a certain number of machines, so you run into delays. And sometimes the workload can be a larger amount on one person in a short amount of time, so in other words, trying to get numerous amounts of people in, and you've got up to 15 participants in, in like a 3-hour window sort of thing and that can add challenges. And so we try to space it out throughout the day however the bulk of your work is usually happening within those time constraints, because of transportation, lunch, and various other things."(P1) "But I think if we had more room, if we could accommodate more people. You know that would be great.… maybe if we had maybe another pair of hands or maybe two other persons you know we might be able to offer more. So increased staffing and maybe some more space." (P15) "I think I would enhance our gym piece so we had almost our own space and more tools that are rehab focused. I mean, it took us years to get parallel bars. These standard pieces of equipment in the world of rehab and we didn't go into it with a lot of that. So I think that would be a big piece. I think transportation too I would offer some more options. " (P5) "The drawbacks of the program are that we have all kinds of people that need that kind of program. And they can only accommodate so many people at one time" (P22) "The government needs to give us more money so we can open another one. Because we are the only one in [location] with this kind of set up." (TP01) "Something that can be improved. Expansion of the program… to accommodate more people" (CP01) "It would be nice if there were more programs like [community-program], even if the VON could do something like that but it would be great because that program is west [location] and you've got [multiple locations of interest] this whole area, I don't know about [another location] and all those areas but even in our area there's only one location so somebody in [far location], they're not going to want to do that drive and [program] would not be able to do that, get everybody there on time."(P9)

			"Probably where they're located, that there's enough of them, we could use more, sometimes it's like, geographic boundaries right so if somebody lives there and they're not in the catchment areas." (P12) "I think the research shows that isolation is one of the biggest factors in determining health for seniors so when you look at all the research on mobility and walking and exercise and bone density on all of those, a program like this can address all of those problems as well as socialization. So I think its quite important that seniors have this connection and more of these programs." (P11) "I don't know what to say about that. I mean, it's successful now I'd say a continuation of it would be the most obvious or else I don't know… more sites I mean it would never be the same but that type of program…"(FG2)
Barrier	Gaps in service post-program completion.	Post Program	"There are some people who do really well at [community program] and then they go home and they don't go to a program or they don't have something and then they.. don't um, continue to do well." (P8) "They get exercises, its free of cost, they're picked up, they're given a meal, they're taken home and they're treated very, very well. Then, at the end of 30 days, you pull the rug out. It tells them that there is hope and things can change, but then many of them do not have the resources to make it happen" (P3) "It's just that, at the end of it we have mixed feelings because quite often they want more, because often we have made them realize sometimes what their true potential is. At the end it means it ends, and we have to find somewhere else to send them on to. This quite often costs money and not everybody can afford it so its bittersweet but it is an excellent program. " (P3) "They cannot afford to participate in any kind of exercise because of financial constraints. I see it all the time because at the end of every assessment we make a plan, its always a question "where do you go from here, who's gonna do your meals, who's gonna do your laundry, how are you going to get from point A to point B" and quite often you hear "I don't have the money, I can't afford" (P2) "There's not enough of programs that do more strengthening compared to cognition. That's a very big thing…they are now waiting on another waitlist for example for another program that's available." (P10) "no funding to subsidize their ability to attend these programs so when it comes down to whether they would have a PSW come for free and do some exercises compared to leave the home and attend the program for $15, 16, 19 dollars a day they're just not going to do it" (P9)

			"Okay so, for most people that are referred to the program, they're referred by a LIHN case coordinator, whether they are coming from homecare or from the hospital, but once they are discharged from the program they do not necessarily have access to those services" (P1) "There aren't many other facilities that even have a fitness centre. So that would be one major asset for any type of facility especially long term care, assisted living places where there's a fitness facility, and staff to help them with" (P2) "Most of them do have a cost so we usually tell people that the free service usually stops here. Over the years we've gotten good at finding things that pop up so falls prevention would be free, that's something we often refer people to, and we offer that here and there are many other sites around the city. So there's things that come up but they always come and go. So those things exist now but might not've two years ago and two years from now these wont probably exist." (P5) "The [another city program] home support exercise program which I refer a lot of my patients to and it's an amazing program, um, and, initially when I started referring a year ago I think it was the waitlist wasn't that "long now it's like up to 6 months and the back up poor thing is on her own and she's trying to do everything." (P9) "Some Support so that they're not just going to be left at home and have nothing in place and unfortunately with our ADP our waitlist a lot of the programs they're stuck to wait[ing]." (P10)

Table 4-3. Facilitators and Barriers to Enhancing and Implementing a Community-Based, Hospital-to-Home Slow-Stream Rehabilitation Program at the Meso Level

Meso Level Factors			
Facilitator/ Barrier	**Theme**	**Program Time Point**	**Quotes**
Barrier	Lack of knowledge and awareness of the program	Pre program	"We have a lot of changes in staff so there's always a possibility that newer staff are not aware of [program]" (FG2) [talking about brochures] "Something so that they know what it is, who the person is, how it works, what it entails and um, and maybe um, and that's something we could use as case managers for those that don't really know about it." (P8) "I know it's integrated with, actually I don't know if I know the right thing, but its integrated with the day program that [person name] organizes and directs the program… you know their assessed and it's specific to them um, that the goals of the program I think are to make them feel well again, to make them feel motivated, like they're okay, um, and get over that hump of being ill." (P9) "But I go back to awareness, not a lot of people are aware of it, because it is such a unique program out there, and so continuing to develop awareness around the program. There are so many people who aren't aware of it so they stay in hospital for an exponential amount of time." (P2) "I think it's whoever knows about it which predominately is the case managers that have been here for a while that know about. We're the ones that are promoting it and letting patients know about it, but I don't know how patients are finding out about it otherwise." (FG2) "Right. They might not know the full scope of it so I think that there should be a nice little package, very small it could be two pages, one could be the overview which could be the general information so that especially new case managers can identify oh, this would be great for my patient and then the second page could be the checklist or the forms or the indicators." (P9) "Something to give to the applications would be great" (P10) "I think because of the way things are now and the amount of information case managers need to know I think there should be a package, an information package that could be given to the patient so that they can see the expectations, how it works and they don't need to sign a consent or anything but at least something so that they know what it is…"(P6) "I could use some brochures (Laughter). I steal some from the social worker and physio but typically the physio and the social worker have brochures and give it to them. "(P12)

