

Title Page

Title: Does additional acute phase inpatient rehabilitation help people return to work? A subgroup analysis from a randomized controlled trial

Running title: Return to work following inpatient rehabilitation

Authors Names: Natasha Kareem Brusco, Jennifer J Watts, Nora Shields, Siew-Pang Chan, Nicholas F Taylor

Address, name and position for each author:

Natasha Kareem Brusco, Master of Physiotherapy, nbrusco@cabrini.com.au^{1,2}

Jennifer J Watts, Master of Commerce (Eco), j.watts@deakin.edu.au³

Nora Shields, PhD, n.shields@latrobe.edu.au^{1,4}

Siew-Pang Chan, PhD, s.chan@latrobe.edu.au¹

Nicholas F Taylor, PhD, n.taylor@latrobe.edu.au^{1,5}

¹Faculty of Health Science, La Trobe University, Bundoora Campus, Victoria, Australia, 3086

²Physiotherapy Services, Cabrini Health, 183 Wattletree Road, Malvern, Victoria, Australia, 3144

³Deakin Health Economics, School of Health and Social Development, Faculty of Health, Deakin University, 221 Burwood Highway, Burwood, Victoria, Australia, 3125

⁴Northern Health, Department of Allied Health, 1231 Plenty Rd., Bundoora, Victoria 3083, Australia

⁵Allied Health Clinical Research Office, Eastern Health, Level 2, 5 Arnold Street, Box Hill, Victoria, Australia, 3128

Correspondence to: Natasha Kareem Brusco nbrusco@cabrini.com.au Physiotherapy Department, Faculty of Health Science, La Trobe University, Bundoora Campus, Victoria, Australia, 3086, Phone Number +61 408 251 124; Fax Number +61 9508 5222

Additional information:

Trial registration: Australian and New Zealand Clinical Trials Registry ACTRN12609000973213

Affiliation: This clinical trial was performed across the rehabilitation wards at Eastern Health, Melbourne, Australia.

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Does additional acute phase inpatient rehabilitation help people return to work? A subgroup analysis from a randomized controlled trial

Abstract

Objective: To investigate if a Saturday rehabilitation service in addition to usual care improved return to work outcomes 12 months post discharge and to report predictors of return to work.

Design: Subgroup analysis of a single-blind randomized controlled trial.

Setting: General inpatient rehabilitation service.

Subjects: A mixed cohort of 137 adults previously engaged in work, who were admitted for inpatient rehabilitation and allocated to a control group (n=63) or an intervention group (n=74).

Intervention: The control group received usual care rehabilitation from Monday to Friday and the intervention group received usual care plus an additional rehabilitation service on Saturdays (physiotherapy and occupational therapy).

Main outcome: Return to paid or unpaid work.

Results: After 12 months, 36 participants (57%) in the control group and 38 participants (51%) in the intervention group had returned to work. There was no difference between groups (mean difference -1.06 hours per week, 95% CI -8.70 to 6.57) in return to work outcomes. Functional status on discharge (OR 1.05, 95%CI 1.00 to 1.10), an orthopaedic diagnosis (OR 4.92, 95%CI 2.01 to 12.03) and engagement in unpaid work prior to rehabilitation (OR 5.08, 95%CI 1.39 to 18.58) were predictive of return to work at 12 months.

Conclusion: A Saturday rehabilitation service in addition to usual care showed no improvement in return to work outcomes at 12 months. Predictors of return to work may help identify those at risk of not returning to work and who require follow-up vocational rehabilitation services.

