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ORIGINAL RESEARCH

Lessons learned: feasibility and acceptability of a telehealth-delivered exercise intervention for rural-dwelling individuals with dementia and their caregivers

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ABSTRACT

Introduction: Until dementias can be prevented or cured, interventions that maintain or maximize cognitive and functional abilities will remain critical healthcare and research priorities. Best practice guidelines suggest that individualized exercise programs may improve fitness, cognition, and function for people with mild to moderate dementia; however, few high quality exercise intervention trials exist for this population. Increasingly, telehealth is being used to improve the delivery and availability of healthcare services for individuals living in rural areas, including exercise. This article describes the feasibility of a telehealth-delivered exercise intervention for rural, community-dwelling individuals diagnosed with dementia and their caregivers.

Methods: A mixed-methods two-phase exploratory approach was used. In phase 1, Rural and Remote Memory Clinic (RRMC; Saskatoon, Saskatchewan, Canada) patients and caregivers were surveyed about current exercise levels, perceptions about exercise, exercise preferences, and perceived barriers to exercise; community resources, acceptability of telehealth exercise interventions, and physical activity and exercise attitudes (Older Persons Attitudes Toward Physical Activity and Exercise Questionnaire). Data were analyzed using descriptive statistics and factors associated with willingness to participate in a telehealth exercise intervention were explored using hierarchical linear regression. In phase 2, acceptability, practicality, and implementation were examined. Two RRMC patient–caregiver dyads completed a 4-week exercise program delivered via telehealth. Observed engagement in the telehealth-based exercise intervention, using a revised version of the Menorah Park Engagement Scale (by Hearthstone Alzheimer Care), and attendance were monitored. Patient–caregiver dyads were interviewed at the end of the intervention phase and

completed a telehealth and intervention satisfaction questionnaire. Interviews were thematically analyzed and questionnaire data were analyzed descriptively.

Results: Phase 1: Survey response rate was 50% (n=77). Patients (n=42) and caregivers (n=35) were equally likely to express interest in participating in the telehealth-based intervention. Willingness to participate in group exercise was the only significant predictor of willingness to participate in a telehealth-based intervention, accounting for 24.4% of the variance (F-statistic=16.14, p<0.001). Phase 2: Attendance rates were high for the telehealth-delivered exercise sessions. Engagement scale data indicated that the caregivers helped the patient participants during the intervention and that, overall, all participants were engaged in the target activity during the sessions. Ease of getting to the telehealth department, how well privacy was respected, ability to focus without distraction due to telehealth, ability to engage with group, and ability to engage with facilitator over telehealth were rated highly, as was the overall intervention experience. Telehealth voice and visual quality, ease of room set-up and conduciveness of the room to exercise were rated as good. Thematic analysis found that both dyads liked participating in the intervention together as a couple, and that participating in an exercise intervention with persons who were in a similar situation was deemed beneficial.

Conclusions: Study results identified that although there are barriers to overcome, the development and evaluation of telehealth-delivered exercise interventions is a timely and important research activity that has the potential to facilitate improved healthcare services for individuals with dementia and their caregivers.

Key words: caregivers, dementia, exercise, feasibility studies, intervention, patient, survey, telemedicine.

Introduction

An estimated 103 728 Canadians developed dementia due to Alzheimer's disease or other irreversible dementias in 2008, and this number is expected to more than double to in excess of 257 811 people diagnosed per year by 2038[1]. Persons with dementia have decreased quality of life as they become dependent on others for activities of daily living. This functional dependence, or loss of independence, is a significant contributor to the annual cost of dementia care in Canada[1]. The expected increase in incidence and prevalence of dementia will result in amplified demands for care, straining Canada's capacity to provide health services, and the overwhelmed healthcare system will shift care to community settings[1]. Until dementias can be prevented or cured, interventions that maintain or maximize cognitive and functional abilities in this population remain critical Canadian healthcare and research priorities.

