


# Impact of a Geriatric Day Hospital Program on Older Adults' Functional Independence and Caregiver Stress: A Non-Experimental, Single Group Pre-/Posttest Study

Journal of Primary Care & Community Health  
Volume 11: 1–8  
© The Author(s) 2020  
Article reuse guidelines:  
sagepub.com/journals-permissions  
DOI: 10.1177/2150132720940504  
journals.sagepub.com/home/jpc  


Yung-En Chung<sup>1</sup>, Douglas E. Angus<sup>1</sup>, and Chantal Backman<sup>1,2,3</sup> 

## Abstract

**Objective:** To evaluate the impact of a geriatric day hospital program on older adults' functional independence and on caregiver stress. **Methods:** We used a single group pre- and posttest design. The data were collected through chart reviews and follow-up phone calls. Outcomes included fear of falling, balance, functional exercise capacity (walking distance), and caregiver stress. Descriptive statistics were used for sociodemographic data, dependent *t* test for paired samples of normally distributed data, and the Wilcoxon signed-rank test for determining differences between nonnormally distributed data sets. **Results:** We found a statistically significant difference in pre (33.54) and post (27.47) mean rank scores for fear of falling ( $Z = -3.895$ ,  $P < .001$ ), pre (49.5) and post (59.42) scores for balance ( $Z = -8.725$ ,  $P < .001$ ), and pre (250.07 m) and post (291.20 m) for functional exercise capacity ( $P < .001$ ). No statistically significant difference was found with respect to caregiver stress pre (22.05) and post (19.90) scores ( $Z = -0.422$ ,  $P = .673$ ). **Discussion:** Future research may consider approaching evaluative studies of a similar type using not only quantitative but also qualitative methods to obtain a more comprehensive understanding of older adults' functional ability and caregiver stress before and after participating in a geriatric day hospital program.

## Keywords

geriatric day hospitals, functional status, program evaluation

Dates received 4 May 2020; revised 29 May 2020; accepted 10 June 2020.

## Background

Geriatric day hospital programs that address the needs of older adults are especially important as, globally, we are experiencing an aging population, with the number of people who are 65 years of age or older surpassing those who are 14 years and younger; with this trend expected to continue for the foreseeable future.<sup>1</sup> This is significant for the health care system as more resources will be required to address the unique health needs of older adults.

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 the population ages.”<sup>2(p2)</sup> 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 independently.<sup>3</sup>

Geriatric day hospitals programs were primarily developed to focus on physical rehabilitation, but some programs

also include mental or psychological interventions and social related activities. Research results on the effects of geriatric day hospital care report mixed results. Some studies found that day hospital care greatly improved functional ability.<sup>4-10</sup> Whereas, other studies found that day hospital care did not improve functional status or prevent deterioration.<sup>11,12</sup> This dichotomy is likely due to the fact that each day hospital program is unique in its structure, in its care delivery, and in its patient population; and as a result, the effects of one program may not be identical to—or cannot be applied to—another program.

<sup>1</sup>University of Ottawa, Ottawa, Ontario, Canada

<sup>2</sup>Bruyère Research Institute, Ottawa, Ontario, Canada

<sup>3</sup>Ottawa Hospital Research Institute, Ottawa, Ontario, Canada

## Corresponding Author:

Chantal Backman, School of Nursing, Faculty of Health Sciences, University of Ottawa, 451, Smyth Road, RGN 3239, Ottawa, Ontario, K1H 8M5, Canada.

Email: chantal.backman@uottawa.ca



Creative Commons Non Commercial CC BY-NC: This article is distributed under the terms of the Creative Commons

Attribution-NonCommercial 4.0 License (<https://creativecommons.org/licenses/by-nc/4.0/>) which permits non-commercial use, reproduction and distribution of the work without further permission provided the original work is attributed as specified on the SAGE and Open Access pages (<https://us.sagepub.com/en-us/nam/open-access-at-sage>).

The Bruyère Geriatric Day Hospital (GDH) program is a bilingual (English and French) interprofessional outpatient program located in Ottawa, Ontario, Canada. The aim of the GDH program is to assist frail 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 improve their functional status, maintain their independence, and prevent hospitalization or being prematurely admitted to long-term care homes. The purpose of this study was to evaluate the impact of the Bruyère GDH program on older adults' functional independence and on caregiver stress.

