A Saturday physiotherapy service may decrease length of stay in patients undergoing rehabilitation in hospital: a randomised controlled trial

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Question: Is additional Saturday physiotherapy intervention beneficial for inpatients undergoing rehabilitation? **Design**: Randomised controlled trial with concealed allocation, assessor blinding, and intention-to-treat analysis. **Participants**: Two hundred and sixty-two inpatients undergoing rehabilitation in an Australian metropolitan hospital. **Intervention**: The experimental group received physiotherapy intervention from Monday to Saturday and the control group from Monday to Friday. **Outcome measures**: Primary outcomes were hospital and physiotherapy length of stay. Secondary measures were collected to reflect patient outcomes (health state, independence, activity, flexibility and strength) and burden of care (discharge destination, adverse events, and follow-up physiotherapy intervention). **Results**: There was a 3.2 day reduction for the experimental group (95% CI –0.5 to 6.9) in hospital length of stay and a 2.5 day reduction (95% CI –0.9 to 5.9) in physiotherapy length of stay. There was no significant between-group difference in change from admission to discharge for most of the secondary patient outcomes (health state, independence, activity, flexibility). The risk of the experimental group being categorised as strong relative to the control group was 1.2 (95% CI 0.99 to 1.50). The risk of not being discharged home, of having an adverse event, or requiring follow-up physiotherapy intervention was no greater for the experimental group than the control group. **Conclusion**: The provision of additional Saturday physiotherapy intervention resulted in a trend to shorter hospital and physiotherapy length of stay without affecting patient outcome unfavourably or increasing burden of care, suggesting that a larger multicentre trial is warranted. **[Brusco NK, Shields N, Taylor NF, Paratz J (2007) A Saturday physiotherapy service may decrease length of stay in patients undergoing rehabilitation in hospital: a randomised controlled trial. Australian Journal of Physiotherapy 53: 75–81]**

Key words: Physiotherapy, Length of Stay, Treatment Outcome, Patient Outcome Assessment, Outcomes Research, Exercise Therapy, Rehabilitation, Randomized Controlled Trial, Cost Analysis

Introduction

Physiotherapy services are often provided by hospitals at the weekend to reduce hospital length of stay, increase facility utilisation, reduce patient fatigue and boredom, and reduce morbidity and mortality (Hopper and Dijkers 1987, Heck et al 2001). A recent systematic review examined the effects of additional physiotherapy outside of regular business hours and reported mixed results (Brusco and Paratz 2006). There was evidence that additional weekend physiotherapy significantly decreased hospital length of stay in patients who had undergone elective hip joint arthroplasty (mean decrease in length of stay 1.9 days, 95% CI 1.7 to 2.1, which translates to an effect size of –2.21, 95% CI –2.88 to –1.46) and knee joint arthroplasty (mean decrease in length of stay 0.9 days, 95% CI 0.7 to 1.1, which translates to an effect size of –4.36, 95% CI –5.08 to –3.57) (Hughes et al 1993), and also in non-surgical stroke patients (mean decrease in length of stay 7.1 days, 95% CI 2.9 to 11.3, which translates to an effect size of –0.77, 95% CI –1.22 to –0.30) (Rapaport and Judd-Van Eerd 1989). Two other studies, however, found no difference in hospital or physiotherapy length of stay for patients with stroke (Ruff et al 1999) or patients with a rheumatological condition (David et al 2003). Methodological limitations of these studies were noted in the review, specific concerns being a lack of random allocation, a lack of blinded assessors, and a lack of similarity of the patient groups at baseline.

Shorter hospital length of stay is not only of financial benefit to a health care system but it can also benefit patients both in terms of spending less time out of their home environment and in reducing the possibility of contracting nosocomial infections during their admission (Duffy 2002). Therefore, the research questions for this trial were:

1. Does the provision of additional physiotherapy intervention on a Saturday for inpatients undergoing rehabilitation decrease hospital length of stay and/or physiotherapy length of stay?
2. Does this provision of additional physiotherapy intervention affect patient outcome unfavourably or increase burden of care?

