

# Hip fractures following a fall: physical outcomes following rehabilitation

AUT

**Te Whatu Ora**  
Health New Zealand

Waitematā

Peter McNair PhD  
Hannah Wyatt PhD

Jill Collier MHSc(Hon)  
David Rice PhD

Min Yee Seow FRACP  
Michal Kluger FRCA



**HEALTH & REHABILITATION  
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# Background

- Appropriate rehabilitation plays an important role in improving physical activity performance.
- Research has focused more upon subjective commentary from the patient (questionnaires)
- There is limited objective information concerning:
  - impairments following surgery for hip fracture
  - performance of activities of daily living



# Aim

- Groups:
  - Neck of femur fracture
  - Controls
- Assessments: 3 to 6 months post fracture
- Across limb deficits
- Across group deficits

## 3-D motion analysis

- Assessing spatial-temporal variables
- Walking: normal walking speed
- Up and Go test

## Physical Activity

- Electronic logger
- 7 days

- **ROM:**
- ankle, knee and hip joints

## Strength

- Dynamometer
- Knee extensors

# The larger study

## Strength

Dynamometer  
Hip and knee muscles

## 3-D motion analysis

- Walking: slow and fast speeds
- Up and Go & stepping over obstacle (single and dual task)
- Assessing spatial-temporal, joint motion and force/loading variables

## Perceived function

- Oxford Hip scale
- Katz-15 ADL activity scale
- Fear of Falling Questionnaire
- Falls Efficacy Scale

## Muscle cross sectional area

Ultrasound

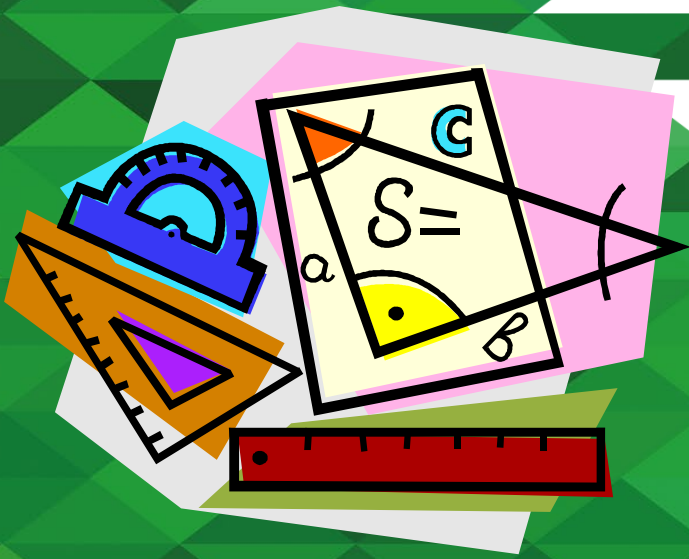
ROM: ankle, knee  
and hip joints

- **Balance**
- 3D sway assessment
- Tasks: Sit to stand; rise on toes; (eyes open & closed, on foam)