Dementia risk increases with increasing age. A national study of prevalence and risk factors for dementia in Canada[2] found the prevalence increased from 8% in those ≥ 65 years to 34.5% in those ≥ 85 years. Because the incidence of dementia increases with age, the rising prevalence of dementia is of particular concern for certain jurisdictions; for example, the province of Saskatchewan has a high proportion of seniors[3], and a high proportion of Saskatchewan seniors live in rural settings[3]. Providing services and supports to individuals with dementia who live in rural communities is a particular challenge and necessitates travel of long distances to access formal services in urban areas[4-6].

Interventions provided through novel delivery methods, such as telehealth, have the potential to diminish the disparity of care for community-dwelling individuals with dementia living in rural and remote areas. Increasingly, telehealth is being used to improve the delivery and availability of healthcare services, including exercise programs, to a wide variety of patient populations, such as those with cardiac problems[7], chronic diseases[8] and mental health concerns[9]. Although

exercise interventions via telehealth for people with dementia have not yet been researched, studies have found that telehealth assessments of dementia patients yielded similar results to in-person assessments[10,11]. In addition, research suggests that two-way interactive video technology to monitor medication compliance in people with mild dementia is feasible and did not induce neuropsychiatric symptoms such as paranoia, delusions, or agitation[12]. These studies suggest that a telehealth delivery method for exercise interventions may be feasible for community-dwelling individuals diagnosed with dementia.

Exercise and physical activity (physical activity) play a critical role in promoting healthy aging and in the management of older adults with chronic illness. Engaging in health promotion behaviors, such as following a healthy diet, engaging in regular exercise and physical activity, and participating in social and intellectual activities may reduce the overall risk of developing dementia later in life[13]; these are important health-promoting behaviors even after a diagnosis of dementia[14]. A growing body of epidemiological evidence indicates that a history of exercise or physical activity may delay the onset and progression of dementia in older adults[15,16] , and a meta-analysis ascertained that older adults without cognitive impairment had a striking improvement in executive functioning after participation in aerobic exercise[17]. Neuroscience research breakthroughs have shown that aerobic exercise delays β-amyloid accumulation in mice genetically engineered to exhibit Alzheimer's disease neuropathological changes and that transgenic mice engaging in aerobic exercise demonstrated improved memory and learning[18,19]. Aerobic exercise has been found to stimulate gene expressions of nerve growth factors important for neurogenesis, production, and function of neurotransmitters, and synaptogenesis, particularly in the hippocampal region, where Alzheimer's disease pathology is severe[19]. In older adults without dementia, aerobic exercise spares brain tissue loss and increases cerebral vasculature and blood flow in frontal, parietal, and temporal cortices[20].

Although exercise appears to reduce risk of dementia and is considered to be an important non-pharmacologic intervention for people with dementia, few high quality studies have examined exercise interventions for people with dementia. Best practice guidelines and cumulative evidence suggest that physical activity at an intensity level adapted to a person's overall physical capacities should be promoted as part of a 'healthy lifestyle' for older individuals with memory loss and that individualized exercise programs should be encouraged to improve fitness, cognition, and day-to-day function for people with mild to moderate dementia[14,21,22]. In addition, it is well documented that caregivers of people with dementia are at high risk for a range of health problems, including depression and increased stress related to caregiving[23,24]. Symptoms related to these problems may also be ameliorated with exercise.

Clearly, exercise interventions for people with dementia and their caregivers are important, but rural areas often lack the resources to support the development and implementation of research-based interventions. Disproportionate attention has been paid by governments, policy makers and the media alike to the care in the last two years of life of those with dementia; until recently, very little consideration has been given to newly diagnosed individuals or those in the earlier stages of dementia[1]. In particular, interventions that can positively affect quality of life, health, and wellbeing, or interventions that may prevent functional decline in the early stages, have received very little attention. Moreover, telehealth service delivery may mitigate the many unique challenges of providing exercise interventions to individuals with dementia who reside in rural or remote areas. The purpose of this feasibility study was to examine the demand, acceptability, practicality, and implementation of telehealth-delivered exercise for rural, community-dwelling individuals diagnosed with dementia and their caregivers.

