

**HOW DOES THE GERIATRIC DAY HOSPITAL PROGRAM AT BRUYÈRE
CONTINUING CARE INFLUENCE FUNCTIONAL INDEPENDENCE OUTCOMES
IN ITS PATIENTS?**

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Abstract

Programs that address the needs of the elderly are especially important in Canada today as it experiences population aging. There are currently no pretest-posttest studies evaluating functional independence of patients attending the Geriatric Day Hospital at Bruyère Continuing Care in Ottawa, Ontario using the set of indicators and outcome measurement instruments in this study. Evaluation of older patients (age over 65) in this program using various outcome measures was carried out using a single group pretest-post test design. Results showed that there was statistically significant improvement between pretest and post-test scores measuring fear of falling, balance, and functional exercise capacity. However, no significant difference was found between pre- and post-scores for caregiver stress, for which various hypothesized reasons are proposed. There were similar findings for the subgroups analyzed (patients with a history of: stroke or TIA; previous falls; or osteoarthritis) with the exception of fear of falling, which did not show a significant decrease in the stroke subgroup. Some caregivers suggested that “burden” was not an appropriate word for describing their experience, as care-giving was often seen as a moral obligation or an act of love. Future evaluation research using a mixed methods approach and repeated measures design is recommended for a more comprehensive understanding of the effects of this Day Hospital. It may also be of value to compare the different geriatric day hospital programs at the local and regional levels.

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Chapter 1: Introduction

1.1 Aging Society and Arising Needs

Programs that address the needs of the elderly are especially important in Canada today since the country is experiencing population aging. As Statistics Canada (2015) pointed out, the number of people who are 65 years of age or older in Canada have now surpassed those who are 14 years and younger. This trend is expected to continue to grow for the foreseeable future (Statistics Canada, 2015). This is significant for the Canadian health care system as more resources will be required to address the unique health needs of seniors.

Though aging itself does not necessarily result in disease or disability, the risks of developing them often rise with age. As a result, “the demand for health services is expected to increase as Canada’s population ages” (Canadian Medical Association, 2013, p. 2). However, having chronic illnesses or disabilities does not automatically imply poor quality of life. With appropriate care and management, older adults can learn to cope with their illness or disability and still live well independently (Economist Intelligence Unit, 2009).

1.2 Subject of Interest

The focus of this study is on geriatric day hospitals. The reason for choosing this type of program as my study subject was that I had volunteered at the Geriatric Day Hospital (GDH) at Bruyère Continuing Care in Ottawa during my undergraduate studies, and I found that it appeared to be a very meaningful service to older adults who attended the program, their family caregivers, and the staff who provided the interventions at the GDH. The general geriatric day hospital model of care and the Bruyère GDH program in specific will be discussed in the following sections.

1.2.1 History of Geriatric Day Hospitals

The geriatric day hospital model of care originated from the United Kingdom in the 1950s. Day hospitals existed in other countries as early as the 1940s, but they were mainly used for psychiatry (“Geriatric Day Hospitals”, British Medical Journal, 1971). The first day hospital that was established specifically for the elderly, or “geriatric day hospital [GDH]”, was developed in 1957 in Oxford, England by an orthopedic surgeon named Lionel Cosin (Barton & Mulley, 2003). Brocklehurst and Tucker (1970) defined the objectives of the GDH as medical and nursing care; rehabilitation; engagement in social and recreational activities; and to relieve the caregivers (as cited in Barton & Mulley, 2003; Zeeli & Isaacs, 1988). In addition, the Lionel Cosin Day Unit at the John Radcliffe Hospital in Oxford, a ward named after the inventor of the geriatric service, includes preventing hospitalization and helping individuals to continue living independently in their own homes as the goals of the program (Oxford University Hospitals, n.d.).

The difference between day hospitals and day centres is not entirely clear. Farndale (1961) found that there was often similarities or overlap between the types of patients admitted to, the needs of those patients, and the interventions provided at, each respective facility (as cited in Weissert, 1976). Brocklehurst (1973) tried to distinguish the two types of geriatric services with the following definitions: day hospitals provide therapy that aims to rehabilitate and maintain physical function, as well as medical and nursing treatment; whereas day centres only offer social and personal care services, are not associated with the hospital, and do not provide medical, nursing, or therapeutic interventions (as cited in Weissert, 1976).

The United States Department of Health, Education, and Welfare (1974) published a definition that does not distinguish between day hospitals and day centres at all, stating that a “Day Care” program is developed for people who do not need full inpatient care yet still require services to restore or maintain function and independence, with a balance between providing for patients’ healthcare and social needs in order to achieve an optimum level of well-being (as cited in Weissert, 1976).

Matlack (1975) also attempted to make a distinction between the two types of services. He described day hospitals as being a hospital-based unit where clients come to participate in activities including physiotherapy, occupational therapy, and other therapeutic interventions or treatments. Opportunities to engage in social or recreational activities are offered in between therapy sessions during the day. Clients of this type of care are primarily referred from inpatient acute care, and in other cases by family physicians or outpatient clinics. Matlack (1975) adds that GDHs serve the purpose of discharging hospitalized patients back into the community quicker and helping them to regain or maintain independence (in the case of community-dwelling frail older persons).

Day centres, on the other hand, mainly focus on supervising persons with disabilities while providing some physical, occupational, social, and psychological interventions. Matlack (1975) describes the objective of this type of care to be “mental and physical stimulation for patients and relief for their families” (p. 110). Social centres, another term often confused with the aforementioned two services, provide older people who are already physically and mentally independent with social and recreational opportunities (Matlack, 1975).

As can be seen, there is some inconsistency with regards to how day hospitals and day centres differ exactly, based on their original and later definitions. In addition, a preliminary online search found that a considerable portion of the literature investigated psychiatric day hospitals. For the purpose of this study, we have chosen to only look at those programs that refer to themselves or are referred to as “day hospitals”. We focused on past studies which examined geriatric day hospitals that are mainly for physical rehabilitation, with additional mental or psychological interventions and social activities provided on the side to complement the medical and physical rehabilitative services – since the program of interest uses this design (see section 1.3).

1.3 Description of Program of Interest

1.3.1 The John and Jennifer Ruddy GDH Program

The program of interest is the day hospital program at Bruyère Continuing Care in Ottawa, Ontario, Canada. The John and Jennifer Ruddy Geriatric Day Hospital is a “bilingual interprofessional outpatient program that aims to optimize the health and quality of life of frail community-dwelling seniors” (Bruyère, n.d.). As of January 2018, it is the largest multidisciplinary GDH team in Ottawa and the only outpatient centre in Ottawa that offers a full range of services in both official languages (Bruyère, 2018). The goal of this program is to assist older adults with transitions that come with aging, and the multimorbidity and decline in functional capabilities which are often associated with aging. It also aims to help patients maintain their independence, and prevent hospitalization and/or being prematurely admitted to long-term care facilities.

The admission criteria of the program are as follows: Clients 1.) must be at least 65 years old; 2) must be referred to this program by a physician or other sources of referral (see section 4.1.3); and 3) must have two or more concerns related to mobility/falls, difficulty with activities of daily living (e.g. bathing, meal preparation etc.), cognitive issues and symptoms that are affecting function, medication concerns, and/or caregiver stress or future planning (Bruyère, n.d.). Patients will be working with a team that comprises health care professionals including physiotherapists, occupational therapists, physicians, nurses, social workers, a pharmacist, a psychological associate, and a recreational therapist in order to maintain or regain holistic health and independent functioning (Bruyère, n.d.). The role of each GDH team member is described in section 1.3.2.

Each therapy session is 3 hours long for two days per week, and the program is administered for approximately 10 weeks. A patient's "typical day" at the GDH is presented in Figure 1 below. Each half-day session is split into 15-minute intervals. Coffee or other beverages are provided to the patients when they arrive at the GDH in the morning or afternoon. To start the day's activities, range of motion exercises are performed as a large group for 15 minutes. For the next two hours, patients attend their individual appointments with the services offered at the GDH (most commonly with physiotherapy, occupational therapy, social work, and nursing; and with pharmacist consultation, recreational therapy, and neuro-psych services based on individual needs). Large group activities that aim to stimulate cognition and improve brain health; muscle strengthening exercises; and cardio exercises may also be included in a patient's schedule during this period of time. Patients usually receive a combination of the interventions given as examples in Figure 1.

Figure 1. A patient’s typical schedule at the GDH

Time	Activity			
9:30 – 9:45	Coffee & getting settled in			
9:45 – 10:00	Range of motion exercises			
10:00 – 10:15 10:15 – 10:30	Physiotherapeutic exercise machine		OT	SW
10:30 – 10:45 10:45 – 11:00	Pharmacist	PT	Nursing	Therapeutic activities
11:00 – 11:15 11:15 – 11:30	Cognitive / Brain health activities	OT	Recreational therapy	PT
11:30 – 11:45 11:45 – 12:00	Muscle strengthening exercises		Cardio exercises	SW/PT/OT

1.3.2 Composition of the Clinical Team

The various disciplines and the role of each team member are as follows. The descriptions of their respective responsibilities are taken directly from consultations with the team members themselves and/or are cited from the article by Chen and colleagues (2010), a study that investigated a benzodiazepine tapering process conducted at the same GDH at Bruyère and how it relates to the provider and patient experience. The GDH pharmacist is one of the primary authors (BF).

Medical Care

The physicians “[a]ssess, provide medical care to and monitor patients..., and refer patients to other providers as required”, and “attend rounds once weekly” (Chen et al., 2010, p. 290). These are part-time positions.

Nursing Care

There is a part-time Registered Practical Nurse (RPN; 50% of the time), part-time Registered Nurse (RN; 80%), and a full-time Clinical Nurse Specialist (CNS; 100%) on staff.

(1.) The Clinical Nurse Specialist works with the physicians to do medication reconciliation with the assessments; does follow-ups when physicians are off-duty, on issues such as congestive heart failure, medication changes, falls sequelae, and edema management etc.; triages all referrals to the day hospital; follows clients through the program related to specific nursing issues including pain management, complex medication management issues, lower extremity edema, ankle-brachial indices (ABIs) etc.; manages flow of patients; maintains the number of physicians and the GDH in general; performs assessments, treatments, and monitoring as needed; and acts as a mentor to the other nursing roles as well.

(2.) The RN attends rounds for 55 clients; performs assessments, implementations, and evaluations related to many health issues such as edema, falls, osteoporosis, nutrition, incontinence, and bowel and bladder patterns etc.; are involved in a large component of teaching about various health topics to patients; and manages urgent situations.

(3.) The RPN attends rounds for 15 clients; performs teaching related to specific health topics; and leads weekly education sessions from a prepared presentation.

Physiotherapy

Physiotherapists (PT) “[h]elp patients to improve their balance and/or increase their confidence after a fall; create individualized physiotherapy programs; continually monitors for

falls during GDH stay; observes patients with cognitive impairment more carefully than other patients; [and] encourages anxious patients to be active and use relaxation exercises” (Chen et al., 2010, p. 290).

Occupational Therapy

Occupational therapists (OT) assess a person’s ability to manage their basic activities of daily living (ADLs) such as bathing and dressing as well as safety to perform instrumental ADLs (IADLs) such as cooking. All patients are referred to OTs for assessment of fall risk factors. The intervention includes a review of behavioural and environmental risk factors, activity level and footwear. Recommendations are made for equipment or assistive devices to help with transfers and home accessibility. OTs work in regular consultation with the interdisciplinary team as well as the patient and their family. The primary goal of OT intervention is to optimize the patient’s independence and safety to allow them to live in their homes for as long as possible.

Social Work

Social workers provide information and counselling to both patients and families or caregivers. The clinical counselling may help to address mood issues and adjustment to aging and illness. Social workers also: help to assess cognitive impairment and to identify if patients’ cognition or its assessment is being affected by other factors such as mood, socioeconomic issues, or cross-cultural considerations; provide education in accessible terms to patients and their caregivers regarding a wide range of common geriatric issues; help patients and caregivers to develop habits and tools that help them cope and plan for their futures; and connect patients with

other health and community resources including various home care services, transportation services, or for the basic necessities of life (i.e. access to food, income, and stable housing).

Pharmacist Consultation

The pharmacist “[i]nterviews and develops rapport with referred patients (usually focusing on the most pharmacologically complex admissions); obtains medication history from patient, family, and/or community providers; identifies and addresses [drug-related problems]; provides comprehensive written and verbal information or education about [drug-related problems] and how to solve them; prepares and updates patient medication chart; provides frequent (often weekly) follow-up and monitoring of medication changes and their effects; facilitates and communicates medication changes with community providers; [and] conducts home visits if needed” (Chen et al., 2010, p. 290).

Psychology Consultation

The psychological associate “[c]onducts cognitive assessments over 2–3 weeks for selected patients referred by physicians; determines cognitive abilities (e.g., memory, attention, concentration, language, executive functions, visuospatial processing, problem-solving and reasoning); [and] may discuss strategies to help improve memory and concentration” (Chen et al., 2010, p. 291).

1.3.3 The Patient Population

Pertinent information and details regarding the GDH and its patients were also obtained from key informants such as the leading physicians and the clinical manager, to create a more comprehensive plan for the evaluation of this program. According to the key informants, the

majority of the patients admitted to the GDH present with mobility or balance issues and at least one other problem. However, patients who are severely cognitively impaired are not usually admitted to the program and are referred to other more appropriate types of care, as this population would require interventions different from what the Day Hospital offers. Demographic and baseline health status-related information of the study participants can be found in section 4.1.

1.4 Research Question

The research question to be answered in this study is “How does the Geriatric Day Hospital program at Bruyère Continuing Care influence functional independence in its patients?”

1.5 Reasons for Investigation

1.5.1 Absence of a Program Evaluation Process

A consultation with the administrators of the program revealed that no formal evaluation for the John and Jennifer Ruddy Geriatric Day Hospital (hereinafter referred to as “the Day Hospital” or “the GDH”) has been performed in at least a decade. The effects that this program has on the functional status of its patients as well as whether improvements, if any, can be maintained after discharge thus remain unclear. This study can inform Bruyère program administrators about the performance of this specific Day Hospital.

1.5.2 Gap in Existing Literature

As will be seen from the studies described in Chapter 3, research results on the effects of day hospital care were inconsistent. This is largely due to the fact that each day hospital program

is unique in its structure, care delivery, and patient population; and the effects of one program may not be identical to—or can be applied to—another. Therefore, the extent of the effects of the Bruyère Geriatric Day Hospital on functional independence as well as whether these effects would persist after the completion of the program cannot be conclusively determined by referring to past studies alone. In addition, there are currently no pretest-posttest studies evaluating functional independence using the particular set of tools in our study. This study will contribute to the existing body of knowledge on geriatric day hospital care in Canada by adding to how we understand how this specific team composition and the structure of the therapy regimen at this particular day hospital affect its patients, where this GDH is a variation of the larger day hospital care model.

1.5.3 Link to Systems' Perspective

There are other benefits of conducting this study. From a micro level systems' perspective, the results of this study will contribute to improving patient care and quality of care on an individual level. From a perspective at the meso level, Bruyère Continuing Care as an organization will benefit from this research since it is anticipated that this study will provide Bruyère health administrators with evidence on how their Day Hospital program influences the functional independence of their outpatients, and help decision makers in the rehabilitation services department at Bruyère make informed decisions with regards to whether 1) the program should continue the way it is currently implemented, or 2) changes should be made to the program. At the macro level, the wellbeing of the overall community-dwelling geriatric population can be elevated if the evidence from this research study is used to improve patient care on an individual level.

1.6 Operational Definition of Concepts

Since this program is designed to help seniors maintain or regain their functional status, and live as independently and safely as possible, functional independence is the construct that will be focused on in this proposed study. Although there is no single measurement tool that is able to conclusively measure functional independence in older adults, as this construct itself comprises multiple components, there are different factors that can indicate how well a person can function on their own. Since it is not feasible to explore every possible factor, certain indicators have been selected to be assessed and measured.

Selected indicators of functional independence in this study include 1) fear of falling, 2) balance, 3) functional exercise capacity, 4) caregiver stress, 5) overall frailty, and 6) mood. These indicators have been chosen 1) because they were identified as key areas of independent functioning in older adults (Fleming, Evans, Weber, & Chutka, 1995; Frost, Weingarden, Zeilig, Nota, & Rand, 2015; Hellstrom, Lindmark, Wahlberg, & Fugl-Meyer, 2003; Kawryshanker, Raymond, Ingram, & Inderjeeth, 2014, p. 6; Perna et al., 2017, p. 1; Pompey, Muensri, & Kritpracha, 2016); 2) are hypothesized that they would indicate seniors' level of functioning as they correspond with most of the functional issues that the GDH addresses; and 3) as a result of a collaborative decision between the Bruyère GDH team and the student researcher. Before the study officially began, the student researcher and the thesis supervisors met with the GDH team a number of times to determine which indicators and outcome measurement tools should be implemented for the purpose of this study. An agreement was made that the final decision should be one that benefits all parties: the GDH patients, the team, and the study researchers.