## Methods

### Study Design

We used a non-experimental, single group pretest-posttest design. The data were collected through retrospective chart reviews and follow-up phone calls. We chose a single group as it was not possible to recruit a comparable control group. Ethics approval was obtained by the local Research Ethics Board.

### Study Population and Setting

The majority of the patients admitted to the GDH present with mobility or balance issues and at least one other problem. To be admitted, patients (1) must be at least 65 years old, (2) must be referred by a physician, and (3) must have 2 or more concerns related to mobility/falls, activities of daily living, cognitive issues, symptoms that are affecting function, medication concerns, and/or caregiver stress. The program consists of 3-hour therapy sessions 2 days per week for approximately 10 weeks. Patients attend activities in large groups and individual sessions with clinicians (ie, physiotherapy, occupational therapy, social work, nursing, pharmacy, recreational therapy, neuropsychology) based on their individual needs. 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 requires interventions different from what the GDH offers.

### Sample Size

Since there are no known pre and post studies examining functional independence of older adults following a geriatric day hospital program, the effect size required to yield a statistically significant difference in scores was unknown. Therefore, according to sample size requirements for parametric and nonparametric tests, a minimum of 30 data points was needed.<sup>13</sup> Although missing data must also be taken into account for each of the outcomes, we recruited a total of 128 participants for this study.

### Study Eligibility

All patients admitted to the program were eligible for the study. English assessment tools and self-administered questionnaires were used with patients who spoke and understood English. Patients who had moderate to severe cognitive impairment were excluded from the self-administered questionnaires. Patients who did not complete the 10-week program because they were unexpectedly discharged early or were admitted to another unit or facility due to worsening of their condition were also excluded. Caregivers, 18 years of age or older, were invited to complete the caregiver stress-related questionnaire. Patients and caregivers with at least one complete set of data collected for at least one indicator were included.

### Data Collection

A pretest and a posttest were administered at the first visit and the last (week 10) visit, respectively. The clinical staff conducted the assessments and provided the self-administered questionnaires to both the patients and the caregivers during the visits. For any missing self-administered questionnaires that were not completed during the visit, the clinical staff obtained permission from the patients and the caregivers to participate in a follow-up call. A research team member (YEC) conducted the follow-up calls with patients and caregivers ( $n = 128$ ) to complete the questionnaires postdischarge.

The sociodemographic information collected included age, sex, language(s) spoken, marital status, source of referral, living environment, living arrangement, relationship with primary caregiver, significant medical conditions, and frailty status.

### Outcome Measures

The selected indicators of functional independence in this study included (1) fear of falling, (2) balance, (3) functional exercise capacity, (4) caregiver stress, and (5) overall frailty.

**Fear of Falling.** A population-based longitudinal study found that falls and fear of falling are risk factors for each other.<sup>14</sup> Falls are a significant concern in older adults because they: are "the cause of 85% of seniors' injury-related hospitalizations"<sup>15(p1)</sup>; may affect the ability of a person to live on their own, and; can put restrictions on a person's mobility as a result of injuries.<sup>16</sup> If seniors are afraid of falling, they may be less likely to perform daily tasks on their own. Fear of falling thus perpetuates, or can be part of the cause of, impaired functional independence in older adults. In this study, we used the Falls Efficacy Scale-International (FES-I) for assessing fear of falling and activities of daily living functional ability.<sup>17-23</sup> The 16-item FES-I is a 4-point

scale (1-4) that has a total possible score of 64, with higher total scores indicating a greater fear of falling.<sup>19,20</sup> One study found the minimal detectable change (MDC) for this tool to be 17.7 points,<sup>22</sup> while its minimal clinically important difference (MCID) has not been established.

