



Sitting time and patterns of activity in post-stroke rehabilitation: week versus weekend activity

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Background

- Current stroke guideline recommendations for rehabilitation activity:
 - 3-hours therapy per day, at least 2-hours of active task practice¹
- During rehabilitation most time is spent sitting (>10h/d) and little time upright and walking (<3h/d)^{2,3}
- For change, we need to understand patterns of activity during rehabilitation
- Measuring activity can help to identify opportunities for improvement
 - Across the week & during each day
- Several ways of measuring activity, one option is activity monitors

Study aims

To examine whether during stroke rehabilitation:

1. sitting and activity time is different between week and weekend days
2. the 24-hour patterns of activity differ between week and weekend days

Methods

Observational study (n=34)

Cross-sectional

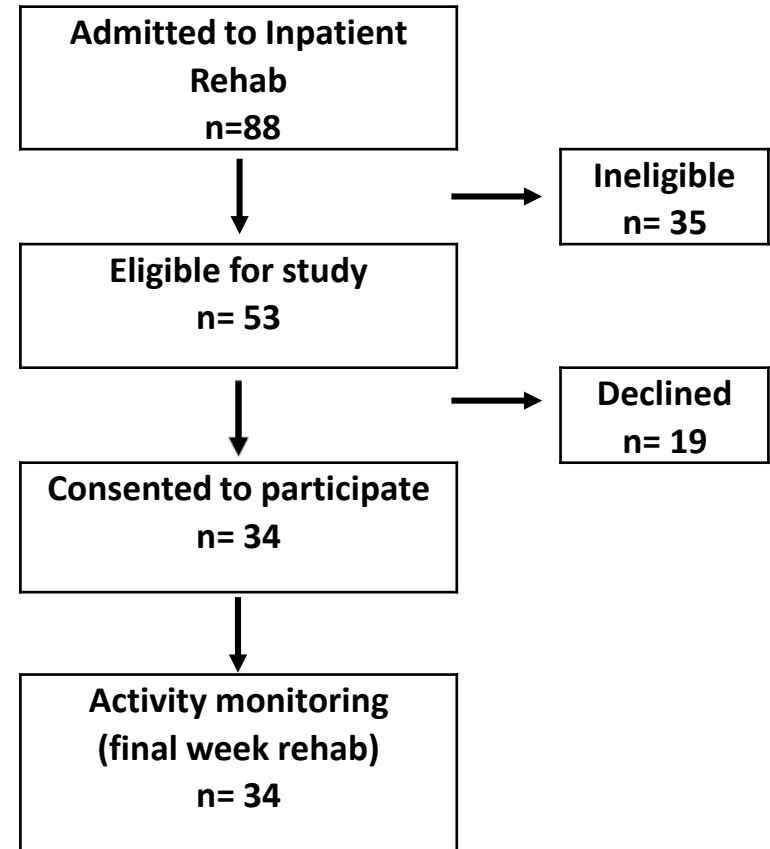
2 inpatient rehabilitation units

Inclusion criteria:

- stroke
- walking prior

Exclusion criteria:

- discharge to care facility
- not expected to survive > 3/12



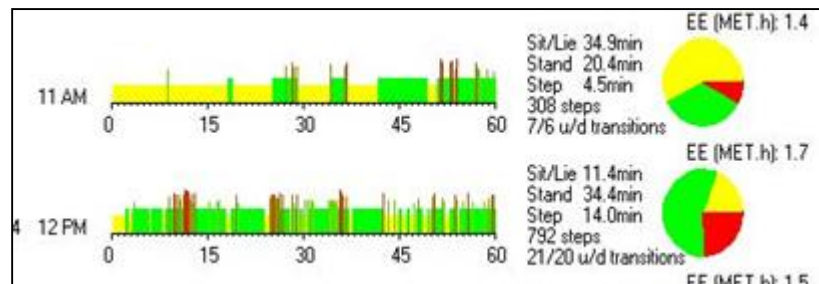
Outcome measures: physical activity

Activity monitor: activPAL3 accelerometer

7 days continuous measurement

Total daily activity (waking hours)