			"There are some handouts available now there's nothing really current I think that's something we… it's a little outdated and very often times they're seen by the community care coordinator as well after discharge from the hospital who can reinforce the information."(P11)
	Lack of specific referral process and procedures	Pre Program	"There's not really a system of who gets referred to us" (P4) "…however another negative is that we're not properly instructed there's no referral base in our computer system to indicate that this person has been referred to [program]... " (P10) "...there's no paperwork or anything and because I luckily know about it's just basically I have to send a task and that's it" (P8) "[Name] will leave a voicemail and just kind of outline… but that voicemail then has to be… like when I get her voicemail I enter it into the patient's file just as a client update so it would be quite nice if there was actually something written, and in the end it might be even easier for [Name]…it would be a living, breathing record which would be quite nice as opposed to a verbatim, because if I don't document, not everybody documents verbatim, so you're kind of interpreting what's being said. Like an admission and a discharge, they are very short and sweet." (P9) "There's no docushare or specific way to know unless we call the PCA and see if the person has been added or to call [Name] and see if the person has been added." (FG2)
	Lack of specific eligibility criteria	Pre Program	"The thing that I'm most dissatisfied with is that we don't really know who this program is for" (P5) "so I don't really know if [program] has specific parameters but I will call and say I have a lady with MS and you know they… if transfers are an issue or something I need to clarify if they can handle that." (P12) [Referral staff discussing who he/she believes the program was designed for stating the following] "I think the program is designed for people but a certain level of independence and ability to follow through on commands and able to benefit from the program," (P11) "But also bigger picture, improving the communication within the system of who is eligible… I feel like the eligibility is too wide. Well I just think it goes back to the hospital, but it's not only the hospital referrals because people quite often get referred community-based. So it's almost like an education for the referring coordinators." (P1) "So actually looking at the criteria, because it's so wide, "well, you've had to have a hospitalization within the last 3 months", and almost anyone can say "well I've been in the hospital". So I would like to see that the eligibility criteria is more specific to who's appropriate and who's not appropriate."(P2)

			"My concern in all of this is the appropriateness of the referrals. I believe if we had some kind of focus group or even just a meeting with the case managers who make referrals to us. It would be good to just remind them of the focus of this program and who it is intended to serve so when they make their referrals they are more appropriate. If we could inform physicians in the community whether it's through written material just informing them of what we offer here so they do not refer people who require focus PT management which belongs in a clinic in the community because the participants will lose time and they have expectations thinking that they can get everything done here." (P3) [Discussion regarding criteria]"No, like when we do a short stay rest or convalescent care form, there's people who work on those goals but there's nothing for G2H. And I think for experienced case managers, they know what the programs about but for brand new case managers its like, what? So…"(FG2) [discussing perceived criteria] " Someone that doesn't have too many comorbidities, who is able to use their gait aids really well, that they're able to cognitively absorb health teaching and need just some improvement. [discussing whether criteria list present]…No" (P8) [program staff discussing issues on admitting program participant and the back and forth unclear communication] "So, "yes this is for you", "no this isn't for you". Because what happens is that I have to call back and plead a case on why this person- like I did that last week for 8 people- trying to please my case on why"(P1)
	Need for enhanced communication between care settings	Pre and Post Program	"Three business days to accept. But sometimes if you have concerns or questions you just kind of like send questions and they have to answer so that when it's not really clear and you've got some concerns that's kind of a delay but then you have to make a decision yes or no" (P7) "A high majority of them, so they'll have a care coordinator in the community and I just tell them that there are adult day programs um, and then the care coordinator in the community will have to apply for them." (P12) "I would say just not knowing the wait times because I would call and say somebody's being discharged do you think they might be coming into the program, I don't know if it's two weeks, three weeks, a month, so I have to tell the family you will expect a call but I can't guarantee when." (P12) [staff discussing how they discuss the program as an option to family post discharge but unsure of staff communication and who is responsible for referral] "I think the LIHN is making that referral maybe a week before or I don't know… what is the time limit?... Um, or they might be already in a community with home support services waiting to get into [program]so depending on the waitlist, that's why I was wondering if there was a more of a priority or a need for convalescent care to go to [program] or… P: They always go on the waitlist, yeah. (FG2)"

			"It's not up to us it's up to the LIHN because I have this conversation with the care coordinator sometimes they are already on the list sometimes they were sent back from another transitional bed program to the hospital that has requirements for our program so… Or if not, when they are in here they will have a file opened for them and then they go through the same process." (P6) "A lot of hospital case managers or sometimes when I'm seeing someone in the hospital ill either do it there and then because I know how to do it or ill ask the community… I know some of the hospital case managers will ask the community case manager to follow up with [program]referral but they identify from hospital, but they get the community case manager to assess it in the home. "(P9) "Because this is very tough when the resident comes from convalescent care they expect that we're gonna do everything because this is what the hospital says.." (P8) "[Name] will leave a voicemail and just kind of outline… but that voicemail then has to be… like when I get her voicemail I enter it into the patient's file just as a client update so it would be quite nice if there was actually something written, and in the end it might be even easier for [Name] because then she wouldn't have to just leave a voicemail, she could write out like a progress or summary note and send it, almost like at the hospital when they do a discharge note, fax it into us and then it would go directly into the patient's file and it would be a living, breathing record which would be quite nice as opposed to a verbatim, because if I don't document, not everybody documents verbatim, so you're kind of interpreting what's being said. Like an admission and a discharge, they are very short and sweet." (P9) "Sometimes the referrals are presenting that the patient is walking and that but they were not walking and it's really like a hospitalization like it's really the patients are coming very deconditioned." (P7)

Table 4-4. Facilitators and Barriers to Enhancing and Implementing a Community-Based, Hospital-to-Home Slow-Stream Rehabilitation Program at the Micro Level

Micro Level			
Facilitator/ Barrier	**Theme**	**Program Time Point**	**Quotes**
Facilitator	Services provided	During Program	"some avenue of nursing staff um, I believe an RPN and that there's a rec therapist as well as someone that coordinates the program…Proper nutrition even, that's something we talk about as well is proper eating, some people come in with diabetes and we have to monitor that or Parkinson's is another one, or having had a fall and what that deals with" (P2) "I think the transportation is key, I think if we were to eliminate that I think we would see a decline probably in referrals" (P6) "...I think the meal is also a big part. I think a lot of times this is probably the best meal people get in their whole day" (P5) "I know it's free, transportation's provided, meals provided, physio-focused, they have to have goals, and then I think that they offer some additional services like a shower or foot care" (P12) "People aren't paying out of pocket and that transportation is provided. A lot of older people or people in the community with like a walking aid or something its hard for them to find transportation and they don't have to pay for it.- Oh yea. And we have the physiotherapist, the nurse, the gym, we do a lunch, there's coffee and tea in the morning."(P3) "I would say the best thing, one is that we provide transportation" (FG1) "The fact that they get transportation is stellar, its amazing" (P6) "It's great that they will come to the door and assist you with transportation because that's a huge barrier for some clients in going to any rehab or adult day program" (P8) "No cost, it's covered by the ministry of health. So that's the other thing big bonus." (FG1) "And the good part is it's at no cost to them" (P3) "…how we are set up so that basically you can get OT, PT, Nursing, PSW all under one umbrella." (P1) "I think just having a wide variety of professional, you know like [Name] being an RN, to myself being a PSW, to having a physio therapist, I think that it's great to have all of that in one program." (P4) "The fact that they have a PSW to help with toileting or a med reviewing like a nurse is great" (P9)