**Balance.** Balance is 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. The Berg Balance Scale (BBS) was used for assessing balance.<sup>24-30</sup> The BBS is a test with very few equipment needed: a ruler, 2 standard chairs, a footstool, a stopwatch, and a 15-foot pathway. It is a 5-point scale (0-4) that has 14 items and a possible total score of 56,<sup>31</sup> 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.<sup>28</sup>

**Functional Exercise Capacity.** It is important to assess functional exercise capacity, as this metric 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 tends to limit the activities they could perform at home and in the community, including performing activities of daily living such as buying groceries, walking pets, or going to appointments. The 6-minute walk test (6MWT) was chosen for assessing functional exercise capacity.<sup>32-37</sup> The 6MWT “measures the distance an individual is able to walk over a total of six minutes on a hard, flat surface.”<sup>38</sup> The person administering the test would ask the patient to walk as far as they can in 6 minutes down a straight pathway 100 feet long, and to instruct the patient to slow down, stop, or rest if needed.<sup>39</sup>

**Caregiver Stress.** The level of caregiver stress might indicate how functionally independent a geriatric patient is. Gratião and colleagues 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.”<sup>40(p140)</sup> The Zarit Caregiver Burden Index (ZBI), a measure of caregiver stress and burden was used in this study.<sup>41,42</sup> The ZBI is a 22-item questionnaire, 5-point (0-4) scale, with a total possible score of 88.<sup>42</sup> 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.

**Overall Frailty.** Overall frailty is important to consider when assessing functional independence since frailty is identified as a predictor for falls, hospitalizations, disability, and mortality.<sup>43</sup> We used the Clinical Frailty Scale (CFS) for measuring overall frailty.<sup>44-46</sup> The CFS is a 9-point ordinal scale with classifications ranging from “very fit” to “terminally ill”.<sup>47</sup> For the CFS, it was agreed that only the assessment scores for frailty at admission would be included in the analysis as no posttest frailty data were available.

## Data Analysis

Sociodemographic data were reported using descriptive statistics. For normally distributed data and where the dependent variable was either at the interval or ratio levels of measurement, the dependent *t* test for paired samples was used.<sup>48</sup> For the outcomes that are not normally distributed, nonparametric tests were used. The related-samples Wilcoxon signed-rank test in SPSS were used for statistical analysis where the data were not normally distributed and the dependent variable was at least of the ordinal level of measurement.<sup>49</sup> The Wilcoxon test is the nonparametric equivalence of the dependent *t* test and is used to compare data from 2 related groups, with the same individuals in each group, between 2 time points.<sup>49</sup> Data missing for either the pre or post outcome were excluded from the analysis. The software package IBM SPSS Statistics version 25 was used to support the data analysis.

## Results

A total of 86.5% (*n* = 128) of patients were included in the study. Participants were older adults ranging from age 65 to 95 years (mean = 79.92 years). Of these, 26.6% were aged 65 to 74 years; 43.6% were aged 75 to 84 years; and 29.8% were aged 85 to 95 years. With regards to sex, 48.4% were male and 51.6% were female. A total of 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. The most prevalent medical conditions were hypertension (*n* = 75, 58.6%), arthritis (*n* = 48, 37.5%), diabetes, type 2 (*n* = 47, 36.7%), stroke (*n* = 33, 25.8%), mood disorder (*n* = 33, 25.8%), and chronic obstructive pulmonary disease (*n* = 16, 12.5%). Of the 61 patients who had a CFS assessment completed, 5 (8.2%) were severely frail, 29 (47.5%) were moderately frail, 19 (31.1%) were mildly frail, and 6 (9.8%) were vulnerable, and 2 (3.3%) were managing well. The sociodemographic information can be found in Table 1.

## Fear of Falling

For fear of falling, the Wilcoxon signed-rank test showed that there was a statistically significant change in FES-I

