Using Motivating Reminiscence Technology to Encourage Physical Activity and Improve Balance and Mobility for Residents in Long Term Care.

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Project Protocol

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1. Project Team

Elizabeth Bruyère Primary Investigator:

Dr. T Mark Campbell, MD
Clinician Investigator
Elizabeth Bruyère Hospital
tcampbell@bruyere.org

Project Lead:

Susan Zorz
Director of Resident Services
The Glebe Centre Inc.
SZorz@glebecentre.ca
Ph. 613.238.2727 X 323
Fx. 613.238.4759

Co-Investigators

Becky MacLeod
Recreation Therapist
The Glebe Centre Inc
613-238-2727
bmacleod@glebecentre.ca

Suja Thomas
Coordinator of Nursing Programs
The Glebe Centre Inc
sthomas@glebecentre.ca

Sean Dellaire
Research Associate
The Glebe Centre Inc

Kathryn L May, NP
Nurse Practitioner
The Ottawa Hospital
Kmay@toh.ca

Study Administration Assistant:
Katherine Reilly
University of Ottawa
613-562-5800 x8238
kreilly@ohri.ca

2. Title

Using Motivating Reminiscence Technology to Encourage Physical Activity and Improve Balance and Mobility for Residents in Long Term Care.

3. Background

Physical activity has numerous benefits for physical well-being and function in the elderly[2]. Maintaining the functional independence of Long-Term Care (LTC) residents alleviates the ever-increasing demands placed on front line staff. Physical activity also provides an opportunity for LTC residents to engage in valued activity[3]. However, many LTC residents rarely or never engage in regular physical activity due to numerous barriers such as lack of exercise equipment or related resources and lack of interest or motivation[4]. For these reasons, adults residing in LTC facilities have been shown to have drastically lower physical activity levels[5]. Those who do engage in regular physical activity maintain functioning and reduce negative health outcomes including but not limited to deconditioning, falls and cognitive decline[1]. For the positive effects of physical activity to last, it is essential that training becomes routine, meaning that easy access and proximity to training opportunities as well as the provision of engaging modalities is of great importance.

A stationary bicycle is a type of exercise equipment that resembles a bicycle without wheels and can engage a user in a similar way standard bicycling can. Stationary cycling is one example of a physical activity modality that provides opportunities for meaningful activity for LTC residents. Advantages of stationary cycling include limited space requirements, lower risk of harm or resources compared to activities such as swimming or walking outside with a population with dementia or mild cognitive impairment. Balance control has been shown to be less deteriorated for older individuals that engage in outdoor cycling activity[7,8] perhaps due to an observed improvement in muscle strength and power with parallel increases in walking speed and other functional abilities[9]. Cycling activity is also beneficial for maintaining cognitive performance across multiple domains for older institutionalized individuals[6]. One of the challenges associated with stationary physical activity however is that it may be perceived as dull or disengaging. Novel ways to engage older adults is therefore of great importance in order to maintain a regular fitness program.

Reminiscence is defined as inducing a vocal or silent recall of past activities, events, and experiences in the life of a person by using tangible prompts[10], has been shown to be effective in improving cognitive functions while reducing depressive symptoms[11]. The ability to select specific virtual cycle trips according to the users' wishes and memories may increase reminiscence for that individual and, when coupled with a stationary cycling intervention, increase motivation for that physical activity.

The use of jDome BikeAround provides older adults in LTC an opportunity to engage in a motivating reminiscence activity that is coupled with physical activity that may have positive impact on maintaining physical and cognitive abilities thereby maintaining function and reducing fall risk.

4. Rationale

One of the biggest challenges faced in LTC is to offer meaningful activities to residents. The jDome BikeAround system provides an ideal opportunity to explore the impact of targeted, specific activity interventions for people who have significant cognitive issues and other chronic health conditions and disabilities. This specific system has never been examined within the literature or any small scale published studies of the benefit of the BikeAround system, highlighting the need to examine this system in a controlled study.

The BikeAround uses Google Street View, a stationary bike and a domed screen (Figure 1). Residents are seated in front of the screen; their destination is typed into the computer and when loaded the image appears on the screen. Using pedals on the bike they can propel themselves down the street, steer and change direction as they wish. Residents are able to visit familiar places anywhere in the world or travel to places they have always wanted to visit. Discussion of past activities, events and experiences will be aided by visited locations and conversations with cycle hosts (i.e. trained staff/volunteers). We will use a mixed methods approach to explore the feasibility and impact of our individualized, personalized structured programs.

The BikeAround system is an innovative program that encourages reminiscence, physical and cognitive stimulation and is a fun activity that promotes positive, interactive experience. This project aims to identify the physical benefits of using a jDome BikeAround reminiscence physical activity program for LTC residents.

Figure 1: jDome BikeAround Set-up.
Image source: https://www.camanio.com/us/products/bikearound/

5. Objectives

1. Determine whether there are any effects on outcome measures of balance, mobility and fall risk reduction from the addition of jDome BikeAround
2. Determine whether reminiscence is facilitated through the observation of locations from jDome BikeAround.
3. Determine feasibility of integrating the technology into care on the units at the Glebe Centre.

6. Hypotheses

1. Residents will have an improvement in their balance, mobility, and fall risk as shown by the physical outcomes due to an enjoyable interaction with the jDome BikeAround that stimulates reminiscence and increased physical activity for residence at the Glebe Centre;
2. The reminiscence is facilitated through the observation of locations from the jDome BikeAround;
3. Integrating the jDome BikeAround technology into care at the Glebe Centre is feasible;

7. Outcomes

Primary Outcomes

1. Feasibility
    a. The ability to enroll 30 participants from The Glebe Centre
    b. Number of participants who completed the protocol
    c. Number of adverse events

2. Physical Outcome Measures (Appendix A)
    a. Tinetti Performance-Oriented Mobility Assessment (POMA) scale

Secondary Outcomes

1. Participation (Appendix B)
    a. Sessions attended
    (Reasons for not attending scheduled sessions)
    b. Total number of sessions
    c. Total time per session
    d. Distance traveled
    e. Wong Baker Scale to evaluate satisfaction
    f. Resistance
2. Qualitative feedback/field notes (Appendix C)
3. Physical Outcomes
    a. Knee Range of Motion
    b. Two Minute Walk Test (TMWT)
4. Chart Data from the CIHI quarterly reports, RAI-MDS and Activity-PRO reporting mechanisms. (Appendix D)
    a. Number of falls during previous year
    b. Cognitive Performance Scale (CPS)
    c. Revised Index of Social Engagement (RISE)

8. Methods

1. Study Design

This research project will use a cross-over pre-post study design (Appendix E) to collect mixed methods data for up to 30 participants. Each phase will last 6 weeks. A washout phase (phase 2) will allow the residents to also serve as their own comparison groups. The washout period is intended to allow activity levels to return to baseline between the two phases.

