

**A NEW MODEL OF PHYSIOTHERAPY REHABILITATION TO IMPROVE OUTCOMES AFTER HIP FRACTURE**

**Background**

According to the 2016 Annual Report of the Australian and New Zealand Hip Fracture Registry, 19,000 people over the age of 50 were hospitalised due to hip fracture in 2011-2012, an increase of 22% over 10 years. The mean age of patients is 82years, 70% are female. 45% were able to walk without a gait aid and 71% were living at home prior to the fracture. The consequences of this injury are significant. Nationally an average of 70% of these patients require inpatient rehabilitation after their surgery, and over 10% will be discharged directly to residential aged care. The costs of hip fracture are also significant, and estimated to cost between $23,000 and $33,000 per fracture, depending on the age of the patient (osteoporosis.org.au) with a total cost of over $1.7 billion per year in Australia (International Osteoporosis Foundation bone health.org).

At Eastern Health approximately 200 patients were admitted to inpatient rehabilitation units post surgery for fractured hips in 2015-2016, 122 were treated at Peter James Centre. The average length of stay was 24 days. Approximately 50% came from home but only about 60% of this group were able to return there (AROC data). Less than 50% of patients regain their pre- fracture walking ability one year later. In addition, the ability to undertake activities of daily living may be compromised by fear of falling and reduced mobility, necessitating the move from independent accommodation to a residential aged care facility (Osnes et al 2004).

The 2016 Australian and New Zealand Hip Fracture Care Clinical Standard states that “a patient with a hip fracture should be offered mobilisation without restrictions on weight- bearing the day after hip surgery and at least once a day thereafter”. There are currently NO recommendations about the intensity of physiotherapy, however a recent study (Kimmel et al 2016) showed that walking a patient 3 times a day was feasible and safe in the first few days post surgery, and could reduce total length of stay (acute + rehabilitation days).

Currently at Peter James, patients in rehabilitation are prescribed ones session of 30-45 minutes of physiotherapy 5 days/week, which usually comprises therapeutic exercises, functional retraining and walking. However research at Eastern (Taylor et al 2015) showed that the maximum tolerated dose of walking for patients recovering from hip fracture in rehabilitation units was 6 minutes for each bout of exercise. This suggests as clinicians we are not making the most of physiotherapy time with this group. AROC data shows that although Peter James Centre admits more fractured hips than other centres, we have a longer length of stay than the rest of Australia in the orthopaedic fracture group (just over 2 days longer). In the current economic climate, we need to think of innovative ways to achieve better results using existing resources.

Even though walking and exercise has been proven to stimulate faster recovery in this group (Handoll et al 2007), observational studies have shown that people in rehabilitation units spend most of the day alone and inactive, with very little time spent in activities likely to promote recovery (Smith et al 2008).

Furthermore, walking and exercise has been shown to prevent cognitive decline and dementia, and should be encouraged in this elderly group where cognitive issues are common (Blondell et al 2014). Post operative delirium is common in patients with cognitive issues, and Eastern Health policy encourages purposeful walking.

**Aims**

The primary aim of this study is to investigate if providing three short sessions of physiotherapy each therapy day for patients admitted to rehabilitation after hip fracture is more effective than providing one long session each therapy day in improving mobility.

The secondary aims of this study are to:

* Determine if this model of care reduces length of stay in this patient group
* Determine whether more walking is achieved in 3 shorter sessions 5 days/week versus 1 longer session both within and outside of therapy sessions
* Determine whether there is an increased chance of returning home with this model of care
* Determine if Functional Independence Measure Scores for mobility improve faster in the distributed model
* Compare the 30 day readmission rate after discharge in both groups
* Determine if the new model of care is acceptable to patients and physiotherapists by means of a brief survey about the project.

**Methods**

**Research design**

The study design is a randomised controlled trial design consisting of an intervention group and a control group. The intervention group will receive 3x15 minute sessions of physiotherapy 5 days/week

The control group will receive usual care of 1x 45minute session of physiotherapy 5 days/week.

Approval to conduct the study will be sought from Eastern Health and La Trobe University Human Research Ethics Committees, and all participants will provide written informed consent. The trial will be registered prospectively with the Australian and New Zealand Clinical Trials Register.

