Protocol: Feasibility and effectiveness of a technology-based remote occupational therapy home safety assessment

# Project summary

A hip fracture can have a serious impact on an older person’s everyday life. Recovery is complex and extends well beyond discharge from hospital with the transition home presenting significant challenges for older people and their carers. Planning for discharge home enables health professionals and older people to work together to identify any needs and organise support after discharge. This study aims to examine the feasibility and effectiveness of using telerehabilitation via a smartphone, tablet or computer to deliver a pre-discharge home safety intervention in a sample of 40 older adults recovering in hospital after hip fracture. Feasibility will be considered in relation to demand, acceptability, practicality and limited efficacy with a view to applying telerehabilitation home safety assessments to older people recovering in hospital after hip fracture who are planning to return to community living.

# Background and literature review

Home assessment visits completed by telerehabilitation have the potential to make a positive impact on health outcomes for the more than 23,000 Australians hospitalised with hip fracture.1 Hip fractures are a major public health issue with an estimated annual combined direct and indirect cost of $908 million.1 Outcomes after hip fracture are poor2 and hospital readmissions are high with falls being a common reason for readmission.3 Many older people have developed increasing levels of frailty and functional dependence even before their hip fracture. Recovery is complex and extends well beyond discharge from hospital with the transition home presenting significant challenges for older people and their carers. Given the strong imperative of health services to discharge people home and reduce length of hospital stay, it is essential we improve outcomes of people after hip fracture by implementing simple, low-cost interventions that promote successful return to independent community living.

As part of planning for a patient’s discharge from hospital back into the community after hip fracture, an occupational therapist may complete a hospital-based assessment and interview with a patient to obtain an understanding about their home environment, the layout and the everyday activities they need or want to be able to do when they get home. However, being able to see the home environment does provide further benefits including collaborative decision making with the patient enabling more targeted recommendations resulting in increased safety and ability to complete activities around the home. An occupational therapist may take a patient home for a short visit to obtain information about their home environment and provide insight into their likely ability to manage at home. Our team completed a randomised controlled trial of 77 adults after hip fracture and found that a single pre-discharge home assessment visit reduced hospital readmissions and likely reduced falls in the first 30 days after discharge and improved functional independence in the first 6 months.4 However, despite evidence from our research that they work, a big problem is that home visits are resource intensive. Occupational therapists spend twice as much time on a home visit compared to a hospital-based consultation.5 A recent Australian study reported that home visits cost approximately four times that of hospital-based consultations with a mean cost per visit of $279 compared with $68 for in-hospital consultations.5 In our recent audit of current practice, we found that only 20% of patients after hip fracture participate in a home visit.6

One scalable solution to the problem of access to home assessment visits is to complete a technology-enabled remote home safety assessment using telerehabilitation. Telerehabilitation refers to the use of information and communication technologies to provide rehabilitation services at a distance.7 It has been suggested as an effective and viable way to access home modification services.8 Eastern Health has an established telehealth platform (Health Direct Australia’s Video Call) and given that 88% of Australians use a mobile, smartphone or tablet,9 it has the potential to address the resource barriers of completing home visits.

To evaluate the feasibility of delivering a home safety intervention via telerehabilitation, Bowen’s feasibility framework10 will be used. The four domains of demand, practicality, acceptability and limited-efficacy testing will be measured in determining feasibility.10

The study aims to determine if it is feasible to use telerehabilitation to deliver a home safety intervention for patients recovering in hospital after hip fracture. Specifically:

* Is there demand for a telerehabilitation home safety assessment?
* Is it practical to provide a home safety intervention using telerehabilitation and how do costs compare to usual care from a health service perspective?
* Are the outcomes for those using telerehabilitation better to those receiving usual care?
* Is telerehabilitation an acceptable form of service delivery for service providers and patients and family?

# Project Design

## Design and setting

The design is a mixed methods study that includes a randomised controlled trial (n=40). Participants hospitalised for hip fracture at Eastern Health will be allocated to receive either:

1. A technology-enabled remote pre-discharge home assessment visit, with an occupational therapist and patient in the hospital linked via a video connection on a smartphone, tablet or laptop to a family member at the patient’s home (intervention) or
2. A hospital-based assessment and consultation with an occupational therapist (control)

## Participants

1. Patients

Patients will be eligible for inclusion if they:

* Have been admitted to Eastern Health with a primary diagnosis of hip fracture11
* Are aged 50 years and older12
* Are expected to return to a private residence on discharge from hospital
* Have a family member who is willing to participate and has access to the technology by which Eastern Health’s telehealth portal can be reached

Patients will be excluded if they:

* Have an extended non-weight bearing period
* Have advanced cancer
* Are refusing to participate in therapy
* Are displaying aggressive behaviour
* Have cognitive impairment (greater than 2 errors on the Short Portable Mental Status Questionnaire13) and no carer who is able to give informed consent to be involved in the study
* Are identified by the occupational therapist as requiring an in-person home-based assessment prior to discharge from hospital.