2. Study population, sample selection/consent process and sample size justification

The study population will consist of residents from the 254-bed Glebe Centre Residence (Ottawa, ON). Recruitment of the participants will commence with a notification going out through the Glebe Centre Newsletter. The small paragraph (Appendix F) will inform readers that a research project will be underway and may be appropriate for them/their resident. There will also be a poster put up in the main foyer to advertise the study (Appendix N). The poster was initially presented at the 2018 Regional Geriatric Annual General Meeting and will be repurposed as an advertisement tool. Contact information for the research team will be included if more information is required.

We will aim to recruit participants of varying age groups (though participants must be ≥ 18 years), sex/gender, and who are able to complete the outcome measures (Section 7, Outcomes).

Inclusion Criteria:

a. Scott fall risk of 2-17 (this is the current range used by the Glebe Centre, there have been 0 falls during transportation to the equipment and during each session of the BikeAround system)
b. Sufficient visual abilities to observe images on the domed screen
c. Able to comprehend and communicate in English.
d. Adequate attentional capacity to remain focused on the pedalling task.
e. Minimum height requirement of 5’2” or 157cm in order to successfully fit the BikeAround system’s stationary bike.

We will exclude residents with the following, as determined by the Glebe Centre healthcare team:

- Physical limitations (as determined by the Glebe Centre healthcare/physiotherapy team) that prevent use of the jDome bike.
- Cognitive impairment (as determined by the Glebe Centre healthcare/physiotherapy team)
    - Inability to sustain attention
    - Inability to follow one-step commands.
- Known behavioural abnormalities (e.g. overly aggressive behavior) that in the opinion of the clinical care team might impede any meaningful participation in the project
- Those who are in the opinion of attending physician or clinical team too unwell to participate in the project
- Fully unable to complete outcome measures indicated (Section 7, Outcomes)

Late exclusions may occur if the resident's condition declines after providing consent such that they then meet exclusion criteria.

Inclusion and exclusion criteria for participation will be made known to a member of the resident's primary circle of care who will inform potentially eligible residents of the opportunity to participate in the study. This staff member will ask if the resident would like to provide contact information to a member of the research team (who will not be a part of the primary circle of care) for the purpose of discussing study participation in more detail (see Recruitment Script for Staff; Appendix G). Agreement to discuss the project with a research team member will be documented on the patient's chart. In the event that the investigators are part of the resident's circle of care, they will neither be recruiting participants nor obtaining consent.

If the resident agrees to provide their name and room number, the member of the circle of care will forward the resident name and room number to the research assistant (RA) in a secure manner via password-protected voicemail and/or encrypted email. The RA will then visit the resident in-person (visit #1) on the unit to discuss the project (using Recruitment Script for RA; Appendix H) and obtain informed consent in-person (Appendix I). Potential participants and/or substitute decision-makers will be given an opportunity to read the consent form, ask questions and will be provided adequate time to make their decision.

Residents that are identified by the staff as being potential participants, but do not have the capacity to provide informed consent will not be excluded. If they are eligible but unable to provide informed consent (that is, they have a substitute decision-maker for their medical care), the substitute decision maker (SDM) will be contacted. The SDM on file will be contacted by a member of the resident's healthcare team and will be asked for verbal or written (via email) consent to provide contact information to the research team if they express interest in more information about their resident's participation in the study. A member of the research team will then call the SDM to obtain informed consent (Appendix J) for their resident. An option for the SDM to return their consent to participate in the research study either verbally or over email as it is possible that some will not be able to scan and send a signed consent form.

As per the Partnership of Consent Protocol[12], after the SDM provides informed consent for the resident, assent is still required from the resident. If the resident provides no signs of dissent (shrieking, repetitive verbalizations, facial grimacing, hand wringing, or rocking movements), then the resident will be included in the study. However, if the resident shows signs of dissent, the behaviours will be verified with the LTC staff. If these signs are at baseline for that resident, it can be considered assent and the resident will be included. If the behaviours are not at baseline, the RA will wait 24 hours and try to approach the resident again. If the resident shows signs of dissent not at baseline for a second time, the resident will be excluded from participation in the study.

It is important that the patient also demonstrates assent for each jDome BikeAround session. Timing of each session will be optimized for each participant's daily schedule and activity performance. If the patient shows no signs of dissent before and during each jDome BikeAround session the session will continue. If the patient does show signs of dissent, or exhibits behaviour suggesting they are no longer willing to participate,the session will be ended. . The patient will

be approached for another session 24 hours later, if the patient shows signs of dissent during the second attempt at a jDome BikeAround session that session will be halted and the patient will be withdrawn from the study.

Sample Size

Sample size will be based upon our primary feasibility outcome. At the Glebe LTC, approximately 50 residents use the jDome BikeAround System annually. We estimate that over the course of the study timeframe that ~40% of these residents will be unavailable to participate. Thus, we expect to recruit 30 participants into the study. It should be noted that there are no other studies running at The Glebe Centre at the moment. Those that currently use the BikeAround system can be recruited into the study, but will undergo at least a 4-week washout period (no use of the system) prior to their initial participation in the study.