**Physical Activity**  
electronic logger  
7 days

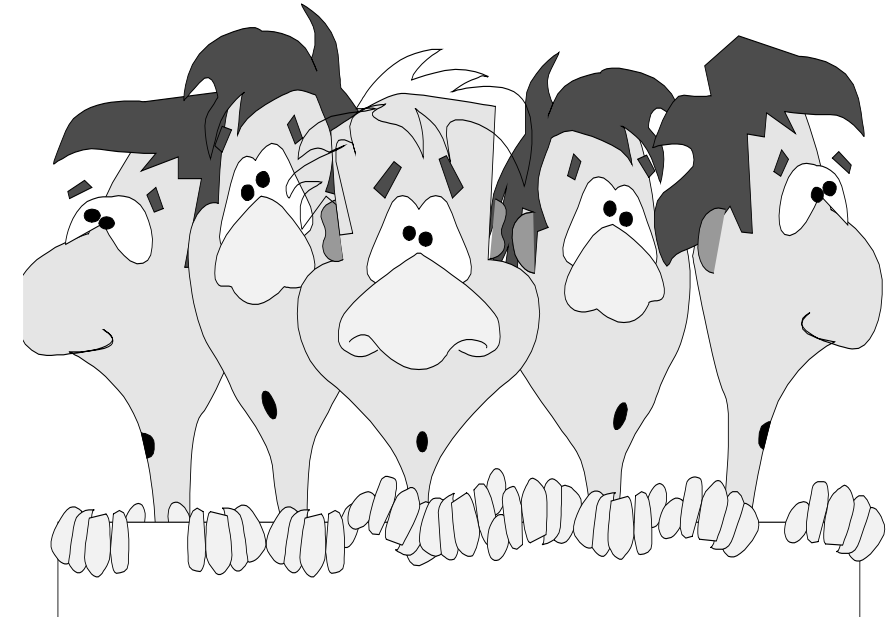
# Methods

- People
- Protocol
- Equipment
- Analyses



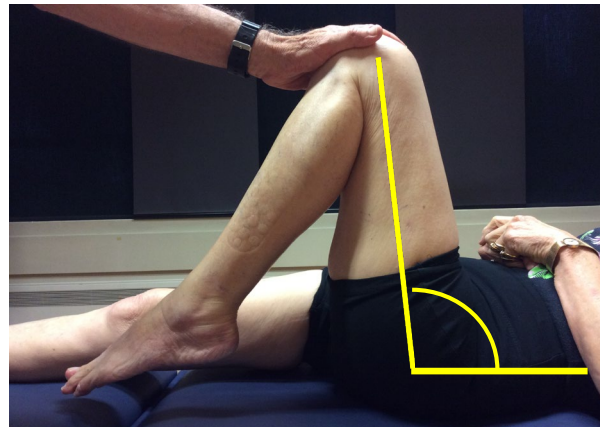
# Participants

- 24 participants with a neck of femur fracture
  - Mean age: 81 (72-90) 23 females
- Recruited from North Shore Hospital
- 85%: independent LLTQ: 30/40; OHS: 36/48
- Inclusion criteria
  - Fractured neck of femur
  - Over 65 years of age
  - Able to walk unaided for 20m
- Exclusion criteria
  - Other significant lower-limb injuries within the 12 months prior to fracture
  - Significant cardiovascular, neurological & muscle/joint disorders
- Control group: 24 participants age and gender matched



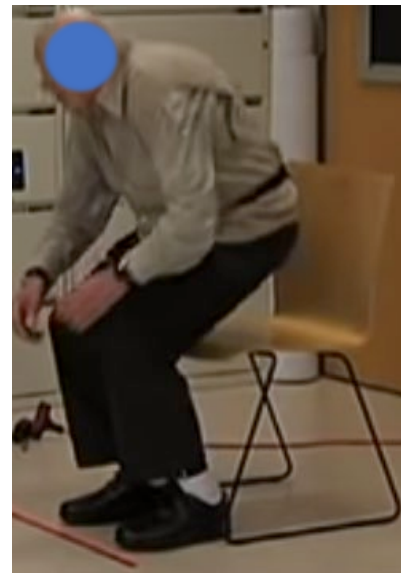
# Physical assessments

- Strength
  - Knee jt extensor muscles
  - Static maximal effort
- Range of motion
  - Photographed
  - Ankle, knee & hip
- Physical activity levels
  - ActiVpal
  - 7 days
  - Walking, standing, sitting, lying



# Gait analysis

- Walking
  - Normal walking speed
  - 3D motion analysis
  - Spatial temporal variables
    - Speed; step length; cadence
    - Stance time; stance width
- “Up and go” test
  - Fast as possible