- Sitting/lying time
- Walking time
- Steps / day



Participant measures

Demographic & stroke

- Age
- Sex
- Stroke type, stroke severity

Physical function

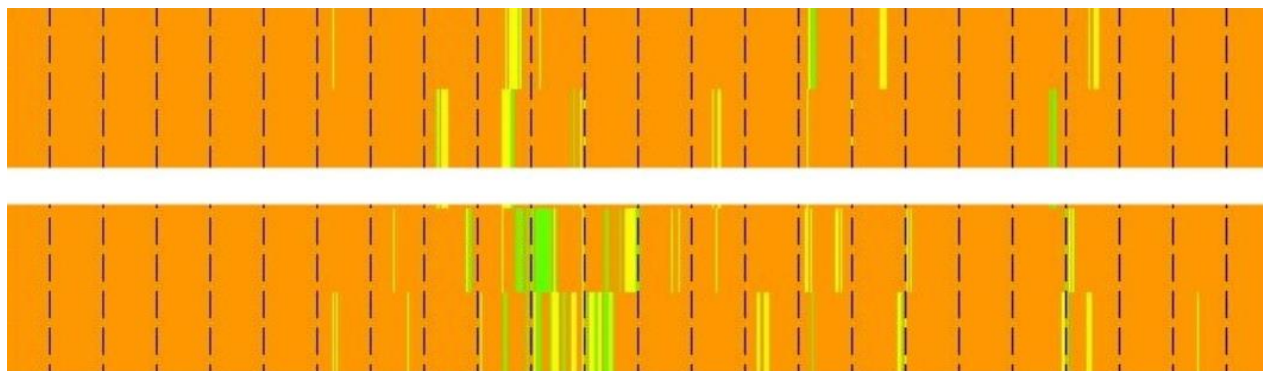
- Gait speed (10mw)
- Endurance (6MW)



24 hour patterns of activity

Individual participant

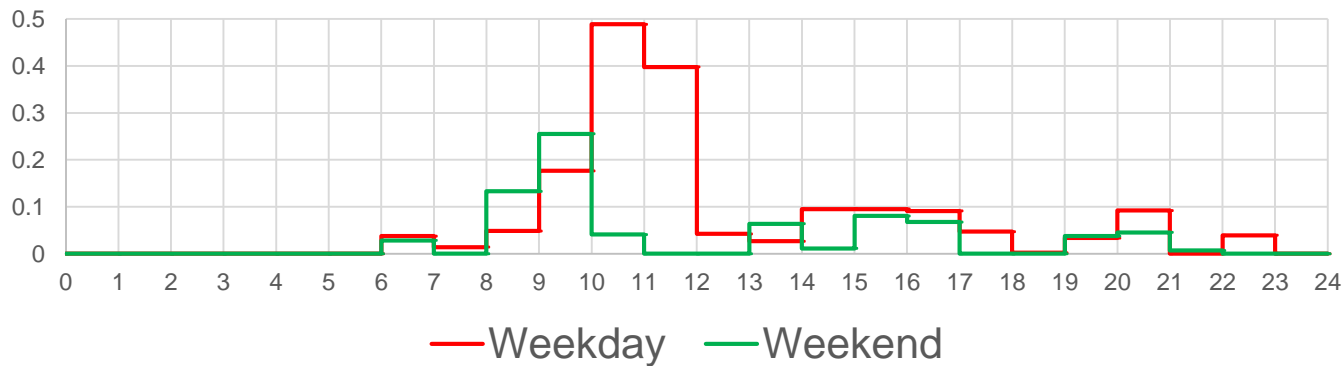
Heat map



weekend

week

Graph



Data analysis

1. Week day versus weekend activity

- Linear mixed models with activity time (Sitting, walking) as the outcome and day type as exposure (adjusted for waking hours)

2. Patterns of daily activity accumulation

- Generated activity heat maps - graphed as % average activity per hour
 - All participants
 - For each individual rehabilitation unit

Participants (n=29)