3. Methods and procedures for data collection and analysis

ii. Data Collection

All participants will be assessed with the physical outcome measures (Section 7) prior to the commencement of the intervention (phase 1) as well as after each phase (total of 4 outcome measure time points, see Appendix E). Physical outcome measures will be done by a member of the physiotherapy team who will be blinded to the participants' current phase. Each measurement session is expected to take approximately 20 minutes and will include the POMA, 2MWT and knee ROM. Hard-copy versions of the all the data forms will not use resident identifiers but will instead use research team allocated study-specific identifiers that cannot be linked back to the participant (e.g. P01). All hard copies of study data will be kept in the physio team's locked office within a locked filing cabinet. All electronic and hard copies of study data will be destroyed and/or shredded 10 years after the culmination of the study. The masterlist that connects the study specific identifiers to the participants will be stored separately in a password-protected file on the Glebe's secure server.

Following the completion of pre-intervention outcome measures, the participants will be randomized into one of two possible groups Residents will either participate in the intervention during phase 1 or be delayed until phase 3. Due to the nature of the cross-over design, it is possible that participants will identify their group allocation (e.g. if their use of the jDome BikeAround System is delayed). This may result in performance bias, and is a limitation of our protocol. The physiotherapy team performing the outcome measures will be blinded to the group allocation, reducing the likelihood of detection bias. As per the standard of care all the patients will be participating in the 'fall prevention program' throughout all phases of the protocol. The standard fall prevention program involves reducing the incidence of residents' falls and mitigating risks of falls through a resident focused, team approach which ensures that a resident's environment and social, physical, cognitive and emotional strengths are supported. A more in-depth summary of the program can be found in Appendix L.

Data extraction of chart data will be completed by a research associate using a de-identified Microsoft Excel spreadsheet saved on the secure Glebe Centre server. A password-protected master list saved on the secure Glebe Centre server will contain resident identifying information and study identification codes and will be updated throughout the course of the study (Appendix K).

Personal health information extracted from the charts for the purposes of the study will include:

a) Age
b) Sex (Male, Female, or Other)
c) Height
d) Weight
e) Medical diagnoses
f) List of medications
g) Cognitive Performance Scale score
h) Revised Index of Social Engagement (RISE) score
i) ActivityPro data

ii. Analysis

Qualitative Analysis
Qualitative field notes will be de-identified and imported into NVivo 11, a qualitative software program. Transcripts and field notes will be reviewed and coded using an iterative content analysis approach. Themes and sub-themes across transcripts will be identified using NVivo.

Quantitative Analysis
We will determine the success of the primary outcome of feasibility as follows: 1) We are able to recruit 30 participants into the study; 2) Less than 15% of participants will be unable to complete the study; 3) There are no serious adverse events, defined as (i) major change in medical condition, injury, or intractable dizziness ± nausea related to the use of the jDome BikeAround System, (ii) severe emotional distress necessitating cessation of use of the jDome BikeAround System, (iii) falls either during transport to and from, or while using the jDome BikeAround System.

Regarding the primary physical outcome, POMA, we do not have data upon which to perform a power analysis for this part of the study, thus we are unable to set specific thresholds for success based on our available sample size.

All quantitative data (e.g. physical outcomes, participation data) will be analyzed using SPSS software with an α of 0.05. Data will be analyzed to determine normality and appropriate statistical tests will be used to determine intergroup differences. Continuous data will be evaluated using methods such as student's t-test, categorical data will be evaluated using chi-squared.

Analysis Location
All de-identified data will be entered into excel databases. This data will be transported on an encrypted external hard drive to the University of Ottawa where it will be stored on the Campbell Laboratory server space for data analysis. The data being transferred will not include the master list that connects study identifiers to individual participants and the data will only be transferred after the study intervention is complete.

4. Intervention details

In collaboration with the healthcare team and the residents, cycling sessions will be scheduled to provide consistency for the residents. A goal of 3 sessions every week will be attempted, this is the number of sessions attempted during regular implementation at the Glebe Centre. Each session will be facilitated by a "Cycle Host". A cycle host is either a trained staff or volunteer at the Glebe Centre. All Cycle Hosts will be required to undergo a 1-hour training session to ensure consistency between hosts and safety of the residents as well as how to assess whether the patients are giving ongoing consent. They may also provide basic technical support. The RA will also work closely with the participant's circle of care to ensure that the patients continue to meet the inclusion criteria. The cycle host will find the resident and bring them to the BikeAround and escort them back to their room following the session. The length of each BikeAround session will be at the participant's discretion provided the cycle host (research associate/volunteer) deem it safe and it does not exceed 30 minutes in one session, a common participation duration for current Glebe LTC resident users.

The jDome BikeAround sessions involve the use of Google Street View, a stationary bike and a domed screen. Residents are seated comfortably in front of the screen; their destination is typed into the computer and when loaded the image appears on the screen. Using pedals on the bike they can propel themselves down the street, steer and change direction as they wish. Residents are able to visit familiar places of their choosing anywhere in the world or travel to places they have always wanted to visit. As long as it has been mapped by Google, it can be displayed on the domed screen. Google StreetView covers 39 countries and approximately 3000 cities. Each session the participants have the option to pick their location, or the cyclehost can pick from pre-selected locations given by families and/or SDMs of the participants.

9. Risks/Benefits

We predict that there are minimal risks involved in participation in this study, though there is a chance of emotional distress being triggered by reminiscences. In the event that a participant begins to show signs of severe emotional distress, participation will be stopped immediately at the participant's request, and clinical chaplains and social workers will be available on the unit and contacted as soon as possible. The resident's attending physician and nurse will also be notified of any emotional distress caused as a result of this project.

It should be noted that with the regular use of the BikeAround system at the Glebe Centre over the last 12 months. During this time period there have been hundreds of sessions with over 50 residents have used the equipment multiple times per week. Only where 3 residents experienced adverse events during one of their sessions. All of them being that the resident felt dizzy during the session due to the speed the bike was appearing to be going on the screen. These adverse events have been resolved by changing the parameters of the jDome BikeAround session, where the speed of the video aspect is slowed and not dependent on the speed the participant is pedaling. The highest resident's Scott Fall Risk that has used the system in the past was 17, and there were no serious adverse events experienced.