# Statistics

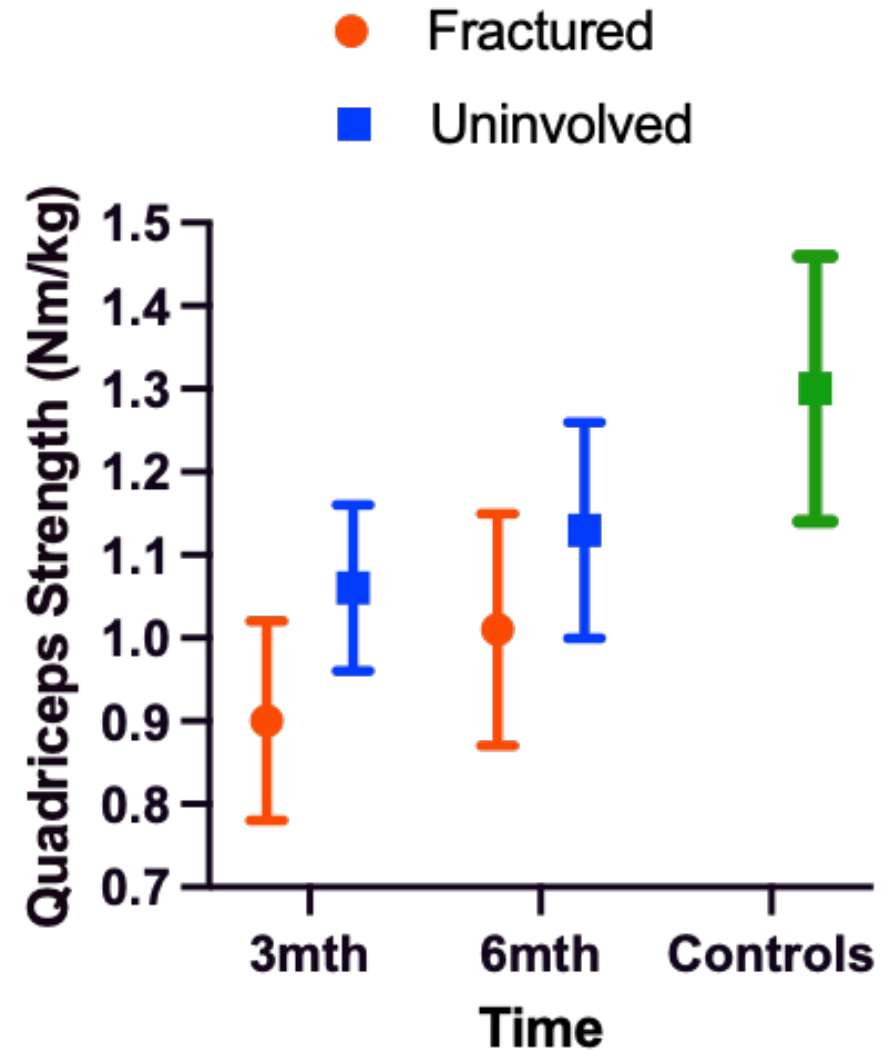
- Comparisons across fracture and control group limbs
- Comparisons across 3 & 6 months
- ANOVA and t-tests ( $p < 0.05$ )
  - Non parametric tests where needed



Results

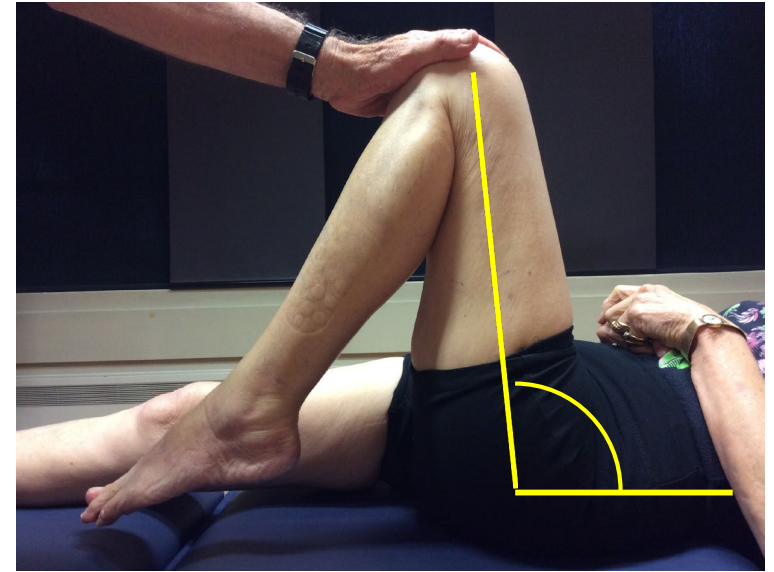
# Strength: knee extensors

- 16% deficit across involved & uninvolved limbs at 3 months
- 13% deficit across involved & uninvolved limbs at 6 months
- Control vs fractured limb: 30% deficit at 6 months
- Uninvolved limb not different from controls at 6 months