Methods

A mixed-methods exploratory approach was used. A feasibility study encompasses any sort of study that assists investigators to assess whether the ideas, methods, protocols, and findings can be shaped to be relevant and sustainable, and

whether an intervention is appropriate for further testing[25]. This feasibility study was divided into two main phases. Phase 1, survey development and administration, was used to examine the demand aspect of feasibility. Phase 2 focused on the acceptability, practicality, and implementation aspects of feasibility of a 4-week telehealth-delivered exercise intervention.

Context

The province of Saskatchewan is located in central Canada and has an area of 651 035 km^2 and a population of 1 072 082[26]. Census data from 2011 indicates that a higher proportion of seniors aged 65 years and older live in towns (21.3%), villages (20.1%), and recreational villages (25.8%), compared to cities (14.0%), and that 39.1% of the population is classified as 'rural and small town' (living outside of centers of 10 000 or more population)[27]. In 1999, Saskatchewan Health initiated a provincial telehealth system to help address the challenges of health delivery in rural and remote areas. In 2011, there were 163 telehealth devices in 76 communities across the province.

The Rural and Remote Memory Clinic (RRMC), in existence since 2004, is an interdisciplinary (neurology, neuropsychology, nursing, physical therapy), 'one-stop' (one-day) clinic based in Saskatoon that integrates telehealth in assessment and follow-up. The RRMC was designed to provide dementia specialty diagnoses for community-dwelling rural and remote residents in Saskatchewan who live more than 100 km from tertiary care[28,29].

Phase 1: Demand for telehealth exercise

Phase 1 comprised developing and administering a survey to examine the demand aspect of feasibility. Demand refers to the extent to which a new idea, program, process, or measure is likely to be used[25]. As an initial step, semi-structured interviews were conducted with 16 consecutive RRMC patients and their caregivers to inform survey development to assess the above issues. Several constructs constituted the interview questions: current and past exercise habits, participation and levels; spousal or peer influence on exercise habits; attitudes of self and others toward exercise; preference for and barriers to exercise; feelings about group exercise; access to and feelings about telehealth exercise; potential alternatives to telehealth for group exercise, such as availability of home computer; and availability and awareness of exercise resources in the community.

Interviews were recorded verbatim and thematic trend analysis was used to inform survey questions designed to assess the above issues. Thematic analysis, a qualitative data analysis method, is used to identify, analyze, and report patterns (themes), and does not derive from nor is tied to a particular epistemological or theoretical position[30,31]. The transcripts were read and re-read by two of the authors individually, and recurring themes (codes) were linked to the data using an inductive approach. Theme frequencies and co-occurrences were captured, and similarities, patterns, and consistency of the themes were reviewed. This process was repeated until consensus was reached regarding the themes and the theme reflected the interview transcripts as a whole. The survey was developed in an iterative fashion by the research team, using the literature and semi-structured interview results. The first draft of the survey was revised based on pilot administration to four patients and their caregivers. The final survey comprised Likert-type and open-ended questions that asked about (1) level of interest in participating in group and telehealth-delivered exercise programs; (2) knowledge of physical activity and exercise resources available in the community; (3) the types of exercises respondents would like to engage in or would never engage in; and (4) current and previous engagement in light, moderate, or vigorous physical activity or exercise.

Attitudes toward physical activity and exercise were also examined using the four sub-scales from the Older Persons Attitudes Toward Physical Activity and Exercise Questionnaire[32]. Self-administered survey packages that included a detailed cover letter, a consent form, the questionnaire package, the Older Persons Attitudes Toward Physical Activity and Exercise Questionnaire, and a self-addressed stamped envelope were mailed to all RRMC

patients diagnosed with dementia who were still ambulatory and living in the community and their caregivers (N=154). To improve response rates, several strategies were used: multiple reminders, stamped return envelopes, clearly indicated assurances of confidentiality, and a personalized cover letter. Questionnaire data were analyzed using descriptive statistics (modes, medians, ranges), and factors associated with willingness to participate in a telehealth intervention for these caregivers and patients using hierarchical linear regression were explored.