Method

Design: A randomised controlled trial was conducted across two inpatient wards at an Australian metropolitan hospital. Each ward managed a mixed caseload including patients with neurological, orthopaedic, and other conditions requiring rehabilitation. The treating therapists, who were blind to allocation sequence, identified the participants and if they consented to take part enrolled them in the trial and completed the initial measurement. An independent assistant, blind to these results, allocated them randomly by taking a sealed envelope from a container of identical envelopes prepared and shuffled by an investigator prior

to the commencement of the trial. The envelopes were not sequenced or numbered. The experimental group received six days of physiotherapy intervention (Monday to Saturday) and the control group received five days (Monday to Friday). In an attempt to minimise bias, participants were not informed of the specific details of the intervention. The consent form stated that the trial was to review the amount of physiotherapy intervention provided for inpatients and that participants would be randomly allocated to have either the traditional amount of intervention or to receive the traditional amount plus a little extra. Due to the nature of the intervention, it was not possible to blind the treating physiotherapist or other members of staff working on Saturday. Hospital length of stay was measured by a blinded assessor but physiotherapy length of stay was not. Secondary patient outcomes were measured on admission and at discharge by a blinded assessor. The success of the blinding process was measured on discharge after the final assessment by asking the assessors to guess the allocation of the participant. Ethical approval was obtained prior to commencement of the trial from both the Hospital and University Human Research Ethics Committees. Written informed consent was obtained from each participant prior to their initial assessment.

Participants: Participants were recruited from patients admitted for rehabilitation to either of two wards and were included if they were aged 18 years or older. They were excluded if they had impaired cognition, as indicated by a score of less than 24 out of 30 on the Mini-Mental State Examination administered by a medical officer on admission, since this suggested that they would be unable to provide informed consent (Ishizaki et al 1998). They were also excluded if they were admitted for geriatric evaluation and management since these patients were managed differently to those admitted for rehabilitation. Patients were not excluded if their primary language was not English. If required, an interpreter was provided to ensure patients understood the informed consent procedure and assisted with administration of the quality of life outcome measure.

Demographic data were collected on age, gender, diagnosis (AR-DRG 2004), and co-morbidities (past history of stroke, cardiac disease, respiratory disease, depression, reduced cognition, history of falls, reduced mobility and reduced social support) from the participant's medical chart. Reduced mobility was defined as the need for a gait aid and/or being unable to walk 50 m prior to admission; reduced social support was defined as the participant not having at least one key person (usually the next of kin) able to provide both physical and emotional support on discharge.

Intervention: Both the experimental and control group received one hour of physiotherapy intervention each day between Monday and Friday. Participants with a neurological diagnosis were treated individually by a physiotherapist. Participants with a non-neurological diagnosis were usually treated in pairs by a physiotherapist for at least three sessions per week, with the other sessions completed by a physiotherapy assistant. Content of the physiotherapy intervention varied with the priorities of treatment according to the treating physiotherapist, but typically included mobility, balance, strength, and range of motion exercises aimed at improving activity and mobility and preparing the participant for discharge. Both groups also received other allied health interventions as indicated (including occupational therapy, speech pathology, psychology, neuropsychology, dietetics, social work, and ongoing community-based rehabilitation after discharge) from Monday to Friday, with medical and nursing care available from Monday to Sunday.

Table 1. Participant characteristics.

Characteristic	Exp (n = 130)	Con (n = 132)
Age (yr), mean (SD)	77 (13)	77 (13)
Gender (M:F)	53:77	58:74
Co-morbidity, number (%)		
Cardiac disease	61 (47)	67 (51)
Respiratory disease	25 (19)	30 (23)
Past history of stroke	8 (6)	19 (14)
Reduced cognition	36 (28)	37 (28)
Depression	15 (12)	18 (14)
History of falls	31 (24)	39 (30)
Reduced mobility	70 (54)	61 (46)
Reduced social support	5 (4)	8 (6)

Exp = experimental group, Con = control group

The experimental group received an additional one hour of physiotherapy intervention on a Saturday. Participants with a neurological diagnosis were treated individually by a physiotherapist and participants with a non-neurological diagnosis completed their additional Saturday intervention in pairs under the supervision of a physiotherapy assistant. Content of intervention provided at the weekend was decided by the participant's regular physiotherapist, and instructions were provided via a written handover. Provision was made to ensure that if a participant in the control group required urgent physiotherapy intervention at the weekend that it would be provided, eg, if an acute respiratory complication developed.