This set of indicators relate well in part to the targeted concerns listed in the Bruyère GDH admission criteria. Some areas and their proposed corresponding measurement tools, such

as the ability to perform ADLs, hand grip strength, health-related quality of life, and self-efficacy were once briefly considered; and other areas such as medication concerns (e.g. adherence issues, polypharmacy) and cognitive functioning that directly relate to the issues listed in the admission criteria were all important, but ultimately not included in this study as the clinical team did not regard them to be the most pertinent to measure and/or best reflect their interventions. In addition, the goal of the study was not to evaluate every single area that the GDH addresses through its interventions. The following indicators were thus focused on in this study for their role in seniors' functional independence.

1.6.1 Fear of falling

The importance of examining these aspects of independent functioning is apparent. A population-based longitudinal study by Friedman, Munoz, West, Rubin, and Fried (2002) found that falls and fear of falling are risk factors for each other. In other words, people who have falls are at risk of fear of falling, and vice versa. Moreover, the Public Health Agency of Canada [(PHAC), 2014] stated that “[a] fear of falling may lead to a decrease in physical activity, which in turn leads to muscle weakness and poor balance, and poorer self-reported health” (p. 28). This can create a vicious negative cycle, since impaired balance and reduced muscle strength are also risk factors for falls (PHAC, 2005).

Falls are a significant concern in the elderly because they: are “the cause of 85% of seniors' injury-related hospitalizations” (PHAC, 2005, p. 1); may impact the ability of a person to live on their own, and; can put restrictions on a person's mobility as a result of injuries (National Institutes of Health, 2015). If seniors are afraid of falling, they may be less likely to perform

daily tasks on their own. Fear of falling thus perpetuates, or is part of the cause of, impaired functional independence in older adults.

1.6.2 Balance

As most patients admitted to the GDH present with issues relating to balance or mobility, these areas would be essential to assess when evaluating functional independence. If older adults are physically weakened or injured, their level of independence may be impaired as a result because they may find it more challenging to ambulate for a prolonged time, to dress and feed themselves, or to maintain good hygiene.

1.6.3 Functional exercise capacity

It would be important to assess functional exercise capacity, as it relates to how long patients can endure ambulating around their residence or neighborhood. If they can only walk a short distance before feeling fatigue or exhaustion and need to rest, it would limit the activities they could perform at home and in the community, including performing ADLs such as buying groceries, walking pets, or going to appointments.

1.6.4 Caregiver Stress

The level of caregiver stress might indicate how functionally independent a geriatric patient is. Gratão et al. noted that "Caregiving, when associated with a senior's lack of ability to perform the basic activities of daily living, results in caregiver burden. The level of dependence of the senior was an important predictor of elevated burden levels" (2013, p. 140).

1.6.5 Overall Frailty

Overall frailty would be important to consider when assessing functional independence as well, since frailty is identified as a predictor for falls, hospitalizations, disability, and mortality (Fried et al., 2001). In addition, we know from the GDH program administrators that the program participants are mostly older adults with some level of frailty present.

1.6.6 Mood

Mood can impact daily functioning as well. Symptoms of depression are strongly associated with a decline in functional status and social engagement as well as deterioration in the ability to perform ADLs (Kazama et al., 2011). While mood is not the primary cognitive issue addressed at the GDH, the clinical team found it to be an important indicator to include and measure when a basket of indicators were proposed to them during the developmental stage of this study.

In the following chapter, a literature review of geriatric day hospitals will be discussed (Chapter 2). Next, the methodology used to conduct the study and answer the research question will be introduced in Chapter 3. In Chapter 4, the results including the descriptive statistics for the study participants, and the outcome measure data for the overall GDH participants as well as the three subgroups that were analyzed, will be presented. Finally, there will be a discussion of results and the conclusion; contributions and limitations of this study; and recommendations for future research in Chapter 5.

Chapter 2: Literature Review

2.1 Literature Search

A literature search was conducted (2016-2018) to review similar past studies and what is known about day hospital care. Searches were completed via the PubMed database as it consists largely of biomedical literature and contains articles and works from the Medline database as well (PubMed, n.d.). This database was chosen since the topic of interest is related to biomedical sciences. Searches were performed by using the following key terms: “geriatric”, “day hospital” (synonym “day clinic”), “evaluation”, “functional status” (synonyms “functional outcomes”, “functional independence”). 11202 articles were found.

The titles and abstracts of the articles were then examined to narrow down the results; the works whose titles or abstracts contained the words “day hospital/clinic”, “outpatient”, or “rehabilitation” were selected and set aside for further examination since these keywords were considered to be the most important and relevant to this study. 836 articles were found. Among these articles, ones that also contained the terms “geriatric”, “elderly”, “functional”, “status”, “outcomes”, “effectiveness”, and/or “evaluation” in their titles or abstracts were chosen. 79 articles were selected.

On the next overview of the list of works, any articles that were in a non-English language; were about psychiatric day hospitals; were about inpatient rehabilitation care or other types of non-day hospital outpatient services; did not evaluate functional outcomes or status; were protocols instead of a completed study; or were inaccessible beyond the abstract were eliminated. 20 articles remained.

Another search was conducted via the ScienceDirect database using the above search terms and procedure as well. This rendered 9 articles for the ScienceDirect database ultimately. The selected 29 studies will be discussed in detail in the following section as they were deemed

to be directly related to answering the research question at hand, and because they are similar to this research study in that they utilized the geriatric day hospital model as well. These past studies will be described and summarized here to present what approaches have been used in the past with regards to evaluation of day hospital care as well as the results that were found. Although a cost-benefit analysis of day hospitals would have been interesting to perform, it was not within the scope of this study.

2.2 Overview of Day Hospitals

2.2.1 Studies without a control or comparison group

This section will describe the studies that were conducted without a control or comparison group for the day hospital intervention. No comparison or control groups (that received other types of treatment or were given no treatment) were used for the following studies: Aliberti et al. (2016); de Jaime et al. (2013); Chew, Chong, Fong, and Tay (2015); Dasgupta, Clarke, and Brymer (2005); Desrosiers et al. (2004); Fowler, Condon, and Hamilton (2000); HersHKovitz, Beloosesky, Brill, and Gottlieb (2003, 2004, 2006); HersHKovitz and Brill (2007); Luk and Chan (2011); Luk, Chan, Chan, and Chu (2011); Malone, Hill, and Smith (2002); Manckoundia et al. (2007); Moorhouse et al. (2017); and Olsson and Sunnerhagen (2006, 2007).

2.2.1.1 Studies with positive outcomes

Some studies found that day hospital care greatly improved functional ability. A study by HersHKovitz, Beloosesky, Brill, and Gottlieb (2004) looked at whether day hospital rehabilitation was associated with reduced functional impairment in geriatric stroke patients. They used the following measures to assess outcomes: London Handicap Scale (LHS), Functional

Independence Measure (FIM), Nottingham Extended ADL Index (NEAI), and the Timed-Up and Go (TUG) test. They found that significant improvements were made in mobility, physical independence and functioning, and performance of ADLs.

Another study by the same authors using the same assessment tools but examining patients with a variety of conditions including history of stroke, deconditioning, and in recovery from orthopedic surgery found that great improvements were made in performing instrumental ADLs and mobility, while gains were made in performing basic ADLs but were clinically insignificant (HersHKovitz, Beloosesky, Brill, & Gottlieb, 2003). Their later study that looked at stroke patients over the age of 60 found that there were significant functional improvements with geriatric day hospital care, as indicated by the FIM, NEAI, TUG, and the Orpington Prognostic Scale scores (HersHKovitz, Beloosesky, Brill, & Gottlieb, 2006). Similarly, HersHKovitz and Brill found that mobility and NEAI scores significantly improved for day hospital patients who were post-stroke or post-orthopedic surgery (2007).

Luk, Chan, Chan, and Chu's study (2011) looked at Chinese older individuals over the age of 65 who attended a Geriatric Day Hospital in Hong Kong. Patients were referred or transferred from multiple sources. Those who were "confused, uncooperative, poorly motivated, medically unstable and unfit for travelling" (e145) were not recruited. Cognitive status and functional independence were measured using the Cantonese version of the Mini-Mental State Exam (MMSE) and the FIM, respectively, at admission to and discharge from the GDH. They found a significant improvement in FIM scores and that some patients who were cognitively impaired could still benefit from GDH interventions.

Aliberti and his colleagues (2016) examined the effects of GDH care on older patients who present with an acute or chronic condition, or require a minor procedure unattainable in other settings. Nearly a third of the study sample had dementia. Aliberti et al. measured the following outcomes as part of a comprehensive geriatric assessment: number of comorbidities and medications, ability to perform ADLs, and self-reported health. The results suggested that the majority of the participants did not require another type of hospital care after their stay in the GDH; that their functional status was maintained; and they experienced an improvement in self-reported health.

A longitudinal study by de Jaime et al. (2013) found that older adults with diagnoses including mild cognitive impairment or mild dementia, stroke, fracture, osteoarthritis, and Parkinson's disease improved significantly in the areas of ADLs functional ability, cognitive status, mood, balance, and mobility after admission to a GDH program. Improvements were also seen in the health perception and quality of life dimensions using the Nottingham Health Profile (NHP). Interestingly, there was a sex difference in which gains in physical mobility and emotional aspects were noted in women, while for men only the pain perception aspect of the NHP improved.

Olsson and Sunnerhagen (2006) evaluated the effects of multidisciplinary day hospital rehabilitation care on stroke patients. This prospective non-experimental study assessed the areas of physical function, cognitive function, self-rated health, and health-related quality of life (HRQoL) using the FIM, 36-item Short Form Health Survey (SF-36), the EuroQoL EQ-5D instrument; and examined direct costs for the period of treatment. It is important to note that participants consisted of only stroke patients, and that this was a non-geriatric population (age

range 18-60). Results showed that all areas improved significantly, and gains were most drastic in patients who were most impaired in all areas at baseline. Olsson and Sunnerhagen's follow-up study in 2007, however, showed mixed results with respect to maintenance of gains (see section 2.2.1.2).

2.2.1.1a Gains were maintained

Some studies found that improvements were maintained after discharge from a day hospital program. Factors including mobility, functional independence, grip strength, and psychiatric profile among others were assessed in Desrosiers et al.'s study (2004) using the Tinetti Test, Functional Autonomy Measurement System, Jamar dynamometer, and Derogatis' Brief Symptoms Inventory respectively. They found that gains were not only made in these functional areas during the program, but were also maintained 3 months after the patients have been discharged.

A study by Manckoundia et al. (2007) looked at whether interventions provided at a day hospital using a multidisciplinary approach could improve motor function, mental status, and independence in older adults with a history of falls during the last 6 months and psychomotor disadaptation syndrome (PDS). They used the following tools to measure outcomes: the FIM, MMSE, Tinetti test, mini motor test (MMT), dual task test, Beck Depression Inventory-II (BDI-II), the Covi Scale for anxiety, and the Modified-Falls Efficacy Scale (M-FES). It was found that such a multidisciplinary approach, which included medical, physiotherapeutic, and psychosocial interventions, helped to improve test scores in the areas of dual task timing, ability to rise from the floor, and motor function. Fear of falling and rate of falls also decreased. The gains for the

latter three outcomes were maintained for at least 7 months since admission, with motor abilities and rate of falls sustaining for up to 9 months.

Moorhouse et al.'s prospective cohort study (2017) investigated whether a traditional multidisciplinary day hospital model of care could improve outcomes and whether those gains could be sustained at 6 months after discharge. Patients were older (age ranging from 62 to 99); presented with diagnoses including falls, Parkinson's disease, mobility and cognitive impairment, polypharmacy; and were observed at admission, discharge and 6-months after discharge using psychometric tests such as the MMSE, BBS, POMA, TUG, Elderly Mobility Scale (EMS), Lawton Brody Instrumental Activities of Daily Living scale, and the Frailty Index. Mobility, cognition, and physical function were also assessed via goal attainment scaling (GAS). Results showed that all aforementioned test outcomes, other than cognition, improved statistically at discharge. The vast majority of participants improved in total GAS at discharge, and scores for this measure at 6 months were significantly higher compared to baseline as well. However, it is important to note that those who were assessed at 6-months post-discharge, compared to those who were not assessed again, were less frail and more highly functioning to begin with. They also had greater GAS scores at discharge.

Dasgupta, Clarke, and Brymer (2005)'s study involved a retrospective chart review that examined the characteristics of individuals who improved in mobility, balance, polypharmacy, functional and cognitive status, and depression after attending a geriatric day hospital. These patients were older adults who required multidisciplinary services and had multiple co-morbidities, including a history of previous falls, cardiac conditions, chronic pain, stroke, deconditioning, depression, arthritis, and dementia. The authors suggest that patients with certain

diagnostic characteristics were more likely to make initial gains at the day hospital—in specific, frail older persons with cardiac conditions and depression. It was also proposed that this setting may be less effective for patients with dementia, while acknowledging that the evidence for this suggestion may be related to the fact that it is difficult to assess slowing the progression of this illness. All in all, they found that a majority of patients had maintained some functional, psychosocial, or medical gains at follow-up.

2.2.1.1b Gains were not maintained

There were some studies which found that functional gains and positive effects of day hospital care were not well-sustained.

Malone, Hill and Smith's study (2002) examined whether the functional status of geriatric day hospital patients are maintained three months after the program has concluded. The BI, Timed Up and Go Test (TUG), Berg Balance Scale (BBS), Mini-Mental Status Examination (MMSE), and the Geriatric Depression Scale (GDS) were used. They found that scores for mobility and depression significantly improved during the program, but declined for some measures (TUG, BBS, MMSE) and were unchanged for others (BI, GDS) after discharge. Malone and her colleagues concluded that functional improvements were not sustained since only the score for the GDS showed overall improvement while other outcomes either were overall unchanged or worsened from admission to 3 months after discharge (Malone, Hill, & Smith, 2002).

In another study by Luk and Chan (2011), overall significant gains were made in functional independence at 6 months post discharge compared to admission, as indicated by FIM

scores. However, the improvements were not well maintained, seeing as the results showed a sharp decline from discharge to 6 months post-discharge.

2.2.1.2 Studies with mixed results

A prospective observational cohort study by Chew, Chong, Fong, and Tay (2015) looked at the effect of a multidisciplinary and multidimensional cognitive and physical rehabilitation program, which provided a pattern of interventions very similar to the day hospital setting, on community-dwelling older adults with mild dementia as well as their caregivers. Outcome measures include cognition, behavior, quality of life, caregiver burden, and goal attainment scaling (GAS). The results suggest that this type of program can help lessen caregiver burden and improve goal attainment in this population. However, changes in scores for the cognitive, functional, and quality of life aspects were not significant between baseline and post-test.

Olsson and Sunnerhagen (2007) did a follow-up to their previous prospective study (see section 2.2.1.1), evaluating long-term outcomes at 2 years post-discharge in stroke patients (aged 18 to 60 at the time of initial stroke) following day hospital rehabilitation care using the FIM, SF-36, and the EuroQoL EQ-5D instruments. Living conditions and patient handicaps were also assessed using the Riks-Stroke register for stroke care and the Oxford Handicap Scale, respectively. It was found that functional and cognition abilities, self-rated health, and health-related quality of life (HRQoL) were sustained at 2 years post-discharge, with some even showing improvement in cognition and HRQoL. Sex differences were exhibited; fewer gains were seen in self-rated health and HRQoL in women. Moreover, functional and cognitive status as well as HRQoL at discharge was inversely correlated with improvement at 2 years post-

discharge; in other words, patients who were the most highly functioning at discharge tended to deteriorate the most at follow-up.

2.2.1.3 Studies with negative outcomes

Some studies found that day hospital care did not improve functional status or prevent deterioration. Fowler, Condon, and Hamilton (2000) used outcome tools and assessment scales such as the 36-Item Short Form Health Survey (SF36) and the Barthel Index (BI) in their study. They found that scores indicating the health status and functional outcomes of patients of a geriatric day hospital were lower than anticipated, and an overall decline continued over the next six months.

2.2.2 Studies that used a control or comparison group

This section will describe the studies that were conducted with a control or comparison group for the day hospital intervention. A comparison or control group was used for these studies: Brown et al. (2015); Burch, Longbottom, McKay, Borland, and Prevost (1999); Burch et al., (2000); Doig, Fleming, Kuipers, and Cornwell (2010); Eagle et al. (1991); Forster and Young (2011); Forster, Young, and Langhorne (1999); Roderick et al. (2001); Tucker, Davison, and Ogle (1984); Weiler, Kim, & Pickard (1976); Werner and Kessler (1996); and Young & Forster (1992).