Keywords: Rehabilitation, Return to Work, Allied Health, Physiotherapy, Occupational Therapy, Vocational Rehabilitation, Randomized Controlled Trial, Australia

Trial registration: Australian and New Zealand Clinical Trials Registry
ACTRN12609000973213

Abbreviations:

OR - Odds Ratio; MD - Mean Difference; 95% CI - 95% Confidence Interval; AUD\$ - Australian Dollar

Main text

Introduction

The ability to participate in meaningful work is central to financial, psychological and emotional wellbeing.^{1,2} Paid work is performed with financial compensation. Unpaid work has an opportunity cost in terms of time and energy but is performed without financial compensation.³ Unpaid work has a significant effect on a society's economy; in Australia the estimated annual replacement cost of unpaid childcare and care of people with disability is \$4.8 billion.⁴

It would be useful to identify patients at risk of not returning to work after injury or illness so that strategies to improve outcomes could be targeted. There is no available evidence about what factors predict return to work for patients in inpatient rehabilitation. After an acute hospital admission higher functional status, cognitive status, behavioural functioning,⁵ a strong social network, reduced injury severity⁶ and not being depressed⁷ may be positive predictors of return to work.

Our recently published randomized controlled trial demonstrated that the provision of a rehabilitation service on a Saturday improved functional status, quality of life and likely reduced patient length of stay.⁸ The aim of rehabilitation is to prepare people for independent living and resumption of usual social roles. It is important to evaluate if rehabilitation is successful in achieving this, including if improvement in functional status assists people to return to work.

The aim of this study was to investigate if the provision of a rehabilitation service on a Saturday in addition to Monday to Friday compared to Monday to Friday alone, improved return to work outcomes 12 months post discharge; and to report baseline variables that predicted return to work.

Methods

A subgroup analysis was performed on data from a multi-centre single-blind randomized controlled trial examining the outcomes of additional Saturday rehabilitation therapy (occupational therapy and physiotherapy) for a mixed adult cohort of inpatient rehabilitation patients.^{8,9} The trial was registered with the Australian and New Zealand Clinical Trials Registry (ACTRN12609000973213) and had ethics approval. This analysis was an amendment to the original trial protocol.

All participants admitted to inpatient rehabilitation were included. For this study, participants had to have been engaged in work prior to inpatient rehabilitation. Baseline characteristics reported on admission included age, gender, independent living status, co-morbidities,¹⁰ diagnosis, and whether the admission followed an elective or non-elective hospital admission.

Usual care rehabilitation therapy was provided to all participants from Monday to Friday. Interventions focused on task-specific training and discharge planning to independent living with a resumption of usual societal roles, and this may have included elements of vocational rehabilitation. In addition, the intervention group received additional rehabilitation on a Saturday. Physiotherapy and occupational therapy were provided. For the purposes of this study provision of occupational therapy was important for its role in promoting health and wellbeing through occupation.¹¹

The primary outcomes were return to work status at 12 months (paid or unpaid), average hours worked per week and income (paid work). Income for paid employment was based on average wage rates and hours of work per week, with people classified into high, middle or low income groups.¹² Secondary outcomes were measured on admission and discharge from rehabilitation and by telephone at 6 months and 12 months. Functional independence was assessed using the FIM.¹³ Health-related quality of life was assessed using the EQ-5D questionnaire.¹⁴ Length of stay was defined as the number of overnight stays in rehabilitation. Outcomes were assessed by assessors blind to group allocation.

Data analysis

Based on length of stay, a sample size of 712 participants was estimated for the larger randomised controlled trial.⁹ It was assumed this subgroup analysis may be underpowered, however these data may be useful for future meta-analysis. Sample size estimation suggests 171 participants in each group would be required for power of 0.8 at alpha level of 0.05 to detect a minimal clinically significant difference of 8 hours of work per week.

The main analyses were based on generalized estimating equations (GEE). The group difference in return to work (hours per week) was analysed with an identity link and an underlying gamma distribution because of the skewed nature of the outcome variable.

Post-rehabilitation return to work (yes/no) was analysed with a logit link and a binomial distribution. Factors identified as collinear were removed from the logistic regression predictive model. Return to work outcomes were reported at 6 and 12 months and across time from baseline to 12 months. Analyses were completed with the IBM SPSS Statistics Version 21¹⁵ and STATA SE Version 12.0¹⁶ programmes, all statistical tests were conducted at 5% level of significance and relevant 95% confidence intervals (CI) calculated.