**Participants**

Patients will be invited to participate provided they meet the following inclusion criteria:-

* Admitted as an inpatient to Peter James Centre for rehabilitation
* Primary diagnosis of hip fracture as determined by the International Classification of Diseases, 10th edition codes S72.00 - S72.11 without co-current injuries.
* Over 50 years of age

Participants will be excluded if they are not allowed to weight-bear after surgery.

Participants will not be excluded if their primary language is a language other than English. An interpreter will be provided to ensure that these patients understand the informed consent procedure and to assist them with the administration of the outcome measures. Participants will not be excluded if assessment indicates reduced cognition but they meet the other inclusion criteria as next of kin or responsible person will be approached for informed consent.

**Randomisation**

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

**Intervention**

3 x 15 minutes of physiotherapy 5x/week, commencing after randomisation. Until randomisation they will receive usual care (1x45 minute session daily), which begins after their admission and initial physiotherapy assessment. Walking practice, therapeutic exercises and functional task training may be provided within these sessions as deemed appropriate by the treating therapist. Physiotherapy treatment records will be used to assess compliance and content of program. The intervention will continue until the patient is discharged from the rehabilitation unit.

**Control**

1x 45 minute session of physiotherapy 5x/week which may include walking, therapeutic exercise and functional task training as deemed appropriate by the treating therapist ie usual care. This commences after their admission to the ward and initial physiotherapy assessment. Physiotherapy treatment records will be used to assess compliance with and content of the program.

**Program fidelity**

Prior to the commencement of the study, information sessions and training will be provided to the physiotherapy staff at Peter James regarding the study. Separate therapists will treat patients in the control and intervention group. Training will be repeated for all new staff. Fidelity checks will be completed throughout the study to ensure that there is adherence to the protocol.

**Outcome measures**

**The primary clinical outcome is:**

* **De Morton Mobility Index** at admission, 2 weeks and discharge. Post commencement of treatment this will be determined by a blinded assessor. The de Morton Mobility Index has been shown to be a valid and reliable measure of mobility in this patient group with a minimal clinically important difference change of 6 points (de Morton et al 2013).

**The secondary outcomes are:**

* **Daily Functional Independence Measure** of transfers, ambulation and steps
* **Length of Stay** (days in acute and rehabilitation)
* **Discharge Destination,** categorised to a) independent in community b) in community with formal assistance c) residential care d) transition care program
* **Total amount of walking daily** as determined by accelerometer both within and outside of physiotherapy using ActivPAL3 activity monitors monitored continuously for up to 7 days from the start of week 2 of admission to rehabilitation
* **Compliance** with the programs as above
* **Patient and staff satisfaction questionnaires t**o see if this type of service is acceptable and deliverable

**Adverse events**

There are risks associated with having a hip fracture and subsequent surgery as well as hospital stay. These events will be recorded in both groups. 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.

**Sample size calculation**

The primary dependent variable of the de Morton Mobility Index (DEMMI) was used to determine sample size. Based on a previous study in this population and setting power at 80% and alpha at 5%, a sample size of 72 patients is required, 36 in each group to detect a clinically significant difference of 6 points in the DEMMI assuming a standard deviation of 8.9 (de Morton et al 2013).

**Data analyses**

Intention to treat analysis will be performed for all participants in the study using all available data. Between group differences of primary and continuous secondary outcomes will be analysed with ANCOVA using the baseline measures as covariates. The proportion of participants in each group achieving a minimally important change in mobility (DEMMI = 6) will be analysed with relative risk rations. Categorical secondary outcomes will be analysed with Pearson chi square or risk ratios as appropriate. Survey data will be analysed descriptively.

**References**

**Blondell et al (2014). Does physical activity prevent cognitive decline and dementia: a systematic review and meta-analysis of longitudinal studies. *BMC Public Health 14:510.***

**De Morton et al (2013). Validity of the de Morton Mobility Index (DEMMI) for measuring the mobility of patients with hip fracture during rehabilitation. *Disability and Rehabilitation 35(4)325-333.***

**Handoll et al (2007). Mobilisation Strategies after hip fracture surgery in adults. *Cochrane Database Syst Rev (1)*CD001704**

**Kimmel et al (2016). HIPS 4 Hips: High Intensity Physiotherapy for hip fractures in the acute hospital setting: a randomised controlled trial. *Medical Journal of Australia 205(2):73-78.***

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