2.2.2.1 Day hospital is more effective than other interventions

2.2.2.1a Gains were maintained

Werner and Kessler (1996) found that when compared with a control group that received no intervention, day hospital patients improved in functional independence as indicated by FIM motor scores. They also improved in socialization and self-esteem, self-care and ADLs, mobility, and communication, as represented by a lower Sickness Impact Profile (SIP) score. These improvements were sustained at the 9-month follow-up.

Weiler, Kim, and Pickard (1976) assessed levels of physical and emotional functioning, independence in performing ADLs, self-maintenance, and re-establishment of lifestyles in both day hospital patients and a control group. . The composite scores from measuring these components indicated day hospital patients experienced improvement in emotional functioning, self-care, and social relationships. . However, even though patients in the treatment group improved in their levels of physical functioning compared to the treatment group over the study period, they did not improve significantly. The gains were maintained for the day hospital group (Weiler, Kim, & Pickard, 1976).

2.2.2.1b Mixed results about maintenance of gains

Tucker, Davison, and Ogle (1984) used the modified Northwick Park ADL Index and the Zung Depression Index, and found that day hospital patients significantly improved in mood and ADLs functioning at discharge in comparison to other types of intervention including inpatient care, other outpatient care, or home services. However, only the gained effects in mood were maintained at 5 months after discharge while ADLs functioning regressed. In addition, day hospital rehabilitation incurred more costs.

2.2.2.2 Day hospital is just as (not more) effective or is less effective than other interventions

2.2.2.2a DH compared to other types of care alone

Forster and Young (2011) examined randomized controlled trial (RCT) studies in their systematic review, comparing geriatric day hospital care and home-based rehabilitation as the better service for older persons who require rehabilitation care. Some studies used only patients who had a stroke as participants. Indicators measured were death or poor outcome, including institutionalization, physical or functional deterioration, and disability. Resource use and costs were also investigated. They found that home-based rehabilitation appears to be similarly effective to geriatric day hospital care but possibly had lower resource use (i.e. costs, number of visits). However, home-based rehabilitation does have its limitations: interventions may not be adequately intense or multidisciplinary in nature, may create a heavier caregiver burden, or may not always provide a large enough working space.

Results from another study (Eagle et al., 1991) indicated that there was no improvement in functional status with day hospital care, compared to inpatient care, other outpatient care, or community services as the control group. Functioning ability worsened over time in both groups as seen from Barthel Index and Geriatric Quality of Life Questionnaire scores. Interestingly, deterioration occurred to a larger extent in the day hospital treatment group compared to the control. The effect on emotions also favoured the control group (Eagle et al., 1991).

Young and Forster (1992) compared the effects of day hospital care and home care on stroke patients after inpatient discharge. They found that functional abilities such as mobility and performance of ADLs improved significantly for both interventions, but improvements were

greater for the home care group. In addition, in both groups, over one-third of the patients displayed a depressed mood and one-fourth of their caregivers experienced emotional distress.

Burch, Longbottom, McKay, Borland, and Prevost (1999) investigated the difference in effect between day hospitals and social services day centre rehabilitation using a single blind randomized controlled trial. Patients were older adults presenting with diagnoses including stroke, osteoarthritis, fracture, and Parkinsonism. Burch et al. found that both day hospital and day centre patients experienced a statistically significant improvement in scores that point to functional ability and caregiver stress at 3 months since admission (baseline). However, no difference was found between these two settings in terms of changes in scores for the aforementioned outcome measures, nor for morale.

A later study using secondary outcome measures by the same authors (Burch et al., 2000) further revealed that while mobility scores improved, quality of life did not.

Doig, Fleming, Kuipers, and Cornwell (2010)'s systematic literature review searched for evidence comparing day hospital and home-based rehabilitation outcomes. This patient population was more homogeneous in diagnostic terms; persons over the age of 65 with acquired brain injury—more specifically, stroke—were identified in the majority of studies reviewed. Outcome measures used in most of the studies were mobility, balance, mood, upper limb and cognitive function, language, and ADLs via standardised assessments performed by the health care professional as well as self-administered questionnaires (p. 2065). Most of the studies also had multidisciplinary intervention teams, and the programs were longer in duration (3 to 6 months). Doig and colleagues (2010) concluded their evidence indicated that outcomes of day hospital and home-based rehabilitation for this particular population were at least comparable.

However, although most of the studies were randomized controlled trials, almost half of the methodological quality criteria were not met—a limitation that is often expected (p. 2073).

Roderick et al. (2001) compared day hospital and domiciliary (home-based) rehabilitation care with regards to their costs and effectiveness. They conducted a randomized controlled trial with patients 55 years or older, with relatively intact cognition, who have had a stroke and needed further rehab after being discharged. Functional status, mobility, mental state, social activity, and perceived quality of life were assessed using the Barthel Index, Rivermead Mobility Index, Abbreviated Mental Test, Frenchay Activities Index, and the SF-36, respectively. They found that the two types of intervention did not differ significantly in terms of outcomes or total costs. Cognition and social activity were overall largely unaffected by either types of intervention. However, the home-based rehabilitation group did experience non-significant gains in physical function and social activity measures, which may be due to the fact that this group had more physiotherapy and nursing time per treatment session, and more frequently accessed social service day centres and home services. Roderick et al. concluded that stroke patients with the following characteristics seem most likely to benefit from day hospitals: those who need medical or nursing intervention, social service and district nurse inputs, and those whose caregivers are given a chance to be relieved of their burden temporarily while the day hospital takes over the patient's care.

2.2.2.2b DH compared to other types of care and no treatment

Brown et al. (2015) concluded in their systematic review that there was evidence, albeit low quality, that day hospital care can reduce deterioration in the ability to perform ADLs and

was more favourable for the combined outcome of death or poor outcome, including institutional care, dependency, and deterioration in physical function. They concluded that day hospital care might be more beneficial when compared to no treatment. However, it appears to be no more effective, and possibly more expensive, when compared to other types of care (i.e. inpatient services, home-based care, etc.).

Forster, Young, and Langhorne (1999)'s systematic review investigated the effectiveness in increasing older adults' ability to live independently that day hospitals have in comparison to comprehensive care (defined as a combination of inpatient, outpatient, and home-based services), home-based or day centre rehabilitation, and no intervention. The main outcome measures included death, being institutionalized, disability, physical functional decline, and use of resources. It was found that there was no significant difference for the measured outcomes between the aforementioned geriatric services, indicating that day hospitals may be no more effective than alternative types of care; and that day hospitals may possibly incur more costs. However, geriatric day hospitals may be more beneficial for older adults with a variety of medical conditions and disabilities who need rehabilitation, compared to receiving no intervention at all.

2.3 Day Hospital for Patients with Specific Needs

The GDH patient population can be divided into different cohorts. The effects of rehabilitation and day hospital care on specific types of patients, such as those with Parkinson's or those who have experienced a stroke, are documented. It would be inappropriate to compare any single subpopulation to our patient group as a whole, since many of the patients admitted to

the GDH have multimorbidities, often suffering from several physical and cognitive disorders. Similarly, we cannot compare the interventions or therapy programs administered to certain subpopulations with the GDH program, as the former is often more bounded and specific in goals because they focus on recovery from or coping with only one particular disorder. However, it would still be valuable to look to the literature on how patients with strokes or other major illnesses impacting functional ability are affected by interprofessional care similar to that provided at the Bruyère GDH. Here we will only discuss studies relevant to day hospital or outpatient rehabilitation care that focused only on patients who have experienced a stroke, as this is a medical issue that a considerable portion of our study participants presented with, when we retroactively examined the data. Some of these studies may have been described in section 2.2 as well, but may be discussed in more detail here.

2.3.1 Patients who have Experienced a Stroke

Hui, Lum, Woo, Or , and Kay's prospective randomized study (1995) looked at elderly patients with acute stroke and compared the outcomes of those who attended follow-up day hospital rehabilitation after being in an inpatient stroke ward under geriatric team care, with those who received inpatient conventional medical management and were hospitalized on the same ward the entire time under neurology care. They found that geriatric day hospital care resulted in greater functional improvement at 3 months and fewer outpatient follow-up visits at 6 months without costing significantly more.

Smith et al. (1981) examined patients with a recent confirmed stroke who were randomized to attend 3 different variations of rehabilitation programs that were different from day hospitals. Of note, they excluded geriatric, mainly female, patients from the study as they

were deemed to be “either too old or too frail for intensive rehabilitation or had other serious diseases” (p. 518). One of the groups most similar to the day hospital – the conventional intervention group which attended the program for three half days per week and received physiotherapy and occupational therapy in both group and individual settings, improved moderately compared to those in the intensive rehabilitation group and significantly better than those receiving no routine rehabilitation. However, those in the last group also improved slightly.

One study by Hershkovitz, Beloosesky, Brill, and Gottlieb (2004) looked at whether day hospital rehabilitation was associated with reduced functional impairment in geriatric stroke patients. They used the London Handicap Scale (LHS), the Functional Independence Measure (FIM), the Nottingham Extended ADL Index (NEAI), and the Timed-Up and Go (TUG) test to assess outcomes. They found that significant improvements were made in mobility, physical independence and functioning, and performance of ADLs.

Hershkovitz, Beloosesky, Brill, & Gottlieb (2006) studied stroke patients over the age of 60 who attended a geriatric day hospital. The tools FIM, NEAI, TUG, and the Orpington Prognostic Scale (which was used to assess the potential for functional improvement) were used to measure outcomes. Results indicate that patients improved significantly on all measures, with those who were less neurologically impaired achieving significantly higher discharge scores than those moderately to severely impaired, but overall score changes were significantly greater in the latter group.

Gladman, Lincoln, and Barer (1993)’s randomized controlled trial compared the effectiveness of domiciliary and hospital-based rehabilitation services including day hospital care after discharge from hospital, on outcomes in geriatric stroke patients using the extended ADL scale for functional recovery and the Nottingham Health Profile for perceived health. They found

that there were no differences between the two types of services in terms of effectiveness; however, the frail older patient subgroup seemed to do better under day hospital care.

Doig, Fleming, Kuipers, and Cornwell (2010)'s systematic literature review compared day hospital and home-based rehabilitation outcomes for patients over the age of 65 with acquired brain injury, including stroke (for the vast majority of the studies) and traumatic brain injury. Outcome measures used in most of the studies were mobility, balance, mood, upper limb and cognitive function, language, and ADLs via standardised assessments performed by the health care professional as well as self-administered questionnaires. Most of the studies also had multidisciplinary intervention teams, and the programs were longer in duration (3 to 6 months). Doig et al. (2010) concluded that the majority of the studies they examined indicated that outcomes of the two aforementioned types of care for this particular population were at least comparable.

Chapter 3: Methodology

3.1 Study Design and Sampling

We used a non-experimental design, which is useful for determining the extent of intervention effects and progression towards achieving program goals, and is appropriate when no comparison group is available (Ontario Centre of Excellence for Child and Youth Mental Health at CHEO, 2008). More specifically, we used a single group pretest-posttest design, with the pretest and the post-test being administered at admission and at discharge, respectively.

Since a comparable control group may be difficult to recruit, only one group was observed and tested: the group of patients receiving the intervention—the GDH program. Originally, we wished to track 8 weeks of new admissions, which would render an estimated 65-80 patients (as 8-10 patients are admitted per week). Given the time frame for the study and the nature of the patients at the day hospital, it was determined that this sample size was large enough to enable a sufficiently robust analysis. A sample size of 30 is usually considered adequately large (Hogg, Tanis, & Zimmerman, 2015; Polit, 2010). Due to challenges in collecting sufficient data (see section 3.4.4), the collection period was extended until the targeted number of sample was reached. All GDH patient charts were reviewed.

3.2 Inclusion and Exclusion Criteria

Files of individuals who have been admitted to this program after the date of implementation of the proposed measurement tools and those who have completed the full course of the program (10 weeks) were eligible for inclusion in this study. Assessment tools and questionnaires that are in English were used with patients who speak and understand this language. In addition, as will be discussed in more detail in section 3.4.4, patients who had moderate to severe cognitive impairment were not given the questionnaires to complete.

Cognitive impairment was determined based on the clinician's judgment. If they felt that a patient did not have sufficient insight to answer the questions in a way that aligned with what is objectively observed to a degree, they would exclude that patient. Patients who passed away, were unexpectedly discharged early, or were admitted to another unit or facility due to worsening of condition were excluded as well. As such, each patient chart was examined for the presence of these assessment questionnaires, and what data was available was thus analyzed. Files of individuals who have not completed the full course of the program or were admitted before the tools were implemented were excluded from this study to keep the independent variable as uniform as possible across all subjects.

3.3 Instruments of Outcome Measure

One pretest and one post-test were administered at the first visit and the last (week 10) visit, respectively, to observe the extent of the effects of the program on its patients. The research investigators did not have contact with any of the GDH patients at any point. Data collection was conducted by the clinical staff of the GDH using the following selected tests and instruments: 1) the Falls Efficacy Scale-International (FES-I) for assessing fear of falling and ADL functional ability; 2) the Berg Balance Scale (BBS) for assessing balance; 3) the Six-Minute Walk Test (6MWT) for assessing functional exercise capacity; 4) the Patient Health Questionnaire-9 (PHQ-9) for assessing mood; 5) the Clinical Frailty Scale (CFS) for measuring overall frailty; and 6) the Zarit Caregiver Burden Index (ZBI), a measure of caregiver stress and burden. These tools were collaboratively chosen by the GDH and the student researcher because they have been used in past studies (Dasgupta, Clarke, & Brymer, 2005; Desrosiers et al., 2004; Di Mauro et al., 2001; Eagle et al., 1991; Fowler, Congdon, & Hamilton, 2000; HersHKovitz, Beloosesky, Brill, &

Gottlieb, 2003, 2004, 2006; Herkovitz & Brill, 2007; Malone, Hill, & Smith, 2002; Young & Forster, 1992), are reliable and valid, have been recommended as suitable for assessing their respective areas, are relatively easy to administer, and require no training or cost to use.

3.3.1 Falls Efficacy Scale-International (FES-I)

To assess concern about falling or fear of falling while performing ADLs—and more indirectly, ADL functional ability—the Falls Efficacy Scale-International (FES-I) was used. This tool has been recommended in areas of rehabilitation and falls prevention to assess fear of falling in the community-dwelling elderly, and can be used for clinical practice or research purposes (Marques-Vieira, Sousa, Severino, Sousa, & Caldeira, 2016). It has also been validated across different cultures and languages (Marques-Vieira, Sousa, Severino, Sousa, & Caldeira, 2016). The English version of the FES-I has excellent test-retest reliability (ICC=0.96) and internal consistency (Cronbach's alpha=0.96) (Yardley et al., 2005). Convergent validity has been established as well (Delbaere et al., 2010).

The FES-I is a four-point scale (1-4) that has a total possible score of 64, with higher total scores indicating a greater fear of falling (Dewan & MacDermid, 2014; Greenberg, 2011). One study found the minimal detectable change (MDC) for this tool to be 17.7 points (Visschedijk et al., 2015), while its minimal clinically important difference (MCID) has not been established. The MDC is the “the magnitude of change needed to conclude that a real change occurred” (Morgan, Friscia, Whitney, Furman, & Sparto, 2013), or the “minimum amount of change in a patient's score that ensures the change isn't the result of measurement error” (Shirley Ryan AbilityLab, 2016). The MCID, on the other hand, is “the smallest amount of change in an outcome that might be considered important by the patient or clinician” (Shirley Ryan

AbilityLab, 2016). The FES-I was created to address limitations of the original Falls Efficacy Scale (FES), an instrument that has been validated as well (Tinetti, Richman, & Powell, 1990). The FES-I has been used as a pre-post measure in other studies, too (Conradsson et al., 2015; Sedaghati, Goudarzian, Daneshmandi, & Ardjmand, 2018; Wildes et al., 2018).

The 16-item FES-I includes activities with a social component that more active or higher-functioning seniors may find difficulty with, which are not present in the original 10-item FES (Greenberg, 2011; Tinetti, Richman, & Powell, 1990). This feature renders the FES-I a more appropriate tool for the purposes of this study since it may be more sensitive to changes in community-dwelling individuals who, although impaired, are still relatively active (Yardley et al., 2005), which describes the majority of GDH patients.

3.3.2 Berg Balance Scale (BBS)

To assess balance, the Berg Balance Scale (BBS) was used. It was originally developed to assess balance in geriatric individuals (Berg, Wood-Dauphine, Williams, & Gayton, 1989), is widely-used, and can be used with those who have different conditions or disabilities (Downs, 2015). It is also reliable and valid. It has an excellent inter-rater and intra-rater reliability of 0.97 and 0.98, respectively (Downs, 2015), and is highly correlated with other balance-assessment tools such as the Static Balance Test (Pickenbrock, Diel, & Zapf, 2016; Suzuki, Fujisawa, Machida, & Minakata, 2013), which is a test that has also been validated for evaluating balance ability (Suzuki et al., 2010a, 2010b, as cited in Suzuki, Fujisawa, Machida, & Minakata, 2013). This was an ideal tool as it was already incorporated into balance assessments at the GDH at the time of the conception of the study, and waiving the need to adapt to using a completely new tool would be an advantage for the clinical staff administering it.