Benefits to the residents may be limited to interaction with the jDome BikeAround with possible improvements to their balance and mobility. Increased social and psychological well-being may be possible as enjoyable reminiscence through videos/pictures have been shown to be a positive experience for individuals with dementia.

10. Timelines

September – December 2018	Protocol and REB application development and submission
December 2018 – February 2019	REB approval / liaison with REB to obtain approval
February - July 2019	Participant recruitment and data collection
July – September 2019	Data analysis, synthesis of final report of findings

11. Potential Conflicts of Interest

The Glebe Centre is receiving financial payment from the Canadian Aging and Brain Health Innovation (CABHI) to cover the cost of conducting this study.

12. Contingency Planning

In the event of an epidemic, pandemic, or similar emergency situation where the research staff would not have access to the research participants the participants would not participate in the BikeAround system during that period. This would not affect the overall health of the participants since they will still be receiving the standard of care provided by staff at The Glebe Centre and would be cared for following the Glebe Centre's standard operating procedures during emergency situations.

13. Budget

See Appendix K

14. Publication and Dissemination of Results

The results of this study will be published in a peer-review journal and presented at national and international conferences. A summary of the results will also be included in the Glebe Centre's Newsletter, which will also be disseminated directly to the study participants.

15. Troubleshooting

Although highly unlikely due to the large available participant pool to draw from, in the case that not enough participants are available for recruitment, the information gathered will still be of use as this is the first research project on the use of the jDome BikeAround system for residents in long term care. The smaller sample size will impact the strength of significance but still provide a platform for future research.

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17. Appendices

Appendix A – Physical Outcome Measures (Primary and Secondary)
Appendix B – Participation Log
Appendix C – Field Note Page
Appendix D – Medical Chart Data Outcome Extraction Sheet
Appendix E – Cross-over Study Design Diagram
Appendix F – Newsletter Paragraph
Appendix G – Recruitment Script for Staff
Appendix H – Recruitment Script For RA
Appendix I – Participant Consent Form
Appendix J – SDM Participant Consent Form
Appendix K – Master List Sheet
Appendix L – CABHI Budget
Appendix M – Summary of Fall Prevention Program at The Glebe Centre
Appendix N – Poster for presentation in main foyer

Appendix A: Physical Outcomes

17.1.1 Demographic sheet

Item	Value
Participant Number	
Gender	
D.O.B (dd-mm-yyyy)	
Height (m)	
Weight (kg)	
Scott Fall Risk	
Number of falls in the past year	
Gait Aid Used (Y/N)	

17.1.2 The Tinetti Test (Performance Oriented Mobility Assessment (POMA))

DESCRIPTION
The Tinetti Assessment Tool is a simple, easily administered test that measures a resident's gait and balance. The test is scored on the resident's ability to perform specific tasks.

TIME TO COMPLETE
10 to 15 minutes

SCORING
Scoring of the Tinetti Assessment Tool is done on a three-point ordinal scale with a range of 0 to 2. A score of 0 represents the most impairment, while a score of 2 represents independence. The individual scores are then combined to form three measures; an overall gait assessment score, and overall balance assessment score, ad a combined gait and balance score.

INTERPRETATION
The maximum score for the gait component is 12 points. The maximum score for the balance component is 16 points. The maximum total score is 28 points. IN general, residents who score below 19 are at a high risk for falls. Residents who score in the range of 19 – 24 points indicate that the resident has a risk for falls.

RELIABILITY
Interrater reliability was measured in a study of 15 residents by having a physician and a nurse test the residents at the same time. Agreement was found on over 85% of the time and the items that differed never did so by more than 10%. These results indicate that the Tinetti Assessment Tool has good interrater reliability.

VALIDITY
The Tinetti POMA test has been determined to be a valid test in elderly populations amongst other populations and those with mild to moderate dementia.

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Participant Number: _____ Date: _____

Evaluator: _____

POMA BALANCE SECTION

Resident is seated in hard, armless chair;

TASK	DESCRIPTION	SCORE (0-2)
1. SITTING BALANCE	Leans or slides in chair	
	Steady, safe	
2. RISES FROM CHAIR	Unable without help	
	Able, uses arms to help up	
	Able without using arms	
3. ATTEMPTS TO RISE FROM CHAIR	Unable without help	
	Able, requires > 1 attempt	
	Able to rise in 1 attempt	
4. IMMEDIATE STANDING BALANCE (first 5 seconds)	Unsteady (swaggers, moves feet, trunk sways)	
	Steady but uses walker or other support	
	Steady without walker or other support	
5. STANDING BALANCE	Unsteady	
	Steady but wide stance (heels 4 inches apart) and uses cane or other support	
	Narrows stance without support	
6. NUDGED (subject at max position with feet as close together as possible, examiner pushes lightly on subject's sternum with palm of hand 3 times)	Begins to fall	
	Staggers, grabs, catches self	
	Steady	
7. EYES CLOSED (at max position – see #6)	Unsteady	
	Steady	
8. TURNING 360 DEGREES	Discontinuous steps	
	Continuous steps	
	Unsteady (grabs, swaggers)	
	Steady	
9. SITTING DOWN	Unsafe (misjudged distance, falls into chair)	
	Uses arms or not a smooth motion	
	Safe, smooth motion	
Total Balance Score		

POMA GAIT SECTION

Initial Instructions: Subject stands with examiner, walks down the hallway or across the room, first at "usual" pace, then back at "rapid but safe" pace. **Use usual walking aid.**

TASK	DESCRIPTION	SCORE (0-2)
10. INITIATION OF GAIT (immediately after told to "go)	Any hesitancy or multiple attempts to start	
	No hesitancy	
11. STEP LENGTH AND HEIGHT	RIGHT swing food does not pass left stance foot with step	
	RIGHT foot passes left stance foot	
	RIGHT foot does not clear floor completely with step	
	RIGHT foot completely clears floor	
	LEFT swing foot does not pass right stance foot with step	
	LEFT foot passes right stance foot	
	LEFT foot does not clear floor completely with step	
	LEFT foot completely clears floor	
12. STEP SYMMETRY	RIGHT AND LEFT step length not equal-estimate.	
	RIGHT AND LEFT step appear equal	
13. STEP CONTINUITY	Stopping or discontinuity between steps	
	Steps appear to continue	
14. PATH (estimated in relation to floor tiles, 12-inch diameter. Observe excursion of 1 foot over about 10 feet of the course)	Marked deviation	
	Mild/moderate deviation or uses walking aid	
	Straight without walking aid	
15. TRUNK	Marked sway or uses walking aid	
	No sway – but flexion of knees or back, or spreads arms out while walking	
	No sway, no flexion, no use of arms, and no use of walking aid	
16. WALKING STANCE	Heels apart	
	Heels almost touching while walking	
Total Gait Score		

