Research

Additional weekend therapy may reduce length of rehabilitation stay after stroke: a meta-analysis of individual patient data

Coralie English [a,b,c], Nora Shields [d,e], Natasha K Brusco [d,f], Nicholas F Taylor [d,g], Jennifer J Watts [h], Casey Peiris [d], Julie Bernhardt [i], Maria Crotty [j], Adrian Esterman [k,l], Leonie Segal [m], Susan Hillier [c]

[a] School of Health Sciences, University of Newcastle; [b] University of Newcastle Priority Research Centre for Stroke and Brain Injury, Hunter Medical Research Institute, Newcastle; [c] International Centre for Allied Health Evidence, Sansom Institute of Health Research, University of South Australia, Adelaide; [d] School of Allied Health, La Trobe University; [e] Northern Health; [f] Physiotherapy Services, Cabrini Health; [g] Allied Health Clinical Research Office, Eastern Health, Box Hill; [h] Centre for Population Health Research, Deakin Health Economics, Deakin University; [i] Stroke Division, Florey Institute of Neuroscience and Mental Health, Austin Campus, Melbourne; [j] Department of Rehabilitation and Aged Care, Flinders University, Bedford Park Campus; [k] Division of Health Sciences, University of South Australia, Adelaide; [l] Australian Institute of Health and Tropical Medicine, James Cook University, Cairns; [m] Health Economics and Social Policy, Health Economics and Social Policy Group, Division of Health Sciences, University of South Australia, Adelaide, Australia

KEY WORDS

Physical therapy
Occupational therapy
Rehabilitation
Stroke
Weekend therapy

CrossMark

A B S T R A C T

Questions: Among people receiving inpatient rehabilitation after stroke, does additional weekend physiotherapy and/or occupational therapy reduce the length of rehabilitation hospital stay compared to those who receive a weekday-only service, and does this change after controlling for individual factors? Does additional weekend therapy improve the ability to walk and perform activities of daily living, measured at discharge? Does additional weekend therapy improve health-related quality of life, measured 6 months after discharge from rehabilitation? Which individual, clinical and hospital characteristics are associated with shorter length of rehabilitation hospital stay? **Design:** This study pooled individual data from two randomised, controlled trials (n = 350) using an individual patient data meta-analysis and multivariate regression. **Participants:** People with stroke admitted to inpatient rehabilitation facilities. **Intervention:** Additional weekend therapy (physiotherapy and/or occupational therapy) compared to usual care (5 days/week therapy). **Outcome measures:** Length of rehabilitation hospital stay, independence in activities of daily living measured with the Functional Independence Measure, walking speed and health-related quality of life. **Results:** Participants who received weekend therapy had a shorter length of rehabilitation hospital stay. In the un-adjusted analysis, this was not statistically significant (MD –5.7 days, 95% CI –13.0 to 1.5). Controlling for hospital site, age, walking speed and Functional Independence Measure score on admission, receiving weekend therapy was significantly associated with a shorter length of rehabilitation hospital stay (β = 7.5, 95% CI 1.7 to 13.4, p = 0.001). There were no significant between-group differences in Functional Independence Measure scores (MD 1.9 points, 95% CI –2.8 to 6.6), walking speed (MD 0.06 m/second, 95% CI –0.15 to 0.04) or health-related quality of life (SMD –0.04, 95% CI –0.26 to 0.19) at discharge. **Discussion:** Modest evidence indicates that additional weekend therapy might reduce rehabilitation hospital length of stay. **Clinical Trial Registration:** ACTRN12610000096055, ACTRN12609000973213. **[English C, Shields N, Brusco NK, Taylor NF, Watts JJ, Peiris C, et al. (2016) Additional weekend therapy may reduce length of rehabilitation stay after stroke: a meta-analysis of individual patient data. *Journal of Physiotherapy* 62: 124–129]**

© 2016 Australian Physiotherapy Association. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

Introduction

Rehabilitation for people who have had a stroke is expensive, costing an estimated AUD150 million per year in Australia.[1] One of the most powerful ways of reducing cost is reducing the number of days spent in hospital.[2] Providing therapy services on weekends has become a more common part of usual care for rehabilitation facilities in Australia,[3] although until recently there was little published evidence to support its clinical effectiveness or impact on length of rehabilitation hospital stay.

Two recent, large, randomised, controlled trials investigated the effectiveness of weekend therapy services for people during rehabilitation after stroke. One trial,[4] referred to here as the Saturday trial, investigated the effectiveness of additional physiotherapy and occupational therapy services provided on Saturdays, compared to usual care for people with a range of diagnoses, including stroke. The other trial,[5] referred to here as the CIRCIT trial, included only participants with stroke, and included three arms: weekend physiotherapy services provided on Saturdays and Sundays; group circuit class therapy provided 5 days per week; and usual care physiotherapy. In both trials, participants receiving weekend therapy had a shorter mean length of rehabilitation hospital stay (by 2 days[4] and 3 days[5]), compared to usual care consisting of therapy 5 days per week. However, in both trials, the

between-group difference in length of rehabilitation hospital stay did not reach statistical significance.

