Journal of Physiotherapy 61 (2015) 61–67

Journal of PHYSIOTHERAPY

journal homepage: www.elsevier.com/locate/jphys

Research

After-hours or weekend rehabilitation improves outcomes and increases physical activity but does not affect length of stay: a systematic review

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KEY WORDS

Rehabilitation
Physical activity
Outcome
After hours
Weekend

ABSTRACT

Question: In adults undergoing inpatient rehabilitation, does additional after-hours rehabilitation decrease length of stay and improve functional outcome, activities of daily living performance and physical activity? **Design:** Systematic review with meta-analysis of randomised trials. **Participants:** Adults participating in an inpatient rehabilitation program. **Intervention:** Additional rehabilitation provided after hours (evening or weekend). **Outcome measures:** Function was measured with tests such as the Motor Assessment Scale, 10-m walk test, the Timed Up and Go test, and Berg Balance Scale. Performance on activities of daily living was measured with the Barthel index or the Functional Independence Measure. Length of stay was measured in days. Physical activity levels were measured as number of steps or time spent upright. Standardised mean differences (SMD) or mean differences (MD) were used to combine these outcomes. Adverse events were summarised using relative risks (RR). Study quality was assessed using PEDro scores. **Results:** Seven trials were included in the review. All trials had strong methodological quality, scoring 8/10 on the PEDro scale. Among the measures of function, only balance showed a significant effect: the MD was 14 points better (95% CI 5 to 23) with additional after-hours rehabilitation on a 0-to-56-point scale. The improvement in activities of daily living performance with additional after-hours rehabilitation was of borderline statistical significance (SMD 0.10, 95% CI 0.00 to 0.21). Hospital length of stay did not differ significantly (MD –1.8 days, 95% CI –5.1 to 1.6). Those receiving additional rehabilitation had significantly higher step counts and spent significantly more time upright. Overall, the risk of adverse events was not increased by the provision of after-hours or weekend rehabilitation (RR 0.87, 95% CI 0.70 to 1.10). **Conclusion:** Additional after-hours rehabilitation can increase physical activity and may improve activities of daily living, but does not seem to affect the hospital length of stay. **Review registration:** PROSPERO CRD42014007648. **[Scrivener K, Jones T, Schurr K, Graham PL, Dean CM (2015) After-hours or weekend rehabilitation improves outcomes and increases physical activity but does not affect length of stay: a systematic review. *Journal of Physiotherapy* 61: 61–67]**

Introduction

Inpatient rehabilitation programs are commonly required for people with poor mobility and functional performance as a result of many health conditions.[1–3] These rehabilitation programs should contain repetitive practice of functional tasks and exercise in order to improve fitness.[1,4,5] Increasing the intensity of rehabilitation programs elicits greater improvement in participants' mobility and functional outcomes, as well as a reduction in the length of hospital stay.[6–9] Despite this, inpatients undergoing rehabilitation programs are inactive for large amounts of time during the day.[10–12] During weekdays, the amount of therapy occurring in hospital varies greatly. In rehabilitation after hip fracture, for example, 2 hours of physiotherapy and occupational therapy have been observed to be completed each weekday,[13] whereas in stroke rehabilitation, as little as 16 minutes of therapy time has been observed each weekday.[14]

Inpatient rehabilitation participants are more inactive on the weekend than during the week.[15,16] Furthermore, less therapeutic activity is observed in the evenings and on the weekend.[17] In many rehabilitation hospital settings, therapists are rostered to work from Monday to Friday, within usual working hours. Consequently, little or no therapeutic activities occur in the evenings and on the weekend. In addition, therapy areas are usually closed when therapists are not present. Therefore, for rehabilitation, increasing physical activity opportunities out of traditional working hours is a major challenge. In 2006, a systematic review analysed trials of additional physiotherapy outside of traditional working hours provided to acute hospital inpatients but did not show a benefit from the additional therapy.[18]

Various strategies have been investigated to provide opportunities for exercise out of the typical therapy times and environment. For example, one of these strategies included the provision of supplementary arm exercise programs that the

http://dx.doi.org/10.1016/j.jphys.2015.02.017

rehabilitation participant completes independently in the ward environment.[19] This program demonstrated a positive outcome with very minimal burden on therapy staff.

The aim of this systematic review was to summarise current evidence about the effect of additional in-hospital rehabilitation out of traditional working hours. This is in contrast to other reviews of more intensive therapy after stroke, which predominantly included studies of additional therapy during the working day.[6,7] Therefore, the research questions for this systematic review were:

1. Does additional rehabilitation occurring after hours or on weekends improve the functional outcomes of rehabilitation participants?
2. Does providing additional rehabilitation after hours or on weekends decrease the length of stay in rehabilitation?
3. Does providing additional rehabilitation after hours or on weekends increase daily physical activity among hospital inpatients?
4. Does providing additional rehabilitation after hours or on weekends increase the risk of adverse events?