The BBS is a test with very few equipment needed: a ruler, two standard chairs, a footstool, a stopwatch, and a 15-foot pathway. It is a five-point scale (0-4) that has 14 items and a possible total score of 56 (American Academy of Health and Fitness, n.d.), with higher total scores indicating a lower falls risk. A study on balance in patients with chronic obstructive pulmonary disease found that the MCID of the BBS is 5 to 7 points (Beauchamp, Harrison, Goldstein, & Brooks, 2016). This was supported by observations of the physiotherapists at the GDH. The MDC of the BBS ranges from 5 to 6.5 points (Hiengkaew, Jitaree, & Chaiyawat, 2012; Romero, Bishop, Velozo, & Light, 2011).

3.3.3 Six-Minute Walk Test (6MWT)

We had planned to use the Six-Minute Walk Test (6MWT) to assess functional exercise capacity. It is simple, practical, and does not require any equipment or extensive training to administer except a 100-foot straight hallway (American Thoracic Society, 2002), a space which the GDH can accommodate. It can assess the functional exercise level as well as the capacity of the bodily systems involved during daily physical activities (American College of Rheumatology, n.d.; American Thoracic Society, 2002), which is useful for evaluating mobility in the community.

Studies have found the 6MWT to have excellent test-retest reliability with ICC= 0.97-0.99 (Eichinger et al., 2017; Hamilton & Haennel, 2000), and high inter-rater reliability with ICC=0.92 (Larsen, Overgaard, & Kristensen, 2015; Overgaard, Larsen, Holtze, Ockholm, & Kristensen, 2017). It also moderately correlates with physical functional capacity measures (Hamilton & Haennel, 2000); and positively correlates with strength in the lower limbs (Eichinger et al., 2017). Rikli and Jones (1998) found this test to have reasonable reliability and

validity in measuring physical endurance in the elderly. As with the BBS, the 6MWT is also a tool that is currently used as part of the assessment process at the GDH; similarly, it would be advantageous for the clinical staff to be able to use this familiar tool.

The 6MWT “measures the distance an individual is able to walk over a total of six minutes on a hard, flat surface” (American College of Rheumatology, n.d., “General Description”). The person administering the test would ask the patient to walk as far as they can in six minutes down a straight pathway 100 feet long, and to instruct the patient to slow down, stop, or rest if needed (Heart Foundation, n.d.). The total distance walked, vital signs, and comments noting any pause in normal pace should be recorded (Spiromics, n.d.). However, the GDH physiotherapists felt that measuring the walking distance alone was sufficient and most reflective of their interventions; therefore, only the “distance walked” was measured using the 6MWT. Although the MCID of the 6MWT varies greatly with different diagnoses and studies that investigated this tool (Bohannon & Crouch, 2016; Holland, 2013; Huang & Chen, 2016; Perera, Mody, Woodman, & Studenski, 2006; Wise & Brown, 2005), the physiotherapists at the GDH have noted that a 50-meter MCID is of clinical significance.

3.3.4 Zarit Caregiver Burden Index (ZBI)

The Zarit Caregiver Burden Index, also known as the Zarit Burden Interview (ZBI), was used as a measure of the level of caregiver stress and burden. It was an appropriate option since it requires no training to use, can be self-administered by the patient’s caregiver, and was suggested as one of the outcome measure tools by Dr. French Merkley, the Medical Chief of the Department of Care of the Elderly at Bruyère, who is also one of the leading physicians at the GDH. Strong validity and reliability have been established for the ZBI; Seng and colleagues

(2010) found this tool to have an internal consistency of 0.93, a test-retest reliability of 0.89, and correlation with the Burden Assessment Scale—another tool that assesses caregiver burden—was 0.73.

The ZBI is a 22-item questionnaire, 5-point (0-4) scale, with a total possible score of 88 (American Psychological Association, n.d.-b). Higher total scores indicate higher levels of burden. Interpretation of scores is as the following: “little or no burden” (0-20), “mild to moderate burden” (21-40), “moderate to severe burden” (41-60), and “severe burden” (61-88). To the best of our knowledge, the MCID of this tool has not been established yet.

3.3.5 Clinical Frailty Scale (CFS)

To measure overall frailty, the Clinical Frailty Scale (CFS) was used. This tool was developed and applied to seniors who were part of the Canadian Study of Health and Aging (Rockwood et al., 2005). The CFS was originally developed as a 7-point scale (Rockwood et al., 2005), but has later been modified into a 9-point ordinal scale with classifications ranging from “very fit” to “terminally ill” (Moorhouse & Rockwood, 2012). It is an attractive tool since it requires no extra equipment to be used, as it relies on clinical judgement (Moorhouse & Rockwood, 2012; Rockwood et al., 2005). In addition, its brevity renders it simpler than other frailty instruments—such as the 70-item Frailty Index—to administer in a clinical setting.

Studies have found that the CFS has excellent inter-rater reliability (ICC=0.94-0.98) (Ekerstad et al., 2011; Grossman et al., 2014), an important feature for assessment tools that depend on clinical judgement. The criterion and construct validity of the CFS have been established as well. Rockwood and colleagues (2005) found that there was high correlation between the CFS and the Frailty Index ($r = 0.80$), another instrument used to assess frailty.

Moreover, this tool can be used to obtain predictive information about risks of death or of being institutionalized, and frailty was negatively correlated with health status (Rockwood et al., 2005) and positively associated with functional decline (Gregorevic, Hubbard, Katz, & Lim, 2016).

3.3.6 Patient Health Questionnaire-9 (PHQ-9)

The Patient Health Questionnaire-9 (PHQ-9) was an appropriate tool for assessing mood. It is a free, widely-used, and brief tool that can screen, diagnose, monitor, and measure depression severity (American Psychological Association, n.d.-a; Center for Quality Assessment and Improvement in Mental Health, n.d.). In addition, it has been used with older people and can be self-administered by the patient in a short time (American Psychological Association, n.d.-a). The psychometric properties of the PHQ-9 have been validated. Studies evaluating the validity of this tool have shown good to excellent sensitivity (74-80%) and specificity (91-94%) (Arroll et al., 2010; Gilbody, Richards, Brealey, & Hewitt, 2007; Kroenke, Spitzer, & Williams, 2001; Wittkampf, Naeije, Schene, Huyser, & van Weert, 2007). This has been similarly documented with older individuals (Phelan et al., 2010; Richardson, He, Podgorski, Tu, & Conwell, 2010). Good to high test-retest reliability (0.75-0.96) and inter-rater reliability (0.98) have also been established in different populations (de Man-van Ginkel et al., 2012; Kroenke, Spitzer, & Williams, 2001; Löwe, Unützer, Callahan, Perkins, & Kroenke, 2004; Zhang et al., 2013).

The PHQ-9 is a 9-item questionnaire, 4-point (0-3) scale, with a total possible score of 27 (Center for Quality Assessment and Improvement in Mental Health, n.d.). Ranking of the severity of depression depends on scores using 5-point intervals, with higher total scores indicating a higher severity (Kroenke, Spitzer, & Williams, 2001). The MCID of this tool has been estimated to be 5 points (Löwe, Unützer, Callahan, Perkins, & Kroenke, 2004).

3.4 Initial Data Collection Protocol

3.4.1 Roles in Data Collection

The clinical team had also agreed on their roles in collecting data as follows: the occupational therapists would administer the FES-I; the physiotherapists were responsible for the BBS and the 6MWT; the social worker would administer the PHQ-9; the physicians would use the CFS; and the nurse would administer the ZBI.

Although the inter-rater reliability of the English version of the FES-I has not been established yet, good to excellent inter-rater reliability has been found for the Dutch (ICC=0.72; Visschedijk et al., 2015) and Persian (ICC=0.98; Azad, Mehraban, Mehrpour, & Mohammadi, 2014) versions. In addition, the OTs and the student researcher would periodically discuss together how they would rate the items on the test; agreement on the rating approach was reached using this process. We felt comfortable especially because there were only two OTs administering the test.

We did not discuss potential issues that might arise from multiple providers (three or more) administering the BBS and 6MWT, since these were long-established tools that have already been used at the GDH regularly. Excellent inter-rater reliability has also been established for these tools (ICC=0.97 and 0.92, respectively) as mentioned in section 3.3.2 and 3.3.3, and thus we felt it was safe to proceed with data collection with multiple providers. We did not feel this was a concern for the CFS either, as it has excellent inter-rater reliability as well (ICC=0.94-0.98; see section 3.3.5).

3.4.2 Data Storage

The data collected was stored in the paper charts of each participant by the clinical staff, and examined by the student researcher through a retrospective chart review process in a separate office in the GDH. The paper charts were kept in the GDH in a locked charting room and remained on site at all times to protect confidentiality of information. Any charts taken out for review was returned to the charting room at the end of the day.

An Excel document named the “Master List” was created for storing any available basic demographic data; this information was documented along with their corresponding participant codes. Age was calculated using each participant’s date of birth, but the date of birth was not collected as part of our data. The scores that patients obtained on the assessment tests administered before and after the GDH program for each respective indicator was entered for each participant as well.

A second Excel document named the “Code List” was created for storing the codes and the medical record number (MRN) of the participants alone. The MRN was necessary to collect in case there were any concerns or confusion during data analysis and the data needed to be individually reviewed. To protect the confidentiality of information and privacy of the participants, each patient was de-identified via the use of codes consisting of sequential numbers (i.e. 001, 002, 003, etc.). Each MRN was associated with a uniquely assigned code.

The two Excel documents were each protected using different, randomly generated passwords and stored on the secure Bruyère server. Only the student researcher and the co-investigators of this study had access to these passwords.

3.4.3 Ethics Approval

The initial ethics application was submitted for expedited review to the Bruyère Research Ethics Board (REB) on Dec. 5, 2017. Upon receiving feedback from the Bruyère REB post-review, a letter of clarification as well as the first revised ethics application was resubmitted on Dec. 22, 2017, in order to address the Chairperson's comment about the collection of personal identifying information. This was resolved by only using the medical record number (MRN) of a patient's chart instead of their full name. Each MRN was associated with a uniquely assigned code (i.e. 001, 002, 003, etc.).

Dr. Backman had met with Dr. Heidi Sveistrup, who agreed that secondary data analysis and retrospective chart review would not require patient consent and thus would likely go through an expedited review with the Bruyère REB instead of a full board review. However, upon a second review, the Bruyère REB maintained that explicit consent was in fact required, stating that researchers cannot assume it is implied (Jan. 8, 2018).

Much to our surprise, the Bruyère REB sent us their Final Approval letter on Jan. 11, 2018. It was communicated to us that the Chair had decided that our project qualified for exemption to consent processes after reviewing our submission once more. This letter of approval stated that it has "agreed to waive the requirement of consent by the patient-participants in accordance with Article 3.7A of the Tri-Council Policy Statement II".

Shortly after, we submitted a request for access to data of interest with an extended time frame. Originally, we had requested to examine data available from Nov. 13, 2017 to Mar. 11, 2018, but after realizing that no patients were admitted to the Day Hospital during the Christmas week (Dec. 25 - Dec. 29), we asked to examine health records up to March 25, 2018 instead. This was to compensate for the "lost week" of participants as well as to account for any potential

extensions to the length of program attendance (i.e. beyond 10 weeks) made by the physicians for certain patients depending on the latter's medical condition or compliance with the program schedule. An Amendment Approval for this request was granted by the Bruyère REB Chair on Jan. 22, 2018. In addition, a Request to Access Health Records for Quality Review, Case Report, or Research was approved by the Bruyère Privacy and Access to Information Officer on Jan. 18, 2018 to access health records up to Jan. 11, 2019.

A separate application for ethics approval and supporting documents, including the approval letter from the Bruyère REB, were then submitted to the Research Ethics Board of the University of Ottawa via the online eReviews portal. The Letter of Administrative Approval was given on Feb. 5, 2018 by the Office of Research Ethics and Integrity of the University, stating that “the University of Ottawa has authorized the [Bruyère REB] to serve as Board of Record for the review and oversight of this research project”.

3.4.4 Issues with Data Collection

There were issues that arose during data collection. The clinical team and the student researcher agreed that if any of the assessment questionnaires or forms could not be found in a patient's file, it would indicate that they were not done for a number of reasons, which will be discussed shortly.

It seemed near the end of February that there may not be enough data for analysis. A number of assessments were completed using the FES-I, CFS, and ZBI respectively, but only some of these were also completed for the discharge assessment, therefore rendering very few fully completed sets of data for each indicator of functional independence since both the pre-test and post-test are required. For the PHQ-9, only three were completed during this period due to a

variety of reasons. One of them was that the social worker does not necessarily see patients on their first visit; she usually assesses them at their second or third visit instead. Another reason is that she may not always see patients on their last day in the program, as some patients might not be scheduled for a social worker appointment during their discharge visit.

Mortality was a main contributing factor to the difficulty in collecting sufficient data. Some had unfortunately passed away; some decided to stop attending the GDH and as such were discharged unexpectedly; and others were admitted or transferred to an acute care unit or a long-term care facility due to their medical condition worsening. In addition, there were patients who do not speak English well enough to answer the items on the assessment questionnaires either because they were exclusively French-speaking or they primarily spoke a language that is not one of the two official languages. There were also patients who were moderately to severely cognitively impaired; therefore, their answers may not necessarily be reliable. For instance, there was often disparity between their self-rated fear of falling and their actual functional abilities. Some said they do not feel depressed at all but clearly displayed symptoms of depression. In other words, many patients with advanced cognitive impairment have little or no insight regarding their reality and thus would overestimate their own abilities, resulting in scores that reflect rating themselves to be functioning better than they truly do.

The main reason why the PHQ-9 was underused at this time, however, was that the social worker noticed that many patients already show signs of improvement in mood as early as the second week of attending the GDH program. This may suggest that mood and its improvement was primarily influenced by exposure to social interaction and not necessarily related to interventions provided at the Geriatric Day Hospital. It might be argued that social interaction is part of what the program offers and thus considered an intervention in some way. However, the

social worker was not sure if it would be meaningful to assess mood at admission and reassess it after 10 weeks—at discharge—if this is an aspect of the care plan that likely would not change much and that already shows considerable improvement at such an early stage during patients' stay at the GDH. Due to this reluctance, it was decided that the PHQ-9 and the indicator of mood would be discontinued for the remainder of the data collection period.

Nonetheless, it would have been interesting to see whether the scores for mood would be maintained or would change from the beginning to the end of the program. Although it was not feasible for this study, it would be suggested for future studies to examine how the Day Hospital influences mood and other indicators of functional independence throughout the course of the GDH program—by measuring at multiple time points. Possible time points for measurement would be at admission, at weeks 3 and 6 of intervention, upon discharge, and at 3 months post-discharge. Measuring at multiple time points would provide the advantage of seeing any potential changes in the data during the program, which is not always apparent in data sets that are taken between two time intervals only. It is possible that scores for mood, for instance, may have unexpected increases and decreases during this time that do not necessarily reflect the direction of the change in mood scores from admission to discharge. The same can be speculated for the other indicators.

We encountered similar challenges with the use of the FES-I. There were concerns with English fluency or comprehension, moderate to severe cognitive impairments, and the fact that not every patient is scheduled for an appointment with occupational therapy on their very first or last day in the program. The occupational therapists and the student researcher ultimately agreed that the FES-I should not be administered to patients with language or cognitive barriers, and to

complete this test as close to the admission or discharge date as possible, preferably within the same week.

In addition to these issues, the FES-I was not part of the standard practice for the patient intake process. This made it difficult for the occupational therapists to remember to use the FES-I, especially at discharge, since it was a newly introduced procedure at the time. Another challenge with completing the discharge FES-I was that some patients self-discharged, or were discharged earlier than expected, before the post-test could be administered. Moreover, sometimes it was simply difficult for the occupational therapists to find time to complete the FES-I after their regular comprehensive assessments.

For the ZBI, issues with data collection also arose. The ZBI was given to the person who accompanied the patient on the admission and discharge visits. Often the patient attended alone due to various reasons. For instance, the first scenario was that the patient lived alone and did not have a primary caregiver who is a family member or friend who could accompany the patient to the GDH and complete the ZBI. These patients relied on home-based personal care services such as privately-hired personal support workers (PSW) or health care aids (HCA), as well as funded or fee-based community resources including Community Care Access Centres (CCAC)—now merged with the Champlain Local Health Integration Networks (LHIN), Meals on Wheels, and other home-help services.