**Table 1.** Participants' Sociodemographic Information (n = 128).

Variables	n	%
Age, years mean (range): 79.92 (65-95)		
65-74	34	26.56
75-84	56	43.75
85-95	38	29.69
Sex		
Male	62	48.4
Female	66	51.6
Languages spoken		
English only	70	54.7
French only	11	8.6
English and French	19	14.8
English and/or French and other language(s)	23	18.0
Other language(s) only	5	3.9
Marital status		
Single	9	7.0
Married/common-law	63	49.2
Widowed	40	31.3
Divorced/separated	16	12.5
Source of referral		
Family physician	34	26.6
Geriatric Rehabilitation Program (GRP)	31	24.2
Geriatric Emergency Management Clinic (GEM)	17	12.9
Geriatric Assessment Outreach Team (GAOT)	29	22.6
GEM to GAOT	3	2.4
Other sources	14	11.3
Living environment		
Private dwelling		
Own home	87	68.0
Sharing a home with people other than their spouse	22	17.2
Collective dwelling (retirement resident, assisted living facility, etc)	19	14.8
Living arrangement		
Alone	52	41.4
With primary caregiver	67	52.3
With someone NOT their primary caregiver, or are caregivers themselves	8	6.3
Relationship with their primary caregiver		
Spouse/partner	49	38.3
Children	47	36.7
Other family members/friends	6	4.7
Professional services (retirement home, personal support worker, home help etc)	19	14.8
No caregivers	7	5.5

scores (n = 67) between admission and discharge. FES-I pretest scores (mean rank = 33.54) were higher than FES-I posttest scores (mean rank = 27.47),  $Z = -3.895$ ,  $P < .001$ ; indicating a decrease in fear of falling. The range of pretest scores was 18 to 62 with a mean of 35.78, while the range of posttest scores was 16 to 55 with a mean of 31.01 (Table 2).

### Balance

For balance, the Wilcoxon signed-rank test showed that there was a statistically significant change in the BBS scores

(n = 125) between admission and discharge. BBS posttest scores (mean rank = 59.42) were higher than BBS pretest scores (mean rank = 49.50),  $Z = -8.725$ ,  $P < .001$ ; indicating an improvement in balance. The range of pretest scores was 8 to 56 with a mean of 39.05, while the range of posttest scores was 8 to 56 with a mean of 44.34 (Table 2).

### Functional Exercise Capacity

For functional exercise capacity, the dependent *t* test for paired samples showed that there was a statistically significant

**Table 2.** Pre- and Poststudy Scores for Each Outcome.

Outcomes (n)	Pre, mean (range)	Post, mean (range)	Mean difference (SD)
Fear of falling (n = 67)	35.78 (18-62)	31.01 (16-55)	-4.76 <sup>a</sup> (9.203)
Balance (n = 125)	39.05 (8-56)	44.34 (8-56)	5.3 <sup>a</sup> (4.786)
Functional exercise capacity (n = 82)	250.07 ± 95.24 (SD)	291.20 ± 95.26 (SD)	41.12 <sup>a</sup> (54.075)
Caregiver stress (n = 46)	29.48 (5-65)	28.96 (1-72)	-0.52 (9.399)

<sup>a</sup>Difference was statistically significant between pre and post ( $P < .001$ ).

improvement in walking distance as measured during the 6MWT from 250.07 ± 95.24 to 291.20 ± 95.26 m between admission and discharge (n = 82); an increase of 41.12 ± 54.08 m ( $P < .001$ ), indicating an improvement in functional exercise capacity (Table 2).

### Caregiver Stress

For caregiver stress, the Wilcoxon signed-rank test showed that scores for the ZBI did not change significantly between admission and discharge (n = 46). ZBI pretest scores (mean rank = 22.05) were higher than ZBI posttest scores (mean rank = 19.90),  $Z = -0.422$ ,  $P = .673$ . The range of pretest scores was 5 to 65 with a mean of 29.48, while the range of posttest scores was 1 to 72 with a mean of 28.96. Therefore, the decrease in caregiver stress levels was not statistically significant (Table 2).

### Discussion

Overall, our study findings have demonstrated the impact of the GDH program on select older adults' functional independence outcomes and on caregiver stress.