# Range of motion

- No significant differences across legs in fractured group ( $p > 0.05$ )
- Significant differences in ROM across groups
  - Hip extension: 40%
  - Hip flexion: 13%
  - Knee flexion: 9%
  - Ankle plantarflexion: 14%
  - Ankle dorsiflexion: 46%



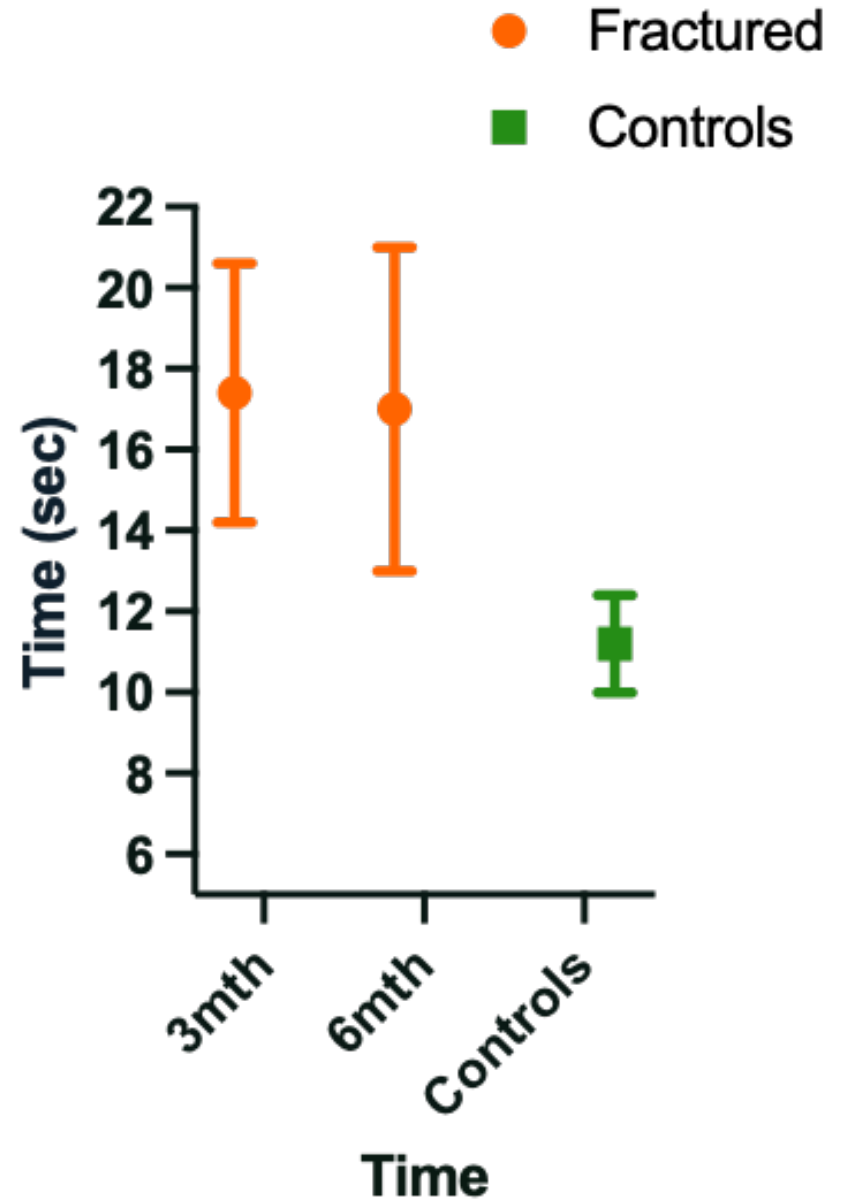
# Gait

	3 months # group	6 months # group	Controls	6 month deficit cf controls (%)
Speed (m/s)	0.62 (37m/min)	0.75 (45m/min)	0.95 (57m/min)	22
Cadence (step/min)	47	49	55	11
Step length (cm)	40	45	54	18
Step width (cm)	14	13	11	18
Stance time (sec)	0.92	0.84	0.71	18

- No differences across limbs in fractured group ( $p > 0.05$ ).
- From 3 to 6 months all variables except step width improved ( $p < 0.05$ ).
- At 6 months, all variables except step width were significant different to controls ( $p < 0.05$ ).