The number of physiotherapy sessions for each group was recorded using the hospital allied health access database, including not only the additional Saturday interventions received by the experimental group but also any missed sessions as a result of medical instability, participant refusal, or participant not being ready on time.

Outcome measures: The primary outcomes for the trial were hospital length of stay and physiotherapy length of stay. Hospital length of stay was measured as the number of overnight stays in the rehabilitation unit, from the day of admission until the day of discharge from the unit. Physiotherapy length of stay was measured as the total number of overnight stays in the rehabilitation unit, from the day of admission to the day the participant had adequate mobility for a safe discharge, as assessed and recorded on their chart by the treating physiotherapist.

Secondary outcomes were collected to reflect patient outcomes (health state, independence, activity, flexibility, and strength) and burden of care (discharge destination, adverse events, follow-up physiotherapy intervention). Overall health state was measured by the EuroQol Questionnaire visual analogue scale (EuroQol Group 1990), a 100-mm scale on which participants were asked to indicate how good or bad their health was on that day. Independence, measured as the amount of assistance required to complete

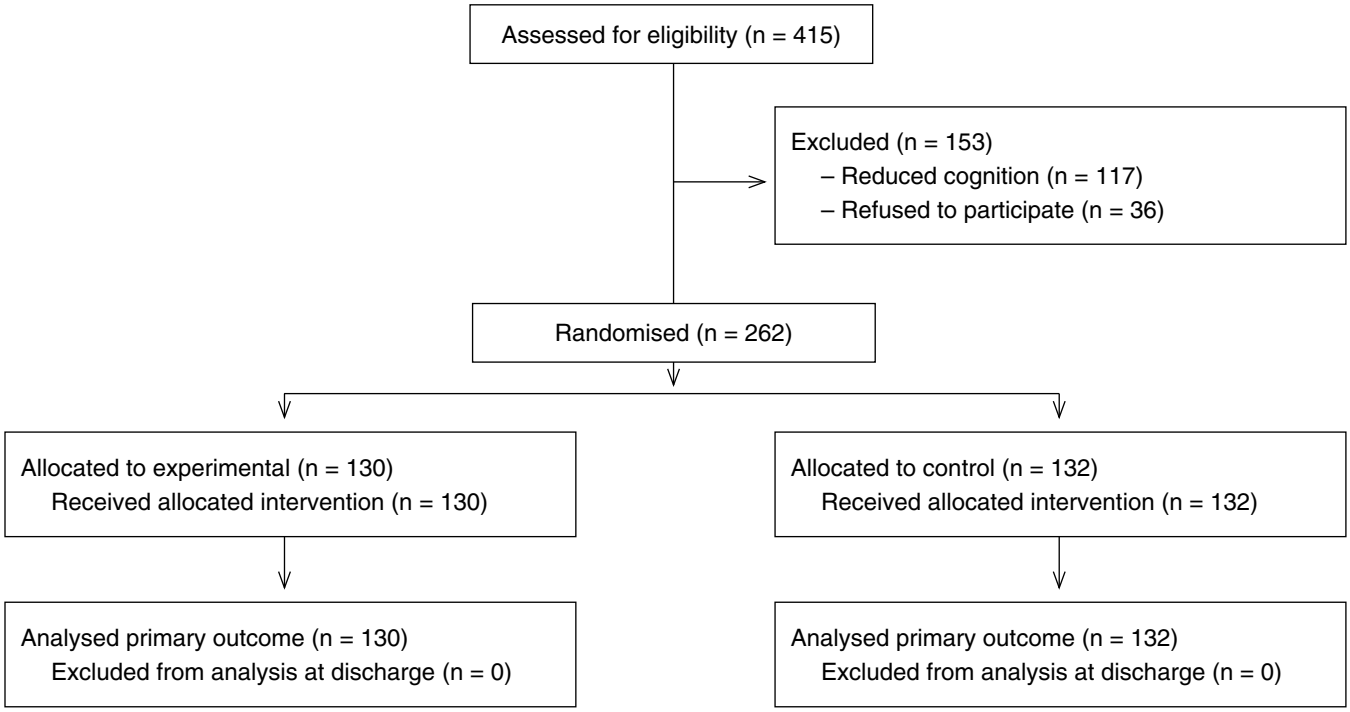

Figure 1. Flow of participants through the trial.