1. Occupational therapists

Occupational therapists who work with participants enrolled in the study will be invited to participate in a focus group to discuss their perceptions of the telerehabilitation home safety intervention.

## Recruitment and Consent

### Patients

Consecutive eligible patients will be approached for recruitment until a total of 40 participants have been recruited to the study.

Hospitalised patients will be approached for consent as soon as they are deemed medically stable after surgery. All types of surgical treatment will be included as clinical practice guidelines do not differentiate between these treatments during the rehabilitation phase. Patients with comorbidities and/ or cognitive impairment will be eligible for inclusion unless, after assessment by the treating healthcare team, they are deemed to have unusually complex medical or social circumstances likely resulting in an expected length of stay of greater than 28 days. Examples include patients with an extended non-weight bearing period, advanced cancer, refusing to participate in therapy or aggressive behaviour.

A representative of the occupational therapy department at Eastern Health will monitor the admissions and identify potential participants. A potential participant will initially be approached by the treating occupational therapist. If the participant gives permission, then he or she will be contacted by the project coordinator. If the person verbally agrees to participate the project coordinator will screen for eligibility using the selection criteria. Potential participants who provide verbal consent to participate will be provided with the “Participant Information Sheet/ Consent Form.” Written informed consent will be obtained from the potential participant, or from next of kin when participants have a cognitive impairment, as indicated by more than two errors on the Short Portable Mental Status Questionnaire (Appendix 5).

### Occupational therapists

All occupational therapists who have completed at least one telerehabilitation home safety intervention will be sent an email by the project coordinator inviting them to participate in a focus group. Potential participants who are interested in participating will be provided with the “Participant Information Sheet (occupational therapist)/ Consent Form.” Written informed consent will be obtained from the potential occupational therapist participant.

## Randomisation

Participants (n=40) will be randomly assigned to receive the intervention (a telerehabilitation home safety assessment) or the control (hospital-based assessment and consultation with an occupational therapist). Prior to randomisation, participants will complete baseline testing with a research assistant blinded to group allocation as detailed in the Outcomes section of the protocol.

Only after the participant has enrolled in the trial and completed written informed consent and baseline testing, will assignment to the group be made. Participants will be randomly assigned using a permuted block design with a computer random number generator (www.randomization.com) using sealed opaque envelopes prepared by an independent researcher with no role in recruitment or assessment.

## Procedure

**Control**

The participants in the control group will receive usual care by a multidisciplinary team including medical, nursing and allied health. The treating occupational therapist will complete a standardised initial assessment including completion of the Home Falls and Accidents Screening Tool (Home Fast)14 (Appendix 6) to gather information about the home environment and identify participant’s at risk of falling because of hazards at home. Consistent with usual care for a patient not receiving a home based assessment, the occupational therapist will provide education about the safe use of adaptive equipment to assist in the home, simulation and practice of activities of daily living as appropriate within the hospital setting, provision of information about available community services and external referrals where required. The occupational therapist will document any recommendations and actions on the Eastern Health Home Assessment Summary form (Appendix 8) and provide the participant with a copy of the form.

**Intervention**

The participants in the intervention group will receive usual care, as provided to the control group including a standardised initial assessment and completion of the Home Falls and Accidents Screening Tool (Home Fast)14 (Appendix 6) to gather information about the home environment and identify participant’s at risk of falling because of hazards at home. In addition, they will participate in a technology-enabled home safety assessment and interview.

Eastern Health’s Telehealth guidelines15 will be followed. In summary this requires:

* Participants and family members/ carers to be provided with the Eastern Health Telehealth Patient Information Booklet https://www.easternhealth.org.au/images/Telehealth\_info\_sheet.pdf
* Scheduling of telerehabilitation appointment with participant’s family member/ carer
* The treating occupational therapist set up with the participant and access to a computer enabling vision and audio (laptop from Allied Health Clinical Research Office), Google Chrome, telehealth login and set up with Health Direct Video Call;
* The treating occupational therapist will enter the telehealth platform via intranet http://ehweb03/eh%20intranet/clinical%20services/clinical\_services\_home.shtml to provide the telerehabilitation home safety assessment and login to Health Direct and connect to the family member/ carer at the participant’s home who has a portable device enabling both audio and video calls.