Results

Fourteen per cent (n=137) of the patients participating in our randomized controlled trial (n=996) were engaged in work prior to their admission and were included in this subgroup analysis. Their mean age was 62 years, 49% were men, 77% lived independently, 74% were in paid employment, and 41% were in employment categorised as “low income”. The groups appeared well matched on admission, although the EQ-5D utility index was higher for the control group (Table 1). There were no missing data for return to work outcomes at 6 and 12 months with the flow of participants through the larger trial reported elsewhere.⁸ The intervention group received a mean of 563 minutes (SD 151) of therapy per week versus the control group with 513 minutes (SD 188), with a mean difference of 50 minutes (95% CI -8 to 108; $p=0.09$).

At 6 and 12 months, there was no difference between the groups for return to work outcomes (Table 2). Across time, there was no difference between the groups in the number of hours worked per week (mean difference (MD) = -0.99 hours; 95% CI: -8.02 to 6.05) or the annual income for paid work at 12 months (MD AUD\$ 2010 = 3,744; 95% CI: -7,182 to 14,669).

Variables that predicted return to work at 12 months were functional status on discharge, diagnosis and whether pre-rehabilitation work was paid or unpaid (Table 3). These data indicated patients with an orthopaedic diagnosis, patients previously engaged in unpaid work, and those with a higher functional status on discharge were more likely to return to work. Time negatively predicted return to work; at each time fewer participants were working (Table 3).

Discussion

Providing a rehabilitation service on a Saturday in addition to Monday to Friday, improved functional status and quality of life,⁸ yet this subgroup analysis showed no improvement in return to work outcomes at 12 months. One in seven patients (137 of 996) admitted to rehabilitation were engaged in work prior to rehabilitation, yet only one in two were successful in returning to work at 12 months. This suggests general inpatient rehabilitation may not meet the vocational needs of patients, who comprise an important subgroup of those in rehabilitation. On balance, it was unlikely that additional rehabilitation would have made a difference to return to work outcomes as it was a small amount given at an early stage and it was not focussed on vocational rehabilitation. However, this additional rehabilitation did significantly improve functional status at 6 months post discharge.⁸

A neurological/other diagnosis compared to an orthopaedic diagnosis as well as reduced functional status may be indicative of more severe illness or slower progress during rehabilitation, resulting in poorer return to work outcomes. Reduced functional status has been reported as resulting in poorer return to work outcomes for people after stroke.¹⁷ Paid work may have higher expectations with respect to hours and duties required to re-engage in work,¹⁷⁻¹⁹ perhaps explaining why participants were more likely to return to unpaid work. Barriers to returning to work were not explored, but include physical and psychological job demands, employer's willingness to accommodate workers following illness, and the work and social environment.^{18, 20, 21}

Predictive characteristics on admission and discharge from rehabilitation can assist health professionals identify those who are at risk of not returning to work, and who may benefit from follow up vocational rehabilitation services. We reported several potential predictive factors that can be evaluated but did not report on all possible predictors for different patient populations and health care settings.⁵⁻⁷ Future studies might include factors such as cognitive and depressive state, behavioural functioning, education and social support.

Our study had some limitations. It was a subgroup analysis of data from a larger trial and was underpowered. However, the mean difference in total hours worked (1 hour) was very small and not suggestive of any trends in the data in favour of additional rehabilitation. Another potential limitation is that the difference in the amount of rehabilitation therapy received by both groups was not significantly different and was small. However, in the larger trial a similar difference in therapy time was significant and sufficient to improve functional status at 6 months post discharge.⁸

In conclusion, a Saturday rehabilitation service improved functional status and quality of life,⁸ yet a subgroup analysis showed no improvement in return to work outcomes at 12 months. Predictors of return to work may help identify those at risk of not returning to work and who require follow-up vocational rehabilitation services in the community.