For patients who did have family caregivers, there were also situations in which the primary caregiver did not come with the patient. If the primary caregiver is at home or at work, a ZBI questionnaire has to be sent home, and it proved challenging to keep track of whether the completed form was returned to the GDH afterwards as well as who had returned it. This made it difficult to decide if a discharge ZBI questionnaire should be subsequently completed, and to

remember to mail one to the caregiver's home if indeed required. Another challenge was that sometimes there were multiple caregivers at home but none designated as the primary caregiver (i.e. they share the burden equally). As a result, it was difficult to decide whom to ask to complete this questionnaire. The fact that the person who completed the admission assessment should be the same as the one reassessed at discharge was also a concern under these circumstances.

The physiotherapists faced some obstacles in obtaining assessment data for the BBS and 6MWT as well, albeit less severely than for the other indicators. Some patients would discharge themselves (referred to as being "self-discharged") before the end of 10 weeks. This could indicate that they decided not to return to the GDH due to the following reasons: 1) they were unhappy with something which happened while attending the program; 2) they did not feel as though the program was useful to them; 3) they fell ill and were physically unable or mentally unprepared to attend on a regular basis again; or 4) they were admitted to acute care or a facility where it would be at least several weeks before they could return to the program. No post-test data would be available for these patients as they simply stopped attending before a discharge assessment could be performed. Although it was possible that some of these patients would perhaps be readmitted at a later date, this did not happen in most cases. Thus, data for this subgroup was not included in the analysis.

3.5 Changes to the Protocol

3.5.1 Planning to Resolve Issues

It was suspected at this time that the data collection period would have to be extended in order to gather sufficient sets of data for analysis. However, we felt that it would not be

appropriate to simply extend the data collection period as it had currently been done, since the same problems brought up in comments and feedback from the clinical team will still remain if no changes are made to this process.

We discussed some options. One was to have the student researcher administer the questionnaires by telephone for those who did not have a post-test assessment completed by the clinical team but who had already been discharged, and also for upcoming discharges to ensure higher levels of completion since one of the main issues described earlier was that the discharge assessment was often forgotten.

However, it was also a concern that results obtained by telephone for those who have already graduated from the program might not be comparable to post-test data collected at, or immediately surrounding, discharge since several weeks may well have passed after the discharge before ethics approval could be obtained to contact patients' caregivers directly. It is possible that some patients' functional abilities may regress towards baseline or even lower a few weeks after they are discharged. Although it would be quite interesting to report any regression in function, we were doubtful that that type of data should be analyzed with the data collected at or immediately surrounding discharge.

In addition, sometimes the discharge assessments were in fact conducted 1-2 weeks before the patient's last day in the program by the clinical team, as per the physician's request. The discrepancy between the time points of test administration for each patient would thus be even larger if we administered the post-test many weeks after discharge compared to 1-2 weeks prior to the discharge.

Another issue was that even if post-test assessments were conducted by telephone to ensure higher levels of completion, there remained the issue of not collecting sufficient data for

the mood indicator using the PHQ-9 not only at discharge but also upon admission. Due to the aforementioned issues with measuring mood, we had considered removing it as one of the outcome measures for this study. Regardless of whichever option we were to select, a request for amended approval would need to be submitted to the REB, and patient consent would need to be appropriately addressed if direct contact were to be made between the researcher and the study subject.

3.5.2 Amendment to Ethics Approval

It was decided after consulting with the research team, the clinical team, and the Manager of Outpatient Programs that the PHQ-9 would be removed from our list of assessment tools to be used, for the aforementioned reasons. For the CFS, it was agreed that only the assessment scores for frailty at admission would be included in the analysis since physicians did not do the discharge assessments; and thus no post-test data was available. No changes were made with regards to the use of the BBS and 6MWT.

For the FES-I and the ZBI, tracking sheets were utilized for better data completion. The following information was documented for each newly admitted patient: 1) name, 2) whether they had the admission assessment done, 3) any barriers to completing the questionnaire, and 4) whether the discharge assessment was done. We also included a column for whether consent was obtained from patients for the student researcher to call their caregiver in order to administer the ZBI.

The aforementioned changes were reflected in the Request for REB Approval of Amendment or Addendum to an Approved Research Project submitted to the Bruyère REB on March 8, 2018, in which we sought to use a more organized tracking system, contact the

caregivers directly and to eliminate mood as an indicator of functional independence for this study. Verbal consent scripts for the patient and the patient's caregiver were submitted as well. The nurse would obtain the consent of the patient to call their caregiver if the caregiver was not present during the admission or discharge visit, and the student would obtain consent from caregivers to complete the ZBI questionnaire over the telephone.

Amended approval was received from the Bruyère REB on March 22, 2018.

3.5.3 Predicted Challenges and Solutions

Some challenges related to the collection and analysis of the data were predicted, including missing data from the following sources: human error, patient refusal or inability to participate in assessments, or incomplete assessment due to time constraints or patient fatigue. Missing data could be addressed depending on the nature of the missing values. Strategies that could be used include 1) deletion methods such as listwise/case deletion, which is the most commonly-used approach and if the sample is large enough; 2) model-based methods such as maximum likelihood or multiple imputation, which are more highly recommended than other methods; or 3) simple imputation methods such as regression imputation, as a last resort since it can cause underestimation of the variance (Bennett, 2001; Kang, 2013).

Chapter 4: Results

The software package IBM SPSS Statistics version 25 was used for analyzing the collected data. 148 sets of data were collected, but only 128 sets were taken into analysis ultimately since 20 cases were early discharges with none of the post-test data collected. 128 was the number of patients who had at least one complete set of data collected for at least one indicator. Since this would still include every person who had a set of BBS (i.e. who will be able to take the test even with a language barrier) and/or 6MWT (i.e. who will be able to take the test even with a language and/or cognitive barrier) scores collected, some patients who did not speak or understand English or were cognitively impaired were part of the $n = 128$ presented in the descriptive statistics. The exclusion criteria of language and cognitive barriers only applied to the questionnaires that required participant response.

4.1 Descriptive Statistics

The characteristics of the study sample includes age, sex, language(s) spoken, marital status, source of referral, living environment, living arrangement, relationship with primary caregiver, significant medical conditions, and frailty status.

4.1.1 Age and Sex

Participants of the study ($n = 128$) were older adults ranging from age 65 to 95 (mean = 79.92). Of these, 26.6% were aged 65-74; 43.6% were aged 75-84; and 29.8% were aged 85-95. With regards to sex, 48.4% were male and 51.6% were female. Data for age and sex, and by age group, was compared between GDH participants and the senior population (age over 65) of the city of Ottawa, from the 2016 Census (Tables 1 and 2).

Table 1. Age of GDH participants compared with seniors in Ottawa, by age group

	Variable	65-74	75-84	85-95
GDH	Age (n = 128, range= 65-95, mean= 79.92)	26.6%	43.6%	29.8%
Ottawa (2016)	Age (15.4% of people are >65 y.o.)	56.9%	29.5%	12.3%

Data from: Statistics Canada, 2017a, Census Profile

Table 2. Sex of GDH participants compared with seniors in Ottawa, by age group

	Variable	65-74	75-84	85-95	
GDH	Sex by age group (n=128)	Male (48.4%)	50%	42.9%	55.3%
		Female (51.6%)	50%	57.1%	44.7%
Ottawa (2016)	Sex by age group	Male (44.6%)	47.1%	44.4%	35.7%
		Female (55.4%)	52.9%	55.6%	64.3%

Data from: Statistics Canada, 2017a, Census Profile

4.1.2 Language(s) Spoken and Marital Status

Regarding language(s) spoken, 54.7% primarily speak English; 8.6% primarily speak French; 14.8% are bilingual (speaks both English and French fluently); 18.0% speak at least one

official language and other languages; and 3.9% primarily only speak other languages (Table 3, compared with the senior population in Ottawa).

Table 3. Language(s) spoken by GDH participants compared with Ottawa seniors

Variable	GDH (n=128)	Ottawa (2016)
English only	54.7%	63.8%
French only	8.6%	1.8%
English and French (bilingual)	14.8%	29.8%
At least one official language and other language(s)	18.0%	N/A
Other language(s) only	3.9%	4.6%

Data from: Statistics Canada, 2017b, Census Profile

Marital status was distributed as follows: 7% were single; 49.2% were currently married or in a common-law relationship; 31.3% were widowed; and 12.5% were divorced or separated (Table 4, compared with the senior population in the Ottawa-Gatineau area). This dataset does not take into account whether or not people who are currently married or in a common-law relationship have been widowed or divorced in the past.

Table 4. Marital status of GDH participants compared with Ottawa-Gatineau seniors

Variable	GDH (n=128)	Ottawa (2016)
Single	7%	5.8%
Married / Common-law	49.2%	60.6%
Widowed	31.3%	21.7%
Divorced/ Separated	12.5%	11.9%

Data from: Statistics Canada, 2017c, Census Profile

4.1.3 Source of Referral

The sources of referral (n = 124) were diverse (Table 5). 26.6% were referred by their family doctor; 24.2% were referred from the Geriatric Rehabilitation Program (GRP); 12.9% came from the Geriatric Emergency Management Clinic (GEM); 22.6% were referred from the Geriatric Assessment Outreach Team (GAOT); 2.4% came from GEM to GAOT initially; and 11.3% were referred from other places including the Care of the Elderly Clinic (COE), the stroke inpatient program, the Saint Vincent Hospital (SVH), the Bruyère Memory Program (BMP), the Dermatology department, and other geriatric medical clinics.

Table 5. Source of referral for GDH participants

Variable	Proportion (n=124)
Family physician	26.6%
Geriatric Rehabilitation Program (GRP)	24.2%
Geriatric Emergency Management Clinic (GEM)	12.9%
Geriatric Assessment Outreach Team (GAOT)	22.6%
GEM to GAOT	2.4%
Other sources*	11.3%

4.1.4 Living Environment and Living Arrangement

Regarding living environment, 68.0% of participants lived in their own home; 17.2% lived in a shared home with people other than their spouse; and 14.8% lived in a retirement residence or assisted living facility (Table 6). For living arrangement (n = 128), 41.4% of the participants lived alone; 52.3% lived with their primary caregiver; and 6.3% were the caregiver for a family member themselves or live with someone who is not their primary caregiver (Table

7). Data for these two variables is compared with that from the 2016 Census for the Ottawa-Gatineau area.

Table 6. Living environment of GDH participants compared with Ottawa-Gatineau seniors

Variable		GDH (n=128)	Ottawa (2016)
Private dwelling (85.2%)	Own home	68.0%	91.8%
	Sharing a home with people other than their spouse	17.2%	
Collective dwelling (retirement residence, assisted living facility etc.)		14.8%	8.2%

Data from: Statistics Canada, 2017d, Census Profile

Table 7. Living arrangement of GDH participants compared with Ottawa-Gatineau seniors

Variable	GDH (n=128)	Ottawa (2016)
Alone	41.4%	25.7%
With primary caregiver	52.3%	N/A
With someone NOT their primary caregiver, or are caregivers themselves	6.3%	N/A

Data from: Statistics Canada, 2017e, Census Profile

4.1.5 Relationship with primary caregiver

With regards to participants' relationship with their primary caregiver, 38.3% had a spouse or partner as their primary caregiver; 36.7% relied on their children as their primary

caregiver; 4.7% had primarily other family members or friends to assist them with their needs; 14.8% relied on professional services such as that provided by a retirement home, the CCAC, a PSW, or home help; and 5.5% had no caregivers (Table 8).

Table 8. GDH participants’ relationship with their primary caregiver

Variable	Percentage (n=128)
Spouse / Partner	38.3%
Children	36.7%
Other family members / Friends	4.7%
Professional services (retirement home, CCAC, PSW, home help etc.)	14.8%
No caregivers	5.5%

4.1.6 Significant medical conditions from past history

Participants presented with a multitude of co-morbidities, as noted from their past medical history at admission. Significant medical conditions that were present in this sample can be divided into the following ten major categories: 1.) history of stroke(s) or TIA(s); 2.) previous fall(s); 3.) cognitive impairment, including mild cognitive impairment (MCI), dementia, and Alzheimer’s disease (AD); 4.) movement disorders including Parkinson’s disease (PD), benign essential tremors, and restless legs syndrome; 5.) musculoskeletal conditions, including osteoporosis (OP), osteoarthritis (OA), rheumatoid arthritis (RA), gout, osteopenia, fractures, previous knee or hip replacement, carpal tunnel syndrome, spinal stenosis, degenerative disc disease (DDD), chronic back pain, scoliosis, and fibromyalgia; 6.) mood issues, including

depression, anxiety, or other mood disorders; 7.) visual or hearing impairment; 8.) gastrointestinal or urinary issues, including gastroesophageal reflux disease (GERD), constipation, and urinary incontinence; 9.) other cardio-vascular or circulatory disorders or conditions including hypertension (HTN), peripheral vascular disease (PVD), coronary artery disease (CAD), congestive heart failure (CHF), and atrial fibrillation (AFib); and 10.) other relevant medical issues including diabetes mellitus type 2 (DM2), chronic renal insufficiency, chronic kidney disease (CKD), chronic renal failure (CRF), multiple sclerosis (MS), chronic obstructive pulmonary disease (COPD), obesity, and chronic fatigue.

The following data represents the percentage of participants (n = 128 total) who have at least one condition in each aforementioned morbidity category (which are not mutually exclusive to each other): 25.8% had a history of stroke(s) or TIA(s) (n = 33); 32.0% had a previous fall(s) (n = 41); 33.6% were cognitively impaired (n = 43); 15.6% had a movement disorder(s) (n = 20); 64.8% had a musculoskeletal condition(s) (n = 83); 25.8% had mood issues (n = 33); 15.6% were visually or hearing impaired (n = 20); 15.6% had gastrointestinal-urinary issues (n = 20); 71.1% had one or more conditions from the other cardio-vascular or circulatory disorders category (n = 91); and 59.4% had one or more conditions from the other relevant medical issues category (n = 76). The prevalence of each condition category can be found in Table 9.

Table 9. Prevalence of significant medical conditions (categories not mutually exclusive)

Variable	Percentage (n=128)
Musculoskeletal condition(s)	64.8%
Cognitively impaired	33.6%
Previous fall(s)	32.0%
History of stroke(s) or TIA(s)	25.8%
Mood issues	25.8%
Movement disorder(s)	15.6%
Visually or hearing impaired	15.6%
Gastrointestinal-urinary issues	15.6%
Other cardio-vascular or circulatory disorder(s) and condition(s) (Hypertension, peripheral vascular disease, coronary artery disease, congestive heart failure, atrial fibrillation)	71.1%
Other relevant medical issue(s) (Diabetes mellitus type 2, chronic renal insufficiency, chronic kidney disease, multiple sclerosis, chronic renal failure, COPD, obesity, chronic fatigue)	59.4%

Of note, some of the most common medical conditions among participants were: HTN (58.6%, n = 75); OA (37.5%, n = 48); and DM2 (36.7%, n = 47). A comparison of the prevalence of the aforementioned medical conditions with the addition of stroke/TIAs, mood disorders, and COPD between GDH participants and data from the province of Ontario (2013/2014) can be found in Table 10.

Table 10. Prevalence of selected most common medical conditions, compared with Ontario seniors

Variable	GDH	Ontario, 2013/2014
Hypertension	58.6%	48.7%
Arthritis	37.5% (only OA* is included)	46.8% (may include OA and RA**)
Diabetes	36.7% (only type 2 is included)	18.4% (including diabetes all types)
Stroke / TIAs	25.8%	N/A
Mood disorder	25.8%	7.2%
COPD	12.5%	7.3%

Data from: Ontario’s Action Plan for Seniors, for the year of 2013-2014 (p. 9); from Government of Ontario, 2017

* Osteoarthritis

** Rheumatoid arthritis

4.1.7 Frailty status

Frailty status data (Table 11) was only available for the pretest measurement; thus it will be used as a baseline characteristic only (n = 61). 3.3% had a frailty rating of 3, indicating a person who is managing their medical problems well and walks routinely, but are otherwise only irregularly active (Moorhouse & Rockwood, 2012). 9.8% rated at 4 (vulnerable), which translates to being limited in daily activities due to symptoms. 31.1% rated at 5 (mildly frail); these people often require help with more complex IADLs as frailty increasingly impairs their ability to perform those tasks. 47.5% had a frailty rating of 6 (moderately frail), meaning they require assistance with all outdoor activities, housekeeping, and some personal grooming. Finally, 8.2% rated at 7 (severely frail), indicating that they are “completely dependent for personal care”

due to physical or cognitive impairments but “seem stable and not at high risk of dying (within 6 months)”.