#### Improvement in Fear of Falling

We found a statistically significant decrease in fear of falling pre and post ( $Z = -3.895$ ,  $P < .001$ ). Delbaere and colleagues<sup>19,20</sup> differentiated between low and high fear of falling, with scores between 23 and 64 indicating a greater fear of falling. Thus, in our study, the decrease in fear of falling between the pre ( $M = 35.78$ , range = 18-62), and the post ( $M = 31.01$ , range = 16-55) scores is not clinically significant as both these mean scores are considered high for fear of falling.<sup>19,20</sup>

#### Improvement in Balance

A statistically significant improvement was found in BBS scores pre (49.5) and post (59.42) ( $Z = -8.725$ ,  $P < .001$ ). The fall risk decreased between the pre ( $M = 39.05$ , range = 8-56) and post ( $M = 44.34$ , range = 8-56) scores. This was considered clinically significant as the risk decreased from a medium fall risk (21-40) to a low fall risk (41-56).<sup>31</sup>

#### Improvement in Functional Exercise Capacity

Similarly, functional exercise capacity also improved significantly between pre (250.07 m) and post (291.20 m) tests ( $P < .001$ ). However, a difference of 41.12 m is not considered clinically significant.<sup>50</sup> Perera and colleagues<sup>50</sup> reported a meaningful clinical change of 50 m based on analyses from a sample of 692 community-living post-stroke older adults.

#### No Change in Caregiver Stress

We did not find a significant decrease in caregiver stress levels between the pre (22.05) and the post (19.90) scores ( $Z = -0.422$ ,  $P = .673$ ). Although, the results show a mild to moderate burden in caregiver stress,<sup>42</sup> the difference pre ( $M = 29.48$ , range = 5-65) and post ( $M = 28.96$ , range = 1-72) was not clinically significant. Warren and colleagues<sup>51</sup> 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 posttest score mean was slightly lower than the pretest score mean.

It is possible that caregiver stress is not entirely based on how well an older adult who receives care functions physically. Gratao and colleagues 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."<sup>40(p140)</sup> 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 and colleagues studied the effects of adult day services 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”<sup>52(p570)</sup> on the days that their family member attended adult day services, 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.

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.

Furthermore, 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 GDH as a variation of the general day hospital care model. 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.

### Limitations

The limitations of this study are as follows. One source 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. 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 (ie, the posttest). 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.

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. A testing threat is a “threat to internal validity that occurs when taking the pretest affects how participants do on the post-test.”<sup>53</sup> Testing threat may be present in our study as we used a pretest 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.

### Conclusion

Our study of the influence of the GDH 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. 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.

### Author Contributions

CB was a major contributor in writing the manuscript. All co-authors were involved in the design of the project and critically

appraised and edited the manuscript. All authors read and approved the final manuscript.


### Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

### Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

### ORCID iD

Chantal Backman  <https://orcid.org/0000-0001-7431-8159>

### References

1. Statistics Canada. Canada's population estimates: age and sex, July 1, 2015. Accessed June 22, 2020. <http://www.statcan.gc.ca/daily-quotidien/150929/dq150929b-eng.htm>
2. Canadian Medical Association. Health and health care for an aging population. Accessed June 22, 2020. [https://www.cma.ca/sites/default/files/2018-11/CMA\\_Policy\\_Health\\_and\\_Health\\_Care\\_for\\_an\\_Aging-Population\\_PD14-03-e\\_0.pdf](https://www.cma.ca/sites/default/files/2018-11/CMA_Policy_Health_and_Health_Care_for_an_Aging-Population_PD14-03-e_0.pdf)
3. Economist Intelligence Unit. Healthcare strategies for an ageing society. Accessed June 22, 2020. [http://graphics.eiu.com/upload/eb/Philips\\_Healthcare\\_ageing\\_3011WEB.pdf](http://graphics.eiu.com/upload/eb/Philips_Healthcare_ageing_3011WEB.pdf)
4. Brown L, Forster A, Young J, et al; Day Hospital Group. Medical day hospital care for older people versus alternative forms of care. *Cochrane Database Syst Rev*. 2015;2015:CD001730. doi:10.1002/14651858.CD001730.pub3
5. Hershkovitz A, Gottlieb D, Beloosesky Y, Brill S. Assessing the potential for functional improvement of stroke patients attending a geriatric day hospital. *Arch Gerontol Geriatr*. 2006;43:243-248. doi:10.1016/j.archger.2005.10.012
6. Hershkovitz A, Brill S. The association between patients' cognitive status and rehabilitation outcome in a geriatric day hospital. *Disabil Rehabil*. 2007;29:333-337. doi:10.1080/09638280600787096
7. Luk JKH, Chan CF. Rehabilitation outcomes of older patients at 6 months follow-up after discharged from a geriatric day hospital (GDH). *Arch Gerontol Geriatr*. 2011;52:327-330. doi:10.1016/j.archger.2010.05.006
8. Desrosiers J, Hébert R, Payette H, Roy P, Tousignant M, Côté S, Trottier L. A geriatric day hospital: who improves the most? *Can J Aging*. 2004;23:217-228. doi:https://doi.org/10.1353/cja.2004.0031
9. Manckoundia P, Gerbault N, Mourey F, et al. Multidisciplinary management in geriatric day-hospital is beneficial for elderly fallers: a prospective study of 28 cases. *Arch Gerontol Geriatr*. 2007;44:61-70. doi:10.1016/j.archger.2006.02.004
10. Moorhouse P, Theou O, Fay S, McMillan M, Moffatt H, Rockwood K. Treatment in a geriatric day hospital improve individualized outcome measures using Goal Attainment Scaling. *BMC Geriatr*. 2017;17:9. doi:10.1186/s12877-016-0397-9
11. Chew J, Chong M, Fong Y, Tay L. Outcomes of a multimodal cognitive and physical rehabilitation program for persons with mild dementia and their caregivers: a goal-oriented approach. *Clin Interv Aging*. 2015;10:1687-1694. doi:10.2147/CIA.S93914
12. Fowler RW, Congdon P, Hamilton S. Assessing health status and outcomes in a geriatric day hospital. *Public Health*. 2000;114:440-445. doi:10.1038/sj.ph.1900700
13. Hulley SB, Cummings SR, Browner WS, Grady DG, Newman TB. *Designing Clinical Research*. Lippincott Williams & Wilkins; 2013.
14. Friedman SM, Munoz B, West SK, Rubin GS, Fried LP. Falls and fear of falling: which comes first? A longitudinal prediction model suggests strategies for primary and secondary prevention. *J Am Geriatr Soc*. 2002;50:1329-1335. doi:10.1046/j.1532-5415.2002.50352.x
15. Public Health Agency of Canada. You CAN prevent falls! Accessed June 22, 2020. <http://www.phac-aspc.gc.ca/seniors-aines/alt-formats/pdf/publications/public/injury-blessure/prevent-eviter/prevent-eviter-e.pdf>
16. National Institute on Aging. Balance exercises. Accessed June 30, 2020. <https://www.nia.nih.gov/health/four-types-exercise-can-improve-your-health-and-physical-ability#balance>
17. Marques-Vieira CM, Sousa LM, Severino S, Sousa L, Caldeira S. Cross-cultural validation of the Falls Efficacy Scale International in elderly: systematic literature review. *J Clin Gerontol Geriatr*. 2016;7:72-76. doi:10.1016/j.jcgg.2015.12.002
18. Yardley L, Beyer N, Hauer K, Kempen G, Piot-Ziegler C, Todd C. Development and initial validation of the Falls Efficacy Scale-International (FES-I). *Age Ageing*. 2005;34:614-619. doi:10.1093/ageing/afi196
19. Delbaere K, Close JCT, Mikolaizak AS, Sachdev PS, Brodaty H, Lord SR. The Falls Efficacy Scale International (FES-I). A comprehensive longitudinal validation study. *Age Ageing*. 2010;39:210-216. doi:10.1093/ageing/afp225
20. Dewan N, MacDermid JC. Fall Efficacy Scale-International (FES-I). *J Physiother*. 2014;60:60. doi:10.1016/j.jphys.2013.12.014
21. Greenberg SA. Assessment of fear of falling in older adults: The Falls Efficacy Scale-International (FES-I). Accessed June 22, 2020. <https://medicine.osu.edu/-/media/files/medicine/departments/orthopaedics/research/clinical-trials/ffp-fes-i.pdf?la=en&hash=17E635EACC101A11BB68537E5DD2A0B9CC014C98>
22. Visschedijk JH, Terwee CB, Caljouw MA, Spruit-van Eijk M, van Balen R, Achterberg WP. Reliability and validity of the Falls Efficacy Scale-International after hip fracture in patients aged  $\geq 65$  years. *Disabil Rehabil*. 2015;37:2225-2232. doi:10.3109/09638288.2014.1002573
23. Morgan MT, Friscia LA, Whitney SL, Furman JM, Sparto PJ. Reliability and validity of the Falls Efficacy Scale-International (FES-I) in individuals with dizziness and imbalance. *Otol Neurotol*. 2013;34:1104-1108. doi:10.1097/MAO.0b013e318281df5d
24. Berg K, Wood-Dauphine S, Williams JI, Gayton D. Measuring balance in the elderly: preliminary development of an instrument. *Physiother Can*. 1989;41:304-311. doi:10.3138/ptc.41.6.304