POMA SORING SECTION

Score – Balance	/16
Score – Gait	/12
Score – Total	/28

Assessor Signature & Title: _____

Location During Assessment: _____

Risk Indicators:

≤18 High

19-23 Moderate

≥24 Low

17.1.3: Two Minute Walk Test (TMWT)

Two Minute Walk Test

General Information:

- ✓ Individual walks without assistance for 2 minutes and the distance is measured from the start of timing when the individual is instructed to "Go"
- ✓ Stop timing at exactly 2 minutes
- ✓ Assistive devices can be used but should be kept consistent and documented from test to test
    - If physical assistance is required to walk, this **should not be** performed
- ✓ A measuring wheel is helpful to determine distance walked should be performed at the fastest speed possible

Set-up and equipment:

- ✓ A measuring wheel is helpful to determine distance walked should be performed at the fastest speed possible
- ✓ Ensure the hallway free of obstacles
- ✓ Functioning stopwatch ready.

Participant Instructions

"*Cover as much ground as possible over 2 minutes. Walk continuously if possible, but do not be concerned if you need to slow down or stop to rest. The goal is to feel at the end of the test that more ground could not have been covered in the two minutes."*

Minimal Detectable Change (MDC) – 12.2m (90% Confidence)[1]
Normative Data (LTC) – 77.5m (±25.6)

Two Minute Walk Test (TMWT)

Participant Number: _____ Date: _____

Evaluator: _____

"*Cover as much ground as possible over 2 minutes. Walk continuously if possible, but do not be concerned if you need to slow down or stop to rest. The goal is to feel at the end of the test that more ground could not have been covered in the two minutes."*

Distance Walked: _____ **(metres)**

Gait Aid Used? YES NO

If yes, what was used: _____

Notes:

_____

_____

_____

_____

Assessor Signature & Title: _____

Location During Assessment: _____

17.1.4: Knee Range of Motion (ROM)

Knee Range of Motion Test (ROM)

Description: Assess the range of motion of the patient's knees.

Equipment: Examination bed, goniometer, rolled towel

Therapist Instructions:

Knee Extension:
-Have the patients placed in supine position, hips at neutral and with the knee in extension
-A rolled towel is placed under the calcaneus to maximize knee extension
-The goniometer's fulcrum is centered over the lateral condyle of the femur. The arms are aligned with the greater trochanter and lateral malleolus.
-The angle formed by these landmarks was the maximal angle of extension

Knee Flexion:
-The patient lifts their leg off of the towel and places their foot flat on the examination table. The patient brings their foot as close as possible toward their hip closing the angle of their knee as much as possible.
- The goniometer's fulcrum is centered over the lateral condyle of the femur. The arms are aligned with the greater trochanter and lateral malleolus.
-The angle formed by these landmarks was the maximal angle of flexion
-The patient might need assistance, aid as necessary

Resident Instructions:
-Please lie on this bed and place your ankle on this towel and extend your knee as much as possible
-I'm just going to find a portion of your hip
-Now, if you could bend your knee, bring your foot as close as you can to your hip and keep your foot flat on the table.

References

Norkin CC, White DJ. Measurement of Joint Motion: A Guide to Goniometry. 3rd ed. Philadelphia: FA Davis Company; 2003.

Knee Range of Motion (ROM)

Participant Number: _____ Date: _____

Evaluator: _____

Max extension left knee:

Max flexion left knee:

Max extension right knee:

Max flexion right knee:

Assessor Signature & Title: _____

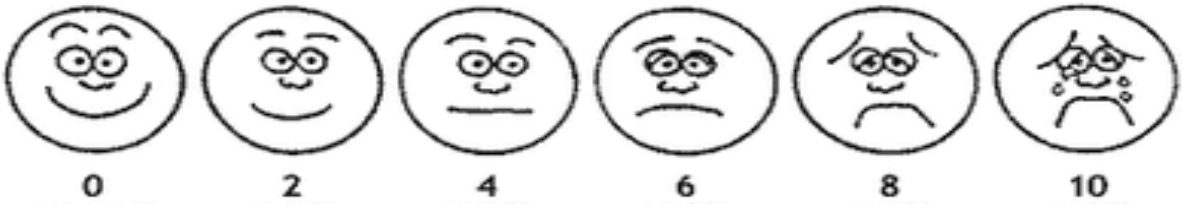
Location During Assessment: _____

Appendix B: Participation Outcomes

17.2.1: BikeAround Session Evaluation

Bike Around Session Evaluation

Participant Number: _____



Date	Baseline Mood (#)	Baseline Time	Follow Up Mood (#)	Follow Up Time	Distance Travelled (KM)	Pedometer Time	Who Facilitated?

Level of resistance (please circle) → 0 1 2 3 4 5 6 7 8

		10	20	30
Interest	Interest in others (staff, cycle hosts, etc.)			
	Without prompts offers support of a peer			
	Acknowledges support from a peer			
Attention	While engaged sustains attention			
	Requires verbal prompting or cueing			
	Initiates or engages in conversation			
Pleasure	Relaxed body language, smiles, and laughs			
	Verbalizes sense of pleasure			
Negative Affect	Anger			
	Physical signs of agitation			
	Verbalizes feeling anxious			
Sadness	Behavioral signs of sadness			
	Verbalizes feeling sad			
Self Esteem	Non-verbal expression of pride			
	Verbal expression of satisfaction			
	Inferred prideful reminiscence			
Normalcy	Verbal expression of normalcy			
	Non-verbal expression of social normalcy			
	When joining or leaving, interacts with others			

4- Always 3- Most of the time 2- Some of the time 1- Rarely 0 – Never

Resident expresses an interest to continue with program **Yes** **No**

What seating adjustments were made for the resident?