Table 11. Frailty status of GDH participants

Score	Interpretation	Percentage (n=61)
3	Managing well	3.3%
4	Vulnerable	9.8%
5	Mildly frail	31.1%
6	Moderately frail	47.5%
7	Severely frail	8.2%

As the Clinical Frailty Scale (Moorhouse & Rockwood, 2012) is a 9-point scale, it is apparent that this sample does not rate on either extreme end of the spectrum. This indicates that participants are well enough to participate in GDH activities yet not healthy enough to be considered “fit” necessarily and would require help in maintaining activity levels, which aligns with expectations for the type of older people who would be admitted to Geriatric Day Hospitals.

4.2 Outcome Measure Data:

If the distribution of differences between two related groups is normally distributed and the dependent variable is of either the interval or ratio levels of measurement, the Dependent T-Test for paired samples is usually used (Laerd Statistics, n.d.-a). Normality of the data was checked with the Shapiro-Wilk Test, as this test is appropriate for smaller sample sizes but can still be used for sample sizes up to 2000 (Laerd Statistics, n.d.-d). With regards to the overall

GDH sample, the Shapiro-Wilk sig. value was greater than 0.05 for the indicator of functional exercise capacity, indicating a normal distribution for this set of group differences. In addition, this variable is measured at the ratio level. Thus the Dependent T-Test for paired samples was used.

As for caregiver stress, the distribution of the differences between groups showed a normal distribution as well. However, for the indicators of fear of falling and balance, the distribution of the differences between groups showed a non-normal distribution. Non-parametric tests were used for the variables of fear of falling, balance, and caregiver stress, which are all measured at the ordinal level. Histograms for each of the distributions of data for the overall GDH study participants can be found in Graphs 1-4 in section 4.2.1.

The Related Samples Wilcoxon Signed-Rank Test and the Paired Samples Sign Test in SPSS were used for statistical analysis since the data is not normally distributed and the dependent variable is at least of the ordinal level of measurement (Laerd Statistics, n.d.-e, Statistics Solutions, n.d.-a). The Wilcoxon test is the non-parametric equivalence of the dependent t-test, and is used to compare data from two related groups, with the same individuals in each group, between two time points (Laerd Statistics, n.d.-e). The Wilcoxon Signed-Rank Test has been used to measure change in other non-experimental studies of day hospitals as well (Fowler, Condon, & Hamilton, 2000; Hershkovitz & Brill, 2007). The Paired Samples Sign Test, on the other hand, is used for a sample with the same description as aforementioned, but the distribution of the differences between pretest and post-test does not need to be shaped symmetrically. It is used to determine if there is a median difference between two groups or not (Laerd Statistics, n.d.-c) and is recommended as an alternative to the Wilcoxon Signed-Rank

Test when the distribution of differences is not symmetrical (Laerd Statistics, n.d.-e), which is the case with fear of falling, balance, and caregiver stress. Both tests will be used for the indicators of fear of falling, balance, and caregiver stress as the Wilcoxon Signed-Rank Test also takes into account the magnitude of the observations and thus may increase the statistical power of the test (Whitley & Ball, 2002). The reason why these non-parametric tests are still valid without meeting the normality assumption is that by converting the data into ranks, they do not depend on the assumption of normality (i.e. are “distribution-free”).

4.2.1 Overall GDH Participants

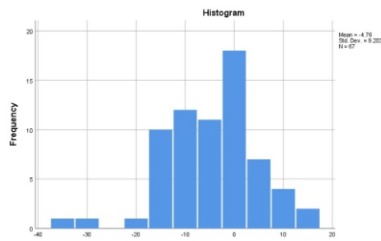
This section will describe the results for the overall GDH study participants.

4.2.1a Fear of Falling

For the indicator of fear of falling, the Wilcoxon Signed-Rank Test showed that there was a statistically significant change in Falls Efficacy Scale-International (FES-I) scores ($n = 67$) between admission and discharge. FES-I pretest scores (mean rank = 33.54) were higher than FES-I post-test scores (mean rank = 27.47), $Z = -3.895$, $p = 0.000098$; indicating a decrease in fear of falling. The range of pretest scores was 18-62 with a mean of 35.78, while for the post-test the range was 16-55 with a mean of 31.01.

The Sign Test showed a significant decrease in FES-I scores between admission and discharge, with $Z = -3.780$, and $p = 0.000157$. Negative differences (i.e. FES-I pretest scores greater than post-test scores) was $N = 47$, while positive differences (i.e. FES-I pretest scores lower than post-test scores) was $N = 16$, with ties (i.e. cases whose values are equal) at $N = 4$. This indicates a decrease in fear of falling.

Graph 1. Histogram – Fear of falling (distribution of pre- and post- group differences for overall GDH participants)

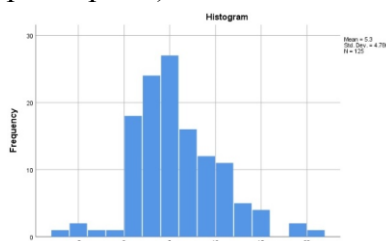


4.2.1b Balance

For the indicator of balance, the Wilcoxon test showed that there was a statistically significant change in Berg Balance Scale (BBS) scores (n = 125) between admission and discharge. BBS post-test scores (mean rank = 59.42) were higher than BBS pretest scores (mean rank = 49.50), $Z = -8.725$, $p < 0.001$; indicating an improvement in balance. The range of pretest scores was 8-56 with a mean of 39.05, while for the post-test the range was 8-56 with a mean of 44.34.

The Sign Test showed a significant increase in BBS scores between admission and discharge, with $Z = -9.800$, and $p < 0.001$. Negative differences (i.e. BBS pretest scores greater than post-test scores) was $N = 5$, while positive differences (i.e. BBS pretest scores lower than post-test scores) was $N = 112$, with ties (i.e. cases whose values are equal) at $N = 8$. This indicates an improvement in balance.

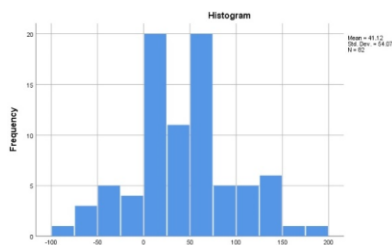
Graph 2. Histogram – Balance (distribution of pre- and post- group differences for overall GDH participants)



4.2.1c Functional Exercise Capacity

For functional exercise capacity, the Dependent T-Test for paired samples showed that there was a statistically significant improvement in walking distance as measured during the Six-Minute Walk Test (6MWT) from 250.07 ± 95.24 m to 291.20 ± 95.26 m between admission and discharge from the GDH ($n = 82$); an increase of 41.12 ± 54.08 m ($p < 0.001$), indicating an improvement in functional exercise capacity.

Graph 3. Histogram – Functional exercise capacity (distribution of pre- and post- group differences for overall GDH participants)



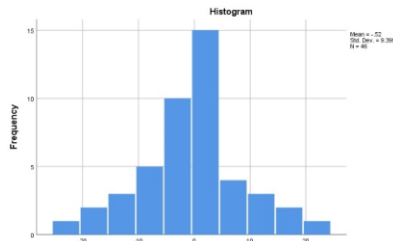
4.2.1d Caregiver Stress

For caregiver stress, the Wilcoxon Signed-Rank Test showed that scores for the Zarit Burden Interview (ZBI) did not change significantly between admission and discharge ($n = 46$). ZBI pretest scores (mean rank = 22.05) were higher than ZBI post-test scores (mean rank = 19.90), $Z = -0.422$, $p = 0.673$. The range of pretest scores was 5-65 with a mean of 29.48, while for the post-test the range was 1-72 with a mean of 28.96. Therefore, there was a statistically non-significant decrease in caregiver stress levels.

The Sign Test showed a non-significant increase in ZBI scores between admission and discharge, with $Z = 0.000$, and $p = 1.000$. Negative differences (i.e. ZBI pretest scores greater than post-test scores) was $N = 21$, while positive differences (i.e. ZBI pretest scores lower than

post-test scores) was $N = 20$, with ties (i.e. cases whose values are equal) at $N = 5$. This indicates no significant difference between the two points of outcome measurement.

Graph 4. Histogram – Caregiver stress (distribution of pre- and post- group differences for overall GDH participants)



4.2.2 Stroke Subgroup among GDH Participants

The overall GDH sample was then stratified and analyzed by subgroups to see if certain groups of patients would benefit differently from the GDH than others and/or than the overall sample. The same approach to selecting which statistical tests to use was applied to the analysis of these subgroups; the histograms for the distribution of group differences within each subgroup can be found in Graphs 5-16 below. This section will describe the results for the subgroup of patients who have experienced a stroke or TIA.

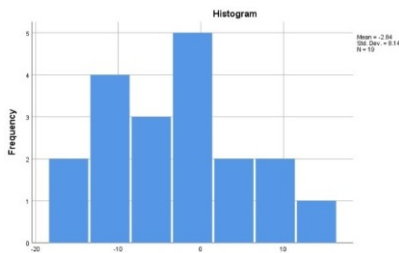
4.2.2a Fear of Falling

For the indicator of fear of falling, the Wilcoxon Signed-Rank Test showed that there was no significant change in Falls Efficacy Scale-International (FES-I) scores ($n = 19$) between admission and discharge for the stroke subgroup. FES-I pretest scores (mean rank = 9.88) were higher than FES-I post-test scores (mean rank = 8.75), $Z = -1.439$, $p = 0.150$; indicating no

significant decrease in fear of falling. The range of pretest scores was 18-62 with a mean of 34.53, while for the post-test the range was 18-50 with a mean of 31.68.

The Sign Test showed no significant decrease in FES-I scores between admission and discharge for the stroke subgroup ($p = 0.238$). Negative differences (i.e. FES-I pretest scores greater than post-test scores) was $N = 12$, while positive differences (i.e. FES-I pretest scores lower than post-test scores) was $N = 6$, with ties (i.e. cases whose values are equal) at $N = 1$. This indicates no statistically significant decrease in fear of falling.

Graph 5. Histogram – Fear of falling (distribution of pre- and post- group differences for the Stroke subgroup)



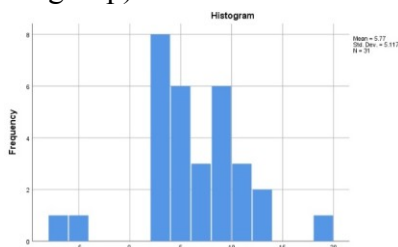
4.2.2b Balance

For the indicator of balance, the Wilcoxon test showed that there was a significant change in Berg Balance Scale (BBS) scores ($n = 31$) between admission and discharge for the stroke subgroup. BBS post-test scores (mean rank = 16.25) were higher than BBS pretest scores (mean rank = 15.98), $Z = -4.230$, $p = 0.000023$; indicating an improvement in balance. The range of pretest scores was 16-54 with a mean of 37.00, while for the post-test the range was 23-56 with a mean of 42.77.

The Sign Test showed a statistically significant increase in BBS scores between admission and discharge, with $Z = -4.670$, and $p = 0.000003$. Negative differences (i.e. BBS

pretest scores greater than post-test scores) was $N = 2$, while positive differences (i.e. BBS pretest scores lower than post-test scores) was $N = 29$, with ties (i.e. cases whose values are equal) at $N = 0$. This indicates an improvement in balance.

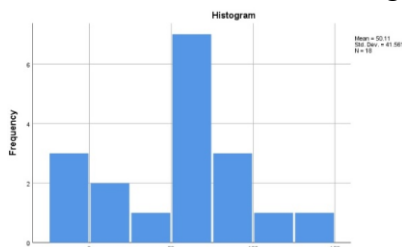
Graph 6. Histogram – Balance (distribution of pre- and post- group differences for the Stroke subgroup)



4.2.2c Functional Exercise Capacity

For functional exercise capacity, the Dependent T-Test for paired samples showed that there was a statistically significant improvement in walking distance as measured during the Six-Minute Walk Test (6MWT) from 259.39 ± 94.39 m to 309.50 ± 87.17 m between admission and discharge from the GDH ($n = 18$) for the stroke subgroup; there was an increase of 50.11 ± 41.56 m ($p < 0.001$), indicating an improvement in functional exercise capacity.

Graph 7. Histogram – Functional exercise capacity (distribution of pre- and post- group differences for the Stroke subgroup)

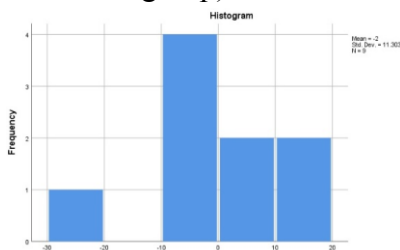


4.2.2d Caregiver Stress

For caregiver stress, the Wilcoxon Signed-Rank Test showed that scores for the Zarit Burden Interview (ZBI) did not change significantly between admission and discharge ($n = 9$) for the stroke subgroup. ZBI pretest scores (mean rank = 5.40) were higher than ZBI post-test scores (mean rank = 4.50), $Z = -0.534$, $p = 0.593$. The range of pretest scores was 14-59 with a mean of 33.11, while for the post-test the range was 18-41 with a mean of 31.11. Therefore, there was a statistically non-significant decrease in caregiver stress levels.

The Sign Test showed a non-significant increase in ZBI scores between admission and discharge ($p = 1.000$). Negative differences (i.e. ZBI pretest scores greater than post-test scores) was $N = 5$, while positive differences (i.e. ZBI pretest scores lower than post-test scores) was $N = 4$, with ties (i.e. cases whose values are equal) at $N = 0$. This indicates no significant difference between the two points of outcome measurement.

Graph 8. Histogram – Caregiver stress (distribution of pre- and post- group differences for the Stroke subgroup)



4.2.3 Previous Falls Subgroup among GDH Participants

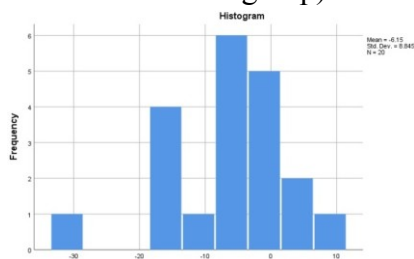
This section will describe the results for the subgroup of patients who have experienced one or more previous falls.

4.2.3a Fear of Falling

For the indicator of fear of falling, the Wilcoxon Signed-Rank Test showed that there was a significant change in Falls Efficacy Scale-International (FES-I) scores (n = 20) between admission and discharge for the previous falls subgroup. FES-I pretest scores (mean rank = 10.97) were higher than FES-I post-test scores (mean rank = 6.38), $Z = -2.799$, $p = 0.005$; indicating a significant decrease in fear of falling. The range of pretest scores was 18-59 with a mean of 36.55, while for the post-test the range was 18-53 with a mean of 30.40.

The Sign Test also showed a significant decrease in FES-I scores between admission and discharge for the previous falls subgroup ($p = 0.019$). Negative differences (i.e. FES-I pretest scores greater than post-test scores) was $N = 15$, while positive differences (i.e. FES-I pretest scores lower than post-test scores) was $N = 4$, with ties (i.e. cases whose values are equal) at $N = 1$. This indicates a statistically significant decrease in fear of falling.

Graph 9. Histogram – Fear of falling (distribution of pre- and post- group differences for the Previous Falls subgroup)



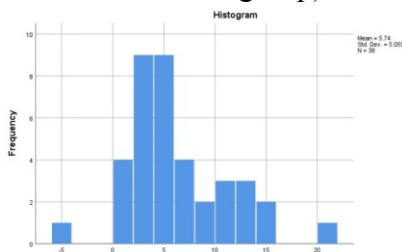
4.2.3b Balance

For the indicator of balance, the Wilcoxon test showed that there was a significant change in Berg Balance Scale (BBS) scores (n = 38) between admission and discharge for the previous

falls subgroup. BBS post-test scores (mean rank =19.00) were higher than BBS pretest scores (mean rank = 18.49), $Z = -4.941$, $p < 0.001$; indicating an improvement in balance. The range of pretest scores was 8-56 with a mean of 37.50, while for the post-test the range was 8-56 with a mean of 43.24.

The Sign Test showed a statistically significant increase in BBS scores between admission and discharge, with $Z = -5.550$, and $p < 0.001$. Negative differences (i.e. BBS pretest scores greater than post-test scores) was $N = 1$, while positive differences (i.e. BBS pretest scores lower than post-test scores) was $N = 35$, with ties (i.e. cases whose values are equal) at $N = 2$. This indicates an improvement in balance.

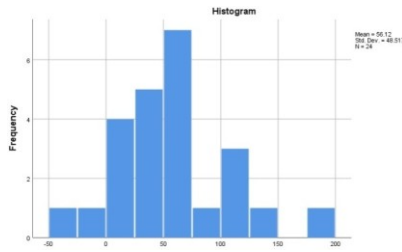
Graph 10. Histogram – Balance (distribution of pre- and post- group differences for the Previous Falls subgroup)



4.2.3c Functional Exercise Capacity

For functional exercise capacity, the Dependent T-Test for paired samples showed that there was a statistically significant improvement in walking distance as measured during the Six-Minute Walk Test (6MWT) from 241.63 ± 107.52 m to 297.75 ± 103.36 m between admission and discharge from the GDH ($n = 24$) for the previous falls subgroup; there was an increase of 56.13 ± 48.52 m ($p < 0.001$), indicating an improvement in functional exercise capacity.