Clinical Message

- Additional Saturday therapy during inpatient rehabilitation did not improve return to work at 12 months
- An orthopaedic diagnosis, unpaid work and being discharged from rehabilitation at a higher functional status, positively predicted return to work at 12 months
- General acute phase inpatient rehabilitation may not adequately address return to work

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Author contributions: NKB, JJW, NS and NFT were responsible for study concept and study design, as well as responsible for data collection. NKB, JJW, NS, SPC and NFT were responsible for data analysis and data interpretation. NKB wrote the first draft of the manuscript and JJW, NS, SPC and NFT contributed to writing the final manuscript. All authors read and approved the final manuscript. NKB and NFT are the guarantors.

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TABLES:

Table 1. Characteristics for the control and the intervention groups, as well as for the those who did and did not return to work at 12 months

Characteristic	On admission to rehabilitation				On discharge from rehabilitation			
	Intervention analysis		Predictive analysis		Intervention analysis		Predictive analysis	
	Control (n = 63)	Intervention (n = 74)	Return to work (n = 74)	Not return to work (n = 63)	Control (n = 63)	Intervention (n = 74)	Return to work (n = 74)	Not return to work (n = 63)
Gender, n men (%)	29 (46)	38 (51)	36 (49)	31 (49)				
Elective versus non elective admission, n elective (%)	18 (29)	25 (34)	27 (37)	16 (25)				
Diagnosis, n orthopaedic (%)	30 (48)	43 (58)	50 (68)	23 (37)*				
n neurological (%)	20 (32)	24 (32)	12 (16)	32 (51)*				
n other (%)	13 (21)	7 (9)	12 (16)	8 (13)*				
Employed in paid versus unpaid work, n paid (%)	46 (73)	55 (74)	50 (68)	51 (81)				
Living independently, n (%)	51 (82)	55 (76)	59 (81)	47 (77)	46 (77)	48 (71)	54 (77)	40 (69)
Group allocation, n M-F group (%)	63 (100)	0 (0)	36 (49)	27 (43)				
Income group pre rehabilitation, n high (%)	16 (25)	21 (28)	20 (27)	17 (27)				
n middle (%)	22 (35)	22 (30)	21 (28)	23 (37)				
n low (%)	25 (40)	31 (42)	33 (45)	23 (37)				
Age (yrs), mean (SD)	60.7 (13.3)	62.6 (11.9)	61.4 (12.9)	62.1 (12.3)				
Co-morbidity Index Score, mean (SD)	0.7 (1.0)	0.6 (1.0)	0.6 (1.1)	0.7 (1.0)				
Total FIM score, mean (SD)	88.2 (18.4)	85.2 (20.6)	92.2 (13.2)	80.0 (23.6)*	111.3 (9.8)	110.2 (17.4)	113.7 (8.4)	107.2 (18.7)*
EQ-5D utility score, mean (SD)	0.43 (0.33)	0.26 (0.32)	0.36 (.33)	0.32 (.35)	0.71 (0.18)	0.66 (0.24)	0.71 (0.17)	0.66 (0.26)
	(n=59)	(n=67)*	(n=71)	(n=55)	(n=60)	(n=70)	(n=72)	(n=58)
Length of stay (days), mean (SD)					19.6 (21.2)	22.1 (21.5)	14.8 (8.9)	28.2 (28.4)*
Average weekly combined paid and unpaid hours pre rehabilitation, mean (SD)	29.2 (26.3)	32.1 (29.0)	28.6 (25.3)	33.3 (30.4)				
Average annual income for paid hours pre rehabilitation (AUD\$ 2010), mean (SD)	41,999 (41,623)	43,460 (38,712)	40,502 (42,366)	45,474 (37,031)				

*= significantly different $p < 0.05$, EQ-5D = EuroQOL 5 Dimensions Questionnaire

Table 2. Control and intervention group mean (SD) for work hours and income, with mean (95% CI) difference between groups