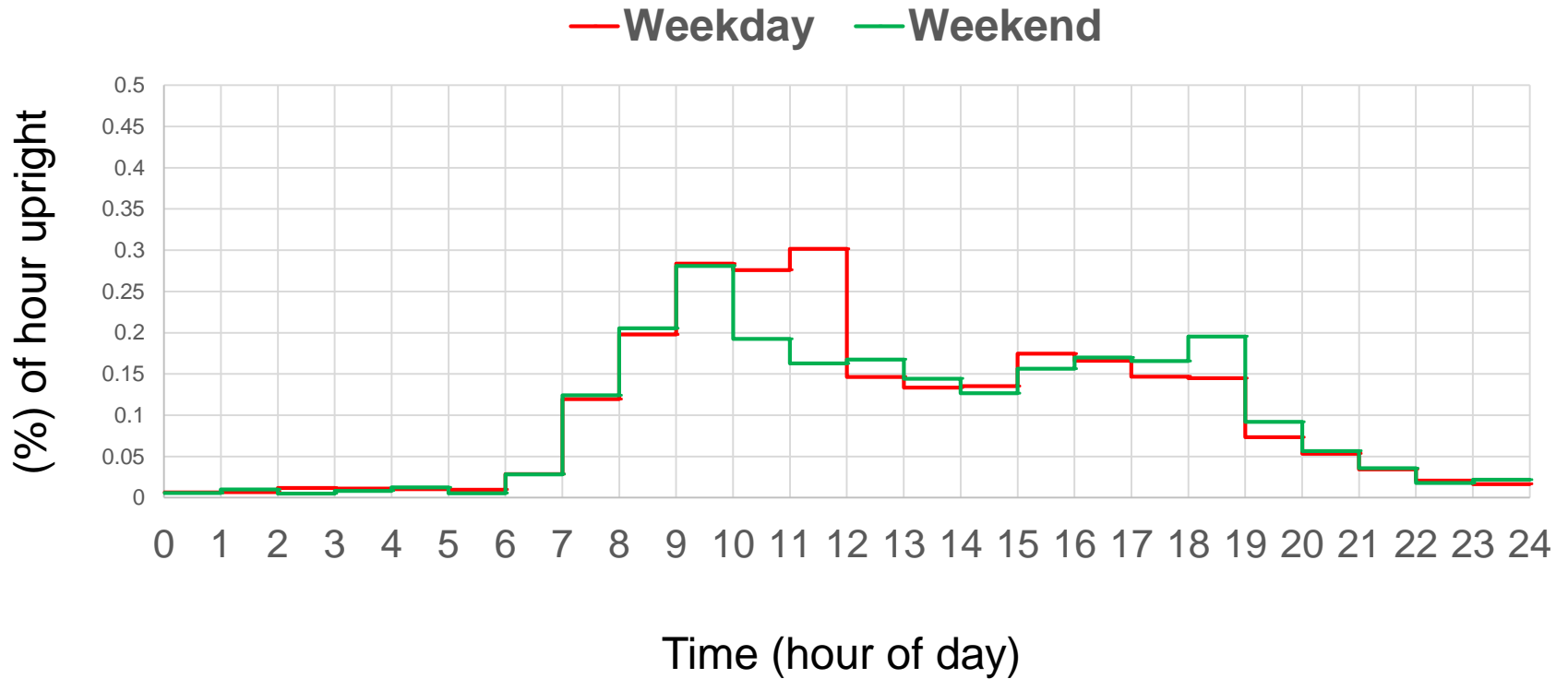
Variable	mean (SD)	(range min - max)
Age (y)	69.0 (12.8)	(32 – 89)
Male (n, %)	15 (51.7)	
Time since stroke (d)	44.1 (28.2)	
Left hemisphere stroke	15 (51.7)	
Stroke type – Infarct (n, %)	27 (93.1)	
Admission NIHSS score	6.7 (5.5)	(1 – 20)
mild (n, %)	20 (69.0)	
moderate (n, %)	6 (20.7)	
severe (n, %)	3 (10.3)	
6MW test (m)	278.3 (155.2)	(60 – 610)
Gait speed (m/s)	0.99 (0.54)	(0.17 – 2.27)

Week versus weekend activity

Activity (mins/day)	Weekday mean \pm SD	Weekend mean \pm SD	Mean difference	(95% CI)	p=
Sitting/lying	636 \pm 118.2	649.8 \pm 114.6	11.54	(-18.0 40.8)	0.444
Walking	30.87 \pm 21.6	21.11 \pm 20.96	-8.35	(-12.1 -4.6)	≤ 0.001
Step count	2179 \pm 1867	1452 \pm 1638	-624	(-951 -296)	≤ 0.001

Linear mixed model adjusted for waking hours and age (n=29)