Graph 11. Histogram – Functional exercise capacity (distribution of pre- and post- group differences for the Previous Falls subgroup)

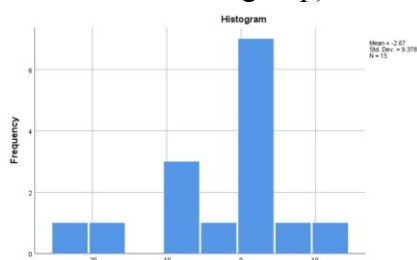


4.2.3d Caregiver Stress

For caregiver stress, the Wilcoxon Signed-Rank Test showed that scores for the Zarit Burden Interview (ZBI) did not change significantly between admission and discharge (n = 15) for the previous falls subgroup. ZBI pretest scores (mean rank = 10.42) were higher than ZBI post-test scores (mean rank = 5.31), $Z = -0.630$, $p = 0.529$. The range of pretest scores was 5-59 with a mean of 27.20, while for the post-test the range was 2-50 with a mean of 24.53. Therefore, there was a statistically non-significant decrease in caregiver stress levels.

The Sign Test showed a non-significant increase in ZBI scores between admission and discharge ($p = 0.791$). Negative differences (i.e. ZBI pretest scores greater than post-test scores) was $N = 6$, while positive differences (i.e. ZBI pretest scores lower than post-test scores) was $N = 8$, with ties (i.e. cases whose values are equal) at $N = 1$. This indicates no significant difference between the two points of outcome measurement.

Graph 12. Histogram – Caregiver stress (distribution of pre- and post- group differences for the Previous Falls subgroup)



4.2.4 Osteoarthritis Subgroup among GDH Participants

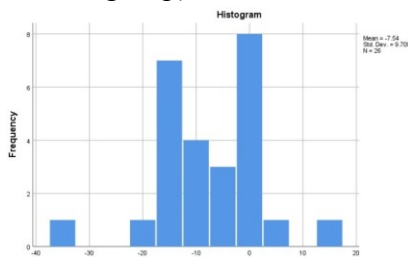
This section will describe the results for the subgroup of patients who have osteoarthritis.

4.2.4a Fear of Falling

For the indicator of fear of falling, the Wilcoxon Signed-Rank Test showed that there was a significant change in Falls Efficacy Scale-International (FES-I) scores ($n = 26$) between admission and discharge for the OA subgroup. FES-I pretest scores (mean rank = 13.28) were higher than FES-I post-test scores (mean rank = 8.63), $Z = -3.303$, $p = 0.001$; indicating a significant decrease in fear of falling. The range of pretest scores was 18-62 with a mean of 38.00, while for the post-test the range was 16-48 with a mean of 30.46.

The Sign Test showed a significant decrease in FES-I scores between admission and discharge for the OA subgroup ($p = 0.002$). Negative differences (i.e. FES-I pretest scores greater than post-test scores) was $N = 20$, while positive differences (i.e. FES-I pretest scores lower than post-test scores) was $N = 4$, with ties (i.e. cases whose values are equal) at $N = 2$. This indicates a statistically significant decrease in fear of falling.

Graph 13. Histogram – Fear of falling (distribution of pre- and post- group differences for the OA subgroup)



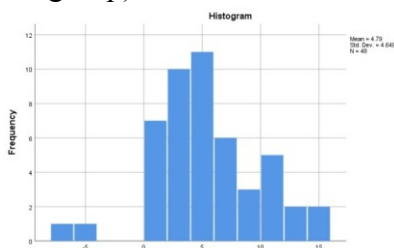
4.2.4b Balance

For the indicator of balance, the Wilcoxon test showed that there was a significant change in Berg Balance Scale (BBS) scores ($n = 48$) between admission and discharge for the OA

subgroup. BBS post-test scores (mean rank = 28.00) were higher than BBS pretest scores (mean rank = 21.71), $Z = -5.044$, $p < 0.001$; indicating an improvement in balance. The range of pretest scores was 8-56 with a mean of 38.65, while for the post-test the range was 8-56 with a mean of 43.44.

The Sign Test showed a statistically significant increase in BBS scores between admission and discharge, with $Z = -5.795$, and $p < 0.001$. Negative differences (i.e. BBS pretest scores greater than post-test scores) was $N = 2$, while positive differences (i.e. BBS pretest scores lower than post-test scores) was $N = 41$, with ties (i.e. cases whose values are equal) at $N = 5$. This indicates an improvement in balance.

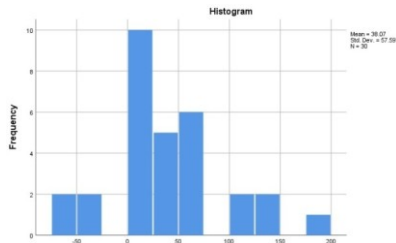
Graph 14. Histogram – Balance (distribution of pre- and post- group differences for the OA subgroup)



4.2.4c Functional Exercise Capacity

For functional exercise capacity, the Dependent T-Test for paired samples showed that there was a statistically significant improvement in walking distance as measured during the Six-Minute Walk Test (6MWT) from 233.70 ± 94.39 m to 271.77 ± 93.10 m between admission and discharge from the GDH ($n = 30$) for the OA subgroup; there was an increase of 38.07 ± 57.60 m ($p = 0.001$), indicating an improvement in functional exercise capacity.

Graph 15. Histogram – Functional exercise capacity (distribution of pre- and post- group differences for the OA subgroup)

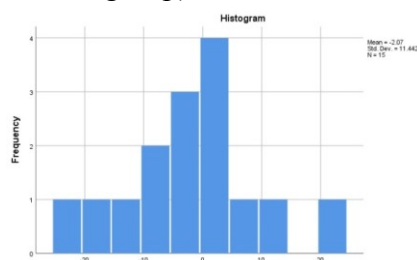


4.2.4d Caregiver Stress

For caregiver stress, the Wilcoxon Signed-Rank Test showed that scores for the Zarit Burden Interview (ZBI) did not change significantly between admission and discharge (n = 15) for the OA subgroup. ZBI pretest scores (mean rank = 7.06) were higher than ZBI post-test scores (mean rank = 6.90), $Z = -0.770$, $p = 0.441$. The range of pretest scores was 10-59 with a mean of 27.20, while for the post-test the range was 1-72 with a mean of 25.13. Therefore, there was a statistically non-significant decrease in caregiver stress levels.

The Sign Test showed a non-significant increase in ZBI scores between admission and discharge ($p = 0.581$). Negative differences (i.e. ZBI pretest scores greater than post-test scores) was $N = 8$, while positive differences (i.e. ZBI pretest scores lower than post-test scores) was $N = 5$, with ties (i.e. cases whose values are equal) at $N = 2$. This indicates no significant difference between the two points of outcome measurement.

Graph 16. Histogram – Caregiver stress (distribution of pre- and post- group differences for the OA subgroup)



**Chapter 5: Discussion of Results,
Conclusion, and Recommendations for Future Research**

5.1 Discussion of Results

As the GDH clinical team is an interprofessional team, it would be difficult to assert that improvement in scores were the result of interventions from a particular discipline alone. Rather, it is more likely that all disciplines involved in caring for the client played an important role in improving functional abilities, since any single type of intervention may very well have an impact on multiple aspects of functional ability, and would overlap with the effects of other interventions provided at the GDH. For instance, studies have shown that balance training helped to not only improve balance and strength in older adults with fear of falling, but also reduced those fears (Gusi et al., 2012). Occupational therapy and physiotherapy work together to prevent falls in this vulnerable population. Weber, Fleming, and Evans (1995) found that a team-based approach was best for the management of a patient's rehabilitation. The following disciplines should be involved as part of the team: medicine, rehabilitation nursing, physical therapy, occupational therapy, psychology, social work, and recreational therapy (Weber, Fleming, & Evans, 1995). The interprofessional team composition at the Bruyère GDH closely aligns with this ideal (see section 1.3.2 for a description of the role of the clinical team members at the GDH).

5.1.1 Improvement in Fear of Falling

We found a statistically significant decrease in fear of falling. Statistics Canada reported that “[j]ust over one-third of Canadians, aged 65 and older (34%), reported being concerned about a future fall. About a third of those who perceived a risk of falling had fallen within the past year” (Pearson, St-Arnaud, & Geran, 2014, p. 2). The American Occupational Therapy Association ([AOTA], 2018) noted that occupational therapists play an important role in

reducing fear of falling by assessing seniors in their homes and/or the community. By recommending strategies to decrease a person's falls risk such as identifying and removing safety hazards in the home; providing advice to use walking or accessibility equipment that would help facilitate mobility; and determining physical and cognitive factors that could influence balance and risk of falling and subsequently addressing them, occupational therapists help older adults to decrease their falls risk and fear of falling. If older adults are more confident because of the mobility and safety aids implemented in their surroundings, they would be less likely to have a high level of fear.

The occupational therapists (OTs) and physiotherapists at the GDH both play an important part in dealing with mobility and balance issues; however, the OTs in particular are specialized in addressing and training older adults to safely perform ADLs, which helps to reduce fear of falling if these safety measures and abilities are present in the living environment and the older individual, respectively.

5.1.2 Improvement in Balance

A statistically significant improvement was found in BBS scores in this study. Sherrington and Tiedemann (2015) noted that many of the physiological functions involved and required in preventing falls including postural control, or balance, can be improved by physiotherapy and structured exercise interventions. The physiotherapists at the GDH provided interventions that, as hypothesized, helped to improve balance in our study population.

5.1.3 Improvement in Functional Exercise Capacity

Similarly, functional exercise capacity also improved significantly in our study. Karttunen, Kallinen, Peurala, and Häkkinen (2015) examined walking training and functioning via multidisciplinary rehabilitation—which included conventional physiotherapy, inpatient and outpatient interventions and exercises—in older adults who have had a stroke. They found that walking distance (as measured by the 6MWT) and functioning (self-reported and measured, using the BBS, Functional Independence Measure [FIM], and other tools) improved with walking rehabilitation. Similarly, as hypothesized, the physiotherapy interventions at the GDH helped to improve both balance and walking distance.

We propose that 6MWT scores may have implications with regards to walking speed; it may relate to how fast a community-dwelling older person can get across the crosswalk before the light changes. It is suggested that the longer distance a person can walk in 6 minutes, the faster they must be walking during that time. This indicates that GDH interventions may help with pedestrian safety in the community by improving walking speed in this senior population.

5.1.4 No Change in Caregiver Stress

We did not find a significant decrease in caregiver stress levels in our study. Warren, Kerr, Smith, Godkin, and Schalm (2003) found in their study of the effect of adult day programs on family caregivers of older adults that caregiver burden remained stable over time; there was no significant differences in burden scores across the points of measurement. They did find that there was a trend of slight decrease in total burden scores, but not significant. Similarly, we

found that although there was no statistically significant change in ZBI scores, the post-test score mean was slightly smaller than the pre-test score mean.

The individuals who had a caregiver complete a ZBI did not always overlap with those who had an FES-I, BBS, or 6MWT completed; therefore, the fact that ZBI scores did not improve significantly between admission and discharge does not necessarily indicate a seemingly confusing phenomenon of improved physical ability without any decrease in stress levels.

It is also possible that caregiver stress is not entirely based on how well an older adult who receives care functions physically. Gratão et al. noted that “Caregiving, when associated with a senior's lack of ability to perform the basic activities of daily living, results in caregiver burden. The level of dependence of the senior was an important predictor of elevated burden levels” (2013, p. 140). It can be speculated that since 1.) the level of dependence was only a predictor and not the *cause* of stress levels, and 2.) having good balance and exercise capacity and/or a low level of fear of falling may not necessarily reflect *ability to perform activities of daily living*—which might be more closely associated with caregiver stress levels yet was not measured in this study, it is reasonable that ZBI scores did not improve significantly even though the other indicators did.

There is also the possibility that before they came to the GDH, patients had attended other rehabilitative or day programs—which we do not know about—that would similarly allow caregivers to rest and alleviate their stress and/or responsibilities temporarily. As a result, the level of stress that caregivers experience may be comparable before and after the GDH program, since the length of time of respite or the amount of support or resources that caregivers receive

due to having their loved ones attend another program might be the same as that experienced as a result of the GDH.

In addition, it could be considered that the fact that caregiver stress levels did not decrease significantly does not indicate failure of interventions to make a difference in this area. Zarit, Kim, Femia, Almeida, and Klein (2014) studied the effects of adult day services (ADS) on care-related stressors in family caregivers and found that they experienced “lower exposure to care-related stressors... , more positive experiences, and more noncare stressors” (p. 570) on the days that their family member attended ADS, with noncare stressors being work-related. This supports the suggestion that caregivers of GDH participants do experience less stress associated with relief of caregiving responsibilities on GDH days, but that temporary relief may not be enough to decrease their overall level of stress.

It is quite possible as well that caregiver stress levels would have not only stagnated in improvement but even increase more, had their loved ones not attended the GDH. That is to say, perhaps the GDH’s actual role was not necessarily to improve caregiver stress level, but rather to prevent it from worsening any further or at a faster rate, which can be argued that it is just as valuable an outcome as improvement in relation to this aging population.

It is interesting to note that many respondents questioned the use of the word “burden” on the ZBI form to describe their experience; they felt that it was not the most appropriate or fitting term. Many caregivers expressed that they disliked the word “burden” because they saw it as their responsibility as a spouse or child to take care of the ailing family member who attended the GDH. Taking care of a loved one was communicated as something that is not necessarily wanted, but is the “right thing to do”. Others mentioned that taking care of a loved one was

something they *wanted* to do out of gratitude (for children mostly) or simply out of love for “[their] family”; and thus they felt it was wrong to call it “burden”, preferring to use the word “stress”. We support the idea of stress as something that all people experience, and that it is not always an entirely negative concept. One could carry a heavy responsibility very willingly and yet still acknowledge that it is a source of physical or emotional stress for them.

5.2 Conclusion

Our study of the influence of the Bruyère Geriatric Day Hospital program on the functional independence outcomes of its patients show that the indicators of fear of falling, balance, and the walking distance aspect of functional exercise capacity improved significantly, and that caregiver stress did not. We discussed the various reasons why caregiver stress may not have changed significantly. Recommendations for future research are discussed below in section 6.5.

5.3 Value and Contributions of the Study

There are many benefits of conducting this study. The strengths and value of the study are suggested as below.

Firstly, the study provides evidence that the GDH program objectives are largely being achieved—even with the aforementioned limitations. Most people who directly provide care as part of a program, or are involved in managing a program, are interested in knowing whether or not the interventions provided are working as well as they intend it to. This study has helped the GDH staff to gain a better understanding of their program compared to before the indicators

were implemented, as they lacked systematic and concrete evidence due to the absence of an evaluation process previously.

The results of this study can also help administrators make a more informed decision regarding changes (if any) to the program. It allows for the administration level to review the study results and subsequently decide whether certain interventions need to be adjusted accordingly. For instance, if no significant difference can be observed between the scores before and after the GDH intervention in a particular functional area, adjustments to the usual care plan which may improve the scores in that area at a more significant degree may be considered.

Even if no change would be made to the delivery of the program, team members and program administrators had expressed at the verbal presentation that it is still valuable for them to simply be informed of the effects that the interventions they do as part of the program has on their patients, and that the process of administering the outcome measurement tools had made them more aware of the needs of individual patients. It is proposed that team members could use the questions and responses on those measurement tools to supplement their interventions in terms of providing additional resources or addressing more specific problem areas.

Thirdly, it will add to how we understand how the team structure, length of program, and the therapy regimen at this particular day hospital affect its patients, with the Bruyère GDH as a variation of the general day hospital care model. There are three GDHs in the Ottawa area, located at three different hospitals, respectively: Bruyère Continuing Care, the Queensway Carleton Hospital, and the Ottawa Hospital (Civic campus).

In addition, this study is an important first step in helping to establish the most appropriate indicators or outcome measures that can be used to monitor and evaluate this specific type of day hospital. It can help to inform the future research of other GDHs that have a similar

program structure. Moreover, it can act as a pilot study for the Bruyère GDH if they find value in implementing their own long-term, ongoing evaluation process. This study will provide a foundation from which to build on when developing a more formal monitoring and evaluation framework.

5.4 Biases and Limitations

There may be some biases and limitations present in the study, which will be discussed in this section.