Individual patient data meta-analyses provide the opportunity to pool data from trials at a participant level, resulting in greater statistical power to test secondary hypotheses more conclusively and to conduct further exploratory analyses.[6] The aim of the present study was to conduct an individual patient data meta-analysis, combining data from the CIRCIT and Saturday trials, to investigate the effectiveness of providing additional weekend therapy services to people with stroke, compared to usual care in the Australian context.

Therefore, the primary research question for this study was:

1. Among people receiving inpatient rehabilitation after stroke, does additional weekend physiotherapy and/or occupational therapy reduce length of rehabilitation hospital stay compared to those who receive a weekday-only service, and does this change after controlling for individual factors?

The secondary research questions were:

1. Does additional weekend therapy improve the ability to walk and to perform activities of daily living, measured at discharge?
2. Does additional weekend therapy improve health-related quality of life, measured 6 months after discharge from rehabilitation?
3. Which individual, clinical and hospital characteristics are associated with shorter length of rehabilitation hospital stay?

Method

Design

Both trials were Phase-III multicentre, randomised, controlled trials with concealed allocation and blinded assessment of outcomes. The full trial protocols have been published elsewhere.[7,8] Randomisation in both trials, across seven hospital sites, occurred within 1 week of admission to rehabilitation.

Participants

Briefly, the inclusion criteria for people with stroke in the CIRCIT trial were: diagnosed stroke of moderate severity, defined as a Functional Independence Measure (FIM) total score between 40 and 80 points or a motor subscale score between 38 and 62 points; and ability to mobilise independently prior to their stroke. There were no stroke-specific inclusion criteria for the Saturday trial.

Interventions

In the CIRCIT trial, participants allocated to the 7-day arm received additional physiotherapy services on Saturday and Sunday. In the Saturday trial, participants in the intervention arm received additional physiotherapy and occupational therapy on Saturdays only. In both trials, usual care participants received physiotherapy and occupational therapy Monday to Friday only. The treating therapists recorded the amount of therapy time received by participants in both trials. In the CIRCIT trial, therapists recorded the time that participants spent in physiotherapy sessions on trial-specific data sheets, up to the first 4 weeks of their rehabilitation stay. In the Saturday trial, therapy time was recorded as part of routine hospital data collection procedures for the entire length of stay.

Outcome measures

Length of rehabilitation hospital stay was defined as the number of days between admission to, and discharge from, the rehabilitation facility. Measures of walking speed and independence in activities of daily living (FIM scores) and health-related quality of life were made 4 weeks after randomisation (CIRCIT trial), at discharge from rehabilitation (Saturday trial), and at approximately 6 months after discharge (in both trials). Health-related quality of life was measured with the Australian Quality of Life tool in the CIRCIT trial and the EQ5D-3L tool in the Saturday trial. The average time post-randomisation for the discharge assessment point in the Saturday trial for people with stroke was 34 days (SD 23); therefore, these data were pooled with the 4-week data from the CIRCIT trial.

Data analyses

Data were pooled from the CIRCIT trial (all participants from the usual care group and the group that received therapy 7 days per week) and the Saturday trial (participants with a diagnosis of stroke from the usual care group and from the group that received additional therapy on Saturdays). Univariate analyses (Chi-squared or Fisher's exact test for categorical variables, *t*-tests or Mann-Whitney U for continuous variables) were used to compare participant characteristics at baseline between the two trials, and outcomes between intervention and control groups in the pooled dataset. Descriptive statistics were used to summarise the average weekly (Monday to Friday) therapy time provided to the usual care groups in the two trials, and the amount of additional weekend therapy provided. As length-of-stay data were not normally distributed, the between-group difference was first examined using a Mann-Whitney U test. Independent *t*-tests were also conducted to determine the mean differences and 95% confidence intervals (CI) to allow interpretation of the size of effect. Multivariate regression was used to explore the independent effect of providing weekend therapy services on rehabilitation length of hospital stay. A theoretically based model, which included factors known to influence length of hospital stay, was developed. As it was a secondary analysis of existing data, the choice of variables was constrained by the data available. Therefore, these participant factors were included: age, gender, co-morbidities, and baseline walking speed and FIM score. As length of rehabilitation hospital stay differed both between trials (CIRCIT versus Saturday trial), and across hospital site within the trials, both of these factors were also included in the model, and collinearity between variables within the model was assessed. Between-group differences in self-selected walking speed and independence in activities of daily living (FIM scores) were examined using Mann-Whitney U tests (as data were not normally distributed), and independent *t*-tests (to allow for interpretation of the size of the effect). Analyses were conducted using commercial software[a] with significance set at α = 0.05. As health-related quality of life data were collected using two different tools, group data (means and standard deviations) were pooled in meta-analysis software[b] using a fixed-effect model and reported as a standardised mean difference. A fixed-effect model was chosen because heterogeneity between the trials was assumed to be low. This assumption was verified by checking heterogeneity using the I^2 statistic.

Results

Flow of participants through the study

All participants that were randomised to therapy 7 days a week (n = 96) or usual care (n = 94) in the CIRCIT trial, and all participants in the Saturday trial with a diagnosis of stroke (usual care n = 79, weekend therapy n = 81) were included in the pooled analysis. Figure 1 presents the flow of participants through the trials. Table 1 compares baseline characteristics of all included participants. Table 2 compares baseline differences between usual care and weekend therapy participants for the pooled dataset.