			"[Name] runs it, she's very informative, she's up to date and she actually does a lot of proactive work there too with regards to insuring that the patients are optimized from an equipment perspective and I know that they have OT and physio there and it's an intensive daily rehab program so it gets more benefits than just doing physio and home exercise programs for those certain individuals" (P10)
Facilitator	Program participant benefits	During-Post Program	"...back to the full body abilities, so there's the rehabilitation piece which takes into account your mind, body, spiritual, all the various assets to helping that rehabilitation model" (P2) "Every single time, we've seen leaps and bounds from where they started" (P10) "I see that they give to the people new meaning, they give them confidence, they seem to be offering care without boundaries, care without any kind of condition…" (P3) "I think also knowing that they can improve, it just reminds them that hey I can improve later, it's possible that I can keep going so it just gives them more intrinsic motivation to continue on with other programs that [Name] finds for them" (FG1) "...once they're finished their 30 days, they move into other programs, one being the fitness center, some people become community members, and we see them continuing to interact, and actually develop social ties with other members, who are also part of the program, and kind of rekindling those friendships if you will" (P2) "...but I know that people leave here happy most of the time. They feel that they've made improvement, is it enough to sustain them ongoing" (P5) "Social ability within the program-so, participants who come into the program don't know each other at the start of the program, but because they're on the same journey, they gravitate and connect with each other. So, they really form bonds that last beyond the program. And we see that because once they're finished their 30 days, they move into other programs, one being the fitness centre, some people become community members, and we see them continuing to interact, and actually develop social ties with other members" (FG2) "it just gives the patient a little bit more confidence, when they're discharged from hospital they have something else to continue working on some of their goals, it helps the caregiver, sometimes when people have been in hospital for a long time they're nervous and it gives them some sort of knowing that there's some program that they can go to and it's sort of partners with their adjusting to home" (P9) "Like definitely I see the social aspect and not even like…in their room they're chatting they get to play games like they're stimulated…

			They're playing trivia games, bingo like they get that cognitive stimulation that you don't always get in maybe at home watching TV all day." (P3) "Long term [effects] I suppose better quality of life…. Because they have improved mobility, improved function… increased independence. So just better quality of life in general" (P11) "and then of course there is the physical aspect of things, where they go to the gym and they get stronger and they're encouraged." (P3)
Facilitator	Person-centered communication	Pre-During-Post Program	"We discuss their goals, what do they want to achieve and we have the background knowledge of the therapist as well to assist but yes we would be discussing goals." (P10) "Once we've assessed somebody and determined that they're not quite at their functional baseline, we give them the option of you know, here are some programs that might assist you in further gaining and what I do at the point of the bedside is provide education around the program and with their consent I would refer them to the program" (P9) "Yes. So we have that family meeting in convalescent care when we discuss the progress and discharge destination…on day 45 you know what, this patient needs to be here for like, up to 90 days because we don't see that going home sooner than 90 days so the family knows, this is the day that is for potential discharge so they are planning everything ahead…"(P7) "And their families are involved a lot in a lot of cases so it's a good relationship that we can build with the family and they feel really comfortable to approach us and talk to us about things..." (P6) "Communication and also the teaching aspect for them and to actually specify the tasks that they need to complete, that's a huge part if they can't work on specific tasks of what they do need when they're at home it's of no use to them later on" (P10) "... they'll tell you things as a friend...So then I'll go afterwards if it's something medically related and I'll tell the nurse and say oh just so you know she mentioned this or that, you know for anything beneficial medical wise" (P4) "Also, the nutritional aspect of it, the health talks, [Name] the [occupation] does a great job. I know that [he/she] empowered many people with the talks that she gives in telling them how to manage health issues" (P3) "Um, I guess I would go back to really, the staff and the passion that they have. Because those are the feedback that I get from families and clients themselves that they- - love the staff. Yeah. And when they have to go to another program they'll say "but it's just not the same". So to me that seems to be the core." (P1)