5.4.1 Sampling Bias

One source of bias lies in the sampling method. Patients from the GDH who were available and fit the set of criteria over the data collection period indicated in our study design were used as our sample. Those who had language and/or cognitive barriers were excluded. More specifically, only patients who were able to understand English well enough were given the questionnaires to complete, since the questionnaires were in English only. The approach to determining whether to exclude patients with cognitive barriers was based on the clinician's judgement; if they felt that a patient did not have sufficient insight to answer the questions in a way that aligns with what is objectively observed to a degree, they would exclude that patient. To illustrate, it was noted after administering the FES-I and PHQ-9 to certain patients that their answers would not necessarily be reliable, due to cognitive impairment. This was demonstrated by some patients, who although were objectively quite impaired in balance and mobility, rated themselves as having a low fear of falling regardless; and by patients who clearly displayed symptoms of depression who self-rated with scores that placed them within the normal range of mood. The research protocol was thus changed to administer questionnaires only to patients who

did not have moderate to severe language or cognitive barriers as our inclusion criteria. Perhaps a more appropriate method of excluded cognitively impaired persons would be to use MMSE or MoCA scores to ensure better inter-rater reliability. In addition, patients who were discharged early unexpectedly or admitted to other units or facilities due to worsening condition were excluded as they would not be able to complete the discharge assessment (i.e. the post-test). The potential impact of excluding the aforementioned patients is that our sample may not represent the overall GDH patient population as well as it could otherwise have, if those excluded were also part of this study.

5.4.2 Threats to Internal Validity

As with other studies that involve only one group of participants and no control or comparison group, there are single group threats that may arise from the design used in this study.

History Threats

A history threat is a “threat to internal validity that occurs when some historical event affects your study outcome” (Trochim, Donnelly, & Arora, 2016). These threats are unlikely for the outcome measures related to balance and functional exercise capacity. It might be conceivable for fear of falling and caregiver stress, which are instruments that take into account the respondents’ attitudes and/or behaviours, but are unlikely as well since there were no external public events that we feel might have influenced, or are relevant to, the outcomes.

Maturation Threats

A maturation threat is a “threat to internal validity that occurs as a result of natural maturation between pre-and post-measurement” or “change in outcome over time due to normal

maturation or internal growth in the outcome, rather than as a result of your program” (Trochim, Donnelly, & Arora, 2016). If scores had not only failed to improve but also decreased, it could be attributed to potential maturation threats as we hypothesize that this senior population would deteriorate naturally without external interventions such as the GDH program to help them maintain their functional status and physical abilities.

Testing Threats

A testing threat is a “threat to internal validity that occurs when taking the pretest affects how participants do on the posttest” (Trochim, Donnelly, & Arora, 2016). Testing threat may be present in our study as we used a pre-post design. There is a possibility that taking the pretest subconsciously influenced participants to answer differently, or made them more aware of how they might want to give their responses, on the post-test. For instance, although FES-I scores statistically improved as a whole, some individuals experienced an increase in fear of falling. This could be attributed to increased awareness of their own internal thoughts about their functional ability, and not necessarily because they had worsened fear after participating in the program.

Instrumentation Threats

An instrumentation threat is a “threat to internal validity that arises when the instruments (or observers) used on the posttest and the pretest differ” (Trochim, Donnelly, & Arora, 2016). This is another possibility to be discussed, as it may be present in pre-post designs like the testing threat (Trochim, Donnelly, & Arora, 2016). Although our outcome measurement tools remained exactly the same at admission and discharge, it is possible that the person administering the tests (i.e. GDH team members) rated the pre-test and post-test in a slightly

different way. Due to the large numbers of tests they had to administer over our data collection period, they could have administered the post-tests somewhat less meticulously than they did the pre-tests as a result of fatigue.

Mortality Threats

A mortality threat is a “threat to internal validity that occurs because a significant number of participants drop out” (Trochim, Donnelly, & Arora, 2016). Mortality threats are not applicable to our study, as we only included the data for those who had both the pre-test and post-test completed. However, participant drop-out certainly posed a challenge to our objective of obtaining enough data.

The potential impact of the aforementioned threats on the conclusion would be that the study results may have been influenced by these threats rather than by the GDH program.

5.4.3 Measurement Error

Some measurement errors may have occurred during the process of totalling all the values for each item into a single score on a pre- or post-test. Human error was addressed by the student researcher who examined every pre- and post-test that was completed to double-check for any mistakes in mathematical addition. Despite this step of precaution, however, it is possible that some errors may still have escaped scrutiny by accident. The potential impact of these types of errors is that they may result in a higher or lower score, and subsequently affect our conclusion of whether or not scores for a particular indicator area have changed significantly between the pretest and the post-test.

5.4.4 Response Bias

Another possible source of bias comes from study participants. Response bias can be prevalent in studies that use surveys or questionnaires, and participants may not always report the perceived or actual situation truthfully (Trochim, Donnelly, & Arora, 2016).

5.4.4a Social desirability bias

It is possible that some patients may have answered the questions on the tests in a way that they believe would be viewed favorably by the health care professional who asked them to complete the questionnaire. For instance, patients who do not genuinely agree with their family members or referring health care provider that they were functionally impaired—or to the extent that the latter two try to convince them of the severity of the impairment, at least—may have answered with “not at all concerned (1)” or “somewhat concerned (2)” for most of the questions on the FES-I, downplaying their true level of fear of falling.

Alternatively, it is conceivable that the opposite may have occurred. Some caregivers may have answered with “quite frequently (3)” or “nearly always (4)” when completing the ZBI, in order to highlight their burden as a caregiver so that the GDH clinical team might give more focus to, or place a higher priority on, them and their family member attending the program. Of course, this does not imply that respondents deliberately lied in order to receive more attention, but that it is possible that when presented with options (and even the act of administering this questionnaire) to represent their level of stress, some caregivers may tend to rate their stress more highly compared to if caregiver burden were evaluated qualitatively. However, since this study used a quantitative approach, we are unable to determine whether or not that might be true. Future research may consider approaching evaluative studies of a similar type using both quantitative and qualitative methods to obtain a more comprehensive understanding of patients’

functional ability and caregiver stress. The potential impact of this bias is that it may result in a higher or lower score, and subsequently affect our conclusion of whether or not scores for a particular indicator area have changed significantly between the pretest and the post-test.

5.4.4b Non-response bias

This potential bias was addressed by training the person administering the questionnaire to ensure that all questions are asked. Participants may be more likely to respond when prompted, compared to when self-administering the questionnaire. However, as previously mentioned, there were still many non-responses which rendered a challenge for our data collection – especially with regards to the Zarit questionnaire. Caregivers who are more proactive in the care of their family members might be more likely to respond, and this may be regarded as a bias since it indicates that we may not have a representative sample of caregivers.

5.4.5 Other biases or confounding factors

Other confounding factors may include not measuring outcomes at the time immediately surrounding admission and/or discharge for some patients. It is possible that scores could be lower or higher if they were measured at admission, compared to 1-2 weeks since being admitted to the program. Similarly, it is possible that scores could be different if the post-test was administered exactly at the time of discharge instead of 1-2 weeks prior to the discharge.

As described previously, the PHQ-9 was ultimately left out as a measurement tool for mood due to the improvement seen very early on in patients' admission to the GDH. We could speculate that this is the influence of the maturation threat—that improvements in mood would happen regardless of whether patients received GDH interventions or not, since it is possible that it was due to the exposure to social interaction with the health professionals and other patients at

the GDH instead of the therapeutic activities. However, as previously discussed, one could consider social interaction as part of the program and thus it may not necessarily be a confounding factor. The potential impact of not measuring mood is that conclusions cannot be made with regards to how mood as an indicator would have changed significantly or not, before and after the program.

There is also a possibility that our study outcomes may have been affected by other programs, outpatient or home rehabilitative care that some participants might have also attended in between the days they come to the GDH, as these other programs may have enhanced or complemented the effects of the GDH interventions. We were aware of two other research projects taking place at the GDH that might have overlapped with this study; however, this is an unavoidable challenge that unfortunately affects many other research studies at any given point in time, and as such is documented here as a limitation. The potential impact of this limitation is that we may not be able to conclude that our study results were influenced by the GDH program alone.

Another potential bias might stem from having the individuals who may have a vested interest in demonstrating the GDH program's effectiveness to administer the questionnaires. Biases might arise from the following: 1) that measurement tools which were deemed to better reflect the interventions of the GDH (i.e. that will show more change) were chosen from the initially proposed list of tools; and 2) that the unconscious feedback of the person administering the surveys may have influenced the participant responses to result in more desirable outcomes overall.

We also note the fact that only the walking distance portion of the 6MWT was measured as one of the limitations, since this indicates that not all aspects of the concept of functional

exercise capacity were assessed. In addition, a limitation would be that it is difficult to know for certain how each team member contributed to the overall outcome, as the outcome for each indicator is the result of the contribution of multiple team members. This may pose a challenge particularly for indicators that do not show improvement, or even deteriorate.

Of all the biases and limitations listed in this Chapter, it is hypothesized that the sampling and response biases would potentially be the most damaging. From this study we found that, although there were limitations, overall speaking the Bruyère GDH is still achieving its intended program objectives.

5.4.6 Generalizability

As each day hospital is unique in its structure and delivery of interventions as well as the composition of its team of health care professionals, it would be inappropriate to generalize the results from this study to other day hospital settings. Since generalizability across settings is limited, we could only discuss the implications of our results on the Bruyère Geriatric Day Hospital.

5.5 Dissemination of Study Results

The results of this study will be considered for submission to a health-related scientific journal in the field of rehabilitation and/or geriatric care, for publication. The clinical team, medical lead, and the program administrators of the Geriatric Day Hospital will be provided with a written summary of the study results; a verbal and visual presentation had also been given in the context of a staff meeting prior to the submission of this thesis.

5.6 Recommendations and Opportunities for Future Research

Although it was not feasible for this study, it would be suggested for future studies to examine how the Day Hospital influences mood and other indicators of functional independence throughout the course of the GDH program—by measuring at multiple time points. Possible time points for measurement would be at admission, at weeks 3 and 6 of intervention, upon discharge, and at 3 months post-discharge via the patient’s primary care physician. This type of measurement was not realistic to implement in our current study as there were already multiple challenges involved in merely measuring at two time points. Ideally, measuring at multiple time points would provide the advantage of seeing any potential changes in the data during the program, which is not always apparent in data sets that are taken between two time intervals only. It is possible that scores for mood, for instance, may have unexpected increases and decreases during this time that do not necessarily reflect the direction of the change in mood scores from admission to discharge. The same can be speculated for the other indicators.

For future analyses, if measurement tests are administered at additional time points, the one-way ANOVA with repeated measures was briefly considered. This test was considered as it can detect changes in mean scores for each indicator that were measured at three or more different time points (Laerd Statistics, n.d.-b). It is, essentially, an “extension of the dependent t-test” (Laerd Statistics, n.d.-b, “Introduction”), and should be used for comparing the means of related groups as well. However, since the data is not continuous, this test cannot be used. The Friedman Test is an appropriate alternative.

Since we only used a quantitative approach to measure caregiver stress in this study, it was not possible to definitively comment on the more delicate and detailed aspects of caregiving because it is not apparent by examining ZBI scores alone. Therefore, another recommendation

for future research is to approach evaluative studies of a similar type using both quantitative (measurement tools) and qualitative (interviewing) methods to obtain a more comprehensive understanding of patients' functional ability and how it relates to caregiver stress and other indicators not explored in this study.

In addition, it would be of interest to examine clinical significance as opposed to statistical significance for the outcome indicators, in future studies. For instance, one could analyze the proportion of participants who improved by a certain length of walking distance, defined by the standard for clinical significance for that outcome indicator. Although some pre- and post-measures may not necessarily be statistically significant, it is possible that clinical significance is achieved, which may or may not be more relevant for the GDH setting where health professionals might be equally as, or more, interested in whether or not there is a practical importance to the effects of their interventions. We also suggest future research to investigate the characteristics of individuals whose score changes achieved clinical significance compared to those whose changes did not. It would be interesting to explore how these two groups differ and/or what made these older adults function better than their peers.

Another recommendation is to compare the different GDH models in Ottawa (such as the one at Bruyère Continuing Care, the Queensway Carleton Hospital, and the Civic Hospital) to see which one would be the most conducive to improving functional independence for older adults.

The Queensway Carleton Geriatric Day Hospital has the following program structure: it provides “assistance with concerns including falling, transfers, safety at home, understanding medications, ADLs, living arrangements, mood, memory, loneliness and isolation, and maintaining social contact. [To be eligible for the program, an older person must be] 60 years of

age or older and require assessment and interventions from at least two of the following disciplines: occupational therapy, nursing, physiotherapy, and social work, etc. The program is suitable for patients who are independently mobile with or without a mobility aide (such as a cane, walker, or wheelchair) and those who require minimal physical assistance. Persons who require constant supervision or may demonstrate inappropriate social behaviour cannot be managed in the program. Referrals can be made from family doctors, members of the Geriatric Assessment Outreach Team (GAOT), other healthcare professionals, or through an in-patient admission to the Queensway Carleton Hospital” (Champlain Healthline, 2018). The Day Hospital staff includes: a physician, registered nurse (RN), physiotherapist (PT), occupational therapist (OT), social worker (SW), recreation therapist, volunteers, rehabilitation assistant, and a secretary. Patients will have “an initial 1 - 1 1/2 hour assessment appointment with the Physician and Registered Nurse...Patients attend two half days per week, for a period of approximately 4 to 6 weeks. The length of time depends on the patient's needs” (Queensway Carleton Hospital, n.d.).

The Ottawa Civic Geriatric Day Hospital, on the other hand, has the following structure: it “provides comprehensive multidisciplinary assessment for patients who are experiencing a change in function, memory, mood, or have complex medical issues. Short-term treatment, counseling, and education are available to patients and their caregivers to facilitate community support and long-term care planning” (The Ottawa Hospital, n.d.-a). The Geriatrics program at the Ottawa Hospital “provides clinical services to patients over 65 years of age who are experiencing a change in function, memory, mood or have complex medical issues and who would benefit from a comprehensive Geriatric assessment” (The Ottawa Hospital, n.d.-b). The Geriatric Day Hospital is one of the services offered by this program. Referrals for patient

assessment can be made by: Family members, Family Physicians, Prospective clients, or Health care workers (The Ottawa Hospital, n.d.-a). “At times, patients will be referred through the Emergency Department (i.e. the Geriatric Emergency Management Program). Typically, patients have already been seen in their own home by the Geriatric Outreach Assessor before an appointment is made for the Geriatric Day Hospital” (Regional Geriatric Program of Eastern Ontario, n.d.). The team includes a geriatrician, registered nurse, occupational therapist, physiotherapist, social worker, speech and language pathologist, dietician, pharmacist; consultation services (e.g. geriatric psychiatrist, neurologist and neuropsychologist); Resource Centre on Aging, which “provides information on all aspects of aging to the elderly and those who care for them”); and a home care case manager, who “acts as a liaison with the Home Care Program in the community and the Geriatric Assessment Unit” (The Ottawa Hospital, n.d.-a). The patient’s first visit is “often 3- 4 hours in length as it includes a thorough medical and nursing assessment...[and for subsequent visits], the patient can expect to have four to five visits scheduled over several weeks. These visits can last one to three hours” (Regional Geriatric Program of Eastern Ontario, n.d.).

As can be seen, the structure of each of these day hospital models differs, and although it was not within the scope of this study, it would be interesting to explore whether or not the Bruyère model might be the most conducive of the three to improving functional independence in older adults. If one were to be more ambitious, they might also compare GDHs in the Champlain LHIN region or across the various LHINs in Ontario.

There are certain things we might do differently if we were to repeat this study, including to pilot test the outcome measurement tools for a certain period of time in order to identify and highlight any issues and render any concerns more apparent earlier on in the study, so that either

1) the GDH team could practice incorporating these tools into their usual assessment routines; or that 2) we could implement other more user-friendly tools. The purpose of pilot testing would be to test out the actual practicality in this clinical setting to confirm how well they should work in theory. In addition, it would have been good to consult with other programs that have used similar measurement tools, and ask about any obstacles they faced as well as any solutions they subsequently suggest. These lessons learned may serve as recommendations for future researchers attempting a similar study to consider as well.

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Appendix

Chart 1. Data extraction table

Participant Code							
Age							
Sex							
Marital Status							
Language(s) spoken							
Referral Source							
Admission Dx (sig. medical conditions)							
Living Situation (alone/with caregiver)							
Relationship with caregiver							
Living Environment (home/other residence)							
Fear of Falling (Pre)							
Fear of Falling (Post)							
Balance (Pre)							
Balance (Post)							
Functional Exercise Capacity (Pre)							
Functional Exercise Capacity (Post)							
Caregiver Stress (Pre)							
Caregiver Stress (Post)							
Frailty (Pre)							
Frailty (Post)							
Mood (Pre)							
Mood (Post)							