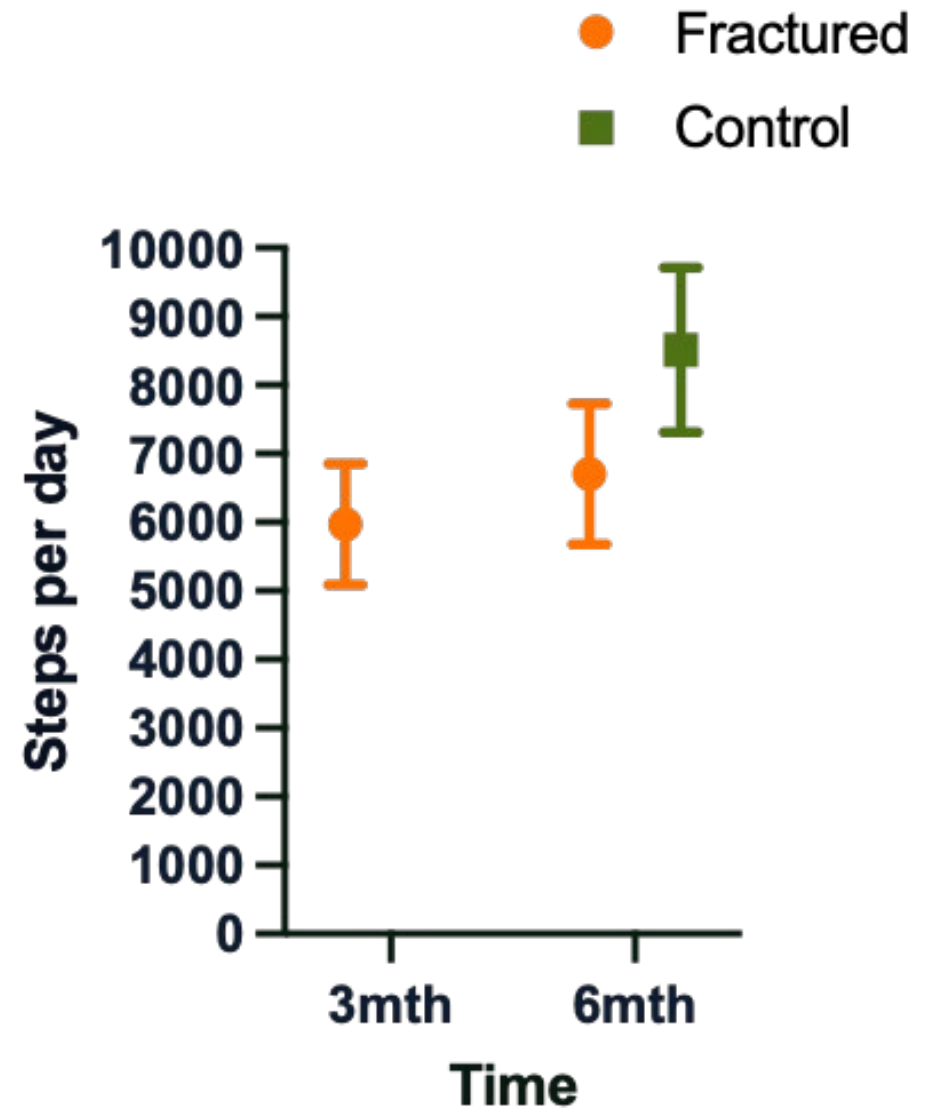
# Up and go (fast)

- No significant difference across 3 and 6 months
- 55% difference between control and fracture groups



# Physical activity level

- Steps: 30% deficit at 3 months between fracture and control groups
- No significant improvement from 3 to 6 months
- Marginal significance at 6 months across groups.
- No differences in standing, sitting and lying across time or groups ( $p>0.05$ )



# Summary and Conclusion

- Quadriceps Strength:
  - Deficits of 14% across limbs at 6 months
  - Deficit of 23-30% across groups at 6 months
- Range of motion:
  - Irrespective of leg, trend showing reduced ROM in the fracture group
    - Particularly ankle joint
- Gait:
  - Normal walking speed is notably decreased (22%) at 6 months
- Up and go:
  - Speed is notably decreased (55%) at 6 months
- Steps per day:
  - 22% less steps at 6 months.

Preliminary findings support increased rehabilitation over the first 6 months



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Thank you!



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