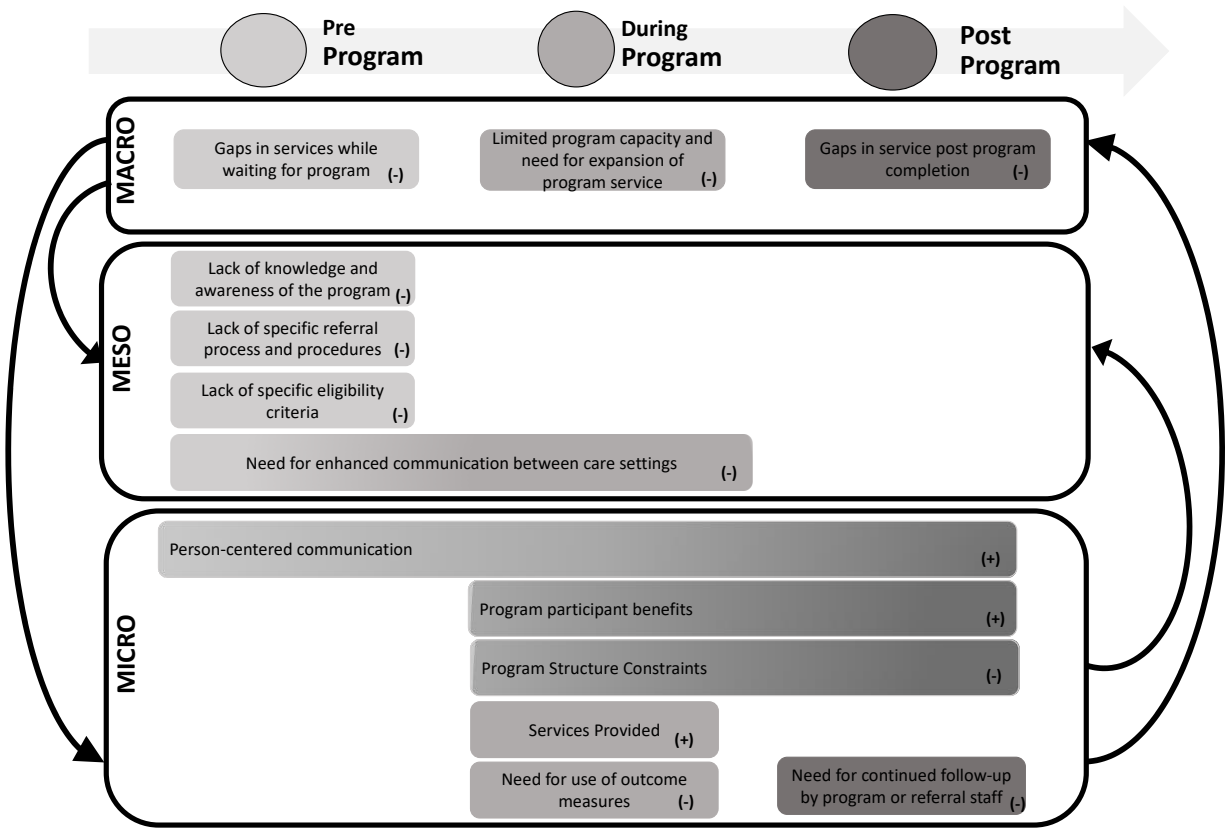
			"So the [occupation of program staff member] who's in there, [Name], really takes a real personal approach with each person, really helps make them feel acknowledged and accommodated as best she can. We try to get all the variable information that's necessary to make their experience as positive as possible"(P2) "We often tell people as a part of our script if you will when they come in that there is very little you will say that will offend us so if you want something or need something please do tell us and most people are sure to tell us what they want and want they don't want… One of our strengths, and I don't know if it's just the team or if it's our organization or what I don't know what it is, but were good at relationships and so people open up pretty quickly here." (P5) "I think that's what it is because you know personally wise a participant will come and their stay depends on how we speak to them how we operate with them in terms of giving care. So, they will, they will stay. They will look forward to coming."(P8) "[Person] sits and hears their whole story start to finish, how did you get here, what does your home look like, how do you get in and out of the shower, things like that. [name] great at figuring out what they need to make things better or she works with [name] to do their walkers" (FG1) "Um, I know people love it so I don't know what happens there that people love it, so it has to be the interpersonal relationships as well as the actual program ."(P6) "I think that warm hand off. As opposed to just saying um, would you like to go to an adult day program, here's the information, the staff will actually make that connection so whether that's through the CCAC or the program itself, to actually make the referrals, send the form, perhaps set up a start date, like I think it's taking that extra mile that helps people be successful."(P5) "[Program staff discussing follow-up phone call] Um, so generally from those phone calls we do find that unfortunately there has been some, kind of, cause generally these people are medically frail to begin with, um, so there may have been a hospitalization or a fall. But it's also a good time to follow up to say so "what programs are you in", "are you connected with a community resource". (P8)
Barrier	Program structure constraints	During-Post Program	"Timing doesn't work for everyone because it is a morning program. If there was two different streams, a morning and afternoon, it would be beneficial to a lot of the population who's not able to get up so early and have their PSW come and assist them…" (P10) "I don't know if extending the program hours benefits anything or not, because there's a point in the day where our participants just get to a

			fatigue level where extending the program wouldn't necessarily help them" (P2) "But, it would be cool if you could almost personalize it to keep people… some people have made so much improvement in the first 2 to 3 weeks that they don't even necessarily need the 30 day" (P4) "So sometimes its hard to explain to them like, so we're gonna go over and do a crossword or we're gonna play a word game or whatever they're kind of like, why, I'm here for rehab, I'm here for physio, why can't [Name] take me to the gym all day. So sometimes that's a challenge." (FG1) "I think the ability to go as many times as they need to during the week, and the ability to stay for an extended period of time are good. In terms of discharging maybe a graduated discharge you know so that they're not just finished with the program and that's it so kind of a graduated way of seeing over how they do as the program is decreased. "(P8) "I think it should be tapered maybe, so you get this lovely one month program and then you're done, can you, you know, ween it down to bi-monthly, you know or, like a step-down program so that it sort of prepares them and educates them about other resources in the community um, I don't know if you would want to call it a coach but somebody just to say what's your quality of life? How are things at home? What else would you like to be doing? Sort of the navigator."(P12) "...I just find also to one of the downfalls is that there isn't an ability to re-enter the program subsequently..." (P10) "the biggest complaint is that the program isn't long enough" (FG1) "I think just hearing them want to stay you know there's only so much we can do and it stinks that we're like sorry it's the end of the 30 days, bye. I don't know for me that's a challenge to not be able to give them more than that…Because there are some folks that are here they just need a 2-week, some need a whole month, so it just depends on your needs but you have a maximum" (FG1) "The four weeks is a good idea and then step down two times a week for another two weeks and then assess for another transition to complete independence at home or maybe a need for a home continuation step down."(P9) "They feel that the program has stopped too early and that they would've like to have had um, a summary week or two and then enter into another rehab program, perhaps not daily but to have something

			established that they could stream right into that program for one to two days a week" (P10) "Either enhance the program to make it longer or have a follow through like a tail end of a program option um, or have the ability to repeat the program if they still some time or to also in accommodation with that is to maybe make two certain streams that one would be like a 12 to 6 and one would be like a 9 to 3 type of a program." (P10)
Barrier	Need for use of outcome measures	Pre-During-Post Program	"If they generated a mini assessment, like an ADL or some kind of measure of what their abilities were... and then did an ability summary assessment that would be kind of beneficial" (P10) [Referral staff discussing how they perceive that to enter the program there should be a screening process and the following aspects should be screened] "I think their emotional, psychological one has to be evaluated, life satisfaction type screens and that kind of thing, and caregiver stress" (P12) "I like the standardized test that we have put into place through your research study. I don't know if there's a better way to validate what we're doing. Those are the accepted measures and I think we should stick with that. I think that helps us to decide the who, and the when and the where" (P5) "I think it would be nice to have the admission and discharge documentation for the patient" (P9)
Barrier	Need for continued follow-up by program or referral staff	Post program	"...sometimes I never see the people again..." (P8) [Suggestion by program staff discussing how the program participant is no longer on their radar]"I believe if there was some kind of outreach to people in the community, where there is some kind of early oversight if things are going in the wrong direction. ...you know just get eyes on them" (P3) "… I don't know if they have any support that's… I don't really ask and I… I really have no idea what is happening after that one month. Do they have any support? Of course they have like services if they are eligible from LIHN but what about the physio you know? The physio I think is the key". (P7) "so yeah I'd say more often than not I don't see people again after and if they still have things with us then that runs out eventually." (P6) [discussing what happens after program] I'm assuming that they're informed of other programs such as the YMCA one or the regular Goldie's program and they work with their care coordinator in the community to find out if there's senior programs or… [stated the do not follow-up personally]"(P11)

			[Study Participant working within the program discussing the struggle for older adult program participants post program completion stating the following] “Well, if they’re living on their own then they don’t have the community or family support, they’re the ones that I find fall off the radar because they don’t know who to call.” (P1)

Figure 4-1. An Overview of Over-Arching Themes and Sub-Themes Categorized by Socio-Ecological Framework Macro Meso Micro Levels



All themes have been categorized into macro, meso and micro level and the interaction between the levels have been identified through the directions of the arrows. Changes in macro level barriers will directly impact resources available for knowledge dissemination and communication between service delivery levels at a meso level and will impact the program structure constraints and services available at a micro level. In turn changes at a micro level such as improving use of outcome measures in the program or implementing a website for the program would in turn affect all the barriers seen at a meso level and may improve resource allocation at a macro level.