25. Downs S. The Berg Balance Scale. *J Physiother.* 2015;61:46. doi:10.1016/j.jphys.2014.10.002
26. Pickenbrock HM, Diel A, Zapf A. A comparison between the Static Balance Test and the Berg Balance Scale: validity, reliability, and comparative resource use. *Clin Rehabil.* 2016;30:288-293. doi:10.1177/0269215515578297
27. Suzuki M, Fujisawa H, Machida Y, Minakata S. Relationship between the Berg Balance Scale and Static Balance Test in hemiplegic patients with stroke. *J Phys Ther Sci.* 2013;25:1043-1049. doi:10.1589/jpts.25.1043
28. Beauchamp MK, Harrison SL, Goldstein RS, Brooks D. Interpretability of change scores in measures of balance in people with COPD. *Chest.* 2016;149:696-703. doi:10.1378/chest.15-0717
29. Hiengkaew V, Jitaree K, Chaiyawat P. Minimal detectable changes of the Berg Balance Scale, Fugl-Meyer Assessment Scale, Timed "Up & Go" Test, gait speeds, and 2-Minute Walk Test in individuals with chronic stroke with different degrees of ankle plantar flexor tone. *Arch Phys Med Rehabil.* 2012;93:1201-1208. doi:10.1016/j.apmr.2012.01.014
30. Romero S, Bishop MD, Velozo CA, Light K. Minimum detectable change of the Berg Balance Scale and Dynamic Gait Index in older persons at risk for falling. *J Geriatr Phys Ther.* 2011;34:131-137. doi:10.1519/JPT.0b013e3182048006
31. American Academy of Health and Fitness. Berg Balance Scale. Accessed June 22, 2020. [http://www.aahf.info/pdf/Berg\\_Balance\\_Scale.pdf](http://www.aahf.info/pdf/Berg_Balance_Scale.pdf)
32. ATS Committee on Proficiency Standards for Clinical Pulmonary Function Laboratories. ATS statement: guidelines for the six-minute walk test. *Am J Respir Crit Care Med.* 2002;166:1111-1117. doi:10.1164/rccm.166/1/1111
33. Eichinger K, Heatwole C, Heining S, et al. Validity of the 6 minute walk test in facioscapulohumeral muscular dystrophy. *Muscle Nerve.* 2017;55:333-337. doi:10.1002/mus.25251
34. Hamilton DM, Haennel RG. Validity and reliability of the 6-minute walk test in a cardiac rehabilitation population. *J Cardiopulm Rehabil.* 2000;20:156-164. doi:10.1097/00008483-200005000-00003
35. Larsen CM, Overgaard J, Kristensen MT. Inter-rater reliability and agreement of the 6-minute walk test in women with hip fracture. Accessed June 22, 2020. [http://findresearcher.sdu.dk/portal/en/publications/interrater-reliability-and-agreement-of-the-6minute-walk-test-in-women-with-hip-fracture\(eaab921e-65a4-4e56-965a-74c3a26abf35\).html](http://findresearcher.sdu.dk/portal/en/publications/interrater-reliability-and-agreement-of-the-6minute-walk-test-in-women-with-hip-fracture(eaab921e-65a4-4e56-965a-74c3a26abf35).html)
36. Overgaard JA, Larsen CM, Holtze S, Ockholm K, Kristensen MT. Interrater reliability of the 6-minute walk test in women with hip fracture. *J Geriatr Phys Ther.* 2017;40:158-166. doi:10.1519/JPT.0000000000000088
37. Rikli RE, Jones CJ. The reliability and validity of a 6-minute walk test as a measure of physical endurance in older adults. *J Aging Phys Activity.* 1998;6:363-375. doi:10.1123/japa.6.4.363