18 everyday activities including feeding, dressing, transfers, walking, and stair climbing, was assessed by direct observation using the Functional Independence Measure (Granger et al 1992). Each item was rated on a 7-point scale, where 1 reflects complete dependence and 7 reflects complete independence.

Activity was measured using the Functional Reach test (Duncan et al 1990), the 10 m Walk Test (Morris et al 1996, Wade et al 1987) and the Timed Up and Go Test (Podsiadlo and Richardson 1991). The Functional Reach Test measures the distance in cm reached by the participant when asked to lean forward along a wall in standing. The 10 m Walk Test measures the walking velocity in m/s over the middle 10 m of a 14 m walkway. The Timed Up and Go Test measures the time taken in s to stand up from a chair, walk 3 m, turn, return to the chair, and sit down. In participants with a neurological diagnosis activity was also measured using the Motor Assessment Scale (Carr et al 1985). This scale rates participants on a 0 to 6 scale for 8 items including arm and hand function, and walking and sitting balance.

In participants with an orthopaedic diagnosis lower limb flexibility and strength were also measured in supine. Active hip and knee range of movement was measured using a goniometer. Participants were categorised as flexible if they were able to flex the knee to 90 degrees and the hip to 90 degrees, and strong if they were able to actively bridge with both hip joints to neutral and to extend the knee joint to 0 degrees (Oldmeadow and Kimmel 2006).

Burden of care was measured as discharge destination, number of adverse events, and type of follow-up physiotherapy intervention. Discharge destination was categorised as home, low level residential care, high level residential care, and acute hospital transfer. This was classified as 'worse' when the participant was discharged to a destination where more assistance would be provided, eg, a high level residential care facility, or 'same' when a participant was discharged to the same place of accommodation prior to the hospital admission. Going home with services was considered a lesser burden than permanent placement in high level residential care. Number of adverse events, including falls, infections and mortality, were extracted through an audit of the participant's medical notes at discharge. Follow-up physiotherapy intervention at discharge was categorised as outpatient (for which the participant attended the hospital once a week), home for rehabilitation (once per week at home), intensive home for rehabilitation (up to five sessions per week at home), or none.

Data analysis: Sample size was based on a predetermined difference in hospital length of stay between the experimental and control group of 3.0 days. This was based on the amount of difference that was believed to be clinically worthwhile. Sample size calculations assumed a standard deviation of 8.6 days (Rapoport and Judd van Eerd 1989) and indicated that 140 participants would be needed in each group for power of 0.8.

The primary outcome measures (hospital and physiotherapy length of stay) were analysed using independent *t* tests with intention-to-treat analysis. Between-group differences of secondary outcomes measured on a continuous or ordinal scale were analysed with ANCOVA of the within-group differences with the baseline score as the covariate (Vickers 2005). Participants who could not complete the 10 m Walk Test and Timed Up and Go Test on admission were excluded from the data set. Between-group differences of the number of participants who were categorised as flexible or strong were analysed using relative risk ratios. Between-group differences in discharge destination (home versus other), number of adverse events, and follow-up physiotherapy intervention (none versus other) were analysed using

Table 2. Mean (SD) of each group, mean (SD) of difference within groups, and mean (95% CI) of difference between groups for patient outcome scores.