Phase 2: Acceptability, practicality, and implementation of a telehealth-delivered exercise program

Phase 2 focused on the acceptability, practicality, and implementation aspects of feasibility of a 4-week telehealth delivered exercise intervention. Acceptability refers to examining how the intended individual recipients, both targeted individuals and those involved in program implementation, react to the intervention[25]. Practicality explores the extent to which an intervention can be delivered when resources, time, commitment, or some combination are constrained in some way[25]. Implementation is concerned with the extent, likelihood, and manner in which an intervention can be implemented as planned and proposed[25]. To examine acceptability, practicality, and implementation, recorded attendance were recorded; participant engagement during the intervention was recorded; interviews with the patient and caregiver dyads after the intervention were conducted; participant dyads completed a telehealth and intervention satisfaction questionnaire; feedback from the Telehealth Saskatchewan Program Manager and telehealth coordinators regarding the proposed intervention was sought; and the processes followed in setting up the telehealth exercise program and the challenges encountered were documented.

Rural and Remote Memory Clinic patients and caregivers who expressed interest in participating in a telehealth-delivered exercise program on the survey were contacted regarding participation. Only patients who had a caregiver who could accompany them to the exercise session, who had attended the RRMC for a follow-up visit within the past 3 months, and who were deemed appropriate and physically able to safely participate in an exercise program were invited to participate. Patients and caregivers had to provide written documentation of medical clearance from their family physician in advance of participation. Prior to the start date of the exercise program, two of the investigators (physiotherapist and neuropsychologist) traveled to each participant's home community and completed a pre-intervention assessment consisting of a past medical history and medication history review, a health-related quality of life questionnaire, upper and lower extremity strength and flexibility, mobility, endurance, evaluation of balance, determination of extent of current physical activity and exercise levels, and blood pressure in response to positional changes. These measures were completed by both the patient and caregiver participants. Neuropsychological assessments completed with the patient participants included a measure of speed of mental processing and ability to inhibit an automatic response. In addition, the caregiver and patient participants were educated regarding the intervention: what to expect during the intervention; telehealth; exercise intensity monitoring via rate of perceived exertion and heart rate range; exercise safety, including safe movements during warm-up and cool-down; and exercise precautions.

The exercise program was led by a trained research assistant from a telehealth suite in the Saskatoon Regional Health Authority and the patients and caregivers participated in the exercise program from a telehealth suite in a rural regional health authority (RHA). The remote research assistant training included training about safety and emergency procedures at both sites, and monitoring of participants during exercise via telehealth. A second research assistant attended all the sessions in the telehealth suite in Saskatoon and evaluated observed engagement in the telehealth-based exercise intervention, using a modified version of the Menorah Park Engagement Scale[33] (by Hearthstone Alzheimer Care). One of the investigators (a physiotherapist) attended the first two telehealth sessions with the patients and caregivers to (1) provide on-site caregiver and patient training, (2) evaluate caregiver participants' ability to set up the room and equipment in a safe manner using of proper body mechanics), (3) monitor for participant understanding of instructions and follow-through abilities, and (4) monitor the ability of caregiver participants to

exercise within an appropriate and safe exertion range and to monitor their partner. The exercise program consisted of a 10-minute warm-up period, 20–25 minutes of aerobic exercise using an upper extremity cycle ergometer (Monark Compact Rehab 871E), and a 10-minute cool-down period. The upper extremity cycle ergometer was chosen as the mode of exercise for safety reasons. With this mode of exercise the patient and caregiver would be in a seated position during exercise. Participants engaged in the exercise program twice a week for 4 weeks.