_____

What location did the resident visit?

Resident Refusal Form

Please mark Resident on this list if they were;

- **(A) Absent from participation**

(i.e. Out with family, in another program, in shower, etc.)

OR

- **(C) Chose to not participate on a day when they were scheduled**

(i.e. They verbally told you they didn't want to participate)

OR

- **(SL) Sleeping**

(i.e. Unable to wake up or too drowsy)

OR

- **(S) Sick**

(i.e. they were not feeling well, or a nursing staff mentioned they were not feeling well)

Date	Time of Day	Participant Number	Resident Reason	Volunteer Name
June 1st	11:00am	PN22	(C) Didn't want to come	Becky

EX.

Appendix C: Field Notes - Qualitative Outcome

Participant ID: _____	
Date:	**Time:**
Observations: (*If completing these forms during the activity sessions, this form can include things like discussions that participants are having with others, including research staff or other staff; changes in behaviour or mood; location selection, if applicable; and so on. Always ask participants at the start of a session if field notes can be taken.*) **The location the participant went:** **Did the participant pick this location (Circle): Yes No** **Was there a change in the participant's mood (Circle): Yes No** **Please Describe this change:** **Other observations:**	

Appendix D: Medical Chart Data Outcome Extraction Sheet

Participant Number: _____ Date: _____

Chart Reviewer: _____

CPS Score

The Cognitive Performance Scale (CPS) combines information on memory impairment, level of consciousness, and executive function, with scores ranging from 0 (intact) to 6 (very severe impairment). The CPS has been shown to be highly correlated with the MMSE in several validation studies.

Morris JN, Fries BE, Mehr DR, Hawes C, Philips C, Mor V, Lipsitz L. (1994) MDS Cognitive Performance Scale. *Journal of Gerontology: Medical Sciences* 49 (4): M174-M182.

SCORE	Date Evaluated	Notes

Revised Index of Social Engagement (RISE)

The Revised Index of Social Engagement (RISE) is a measure of social engagement based on being at ease interacting with others, being at ease doing planned activities, accepting invitations, pursuing involvement in life of facility, initiating interactions and reacting positively to interactions. Scale scores range from 0-6 with higher scores indicative of greater social engagement in the life of the facility. The index is a revised version of the Index of Social Engagement (ISE) that was developed for an earlier version of the RAI for long term care facilities.

SCORE	Date Evaluated	Notes

Participant Number: _____ Date: _____

Chart Reviewer: _____

Current Medication list:
Compile a list of all of the medications each participant is on (both amount and frequency)

Medication Name	**Dosage information**

Activity Pro Data **Extraction Sheet**

Participant Number: _____

Project Phase: _____

Date Range: _____

Overall Engagement Score: _____

Self-Directed Score: _____

Total Minutes of Engagement: _____

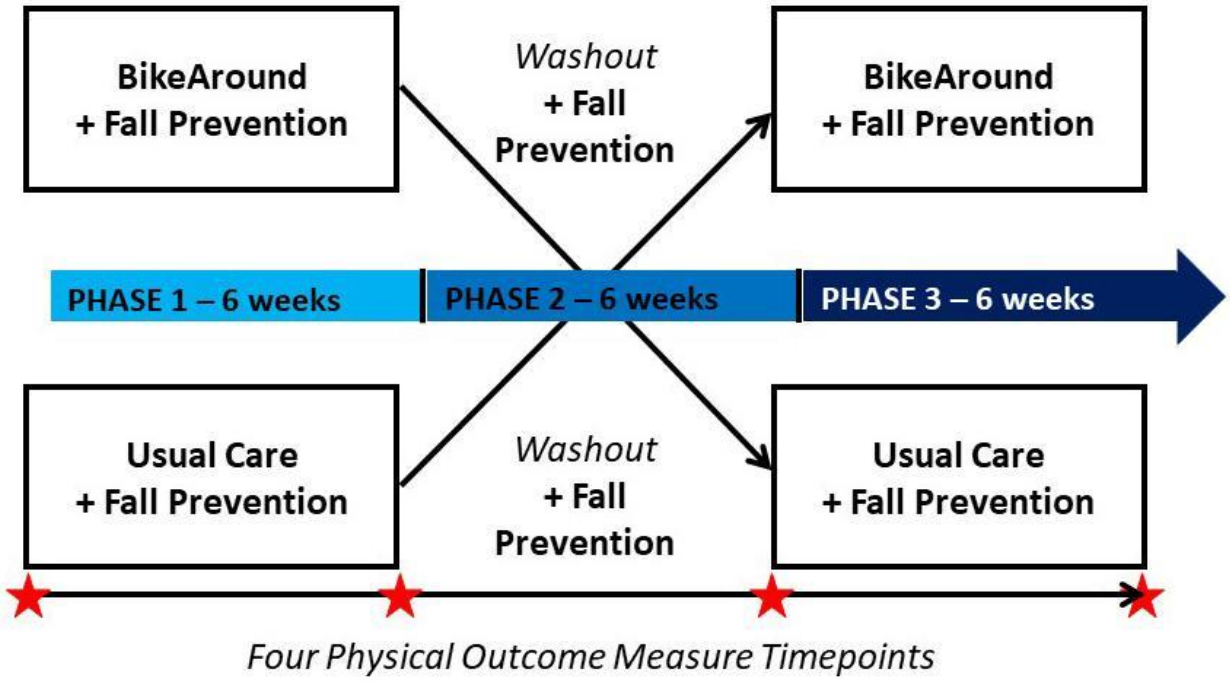
Number of Activity Participations: _____

Category	Total Number	Notes
C *(Chose not to attend)*		
S *(Sick)*		
SL *(Sleeping)*		
A *(Absent)*		

Data Extracted By: _____

Date: _____

<u>Appendix E</u>: Cross-Over Study Design Diagram



Appendix F: Newsletter Paragraph

The Glebe Centre, in partnership with the University of Ottawa and Bruyère Research Institute, is excited to begin recruitment for a research project that will provide residents with an opportunity to engage in a cycling (stationary) activity that is combined with a virtual trip to anywhere Google Maps have been…anywhere around the world. These virtual images may help engage and immerse residents into the activity. We are looking to observe how residents engage in this activity and whether it can improve their balance and mobility. Whether your resident has participated in this activity before or not, feel free to contact Susan Zorz at SZorz@glebecentre.ca or 613.238.2727 X 323 for more information.