Score	Groups				Difference within groups		Difference between groups *
	Admission		Discharge		Discharge minus admission		Discharge minus admission
	Exp	Con	Exp	Con	Exp	Con	Exp minus Con
EQ–5D VAS *(0 to 100 mm)*	56.8 (19.6)	56.4 (18.4)	68.8 (21.5)	65.4 (25.2)	12.0 (21.8) n = 130	9.1 (27.1) n = 132	3.2 (–2.2 to 8.6)
10 m Walk Test *(m/s)*	0.47 (0.29)	0.43 (0.23)	0.69 (0.30)	0.72 (0.29)	0.22 (0.27) n = 89	0.29 (0.25) n = 93	–0.06 (–0.13 to 0.02)
Timed Up and Go Test *(s)*	42.1 (52.1)	31.5 (28.8)	23.1 (21.7)	23.8 (18.8)	19.0 (39.3) n = 79	15.0 (24.9) n = 87	1.7 (–3.2 to 6.6)
Functional Reach Test *(cm)*	10.2 (10.9)	11.6 (11.8)	17.5 (14.4)	19.0 (12.3)	7.3 (11.3) n = 130	7.4 (10.4) n = 132	–0.5 (–3.0 to 2.1)
FIM total med (IQR) *(0 to 126)*	88.0 (74.8, 97.3)	88.5 (74.0, 98.0)	112.0 (98.0, 118.0)	110.0 (98.0, 118.0)	18.0 (13.0, 26.0) n = 130	20.0 (14.0, 28.0) n = 132	–2.7 (–6.4 to 1.0)
FIM motor subtotal med (IQR) *(0 to 91)*	17.0 (12.0, 21.0)	18.0 (13.0, 21.0)	29.0 (24.0, 31.0)	29.0 (25.0, 30.0)	11.0 (6.0, 14.0) n = 130	9.0 (6.0, 13.0) n = 132	0.2 (–1.3 to 1.7)
Motor Assessment Scale med (IQR) *(0 to 48)*	23.0 (15.5, 36.8)	33.0 (19.0. 40.5)	40.5 (21.0, 46.8)	44.0 (28.5, 46.0)	9.5 (6.0, 16.3) n = 32	8.0 (4.0, 17.0) n = 37	0.2 (–5.3 to 5.6)

Exp = experimental group. Con = control group. * = derived from ANCOVA with admission score as covariate, EQ-5D VAS = EuroQol visual analogue scale for overall health state, FIM = Functional Independence Measure

relative risk ratios.

Results

Flow of participants through the trial: The trial was conducted over a one-year period (November 2004 to November 2005). Two hundred and sixty-two participants were recruited to the trial; 130 were allocated to the experimental group (Monday to Saturday physiotherapy intervention) and 132 to the control group (Monday to Friday physiotherapy intervention). As Table 1 shows, random allocation generated groups that were comparable in terms of age, gender, and co-morbidities. Their progress through the trial is shown in Figure 1.

Compliance with trial method: The mean number of physiotherapy interventions was 24.3 (SD 18.7) for the experimental group and 20.2 (SD 12.8) and for the control group, resulting in 4.1 more interventions (95% CI 0.2 to 8.0) for the experimental group.

On discharge, assessors were asked to guess whether the participant had been allocated to the experimental or the control group. Assessors correctly guessed group allocation of the experimental group in 61% of cases and of the control group in 64% of cases.

Effect of intervention: The mean hospital length of stay was 21.2 days (SD 14.0) for the experimental group (n = 130) which was 3.2 days (95% CI –0.5 to 6.9, $p = 0.09$) less than the 24.4 days (SD 15.9) for the control group (n = 132). The mean physiotherapy length of stay was 19.6 days (SD 13.7) for the experimental group (n = 130) which was 2.5 days (95% CI –0.9 to 5.9, $p = 0.15$) less than the 22.1 days (SD 14.0) for the control group (n = 132).

Group data for patient outcomes are presented in Tables 2 and 3 while individual data are presented in Table 4 (for Table 4 see eAddenda). There was no significant difference between groups in the change from admission to discharge for the patient outcome measures of EuroQol Questionnaire, Functional Independence Measure, Functional Reach Test, 10 m Walk Test, Timed Up and Go Test, or Motor Assessment Scale (Table 2). There was no greater risk of the experimental group being categorised as flexible relative to the control group. The risk of the experimental group being categorised as strong relative to the control group was 1.22 (95% CI 0.99 to 1.51) for bridging and 1.21 (95% CI 0.99 to 1.49) for extending the knee to 0 degrees (Table 3).

Group data for burden of care are presented in Table 5. The risk of not being discharged home, of having an adverse event (eg, transfer to an acute hospital, a fall, medical complications, an acute psychological event, or death) or

Table 3. Number of participants (%) in each group and relative risk (95% CI) of difference between groups for patient outcome categories of flexibility and strength at discharge.