After the 4 weeks, the measures were completed again and interviews were conducted with the patient and caregiver participants. The interviews were audiotaped and transcribed, and thematic analysis[30,31] of the transcripts was conducted in a similar manner as previously described. The participant dyads completed a telehealth and intervention satisfaction questionnaire. The questionnaire was modified from the standard telehealth questionnaire that was routinely used in the RHA to evaluate telehealth services. Additional questions relating to the physical and social aspects of the exercise intervention were included. The questions are ranked using a four-point scale: poor=1, fair=2, good=3, excellent=4. The questionnaire data were analyzed using descriptive statistics (modes, medians, ranges).

Last, prior to the development of the telehealth-delivered exercise program, two of the investigators consulted with and sought approval and support from the Telehealth Saskatchewan Program Manager and the telehealth coordinators from two RHAs regarding the feasibility and the potential challenges of the proposed pilot exercise program.

Ethics approval

The research was approved by the University of Saskatchewan Behavioural Research Ethics Committee (BEH #09-184) and Biomedical Research Ethics Committee (BIO #10-119). All patients and caregivers signed an informed consent for their participation in phase 1 or phase 2. Standard RRMC procedure is to have a family member to witness the consent protocol for all patients, and patients are informed that a family member is asked to co-sign their consent form.

Results

Phase 1: Demand for telehealth-delivered exercise – survey results

Seventy-seven of the 154 individuals surveyed responded (response rate=50%). Of the 77 survey respondents, 51 (66%) indicated an interest in participating in an exercise program conducted via telehealth. Patients (n=42) and caregivers (n=35) were equally likely to express interest in participating in the telehealth-based intervention.

Interestingly, attitudes toward physical activity and exercise, as measured with the four sub-scales from the Older Persons Attitudes Toward Physical Activity and Exercise Questionnaire[32], did not predict willingness to participate in the telehealth intervention. Effect sizes of associations were trivial to small, and all were statistically non-significant: belief in benefits of exercise for tension release r_{pb}(point biserial correlation coefficient)= 0.003; belief in benefits of exercise for health promotion r_{pb}=0.108; belief in need for vigorous exercise for benefit r_{pb}=–0.111, and belief in the social benefits of exercise r_{pb}=–0.106. Similarly, travel distance to a telehealth suite had a small association with willingness to participate in a telehealth intervention (r_{pb}=0.188, p>0.05), as did having a computer at home (r_{pb}=–0.213, p>0.05). Willingness to participate in a telehealth-based intervention was most associated with willingness to participate in any group-based exercise, and when entered into a hierarchical linear regression (with above-listed predictors), willingness to participate in a group exercise was the only significant predictor of willingness to participate in a telehealth-based intervention, accounting for 24.4% of the variance (F-statistic=16.14, p<0.001).

Phase 2: Acceptability, practicality, and implementation of a telehealth-delivered exercise program

Two patients, one with Alzheimer's disease and one with fronto-temporal dementia, and their caregivers (two patient–caregiver dyads) participated in the telehealth-delivered

exercise program. One dyad travelled a 48 km round trip to telehealth and the other dyad travelled 95 km – both dyads were at their summer cabins during the intervention timing. Dyads were reimbursed for their travel and parking expenses. Because of the timing of the intervention phase (summer months), no other participant dyads were within a reasonable driving distance of the rural telehealth suite and/or were available for the entire intervention period, and so could not be recruited.

Attendance: Attendance rates were high, with one patient–caregiver participant dyad attending 100% of the sessions. The caregiver of the second patient–caregiver participant dyad was not able to attend one of the sessions due to a scheduling conflict, but a family friend attended this session in her place with the patient.

Engagement: Data from the Menorah Park Engagement Scale[33] indicated that the caregivers did help the patient participants during the intervention session, adjusting the resistance on the cycle ergometer and monitoring exercise intensity. All participants were engaged in the target activity overall during the exercise sessions, no patient participants tried to leave the telehealth suite and patient participants acted appropriately during all the sessions. One patient participant listened and expressed pleasure, via smiling and laughing, for more than half of the activity for all sessions, while the other patient participant (fronto-temporal dementia diagnosis) listened and expressed pleasure, via smiling and laughing for up to half of the activity for some of the exercise sessions.