Methods

Identification and selection of studies

This systematic literature review was conducted according to a protocol that was registered *a priori* and reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement.[20] An electronic search for relevant articles was conducted in July 2014. The following databases were searched: Ovid MEDLINE, Embase, AMED, CINAHL, Scopus and PEDro. The search terms included those related to rehabilitation (*physiotherapy*, *occupational therapy*, *exercise*), additional rehabilitation (*weekend*, *after-hours*, *supplementary*, *six day*, *seven day*, *Saturday*, *Sunday*), inpatient (*patient*, *hospital*) and randomised controlled trial (*controlled*, *intervention group*, *random*). Full details of the search strategy used for each database are in Appendix 1 on the eAddenda.

Titles and abstracts were examined for relevance by one author (KS). Where appropriate, the full text of articles was sought to determine their relevance to the review. Where there was doubt, a second author (TJ) reviewed the full-text article to determine its relevance to the review. The criteria for inclusion of studies in the review are presented in Box 1.

Assessment of characteristics of studies

Quality

Two authors independently examined the full-text version of the trial reports included in the review to assess the risk of bias. Risk of bias was assessed using the PEDro scale[21] and the Cochrane Collaboration's Risk of Bias tool.[22] All included trial reports were located on the PEDro database to confirm their PEDro scale score. If a disagreement arose between the authors about the risk of bias scores, the trial was discussed with a third author in order to reach consensus.

Box 1. Inclusion criteria.

Design
- Randomised trial
- Published in English

Participants
- Adult inpatients in a subacute or rehabilitation setting

Intervention
- Additional after-hours physical rehabilitation

Outcome measures
- Functional outcome
- Activities of daily living
- Length of hospital stay
- Physical activity levels
- Adverse events

Participants, interventions, outcomes

Two authors independently examined the full-text version of the trial reports included in the review to extract data. Where necessary, authors of articles included in the review were contacted to provide additional data to allow the comparison of results. Participants in the included studies could have any clinical condition, provided they were receiving rehabilitation as inpatients. The after-hours physical rehabilitation could occur in any form (eg, arm exercise, mobility training) and could be unsupervised (ie, self-monitored programs) or supervised by anyone (eg, therapists, families, assistants, nursing staff). Trials examining additional therapy during regular working hours were ineligible. Data were extracted for the following outcomes: functional outcomes (eg, Motor Assessment Scale, Berg Balance Scale, 10-m walk test); activities of daily living (eg, Barthel index, Functional Independence Measure); length of hospital stay; physical activity (eg, activity monitors, behavioural mapping data); and adverse events.

Data analysis

To obtain pooled estimates of the effect of the intervention, DerSimonian and Laird random-effects meta-analyses were used. The effect of additional after-hours rehabilitation was estimated using: standardised mean differences (SMD) with 95% CI for the functional outcomes and activities of daily living; mean differences (MD) with 95% CI for the Timed Up and Go test, the 10-m walk test, and length of hospital stay; and relative risk (RR) with 95% CI for adverse events. Heterogeneity between studies was assessed using Cochrane's Q, with p-values less than 0.05 indicating significant heterogeneity. Where results were reported as medians and interquartile ranges or ranges, the methods of Hozo and colleagues[23] were used to convert results into means and standard deviations. While reporting of medians may indicate non-normality, the sizes of the studies where this occurred suggested that it might be reasonable to assume that means would be normally distributed. Subgroup and sensitivity analyses were not undertaken due to the small number of studies providing data for any outcome. R statistical software[24] with the *meta* package[25] was used for all analyses.

Results

Flow of studies through the review

The search identified 2559 papers, of which 25 were retrieved in full text and screened for eligibility. Of these, seven trials were included in the review (Figure 1).

A systematic review[6] of augmented therapy time after stroke was identified by the search. Screening of the reference list identified 10 papers that were possibly relevant. Based on the abstracts, two papers were obtained in full text, but neither was eligible because the participants were outpatients.[26,27] Another systematic review,[18] investigating the effect of additional physiotherapy for hospital inpatients (in all phases of care) provided outside of regular business hours, was identified by the search. Screening of the reference list identified five papers that were possibly relevant. However, screening the abstracts indicated that none was eligible: two were not randomised, controlled trials;[28,29] one assessed additional therapy that was not delivered after hours;[30] and two were conducted in the acute setting.[31,32] A more recent systematic review investigating the