Category	Groups		Difference between groups
	Exp (n = 76)	Con (n = 68)	Exp relative to Con
Flexibility			
Can actively flex knee > 90 deg	36 (47)	26 (38)	1.24 (0.84 to 1.82)
Can actively flex hip > 90 deg	32 (42)	25 (37)	1.15 (0.76 to 1.72)
Strength			
Can bridge	60 (79)	44 (65)	1.22 (0.99 to 1.51)
Can extend knee to 0 deg	61 (79)	45 (66)	1.21 (0.99 to 1.49)

Exp = experimental group, Con = control group

Table 5. Number of participants (%) in each group and relative risk (95 % CI) of difference between groups for burden of care categories of discharge destination, adverse events and follow-up therapy.

Category	Groups		Difference between groups
	Exp (n = 130)	Con (n = 132)	Exp relative to Con
Discharge destination			
Home	107 (82)	103 (78)	1.05 (0.93 to 1.19)
LLRC	10 (8)	15 (11)	
HLRC	6 (5)	1 (0)	
AHT	7 (5)	13 (10)	
Adverse events	29 (22)	33 (25)	0.89 (0.57 to 1.38)
Follow-up physiotherapy intervention			
None	22 (17)	25 (19)	0.89 (0.53 to 1.50)
IHFR	38 (29)	28 (21)	
HFR	64 (49)	65 (49)	
OP	6 (5)	14 (11)	

Exp = experimental group, Con = control group; LLRC = low level residential care, HLRC = high level residential care, AHT = Acute hospital transfer, IHFR = intensive home for rehabilitation, HFR = home for rehabilitation, OP = out patient including physiotherapy and all other allied health and medical consultations

requiring follow-up physiotherapy intervention was no greater for the experimental group than the control group (Table 5). There were a total of 17 falls among the 262 participants over the trial period, but there was no difference in the number of falls between the two groups.

Discussion

This randomised trial investigated whether additional physiotherapy intervention on a Saturday would result in a decrease in hospital or physiotherapy length of stay in patients admitted to hospital for rehabilitation without affecting patient outcomes or increasing the burden of care. The results suggest that it is likely that the provision of additional Saturday physiotherapy intervention resulted in a decrease of 3.2 days in hospital length of stay, with a very small chance that there was a 6.9 day decrease or 0.5 day increase. In addition, it is likely that the provision of additional Saturday physiotherapy intervention resulted in a decrease of 2.5 days in physiotherapy length of stay, with a small chance that there was a 5.9 day decrease or a 0.9 day increase. This trend for a decrease in length of stay did not affect patient outcomes unfavourably nor increase adverse events or affect discharge destination. This suggests that the cost of care was not shifted from one sector (inpatient rehabilitation services) of the health care system to another (community services). If decreased length of stay could be confirmed in a larger trial, it may come with no extra burden on community funds and services.

The participants in our study had orthopaedic and neurological diagnoses, as well as being admitted for geriatric rehabilitation. Previous studies have been completed in the area of neurology, rheumatology, elective and trauma orthopaedics, with mixed results for hospital

and physiotherapy length of stay, as well as patient outcome (David et al 2003, Holden and Daniele 1987, Hughes et al 1993, Lang 1998, Rapoport and Judd-Van Eerd 1989, Ruff et al 1999). However, a number of limitations in these previous studies, including lack of random allocation and blinding, marked inequalities between groups, and treatment not based on consensus-based protocols, appeared to influence the validity of their results.

The between-group difference in hospital length of stay in this trial was not statistically significant because there may have been inadequate participant numbers which would result in a Type II error. In a future trial, the number of participants needed in each group in order to detect a 3-day between-group difference in hospital length of stay in a population with the same standard deviation found in the current trial (15 days) would be 392. Similarly, the number of participants needed in each group in order to detect a 3-day between-group difference in physiotherapy length of stay in a population with the same standard deviation found in the current trial (14 days) would be 356. Recruitment of the necessary 800 participants would be possible with a multicentre clinical trial.