Telehealth feedback: Median responses for voice quality of telehealth and visual quality of telehealth were rated as 3.0 (good) and 3.5 (good to excellent). The respondents rated very highly the ease of getting to the telehealth department, how well privacy was respected, ability to focus without distraction due to telehealth, ability to engage with the group, and ability to engage with the facilitator over telehealth (median = 4.0, excellent). Ease of room set-up and the conduciveness of the room to exercise were rated as good (median = 3.0), and the median rating for the ability to connect socially with others over telehealth was 3.5 (good to excellent). The overall intervention experience was also rated highly, with a median rating of 3.5 (good to excellent).

Intervention feedback: A common thematic comment from the post-exercise intervention interviews was related to participating in the intervention as a couple. While not directly asked during the post-intervention interviews, both couples mentioned that it was very helpful to have an exercise intervention for persons who were in a similar situation:

> *I feel very pleased to be with other people who have the same problem. Not ashamed, but it's just nice that there's something being done about this problem – that we have a place to go and try to work at it. And it has real knock offs too 'cause now that we've started this I walk faithfully at home. (Patient 1)*

> *Making friends with people who are in the same situation which is huge. (Caregiver 2)*

When queried about the use of telehealth videoconferencing technology, both couples stated that it was easy to use and:

> *Everyone knows TV nowadays, it's just like being there. (Caregiver 2)*

Although reported to be an enjoyable experience, the utility of the exercise intervention appeared to depend on the fitness level of the participant. For one couple, the intervention was helpful and appeared to generalize to the couple's daily life:

> *Benefitted me because I haven't been much of an exerciser until recently. And I do it faithfully now. (Patient 1)*

> *… it didn't do me a damn bit of harm… Yeah it did me good. Good exercise program gets your stamina going.* (Caregiver 1)

One caregiver participant, who was a regular exerciser, commented that having only one specific exercise mode (cycle ergometer) was somewhat limiting:

> *I liked it, I would have enjoyed a degree of variety. It's a big time commitment for just a little bit of a body part. (Caregiver 2)*

A cycle ergometer was not purchased for the facilitator to cycle during the sessions, and it was clear early in the intervention that this was an oversight. In fact, this problem was specifically mentioned when participants were queried about what to change:

> *We were able to hear [facilitator name] just fine because she had the music I think she had more difficulty hearing us. But we just sorta tried to interact with each other and we sorta forgot that [facilitator name] was even there. You don't have to even do it over telehealth unless the person is doing the same thing. (Caregiver 2)*

Telehealth Program Manager's and Coordinators' feedback: The Telehealth Saskatchewan Program Manager supported the intervention in principle, but had some concerns regarding the logistics of accessing the RHA staff. Because Telehealth Saskatchewan's core objectives are to provide improved access to specialist care, support rural healthcare practices, and facilitate both professional health education and public health education through the use of high-quality videoconferencing and other emerging technologies across Saskatchewan Health's secure IP network, the Manager did feel there were obvious linkages between Telehealth Saskatchewan's program objectives and the exercise intervention. Thus, he was willing to facilitate the planning and implementation of the pilot study. Similarly, the telehealth coordinators of two RHAs were in support of the pilot intervention. The first thing needed was to find an acceptable time at the Saskatoon site to run the 4-week program. Once this was arranged, connections were made with the coordinator at the rural telehealth site. The coordinator was willing to make the telehealth suite available for the program, but was not able to provide any telehealth staff to assist with the session set-up or in-person monitoring. Thus, the coordinator trained one of the investigators regarding the logistics and telehealth equipment set-up, and the investigator documented the procedures in a binder and in turn trained one of the caregiver participants. Storage of the cycle ergometers proved problematic initially, as the telehealth suite had limited space, did not have storage capabilities, and was used by various individuals throughout the day for a variety of purposes. This necessitated additional negotiation with the telehealth coordinator, and the cycle arm ergometers were able to be kept on rolling carts within the suite for the 4 weeks, with the promise of removing the equipment immediately after the program was completed.