Note: (-) indicates the theme was considered a barrier and (+) indicated the theme was considered a facilitator to enhancing and implementing a community-based, hospital-to-home slow-stream rehabilitation program.

CHAPTER 5: Thesis Discussion and Conclusion

Almost two decades ago, recognizing the potential economic and social impact of the aging population, the World Health Organization (WHO; WHO, 2002) urged countries to implement initiatives that would allow older adults to maintain a healthy life and quality of life through autonomy and physical independence, and that would allow older adults to remain in the community. For older adults who have been hospitalized, community-based, slow-stream rehabilitation (SSR), hospital-to-home transition programs may serve as important models of care to address the needs of older adults highlighted by the WHO. Slow-stream rehabilitation programs were designed to provide care for older adults with complex healthcare needs or for those unable to participate in 'traditional' rehabilitation programs. In Canada and in countries with similar healthcare systems, SSR programs are designed to address activities of daily living and mobility problems and help older adults maintain independence; but, are currently only available in institutional settings such as nursing homes and complex continuing care (Maximos et al., 2019). A study assessing cost-effectiveness found that home-based rehabilitation was 20% more cost-effective than usual care in home (e.g., meals on wheels, personal assistance, and safety alarm) (Kjerstad & Tuntland, 2016). A Cochrane systematic review found that costs for a community-based, day hospital rehabilitation was similar to inpatient rehabilitation (Brown et al., 2015). Furthermore, older adults have expressed strong desire to remain in their home and local community because of a sense of attachment and security with the familiarity of people and 'place', as well as a sense of identity as being independent and autonomous (Wiles et al., 2012).

There are very few hospital-to-home transition programs that incorporate rehabilitation and published hospital-to-home transition frameworks have not specifically mentioned integrated community programs that include rehabilitation or rehabilitation professionals in general, or in

the transition process (Kalu et al., 2019). In particular, there is a dearth of community-based, SSR, hospital-to-home transition programs for older adults in Canada.

The overall aim of this thesis was to explore SSR as a program model and to evaluate a specific community-based, SSR, hospital-to-home transition program. Together the chapters of this thesis build on the literature related to community-based and rehabilitation programs for older adults during the hospital-to-home transition and, provide a greater understanding of a community-based, SSR, hospital-to-home transition program. The first chapter introduced the thesis and the second chapter summarized SSR program location and characteristics, and the characteristics of older adult participants in SSR programs. The third chapter examined exercises completed by older adults participating in a community-based, SSR, hospital-to-home transition program and compared them to the American College of Sports Medicine (ACSM) Exercise Guidelines for Community-dwelling Older Adults (American College of Sports Medicine, 2017). The fourth chapter used a qualitative approach to understand the barriers and facilitators related to structure and implementation of an enhanced community-based, SSR, hospital-to-home transition model of care. This discussion chapter summarizes the findings of each chapter, drawing links between the chapters, and suggests recommendations and future directions for research.

Summary of Findings

The second chapter of this thesis informed the decisions and study designs of Chapter 3 and 4 manuscripts. The purpose of the scoping review (Chapter 2) was to summarize the current body of literature related to SSR for older adults in single-payer health care systems, where "single payer" or "single payer–like" referred to health care funded by the government either through government or quasi-government organizations (World Health Organization, 2018). SSR

was chosen as the model of care as it is thought to be more appropriate for and can be tailored to older adults with frailty, multiple chronic conditions, mild cognitive impairment, and functional limitation (Kortebein, 2009). The scoping review found that there was similarity in the participant populations across the included SSR programs. Participants' mean age ranged between 72- 82 years; high percentage of participants were female; participants had a range of two to seven chronic conditions; and, participants in SSR programs had hospital-acquired deconditioning or were having difficulty with living independently. Included SSR programs were found to have benefits e.g., improved physical and functional outcomes, decreased rates of hospital readmission and institutionalization, emergency rooms visits and, decreased length of hospital stays (Maximos et al., 2019). All SSR programs took place in an inpatient or long-term care setting, and were multidisciplinary in nature with an array of healthcare professionals. There was a large variation in program length (30 to 141 days) and rehabilitation session time ranged from 20-60 minutes.

Through this scoping review, two main gaps in literature were identified: 1) there is a scarcity of community-based, SSR programs for older adults, in particular programs that are focused on the hospital-to-home transition; and, 2) there is a lack of specific information regarding program components and specific exercises (e.g., type, intensity) completed by older adults during the program. The second recommendation from this scoping review led to Chapter 3, which begins to address the need to further understand and assess components of SSR programs. Specifically, Chapter 3 focused on the exercise intervention used in the community-based, SSR, hospital-to-home transition program. This type of information would be critical to any future development of best-practice guidelines for SSR programs. Chapter 4 was designed to address the first recommendation from the scoping review by exploring barriers and facilitators

of a current community-based, SSR hospital to home transition program to guide future enhanced model development and implementation.

Chapter 3 was an observational, prospective cohort study that explored the exercises and exercise parameters that older adults were able to complete as part of one community-based, SSR, hospital-to-home program. This study is the first to contextualize frequency, intensity, and time of cardiovascular and resistance exercise parameters and how they may relate to functional gains in older adults recently discharged from the hospital. Current clinical practice guidelines indicate a combination of resistance and cardiovascular exercise is important to improving physical and functional ability, but there is insufficient evidence related to the optimal frequency, intensity, time of cardiovascular and resistance exercise required to treat or manage frailty (Dent et al., 2019; Mols Bayles et al., 2009). In a practical sense, the ultimate goal of rehabilitation for most, if not all, older adults are to achieve sufficient functional recovery in order to return to independent living. Therefore exercise interventions must address the complex needs of this population, align with relevant exercise recommendations, address any potential contraindications and safety issues, as well as meet individual physiological (strength and cardiovascular) ability to produce gains in function (Guthrie et al., 2012; White et al., 2015). The findings of this study showed that older adults with multiple chronic conditions, functional limitations and mild cognitive impairment who are transitioning back to community living after hospitalization were able to meet many of the ACSM guidelines (American College of Sports Medicine, 2017).