Appendix G: Recruitment Script for Staff

When discussing with the resident:

LTC Staff:
"I would like to let you know that there is a research project underway here at The Glebe Centre that you may be eligible for. Your decision to hear more about this project will not impact the care you receive here at The Glebe Centre. It is completely voluntary, and you have the right to stop participation at any time. Would you like to hear more about this research project?"
If YES:
"Wonderful, thank you! Can I have your verbal consent to pass your information to a member of the research team? They will come by to see you in a few days to provide you more information about this project."
If NO:
"No problem at all. Again, this does not impact the care that you receive here at The Glebe Centre."
If questions arise regarding this project:
"As I am not directly involved with this research project, I would have to defer you to the research team to have your questions answered."

When calling the SDM:

***After confirming you are talking to the SDM for the resident:*

LTC Staff:
"I would like to let you know that there is a research project underway at The Glebe Centre that_____(insert name here)_____is in. Your decision to hear more about this project will not impact the care they receive here at The Glebe Centre. It is completely voluntary, and they have the right to stop participation at any time. Would you like to hear more about this research project?"
If YES:
"Wonderful, thank you! Can I have your verbal consent to pass your contact information to a member of the research team? They will contact you in a few days to provide you more information about this project."
If NO:
"No problem at all. Again, this does not impact the care that_____(insert name here)_____ receives here at The Glebe Centre."
If questions arise regarding this project:
"As I am not directly involved with this research project, I would have to defer you to the research team to have your questions answered."

When emailing the SDM

***After confirming you are using the email on file for the SDM:*

LTC Staff:
Hello ____(Insert name of SDM),

"I would like to let you know that there is a research project underway at The Glebe Centre that_____(insert first name here of resident)_____is in. Your decision to hear more about this project will not impact the care they receive here at The Glebe Centre. It is completely voluntary, and they have the right to stop participation at any time. If you would like to hear more about this research project please reply to this email and a member of the research team will contact you in a few days to provide more information.

Sincerely,

(insert your name)

If YES reply:
"Wonderful, thank you! They will contact you in a few days to provide you more information about this project."
If NO reply:
"No problem at all. Again, this does not impact the care that_____(insert name here)_____ receives here at The Glebe Centre."
If questions arise regarding this project:
"As I am not directly involved with this research project, I would have to defer you to the research team to have your questions answered."

Appendix H: Recruitment Script for RA

1. **Introduction of Research Team Member to SDM/POA:**

"Good morning/ Good afternoon/ Good evening Mrs./Mr./Ms._____. My name is _____. I'm one of the researchers for an activity study happening at The Glebe Centre that _____ mentioned to you, and indicated to me that your loved one might be interested in participating".

2. **Introducing the Study**

"This study involves your loved one using a stationary bike while supervised during their daily activities. This bike is safe and effective for encouraging increased activity for older adults. This is not a real exercise bike, but rather a modified version that your loved one will sit on his own chair and use their arms and legs to engage in activity. This study will go for 18 weeks. Your loved one will either have the opportunity to use this bike for the first 6 weeks or delayed to the second group during the last 6 weeks. Whichever group they are randomized to, they will have the opportunity to participate. During these sessions, your loved one will be helped to the bike by myself, a volunteer, a recreation therapist or a staff member on the unit. Their participation is optional every day. During their pedalling, they will be immersed into a large dome that can display images captured on Google Street View. They can select where in the world they would like to pedal with help from the cycle host. If you decided to allow your loved one to participate, we would love to have your help to create a list of fun places for them to visit. Our hope is that residents who participate in this program will experience overall improvements in their quality of life."

3. **Consent**

"Would you be interested in having your loved one participate in this project?" (If yes, proceed to #4 If no, proceed to #5a).

4. **Follow-Up for Written or Oral Informed Consent**

"When might be the next time you'll be visiting The Glebe Centre, in order for one of the researchers to meet with you to read and sign the full Informed Consent form? Alternatively, we can record your oral consent for your loved one to participate and send you the form electronically for your information."

*(Also give option to send form electronically first, and then follow-up with another phone call for oral consent if the SDM/POA prefers).

Note, the researcher will also have the Informed Consent form nearby in order to answer any other questions directly from the information provided in the form *

5. **Finish the call**
    a. *"No problem at all! This decision does not impact the care your loved one will receive here at the Glebe Centre. Once the project is completed, your loved one will still have the option of using the bike, without being part of any research project."*
    b. *"Thank you very much for your time."*

Appendix I: Participant Consent Form

The following document will be used solely with residents that have the ability to provide informed consent. This will be decided by the health care team.

Participant Consent Form May2019_Clear

Appendix J: SDM Consent Form

The following document will be used with substitute decision makers for residents that do not have the ability to provide informed consent. This individual must be identified in the resident's file as a substitute decision maker.

SDM Consent Form
Consent Form May2

Appendix K: Master Code List

*This mater code list will be password protected and only saved on the secure server at The Glebe Centre.