Even a small effect size can be important in terms of cost. The Australasian College for Emergency Medicine has reported that if a hospital with 20 000 admissions each year saved half a bed day per patient by increasing its discharge rate, about 2000 extra patients a year could be admitted (Nader 2005). An average 30-bed rehabilitation unit would accommodate approximately 448 rehabilitation patients over 12 months with an average hospital length of stay of 24.4 days. Assuming the cost per day of a rehabilitation bed is approximately $466AUD based on the current payment per bed day model, (Department of Human Services Victoria, 2007), if each patient's length of stay was reduced by 3 days, the annual cost saving to the hospital for the 448 patients would be $626 304, or an additional 68 rehabilitation inpatient admissions per year. The annual cost of staffing a Saturday physiotherapy service (including physiotherapists, allied health assistants, and porters) is estimated at $66 560 for 30 rehabilitation patients, making the potential cost saving substantial.

A strength of this trial was that physiotherapy length of stay as well as hospital length of stay was included as an outcome measure. Hospital length of stay can be affected by multiple factors, including lack of services to facilitate discharge, medical availability to allow weekend discharge, available social support, availability of follow-up physiotherapy services and occupational therapy to set up the discharge environment with equipment or modifications, and factors relating to medical complications or other specific issues. Inpatients undergoing rehabilitation have multidisciplinary issues and future research may need to consider the provision of multidisciplinary weekend services, including the provision of medical services to facilitate weekend discharge and admission. The current trial also employed several strategies to reduce sources of bias and improve the methodological limitations of previous research including establishing equality of groups at baseline, allocating participants randomly, concealing the allocation sequence, and blinding assessors. No other trials have considered the effect of five-days-a-week physiotherapy intervention versus six-days-a-week physiotherapy intervention with a cohort of patients with an orthopaedic, neurological, or other diagnosis. An additional strength was the inclusion of patient outcome and burden of care measures.

There were also a number of limitations to this trial. First, the results are not generalisable to a population with reduced cognition as these patients were excluded from the trial on the direction of the hospital ethics committee. Significant cognitive impairment in a hospital inpatient rehabilitation cohort has been reported to be as high as 64% (Luxenberg and Feigenbaum 1986); 24% of our admissions in the current trial had significant cognitive impairment (accounting for 117 or 76% of the exclusions). These participants would be of interest in any future trial because patients with reduced cognitive status have a greater risk of falls (Bergland and Wyller 2004, Pearse et al 2004) and therefore potentially would benefit from additional physiotherapy intervention. Second, a potential source of bias was that the physiotherapists who determined one of the primary outcome measures – physiotherapy length of stay – were not blind to group allocation. Third, although strategies were employed in the informed consent process to suggest that both participant groups would be receiving therapy that was equally credible, it is possible that participants allocated to the Monday-Saturday group perceived they were in the experimental group.

In conclusion, this clinical trial was unable to conclude with 95% confidence that the provision of additional Saturday physiotherapy intervention to inpatients undergoing rehabilitation decreased hospital length of stay or physiotherapy length of stay. However, the results suggest it is likely that the extra physiotherapy services resulted in a decrease of 3.2 days in hospital length of stay and 2.5 days in physiotherapy length of stay. A larger, multicentre trial to investigate the provision of extra physiotherapy service is warranted and this trial provides important data to help power a future trial adequately.

eAddenda: Table 4 available at www.physiotherapy.asn.au/AJP

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References

AR–DRG (2004) *Australian refined diagnosis related groups, version 5.1.* Canberra: Department of Health and Ageing.

Bergland A, Wyller TB (2004) Risk factors for serious fall related injury in elderly women living at home. *Injury Prevention* 10: 308–313.

Brusco N, Paratz J (2006) The effect of additional physiotherapy to hospital inpatients outside regular business hours: a systematic review. *Physiotherapy Theory and Practice* 22: 291–307.

Carr JH, Shepherd RB, Nordholm L, Lynne D (1985) Investigation of a new motor assessment scale for stroke patients. *Physical Therapy* 65: 175–180.

David C, Price N, Price T, Sheeran T, Mulherin D(2003) Impact of weekend physiotherapy delivery on the throughput of rheumatology inpatients: feasibility study. *Physiotherapy* 89: 25–29.