Older adult participants who met ACSM guidelines for both frequency and time for cardiovascular exercise had higher function scores at discharge compared to those who did not meet the guidelines. This suggests that the total amount of time of cardiovascular exercise

completed over a week is vital for functional gains. These findings align with those of others that have suggested that cardiovascular intensity may not be as critical for changes in function as it is for changes in cardiovascular parameters e.g., VO_2 max (Frankel et al., 2006; Keating et al., 2020). Rather, focusing on frequency and time of cardiovascular exercise at an intensity that is comfortable for the individual should be emphasized for older adults with complex healthcare needs that are engaging in a community-based, SSR, hospital-to-home transition program.

Older adult participants who met ACSM guidelines during community-based SSR hospital-to-home transition program for intensity, repetitions, or both for resistance exercise had higher function scores at discharge compared to those who did not meet the guidelines. This finding is similar other literature that has found that fewer repetitions at high intensity or more repetitions at lower intensity have similar benefits in improving strength, endurance and stair climbing ability (Vincent et al., 2002). These findings suggest that there does not appear to be a difference in physical benefit as long as adjustments for the number of repetitions is made (Vincent et al., 2002); that is, if high-intensity resistance exercise is preferred and safe for older individuals with complex healthcare needs, there is research to support this as effective and well-tolerated (Valenzuela, 2012). In contrast, if the older adult prefers lower intensity or there are safety concerns, then a higher number of repetitions at a lower intensity should be completed, and benefits can still be realized (Valenzuela, 2012). Thus, there may be an ability for older adults to tailor their exercise programs to individualized needs, goals and preferences when participating in a community-based, SSR, hospital-to-home transition program.

While Chapter 3 specifically examined what was taking place related to exercises during the program, Chapter 4 incorporated a systems-based approach to understanding barriers and facilitators to successful implementation and functioning of an enhanced program. Chapter 4 was

a qualitative description study that examined the perspectives of care providers working in or referring to a community-based SSR hospital-to-home transition program in order to identify barriers or facilitators to implementation and functioning of an enhanced program. Most of the stated barriers were at a macro or meso level and were out of the study participants' control, while all the facilitators were at a micro level.

Study participants felt that the macro and meso level factors such as limited government resource allocation, lack of knowledge about the program, and the need for more well-defined referral processes and communication across service delivery levels were barriers that needed to be addressed for an enhanced model of care. Many of these barriers are similar to those described in hospital-to-home transition literature: break-down between care delivery levels (Mansukhani et al., 2015), lack of community-based follow-up (Russell et al., 2019), limited access to services and resources (Watkins et al., 2012) and, specifically in Ontario, lack of timely services and community supports, limitations of funded services and coordination of care (Kiran et al., 2020). Implementation of seamless patient information sharing through platforms or other tools and the use of specific referral criteria and standardized outcome measures could address some of the identified barriers such as improper referrals and lack of accurate information for referral and program staff. While some elements can be addressed at the micro, meso or macro level, support would likely be required. The issue in Ontario is that community initiatives are often motivated by a single funding injection and thus long-term sustainability of initiatives becomes difficult when funding is withdrawn (Russell et al., 2019). It has been suggested that to address macro-level barriers a top-down approach rather than bottom-up approach to coordination of funding is needed, which would then allow for sustained programming and

planning with communication and collaboration directly with policy makers rather than single funding injection (Russell et al., 2019).

Study participants emphasized the importance and role that community-based, hospital-to-home transition programs play for older adults in decreasing institutionalization and allowing for return to independent living. Integrated care at a micro level, where a program or clinic provides multidisciplinary care and multifaceted programing to assist older adults with multiple chronic conditions or functional limitations, is an often used as a framework for patient care (Briggs et al., 2018). Previous literature has shown that provision of services such as nutrition, education about chronic conditions and management, transportation or access to community services (e.g., grocery, gyms, coffeeshops), and physiotherapy have been associated with maintained or improved physical function, improved mental health, improved quality of life and a reduction in emergency department use for older adults living independently in their home (Cowan et al., 2009; Falvey et al., 2016; Jeste et al., 2016).

Recommendations and Future Directions

In 2007, the Government of Ontario initiated an 'Aging in Place' plan that aimed to fund and support community-based programming for older adults. This was followed by government recognition for the need to decrease alternative level of care use and improve multifaceted community-based programs to assist older adults with return to "highest level of independence" post-hospital discharge (MOHLTC, 2009). Although recommendations have been drafted by aging and health policy experts to align with the 'Aging in Place' initiative and Ministry of Health and Long-Term Care and other expert panels, the application of such recommendations into practice through sustainable community programs is lacking across the province (Peckham et al., 2018). Funding for community programs has transitioned from the realm of federal to

provincial agendas, which has led to the provincial government being responsible for determining how to respond to the increasing demand for community-based services (Peckham et al., 2018). This shift in provincial responsibility and competing political agendas that include health as well as non-health sector initiatives has produced a competitive bidding process for program funding, resulting in a collection of disjointed community-based programs with variability of services offered and a lack of clear accountability guidelines (Peckham et al., 2018; Russell et al., 2019).

Although community-based initiatives for older adults that focus on specific elements of care do occur, such as short-term falls prevention programs or personal support workers in the home, there is not one summative hospital-to-home model of care that: 1) incorporates all components reported in the literature to be beneficial (e.g., Allen et al., 2018; Mistiaen et al., 2007; Watkins et al., 2012), 2) aligns with health policy; encompasses rehabilitation (e.g., Falvey et al., 2016; Kalu et al., 2019), 3)provides supports and resources for continued independence post-hospitalization. The community-based, SSR, hospital-to-home transition program evaluated in this thesis could serve as a basis of a model of care, with enhancements that address the barriers discussed in Chapter 4. An ideal model of care should: 1) stretch across the continuum of care from hospital discharge to program completion in a coordinated manner allowing for clear and efficient communication between institutional (e.g. hospital staff, convalescent care) and community (e.g., care coordinators, community staff) settings; 2) be comprised of a multidisciplinary healthcare team that is person-centered in its approach to care; 3) include rehabilitation, nutrition, education for self-management, opportunities for social interactions, as well as linkages to community resource; and, 4) provide a common platform to be used by other hospital-to-home initiatives. A more universal model of care that has sustained funding, with

collaboration between government, community and program, would allow for consistency of services and supports for older adults transitioning from hospital-to-home across different regions, would improve program accountability, and would allow for more robust research related to outcomes and cost-effectiveness.