Outcome	Timeline						Difference within groups				Difference between groups	
	Pre rehabilitation		6 months post rehabilitation		12 months post rehabilitation		6 months post minus pre rehabilitation		12 months post minus pre rehabilitation		6 months post minus pre rehabilitation	12 months post minus pre rehabilitation
	Con (n = 63)	Int (n = 74)	Con (n = 63)	Int (n = 74)	Con (n = 63)	Int (n = 74)	Con (n = 63)	Int (n = 74)	Con (n = 63)	Int (n = 74)	Int minus Con	Int minus Con
Average paid hours per week	24.57 (21.37)	25.12 (20.50)	12.68 (18.34)	10.01 (16.50)	11.89 (19.39)	9.81 (17.39)	-11.89 (18.89)	-15.11 (18.67)	-12.68 (19.25)	-15.31 (19.64)	-2.91 (-7.92 to 2.09)	-2.33 (-7.68 to 3.02)
Average unpaid hours per week	4.62 (21.49)	6.96 (27.85)	.84 (2.02)	4.31 (20.39)	.86 (2.20)	4.00 (20.19)	-3.78 (21.47)	-2.65 (19.57)	-3.76 (21.45)	-2.96 (19.82)	2.66 (-1.52 to 6.83)	2.35 (-1.82 to 6.51)
Average total hours per week	29.19 (26.28)	32.07 (29.02)	13.52 (17.86)	14.32 (24.51)	12.75 (18.99)	13.81 (25.11)	-15.67 (26.99)	-17.75 (25.51)	-16.44 (27.08)	-18.26 (25.64)	-0.80 (-8.16 to 6.56)	-1.06 (-8.70 to 6.57)
Average paid annual income (AUD\$ 2010)	41,999 (41,623)	43,460 (38,712)	21,652 (36,092)	17,257 (29,381)	20,435 (37,311)	17,150 (31,640)	-20,347 (33,025)	-26,204 (35,150)	-21,564 (33,365)	-26,310 (36,369)	4,395 (-6,669 to 15,459)	3,285 (-8,364 to 14,934)
Number engaged in paid or unpaid work	n=63 (100%)	n=74 (100%)	n=44 (70%)	n=42 (57%)	n=36 (57%)	n=38 (51%)						

Con = Control group: Monday to Friday therapy, Int = Intervention group: Monday to Saturday therapy.

Table 3. Predictive factors for return to paid and unpaid work at 12 months post rehabilitation

	Odds Ratio (95% CI)		
	6 Months	12 Months	Across time (baseline, 6 and 12 months)
Age	0.99 (0.95 to 1.02)	0.97 (0.94 to 1.00)	0.98 (0.95 to 1.01)
Gender	0.81 (0.33 to 1.98)	0.56 (0.23 to 1.37)	0.66 (0.30 to 1.44)
Co morbidities	1.13 (0.72 to 1.78)	1.27 (0.82 to 1.98)	1.18 (0.80 to 1.74)
Orthopaedic diagnosis versus a neurological / other diagnosis	5.34 (2.17 to 13.16)*	4.92 (2.01 to 12.03)*	5.01 (2.28 to 11.01)*
Unpaid work versus paid work pre rehabilitation	1.94 (0.51 to 7.37)	5.08 (1.39 to 18.58)*	3.37 (1.07 to 10.61)*
Average hours of work per week pre rehabilitation (paid and unpaid)	0.99 (0.98 to 1.01)	0.99 (0.98 to 1.01)	0.99 (0.98 to 1.01)
Average income per week pre rehabilitation (paid work)	1.00 (1.00 to 1.00)	1.00 (1.00 to 1.00)	1.00 (1.00 to 1.00)
FIM score at discharge	1.03 (1.00 to 1.07)	1.05 (1.00 to 1.10)*	1.04 (1.00 to 1.07)*
Living independently versus assisted living at discharge	1.46 (0.58 to 3.66)	1.29 (0.52 to 3.20)	1.35 (0.60 to 3.00)
Time			0.60 (0.41 to 0.86)*

*Significant predictor of return to work post rehabilitation p<0.05

Note. The following factors were not included as explanatory variables in the logistic regression analysis because of collinearity: quality of life (collinear with functional independence), length of stay (collinear with diagnosis), and living status pre rehabilitation (collinear with living status post rehabilitation)