38. American College of Rheumatology. Six minute walk test (6MWT). Accessed June 22, 2020. <https://www.rheumatology.org/I-Am-A/Rheumatologist/Research/Clinician-Researchers/Six-Minute-Walk-Test-SMWT>
39. Heart Foundation. Six minute walk test (6MWT) instructions. Accessed June 22, 2020. [http://www.heartonline.org.au/media/DRL/6MWT\\_standardised\\_instructions.pdf](http://www.heartonline.org.au/media/DRL/6MWT_standardised_instructions.pdf)
40. Grato ACM, Talmelli LF, Figueiredo LC, Rosset I, Freitas CP, Rodrigues RAP. Functional dependency of older individuals and caregiver burden [in Portuguese]. *Rev Esc Enferm USP.* 2013;47:137-144. doi:10.1590/S0080-62342013000100017
41. American Psychological Association. Zarit Burden Interview. Accessed June 22, 2020. <http://www.apa.org/pi/about/publications/caregivers/practice-settings/assessment/tools/zarit.aspx>
42. Seng BK, Luo N, Ng WY, et al. Validity and reliability of the Zarit Burden Interview in assessing caregiving burden. *Ann Acad Med Singapore.* 2010;39:758-763.
43. Fried LP, Tangen CM, Walston J, et al. Frailty in older adults: evidence for a phenotype. *J Gerontol A Biol Sci Med Sci.* 2001;56:M146-M156.
44. Rockwood K, Song X, MacKnight C, et al. A global clinical measure of fitness and frailty in elderly people. *CMAJ.* 2005;173:489-495. doi:10.1503/cmaj.05005
45. Ekerstad N, Swahn E, Janson M, et al. Frailty is independently associated with short-term outcomes for elderly patients with non-ST-segment elevation myocardial infarction. *Circulation.* 2011;124:2397-2404. doi:10.1161/CIRCULATIONAHA.111.025452
46. Grossman D, Rootenberg M, Perri GA, et al. Enhancing communication in end-of-life care: a clinical tool translating between the Clinical Frailty Scale and the Palliative Performance Scale. *J Am Geriatr Soc.* 2014;62:1562-1567. doi:10.1111/jgs.12926
47. Moorhouse P, Rockwood K. Frailty and its quantitative clinical evaluation. *J R Coll Physicians Edinb.* 2012;42:333-340. doi:10.4997/JRCPE.2012.412
48. Laerd Statistics. Dependent *t* test using SPSS statistics using SPSS statistics. Accessed June 22, 2020. <https://statistics.laerd.com/spss-tutorials/dependent-t-test-using-spss-statistics.php>
49. Laerd Statistics. Wilcoxon signed-rank test using SPSS statistics. Accessed June 22, 2020. <https://statistics.laerd.com/spss-tutorials/wilcoxon-signed-rank-test-using-spss-statistics.php>
50. Perera S, Mody S, Woodman R, Studenski S. Meaningful change and responsiveness in common physical performance measures in older adults. *J Am Geriatr Soc.* 2006;54:743-749.
51. Warren S, Kerr JR, Smith D, Schalm C. The impact of adult day programs on family caregivers of elderly relatives. *J Community Health Nurs.* 2003;20:209-221. doi:10.1207/S15327655JCHN2004\_02
52. Zarit SH, Kim K, Femia EE, Almeida DM, Klein LC. The effects of adult day services on family caregivers' daily stress, affect, and health: outcomes from the Daily Stress and Health (DaSH) Study. *Gerontologist.* 2014;54:570-579. doi:10.1093/geront/gnt045
53. Trochim W, Donnelly JP, Arora K. *Research Methods: The Essential Knowledge Base.* 2nd ed. Cengage Learning; 2016.