The fragmentation and complexities of hospital-to-home transitions are not unique to Canada; Australia, Europe and the USA have also struggled to implement systems that would allow for a seamless care transition. Finland, Denmark and some states in the USA have mainly focused on technology as a method of improving healthcare delivery and expenditure via centralized electronic medical records that provide detailed medical information and allow for seamless communication between hospital and community healthcare providers(Kushniruk et al., 2010; Mansukhani et al., 2015). In contrast, Australia has taken a macro level approach to improve hospital-to-home transitions for older adults through nationally funded and standardized "Transition Care Programme". The transition program is provided to all older adults across Australia that need assistance post hospitalization to return to independent community living. The program is 12 weeks and includes social work, nursing care, personal care and allied health providers (Australian Government Department of Health, 2019).

As a next step, future studies should incorporate current findings as well as consider models of care in other countries to develop an enhanced model of care. This enhanced model of care should then be piloted to assess feasibility, acceptability and usability. These future studies would allow for further implementation and expansion of the community-based, SSR hospital-to-home transition program.

The findings in Chapter 3 suggest that physiotherapists and other rehabilitation professionals should not place pre-determined confines on the ability of older adults with

complex healthcare needs when prescribing exercise interventions. The findings support White et al. (2015) and Guthrie et al (2012) recommendations that exercise frequency, intensity and time should be matched to the individual's abilities and should also be sufficient enough to lead to physical gains. Encouraging older adult participants to work towards their ability rather than perceived limits using established guidelines, and discussing the benefits of meeting exercise guideline parameters can improve the older adult's understanding of what is required to meet goals and the need for self-monitoring.

Exercise interventions should be flexible and tailored to an older adult's preference and needs, and considering safety and appropriateness of intensity, time and frequency parameters to achieve functional gains. For example, based on Chapter 3 findings regarding cardiovascular exercise, to improve function it would be important for older adults to engage in a minimum of 100 minutes per week (total amount based on frequency and time over the week), but the time of a session could vary based on need. In other words, older adults could be given the choice between engaging in 20 or more minutes of cardiovascular exercise at one time or engaging in smaller bouts of exercise e.g., five to 10 minutes throughout the day, as long as the minimum total time per week is achieved. Similarly, in considering resistance exercise prescription, the total amount of resistance was found to be important and could be achieved in various ways while considering the older adult's needs and preference. If high-intensity is preferred and safe for the older adult, then they should be supported in engaging in a higher intensity and lower repetition exercises. In contrast, if the older adult prefers lower intensity or there are safety concerns, then a higher number of repetitions at a lower intensity should be completed (Chapter 3) (Valenzuela, 2012).

Additional studies are needed to further develop optimal exercise guidelines for older adults with complex healthcare needs who are transitioning from hospital-to-home to guide clinicians. As a first step, a prospective observational study was conducted as part of this thesis. The results showed that the older adult participants were able to meet many of the ACSM guidelines and that meeting FIT parameters were related to improvements in function. However, due to the number of participants in each interaction group, many of the interaction analyses could not be conducted. Future studies, with a priori sample size calculation, should be conducted as a next step. As this thesis did not examine balance and flexibility exercise due to lack of access of systematically collected information, future studies should also examine balance and flexibility exercise guidelines in order to gain more understanding of the effect of meeting these exercise type parameters on functional status in older adults recently discharged from hospital.

Strengths

This thesis incorporates a variety of study designs and methods, with the first study, a scoping review, identifying gaps that led to a quantitative (Chapter 3) and a qualitative study (Chapter 4). Each study was thoughtfully designed and carried out using established methods and quality checks, and incorporating established guidelines (e.g., ACSM, Chapter 3). For example, the scoping review used the framework proposed by Arksey and O'Malley, and the suggestions proposed by Levac et al. (2010) and a librarian was consulted to ensure search term where in inclusive of our research question. Titles and abstracts were screened by two independent reviewers who piloted the first 30 titles and abstracts, and calculated a Kappa value to ensure consistency on inclusion and exclusion criteria between reviewers. Prior to data collection for the quantitative study, research assistants were trained on the use of the CR-10

Borg® Rate of Perceived Exertion Scale (Borg 1962), other assessment measures, and use data collection logs. Research assistants were also provided with a script to follow during data collection to ensure consistency. At regular intervals data collection procedures were reviewed. During the qualitative study reflexive journals were kept during data collection and analysis. Each transcript was coded by two independent coders who then came together to compare themes, the coders then came together to develop a code book which was presented to the research team for further triangulation. The studies described in Chapter 3 and 4 took place in a real-world context, as part of a program evaluation, and explored a model of care that is currently in existence. This real-world setting allowed for observations to be made regarding community-based programs for older adults in Ontario and recommendations are aligned with the current context of health care. Last, a broad range of literature was reviewed to provide a strong foundation for the thesis including health and health policy documents, program evaluation and models of care (rehabilitation, hospital-to-home, community-based) literature, and research and guidelines related to exercise, older adults and frailty.

Limitations

In order to define and assess SSR programs, we narrowed the search terms to literature documents that explicitly defined their rehabilitation as slow stream or long duration and low intensity. Older adult day programs, and day hospital programs that could have potentially been identified or classified as low intensity, long duration rehabilitation, but that did not define themselves as slow stream, were excluded. Furthermore, as we wanted to include SSR programs in health care systems that were similar to those of Canada, programs in countries with privately or insurance funded healthcare were excluded. Although relevancy to the Canadian context was achieved, international comprehensiveness was lost.

This thesis was part of a larger program evaluation study and thus, various elements were out of the researchers' control. For example, the program structure and design was 'pre-set'; and, participant dropout was not related to the study, but rather environmental factors such as staff turnover, program closures due to influenza and other outbreaks. For example, in the prospective cohort study (Chapter 3), the number of participants available for each cell of the Factorial ANCOVA was not controlled a priori, thus some of the two- and three-way interaction analyses were not conducted due to insufficient number of participants in each cell. For the qualitative study, themes were not revisited by study participants for confirmation to decrease the demand on participants' time and because staff turnover affected participant availability for triangulation at a later date. The opportunity to check the interpretation of what was said during interviews and focus groups may have led to potential misinterpretation during analysis.

Conclusion

With over 6 million older adults in Canada, with 17% of older adults hospitalized per year, and 80% of older adults currently living in the community, there continues to be an increased need for community-based services that transition older adults back to independent living post-hospitalization (Canadian Medical Association, 2016). This need for community-based services and programs, as part of the 'Aging in Place' initiative, was recognized by the WHO more than a decade ago, yet gaps between recommendations and available hospital-to-home models of care that encompass community support and rehabilitation still exists. This thesis built upon current literature and address identified gaps related to exercise interventions and implementation of community-based, SSR programs for older adults who are returning home post-hospitalization. This thesis highlights that: 1) rehabilitation, and exercise as part of overall rehabilitation, are key components to addressing hospital-related deconditioning and loss of

function; and, 2) hospital-to-home models of care that include rehabilitation are of value. Given the need to improve older adult outcomes and experiences post-hospitalization.