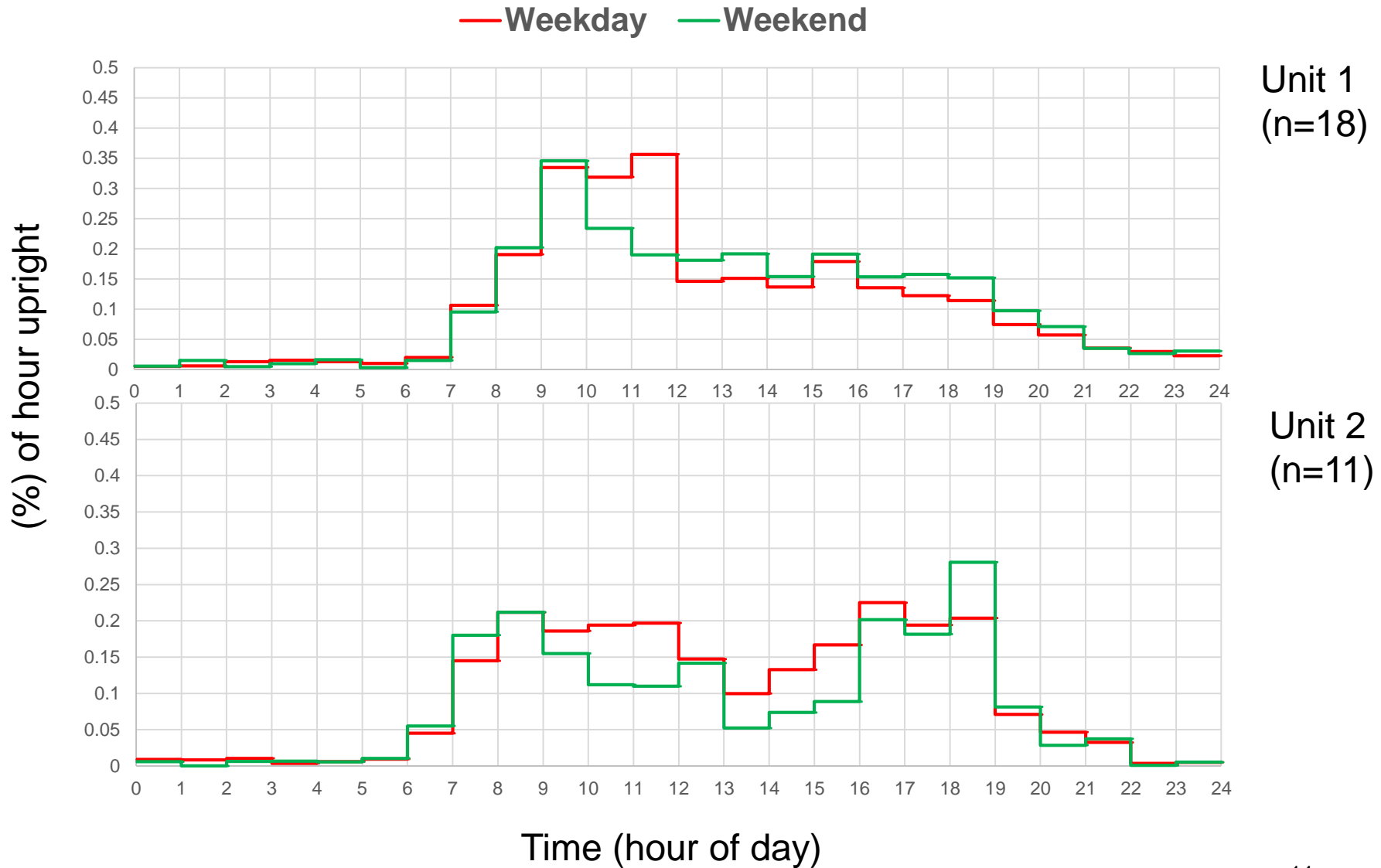
24 hour patterns of activity



Unit characteristics

Ward characteristic	Unit 1	Unit 2
Full Rehab MDT (M – F)	✓	✓
Therapy timetable	✓	X
Rooms: single and shared	✓	✓
Therapy areas on ward (PT/OT)	✓	✓
Meals in dining area	X	✓
Communal area	✓	X
Therapy garden access	✓	✓

Patterns of activity – individual units



Strengths and limitations

Strengths

- Objective device (activPAL3) high accuracy, 24-hour monitoring
- activPAL minimal burden for participant and clinical staff
- Use of heat maps is novel to assess patterns of inpatient activity
- Participants: less ambulant, greater stroke severity

Limitations

- Small sample size
- activPAL less accurate at slow gait speeds
- Data lacks context (location, who present)

Discussion

- No difference in sitting/lying time over the 7 day week
 - 8 mins less walking and 624 fewer steps/day at the weekend
 - Systems, processes and culture
- 24 hour patterns of activity
 - Afternoons and evenings appear to be opportunities for activity
 - Minor variations across participants, greater variation between wards
- Activity monitoring is a useful tool quality improvement for clinicians to consider when evaluating activity during rehabilitation
 - Results may be unit / service specific

Patterns of activity – variation



Unit 1
(n=18)

Unit 2
(n=11)

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Acknowledgements

Our Participants

Funding:

Department of Geriatrics philanthropic award
Tasmanian Health Service – South

NAHSSS Post Graduate Scholarship

Menzies Community Research Scholarship

Study support:

Acute Rehabilitation Unit (*THS-S*)

Department of Rehabilitation (*THS-S*)

Peacock 3 Unit (*THS-S*)

Physiotherapy Department (*THS-S*)

Dr Frank Nicklason & Department of Geriatrics (*THS-S*)

Dr Helen Castley & Department of Neurology (*THS-S*)

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