The treating occupational therapist will complete a ‘real time’ remote assessment of the environment and provide advice and recommendations and plan targeted interventions to be completed in hospital in preparation for discharge home.

The remote home safety assessment will be completed using the Eastern Health Home Assessment Report (Appendix 7) taking into consideration functional capacity and potential environmental hazards. Recommendations and actions from the home assessment visit will be recorded on the Eastern Health Home Assessment Summary form (Appendix 8) and provide the participant with a copy of the form.

The home safety assessment will be conducted between 1 and 5 days prior to expected discharge date or whenever the participant has recovered sufficiently to be able to participate, or within 24 hours post discharge for patients discharged directly from acute settings with insufficient notice to arrange the telerehabilitation home safety assessment. The home safety assessment is not anticipated to take longer than one hour. The aim is to involve the participant/ family in collaborative decision making to maximise functional capacity and confidence in returning home. It involves working with the participant and their family and practising activities of daily living and includes the provision of education, advice and recommendations on equipment and home adaptations.

If it is considered appropriate the research officer can support the participant’s family member/ carer in the set-up of the video call. This may be on the day of the appointment or a “test-run” prior.

After the assessment, participants (patients and family members/ carers) from both groups will complete a questionnaire (Appendix 14) that aims to obtain their perceptions of using telerehabilitation as part of discharge planning for patients recovering in hospital following hip fracture.

Demographic data describing the sample will be collected from the participant and Eastern Health’s electronic database and client record (see Table 1). One month after discharge from Eastern Health, participants will be contacted by phone by a blinded assessor to organise an appointment to complete outcome measures as detailed in the Outcomes section of the Protocol. This appointment can take place at the participant’s home, at the hospital or via online video call.

The demographic data, responses to questionnaires and assessments will be entered into an excel spreadsheet.

**Focus group with occupational therapists**

A focus group will be conducted with the occupational therapists involved in the study. The focus group will run online and will take between 30 and 60 minutes. The session will be recorded and transcribed verbatim. The purpose of the focus group will be to gain insights into the feasibility of using telerehabilitation to deliver a home safety intervention for patients recovering in hospital after hip fracture and intending on returning home. Topic areas covered will include:

* Context and general comments about how the intervention was delivered
* Practicality including identification of enablers and barriers
* Satisfaction and acceptability of the intervention
* Limited efficacy and quality of care from a clinical perspective

**Program fidelity**

Prior to the commencement of the study, information sessions and training will be provided to the occupational therapy staff at the participating hospitals regarding the project protocol, including both the telerehabilitation home safety assessment and usual care. Training will be repeated for all new staff. Fidelity checks will be completed throughout the study and will include monitoring completion of the Home Falls and Accidents Screening Tool (Home Fast), the Eastern Health occupational therapy home assessment form (intervention group), and completion of the Occupational Therapy home assessment summary (Appendix 8) by both groups to ensure adherence to the protocol.

## Data collection

Patient data to describe the sample will be collected for the 40 included patients from the following sources:

* Clinical Patient Folder (CPF)- Eastern Health’s electronic patient medical record which includes all clinical as well as demographic information.
* Health Direct- the telehealth platform used by Eastern Health and endorsed by the Department of Health and Human Services. Administration function includes start and finish times of consultation and wait time. The session will not be recorded.
* Participant (patient/ carer) questionnaire is based on Eastern Health’s telehealth evaluation, developed by Christopher Stott, amended to reflect Bowen’s feasibility guidelines (Appendix 14).
* Clinical assessment of participant outcomes including falls, concern about falling, activity and participation in everyday activities and health-related quality of life.

In addition, the perceptions of occupational therapists will be explored using a focus group. A focus group schedule based on Bowen’s feasibility guidelines has been developed for this study (Appendix 15).

**Table 1- Data collection, source and time point**

|  |  |  |
| --- | --- | --- |
| Demographic data to be collected | Source | Time point |
| Patient UR | CPF | At recruitment |
| Date of admission | CPF | At recruitment |
| Meets eligibility criteria | CPF and researcher discussion with treating occupational therapist and patient/ family | At recruitment |
| Date of birth/ age | CPF | At recruitment |
| Gender | CPF | At recruitment |
| Reason for admission | CPF | At recruitment |
| Type of surgical procedure and date of surgery | CPF | At recruitment |
| Health status/ comorbidities | CPF | At recruitment |
| Group allocation (Intervention or usual care) | Research team | At recruitment |