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Supplementary Information

Sample Daily Schedule

Time	Activity
0930	Arrival and light snack, socialization
1000 - 1030	*Individualized rehabilitation, Individualized exercise or Group exercise
1030 - 1100	**Health Coaching or Workshop
1100 - 1130	Rest Break
1130 - 1200	*Individualized rehabilitation, Individualized exercise or Group exercise
1200 -1330	Lunch break and rest, socialization
1330 - 1400	**Health Coaching or Workshop
1400 - 1430	*Individualized rehabilitation, Individualized exercise or Group exercise
1430 - 1500	Rest break
1500	Travel home

*Individualized rehabilitation, Individualized exercise or Group exercise – one activity in each of the timeslots

**Health Coaching or Workshop – one activity in each of the time slots. Included topics such as nutrition education, medication management, falls prevention strategies.

Semi-Structured Focus Group/ Interview Guide Referral or Program Staff

Introduction: As we talked about, we are doing a study looking at [PROGRAM NAME] as a model of care. Our main goal for this research is to develop an enhanced community-based, slow-stream rehabilitation, hospital-to-home transition model of care for older adults, building on the successful current [PROGRAM NAME]. In particular, we are interested in your experiences working with the [PROGRAM NAME] as a staff member working in the program or an indirect staff member who makes referrals to the program with [PROGRAM NAME].

We are also interested in hearing about what you think might make the [PROGRAM NAME] even better.

My role as Facilitator of this interview is to ask questions for the group to consider. We will move through a series of questions that will ask about your experiences, views and opinions. We do value your thoughts and opinions; however, please do not feel as if you need to answer every question. Remember . . . your participation is voluntary. You may withdraw consent at any time and you do not have to answer any question you do not want to answer.

Last, I would like to introduce _____. _____ role is to observe the focus group, take notes as a back-up in case there are issues with the tape recorder, and to record general information and reactions. Let's begin . . .

**** bulleted items are probes intended to bring out specific information, will be used as required. Certain questions may not be applicable to certain focus group attendees.*

I think some of the general questions first e.g., above, then 10

Then all *[PROGRAM NAME]* focused, combining if/where possible – have 5, 6, 7 as first questions related to *[PROGRAM NAME]* e.g, who do you refer, why, what other referrals … and then specific *[PROGRAM NAME]* questions

Then the enhanced/ideal program questions

1. What is your experience with slow-stream community-based rehabilitation programs for older adults?

2. What are your experiences with the *[PROGRAM NAME]* program . . .
    a. What are your thoughts about the operations of the program? (ex. Location, hours, scheduling, day structure and activities of the day, type and amount of supervision, services, transportation, meals, social activities, etc.)

3. How do you think participants' needs are addressed by the program?
    a. What are their goals? Are they met? How so?
    b. What are their needs? How are they addressed?
    c. What goals do you set for the people you refer?

4. What outstanding goals/needs do participants have upon discharge? Do you think there any participant needs/goals/issue(s) that could not/cannot be addressed by the program? What remaining challenges do you think participants are discharged with related to:
    a. health condition?
    b. Mobility?
    c. Function?
    d. Other goals?
    e. How do you think these are addressed in the community?

5. What do you think are the best things about the program?
    b. What are you most satisfied with regarding *[PROGRAM NAME]*?
    c. What is most notable/impressive about *[PROGRAM NAME]*?
    d. What would you say are the most important factors or features of the program?
    e. What factors/features should be kept? Why?

6. . What do you like least?
    a. What are you most dissatisfied with?
    b. What can be improved? What can be improved regarding your experience(s) with the *[PROGRAM NAME]*?
    c. What factors/features need to be revised/changed? Why?

7. Who do you refer to the *[PROGRAM NAME]* program?
    a. What criteria do you look for in a person to make the referral?
    b. how often do you make referral into the program?

8. When do you refer a person to the program?
    a. From hospital or from home?
    b. Why? What conditions have to be present to make the referral?
    c. What is the average waitlist?

9. What other services do you refer your clients in home care to?
    a. Is there anything similar to Goldies2Home?
    b. What other rehabilitation services do people receive?

10. What do you think happens to *[PROGRAM NAME]* participants after they are discharged?

What experience(s) do you think discharged *[PROGRAM NAME]* participants have in navigating their way through the various governmental and non-governmental systems (both healthcare and support services) to find the local supports that are needed after discharge from *[PROGRAM NAME]*.

a. What services and supports do you think would be most helpful for participants after discharge from *[PROGRAM NAME]*? What is/was most useful?
b. What barriers do you think participants discharged from *[PROGRAM NAME]* have in terms of gaining access to services and support?
c. What is your follow up with people who complete the *[PROGRAM NAME]* program?
    i. Do they continue with home care services?

11. What changes would you like to see made to the current system or what resources could be put in place that would better support *[PROGRAM NAME]* participants after discharge, to help older adults with the transition from hospital to home?

12. How do you think participating in Goldies2Home affect older adults'/participants' personal situation?
    a. Their health?
    b. Their well-being?
    c. Their life/lives?
    d. In the short-term? In the long-term?

13. What outcomes do you believe should be measured to indicate the participant(s) has changed? Has improved?

14. What do you see as the most pressing issues related to community-based programs such as *[PROGRAM NAME]*?

    a. Are there recent successes, factors/elements you can point to that may help address these issues?
    b. What challenges stand in the way of addressing these issues in a meaningful way?
    c. What priority actions should be undertaken to move possible solutions forward? Who should be responsible?

15. What factors do you think would promote the success of an enhanced community-based, slow-stream rehabilitation, hospital-to-home transition program?
    a. What factors promote the implementation of this program?
    b. Are there resources that are important?

16. What factors do you think would hinder the success of an enhanced community-based, slow-stream rehabilitation, hospital-to-home transition program?
    a. What factors hinder the implementation of this program?
    b. Are there resources that are not important?

17. If costs were no object, what would the ideal *[PROGRAM NAME]* program look like?
    a. Length of the program (day), overall # of days
    b. Program components/parts/elements
    c. Structure of the day
    d. Staff complement
    e. Supervision
    f. Other

18. What would be the ideal referral system for *[PROGRAM NAME]* in your opinion?

19. What problems might you envision with this ideal program?

20. What would be important elements to ensure success of the ideal program? What people would need to be involved? On board?

    a. What elements are important to ensure the success of the program structurally?
    b. What elements are important to ensure the success of the participant's outcomes?

21. What should we look at (measure) to know that the ideal program is meeting its goals? Is successful?

22. If there were a cost to the participant to attend an ideal program, what would be a reasonable cost?

23. Are there other people or organizations that we should contact to ask these types of questions to get a better understanding of the current *[PROGRAM NAME]* program and an ideal program?

24. Is there anything else you would like to share with us?