Department of Human Services Victoria (2007) Public hospital and mental health services: Policy and funding guidelines 2006–07 http: //www.health.vic.gov.au/pfg/pfg0607/conditions.pdf.

Duffy JR (2002) Nosocomial infections: important acute care nursing-sensitive outcomes indicators. *Clinical Issues* 13: 358–366.

Duncan PW, Weiner DK, Chandler J, Studenski S (1990) Functional reach: a new clinical measure of balance. *Journal of Gerontol*ogy 45: M192–197.

EuroQol Group (1990) EuroQol–a new facility for the measurement of health related quality of life. *Health Policy* 16: 199–208.

Granger CV, Hamilton BB, Fiedler RC (1992) Discharge outcome after stroke rehabilitation. *Stroke* 23: 978–982.

Heck CS, Newton J, Chan A (2001) Weekend physiotherapy service provision: a survey of Toronto area hospitals. *Physiotherapy Canada* 53: 288–297.

Holden MK, Daniele CA (1987) Comparison of seven- and five-day physical therapy coverage in patients with acute orthopedic disorders. *Physical Therapy* 67: 1240–1246.

Hooper PJ, Dijkers M (1987) Weekend therapy in rehab hospitals: a survey of costs and benefits. *Clinical Management in Physical Therapy* 7: 16–21.

Hughes K, Kuffner L, Dean B (1993) Effect of weekend physical therapy treatment on postoperative length of stay following total hip and total knee arthroplasty. *Physiotherapy Canada* 45: 245–249.

Ishizaki J, Meguro K, Ambo H, Shimada M, Yamaguchi S, Hayasaka C, Komatsu H, Sekita Y, Yamadori A (1998) A normative, community-based study of Mini-Mental State in elderly adults: the effect of age and educational level. *Journal of Gerontology* 53B: 359–363.

Lang CE (1998) Comparison of 6- and 7-day physical therapy coverage on length of stay and discharge outcome for individuals with total hip and knee arthroplasty. *Journal of Orthopaedic and Sports Physical Ther*apy 28: 15–22.

Luxenberg JS, Feigenbaum LZ (1986) Cognitive impairment on a rehabilitation service. *Archives of Physical Medicine and Rehabilitation* 67: 796–798.

Morris ME, Matyas TA, Iansek R, Summers JJ (1996) Temporal stability of gait in Parkinson's disease. *Physical Therapy* 76: 763–780.

Nader C (2005) Breakthrough with nurses with power to discharge patients. *The Age.* May 23: 7.

Oldmeadow L, Kimmel L (2006) Clinical Protocols in Acute Orthopaedics. Melbourne: Physiotherapy Department, The Alfred Hospital.

Pearse H, Nicholson L, Bennett M (2004) Falls in hospices: a cancer network observational study of fall rates and risk factors. *Palliative Medicine* 18: 478–481.

Podsiadlo D, Richardson S (1991) The timed 'Up & Go': a test of basic functional mobility for frail elderly persons. *Journal of the American Geriatric Society* 39: 142–148.

Rapoport J, Judd-Van Eerd M (1989) Impact of physical therapy weekend coverage on length of stay in an acute care community hospital. *Physical Therapy* 69: 32–37.

Ruff RM, Yarnell S, Marinos JM (1999) Are stroke patients discharged sooner if inpatient rehabilitation services are provided seven v six days per week? *American Journal of Physical Medicine and Rehabilitation* 78: 143–146.

Vickers AJ (2005) Parametric versus non-parametric statistics in the analysis of randomized controlled trials with non-normally distributed data. *BMC Medical Research Technology* 5: 35.

Wade DT, Wood VA, Heller A et al (1987) Walking after stroke. Measurement and recovery over the first 3 months. *Scandinavian Journal of Rehabilitation Medicine* 19: 25–30.

Statement regarding registration of clinical trials from the Editorial Board of *Australian Journal of Physiotherapy*

This journal is moving towards requiring that clinical trials whose results are submitted for publication in *Australian Journal of Physiotherapy* are registered. From January 2008, all clinical trials submitted to the journal must have been registered prospectively in a publicly-accessible trials register. We will accept any register that satisfies the International Committee of Medical Journal Editors requirements. Authors must provide the name and address of the register and the trial registration number on submission.