|  |  |  |
| --- | --- | --- |
| Feasibility data to be collected | Source | Time point |
| Demand   * Patient/ family agreement for telerehabilitation and reason why/why not * Occupational therapist agreement for participant to be involved in telerehabilitation and reason why/ why not * Number of participants requiring a home-based assessment | Patient/ researcher consultation  Occupational therapist/ researcher consultation | At recruitment |
| Practicality   * Mean time per assessment * Delays/ cancellations due to technical issues * Proportion of items on standardised home assessment visit form able/ unable to be assessed * Cost of delivery | Health Direct  Health Direct/ observation  CPF/ Health Direct/ Salary information from Human Resources/ Semi-structured interview | After intervention |
| Limited efficacy testing  Clinical outcomes   * Falls * Functional independence * Health-related quality of life * Concern about falling   Health service outcomes   * Length of stay * Readmissions to hospital in 30 days * Days in hospital in the 30 days after discharge * Adherence to recommendations | Clinical outcome measures  CPF/ Health Direct/ Semi-structured interview | At baseline and at 30 days post discharge  After intervention and at 30 days post discharge |
| Acceptability   * Patient/ family satisfaction * Occupational therapist satisfaction | Questionnaire/ semi-structured interview  Focus group | After intervention |

## Outcome measures

Feasibility will be evaluated in terms of Demand, Acceptability, Practicality and Limited Efficacy.10

*Demand* will be evaluated by collecting and analysing recruitment data. The number of people eligible and agree to participate in a telerehabilitation consultation will be recorded, as well as the number and reasons of those who decline. The number of people who are eligible and the treating occupational therapist makes a clinical decision that they will require an in-person home-based assessment prior to discharge will also be recorded. This will provide some information regarding the potential demand for telerehabilitation in future.

*Acceptability* will be evaluated by using participant (patient/ carer) responses to questionnaire. Acceptability for occupational therapists will be evaluated by information provided during focus group discussion.

*Practicality* will be evaluated by length of the home safety assessment/ intervention, data on delays or cancellations for technical reasons and proportion of items on the standardised home assessment form unable to be assessed. Questionnaires and focus groups will also provide data on practicality.

As part of practicality, cost of delivery will be evaluated for the health service. This will include:

* Cost minimisation analysis to compare the direct health service costs for the usual care group compared to the intervention group for the original admission and for readmissions within the 30-day post discharge period
* Cost utility analysis shall combine the cost and quality of life utility index data to report the incremental cost effectiveness ratio for the cost per quality adjusted life year
* Cost effectiveness analysis shall combine the cost and functional status (Functional Independence Measure, FIM16) data to report the incremental cost effectiveness ratio for change in the FIM.

*Limited efficacy testing* will be evaluated via clinical outcome. The outcomes will be collected at baseline prior to randomisation and at 30 days post discharge by an assessor blinded to group allocation.

Comparison of clinical outcomes including:

* **Number of falls** reported by participants. A fall is defined as an unexpected event in which the participants come to rest on the ground, floor or lower level.17 Falls will be monitored to 30 days post discharge. Participants will record all falls on the day they occur for 30 days on a self-report falls surveillance calendar (Appendix 9).Injurious falls, defined as a fall requiring medical attention or any healthcare utilisation, will be marked with a sticker. Telephone calls will be used to remind participants who have not returned the monthly sheet. Telephone calls will also be used to investigate each injurious fall using a set questionnaire*.*
* **Anxiety and concern about falling** during the performance of a range of activities of daily living and will be assessed using the Falls Efficacy Scale- International (FES-I)18 (Appendix 10).
* **Activity** limitations in activities of daily living and will be assessed using the Functional Independence measure (FIM)16 (Appendix 11) and the Nottingham Extended Activities of Daily Living Scale (NEADL)19 (Appendix 12).
* **Health-related quality of life** using the EuroQOL EQ5D20 converted into a utility index (Appendix 13).
* **Number of readmissions** to the health service and number of overnight stays using the health service data management system.
* **Adherence to recommendations** using observation and semi-structured interview using the Home Assessment Summary Form to guide the discussion.

## Adverse events

There are risks associated with returning to community living following a hip fracture, including the possibility of further falls. All participants admitted to the health service following hip fracture will be assessed and managed by the health care team as part of usual care. In the event of any adverse events, participants will be assisted to seek medical or allied health treatment as appropriate. The relevant ethics committees will be informed immediately, and a detailed written report describing the incident will be provided. The adverse events will be recorded in the results section of the manuscript.