Resident Name	Participant Code	Room Number	SDM	SDM Contact Number
Jennie Smith	PN01	424	Johnnie Smith	613-555-5555

Appendix L: CABHI Budget

The Glebe Centre PROJECT BUDGET

Project Title:	Project Start:		Project End:
Fall Prevention Program Using the Idome Bike Around for High Risk Residents Living in Long Term Care	2018-09-01		2019-08-31
Name of Project Lead:		Institution	
Susan Zorz		The Glebe Center	

REQUESTED/SECURED FUNDS				
Funding from CABHI				
Requested from CABHI ($CAD, should match amount indicated in application)			$	49,754.00
Secured from other sources (in-kind, valued in $CAD) (Specify clearly the sources of all in-kind contributions; add and/or delete rows as needed)				
Program Facilitator - 18 hours/week salary plus employer related costs			$	*26,019.23*
Human Resources, Finance, and Nursing support (10% of project)			$	*7,867.34*
Materials & Supplies (photocopier, printer, etc.)			$	*500.00*
Camino Support Fees			$	*2,400.00*
GRAND TOTAL *(should match below)*			$	86,540.57

EXTIMATED PROJECT EXPENDITURES	AMOUNT ($CAD)	Source Name (if more than one, breakdown by %)	In-kind Contributions (if applicable, see note in "Requested/Secured Funds")	Cash
Commentary: Eligible costs are expenses that are directly related to the project, are incurred at or on behalf of the Host Institution, and achieve its milestones and deliverables, subject to the limitations set out in the "http://www.ccabhi.com/wp-content/uploads/Spark-Program-Eligible-Expenses-Guideline.pdf". Funding will flow to the applicant's host organization.				
Important: All expense categories (e.g., Materials and Supplies) need to be itemized. For example, an expense entry within "Materials & Supplies" would require the name of the material/supply, quantity and price per quantity. See Sample tab for further information.				
a) Personnel				
Salaries and benefits (existing personnel)				
Program Facilitator (18 hours/week @ 22.88/hour x 52 weeks + 21.5% employer related costs)	$ 26,019.23	The Glebe Centre	$ 26,019.23	
Salaries and benefits (new personnel)				
Project Lead (19.00/hour x 22.5 hours / week for 52 weeks + 21.5% employer related fees)	$ 27,009.45	CABHI		$ 27,009.45
Program Assistant @16/hour x 22.5 hours/week for 52 weeks + 21.5% employer related costs	$ 22,744.80	CABHI		$ 22,744.80

Funding from the Host Institution

CABHI releases an initial payment of 90 per cent of its funding at the start of the project. A holdback of 10 per cent will be released upon project completion and receipt of final progress and financial reports, outcomes and attestation from the host organization regarding the use of funds.

In-Kind Contributions

No specific amount of matching funds from the Host Institution is required to apply for the program. The Host Institution may contribute in cash or in-kind, either from its own sources or through other funding sources. For example, applicants might show evidence of government, industry partner or institutional commitment through a blend of cash and/or in-kind contributions such as office space, equipment, connectivity, staff salaries, etc.

The maximum funding available for projects selected in this call for innovations is $50,000 (CAD). The SPARK Program will be funding projects that are scheduled to run for 6 to 12 months, starting in February 2018. CABHI funding will be attached to project milestones and deliverables. Funding will flow to the applicant's host organization. The host organization will be accountable for the applicant's completion of project milestones and deliverables as well as performance reporting.

Other expenditures (provide detail)						
Total personnel costs	$ 75,773.48		$ 26,019.23	$	49,754.25	
b) Non-Personnel Related Costs						
Materials and supplies						
Paper, photocopier, printers, communiques	$ 500.00	The Glebe Centre	$ 500.00			
Site preparation and training						
Hardware, software and IT support						
Camino Support - The Glebe Centre pays a monthly maintenance fee to Camino for the BikeAround, this cost will continued to be	$ 2,400.00	The Glebe Centre	$ 2,400.00			
Professional and technical services						
Participant costs						
Office and administrative						
Human Resources, Finance, and Nursing support (10% of total project cost)	$ 7,867.34	The Glebe Centre	$ 7,867.34			
Meetings and events						
Minor equipment						
Other expenditures (provide detail)						
Total non-personnel related costs	$ 10,767.34		$ 10,767.34	$	-	
c) Equipment						
Total equipment costs	$ -		$ -	$	-	
d) Travel						
Travel within Canada						
International travel						
Total travel costs (pre-approved by CABH)	$ -		$ -	$	-	
e) Other						
Total other costs	$ -		$ -	$	-	
GRAND TOTALS	$ 86,540.82		$ 36,786.57	$	49,754.25	

Appendix M: Summary of Fall Prevention Program at The Glebe Centre

This program focuses on reducing the incidence of residents' falls and mitigating risks of falls through a resident focused, team approach which ensures that a resident's environment and social, physical, cognitive and emotional strengths are supported. The program ensures team training, communication and effective care planning. This is an interdisciplinary program involving nursing and program staff, physician/pharmacist, dietician, physiotherapist, housekeeping staff and the resident/POA. They communicate regarding their planned interventions and evaluation of resident progress and outcomes in falls prevention through documentation. This program works in collaboration with the Centre's Restraint reduction and Restorative care programs.

Every Resident's Fall Risk is assessed using Scott Fall Risk Assessment by registered nursing staff on admission, after a fall and when there is a significant change in condition. Based on the assessment residents are categorized into High and Very High risk and Interventions are targeted in areas contributing to falls.

A number of fall prevention tools are used in the facility such as motion sensors, seat belt alarms, bed sensor pads. Hourly rounding of residents to prevent falls and avoid use of restraints is also part of the daily routine. Equipment such as fall mats, hip protectors, low electric bed are also used to prevent significant injury in case of a fall.

The Restorative Program also works along with the Fall Prevention Program in identifying those at high risk for falls and exercises are carried out by nursing staff seven days a week to strengthen lower extremities and prevent falls. Along with Nursing, Physiotherapy staff and program facilitators are also involved in providing balance and strength exercises which area core component of the Fall Prevention Program to reduce the number of falls. Residents' Fall Risk is communicated at the Interdisciplinary Care Conferences to keep families (POA/ADM) informed of the actions taken to prevent falls.

The Nurse Practitioner assigned to The Glebe Centre is referred to one-time fallers to rule out medical causes to prevent further fall. The Co-coordinator of Nursing Program audits all falls on a daily basis and acts as a resource to the rest of the staff in identifying risk areas, suggesting new interventions and also responsible for reviewing the program on an annual basis.

Appendix N: Poster for presentation in main foyer

Poster was presented at 2018 Regional Geriatric Annual General meeting and will be used to promote study by being placed in main foyer of The Glebe Centre to advertise the research.