Discussion

Telehealth has been used previously for programs for neurological populations and caregivers, including caregivers of individuals with dementia[34]. Benefits of telehealth have been documented[7,8,11,29] and include improved access to health services, cost-effectiveness, enhanced educational opportunities, enhanced social support; and improved health outcomes, quality of care, and quality of life. About two-thirds of the RRMC patient and caregiver respondents indicated an interest in participating in an exercise program conducted via telehealth, with patients and caregivers equally likely to express interest. Those who indicated willingness to participate in group exercise were more likely to indicate willingness to participate in telehealth-based exercise. These findings suggest that telehealth-based exercise is something that RRMC patients and caregivers would consider engaging in, particularly those who prefer group exercise.

Telehealth delivery for this feasibility project used existing infrastructure and support of Telehealth Saskatchewan, and no major technical problems that interfered with program delivery were experienced over the 4 weeks. Visual and audio quality were rated good to excellent, but only two telehealth sites were involved. Any future research or programs using telehealth-facilitated exercise intervention programs for community-dwelling individuals with dementia will require further investigation of additional resources and supports that are necessary to ensure seamless program delivery and safety of the participations, in particular with larger number of participants and if the number of telehealth

sites is increased. As well, the screening of participants prior to enrolment in the program is critical for safety and engagement reasons; however, this aspect was time- and resource-intensive, with the investigators traveling to the participants' home communities. To what extent pre-intervention screening of participants can occur via telehealth has yet to be determined.

The exercise intervention program was administered without any supplementary telehealth staff support, as this additional human resource could not be made available. This necessitated the assignment of roles typically assigned to a telehealth staff member to caregiver participants who were cognitively and functionally capable of taking over. For example, caregivers needed to obtain the key to the telehealth suite; set up the telehealth equipment; set up the room for the exercise sessions, including moving the cycle ergometers from a storage cart to a table; and monitor patient participant during the exercise session, while also self-monitoring. Although this required additional caregiver participant training, similar to others have reported[35], providing an intervention for patient and caregiver dyads was acceptable and preferred.

Storage of the exercise equipment proved to be an initial obstacle. Keeping the equipment within the telehealth suite was deemed necessary to decrease the burden on the caregiver participants, as they were responsible for setting up the room for the exercise sessions. The issue of equipment storage was not anticipated, however, it can be a detriment to program implementation and administration. Although the telehealth suite used was dedicated telehealth space, and a short-term solution was negotiated for the purposes of the study, space and storage issues can be potential deterrents. For example, in some Saskatchewan RHAs it is not uncommon for telehealth equipment to be stored in a closet. Not surprisingly the findings indicate less satisfaction ('good') with the ease of room set-up and the room being conducive to exercise. To sustain consistent and longer term telehealth exercise interventions, strategies will need to be implemented and resources will need to be garnered to have dedicated space for the equipment and for the intervention.

Regardless of the issues with the room and set-up, attendance rates were high, and the ability to focus without distractions due to telehealth, with the facilitator over telehealth, with the group and the exercise, and the overall experience, were all rated highly.

This feasibility study focused on several priority areas identified in published dementia strategies reports[1]: early treatment, support of individuals and their caregivers, services in the earlier phases of the care continuum, education and training, and research. Seniors who live in rural and remote regions are a typically underserviced population[36]. Determining what is feasible and acceptable with respect to exercise interventions is crucial, as exercise is one of the few activities that people in the earlier stages of dementia can engage in to maintain function. Exercise not only has clear health benefits, but also has the potential for cost savings by reducing care needs.

Conclusions

Prior to undertaking a dyadic exercise intervention via telehealth for people with dementia and their caregivers, it is important to determine potential challenges and barriers, and to assess acceptability and feasibility. Study results identified that although there are barriers to overcome, the development and evaluation of telehealth-delivered exercise interventions is a timely and important research activity that has the potential to facilitate improved healthcare services for individuals with dementia and their caregivers.

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