## Data analysis and sample size

Effect size estimates of efficacy outcomes will be estimated using standardised mean differences for continuous outcomes and relative risk for dichotomous outcomes. Descriptive statistics and simple comparisons will be used to describe practicality. Interviews will be analysed thematically using an inductive approach. There is no set number for estimating sample size in a pilot randomised controlled trial but a sample of n=40 will be sufficient to gain estimates of effect with moderate confidence intervals, and will be sufficient to achieve saturation with qualitative analysis.21

# References

1. Watts JJ, Abimanyi-Ochom J and Sanders KM. (2013) Osteoporosis costing all Australians. A new burden of disease analysis 2012-2022. Sydney: Osteoporosis Australia.
2. Dyer SM, Crotty M, Fairhall N, et al. (2016) A critical review of the long-term disability outcomes following hip fracture. *BMC Geriatrics* 16: 1-18.
3. Lockwood KJ, Harding KE, Boyd JN, Taylor NF. (2018) Reasons for readmission to hospital after hip fracture: Implications for occupational therapy. *British Journal of Occupational Therapy* 81 (5): 247-254. DOI: 10.1177/0308022618756000
4. Lockwood KJ, Harding KE, Boyd JN, Taylor NF. (2019) Pre-discharge home visits by occupational therapists reduce readmissions: A randomized controlled trial. *Clinical Rehabilitation* 33(4): 681-692.
5. Clemson L, Lannin NA, Wales K, et al. (2016) Occupational therapy pre-discharge home visits in acute hospital care: A randomized trial. *Journal of the American Geriatrics Society* 64: 2019-2026.
6. Lockwood KJ, Taylor NF, Boyd JN, Harding KE. (2017) Pre-discharge home visits by occupational therapists completed for patients following hip fracture. *Australian Occupational Therapy Journal* 64 (1): 41-48.
7. Hung GKN & Fong, KNK. (2019) Effects of telerehabilitation in occupational therapy practice: A systematic review. *Hong Kong Journal of Occupational Therapy* 32 (1): 3-21.
8. Cason J. (2014) Telehealth: A rapidly developing service delivery model for occupational therapy. *International Journal of Telerehabilitation*, 6(1), 29-35.
9. Australian Bureau of Statistics. (2018) *Household use of Information Technology, Australia, 2016-17* [online] Available at: http://www.abs.gov.au/ausstats/abs@.nsf/mf/8146.0 [Accessed Feb. 2019].
10. Bowen DJ, Kreuter M, Spring B, et al. (2009) How we design feasibility studies. American Journal of Preventive Medicine, 36(5), 452-457.
11. World Health Organization. (2004). ICD-10: International Classification of Diseases and Related Health Problems (2nd ed.). Geneva: World Health Organisation.
12. Voeten, S. C., Krijnen, P., Voeten, D. M., Hegeman, J. H., Wouters, M. W., & Schipper, I. B. (2018). Quality indicators for hip fracture care: A systematic review. *Osteoporosis International, 29*(9), 1963-1985.
13. Pfeiffer E. (1975) A short portable mental status questionnaire for the assessment of organic brain deficit in elderly patients. Journal of the American Geriatrics Society, 23(10): 433–441.
14. Mackenzie L, Byles J and Higginbotham N. (2002) Reliability of the Home Falls and Accidents Screening Tool (HOME FAST) for identifying older people at increased risk of falls. *Disability and Rehabilitation,* 24(5): 266–274.
15. *Telehealth Guideline*. 2017 Available from: http://ehpolicies.eh.local:90/index.aspx?itemDetails=3241&xText=telemedicine.
16. Ottenbacher KJ, Hsu Y, Granger CV, et al. (1996) The reliability of the functional independence measure: a quantitative review. *Archives of Physical Medicine & Rehabilitation,* 77(12): 1226–1232.
17. Lamb SE, Jørstad-Stein EC, Hauer K, Becker C. (2005) Development of a common outcome data set for fall injury prevention trials: The Prevention of Falls Network Europe consensus. *Journal of the American Geriatrics Society*, 53(9):1618-22.
18. Yardley L, Beyer N, Hauer K, et al. (2005) Development and initial validation of the Falls Efficacy Scale-International (FES-I). *Age Ageing,* 34(6): 614–619.
19. Harwood RH and Ebrahim S. (2002) The validity, reliability and responsiveness of the Nottingham Extended Activities of Daily Living scale in patients undergoing total hip replacement. *Disability & Rehabilitation,* 24(7): 371–377.
20. Brooks R. (1996) EuroQol: the current state of play. *Health Policy,* 37(1): 53–72.
21. Hertzog MA (2008) Considerations in determining sample size for pilot studies. *Research in Nursing & Health,* 31, 180-191.