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Intensive rehabilitation improves functional outcome of traumatic brain injury

Key Messages

1. Intensive rehabilitation may improve the functional outcome for patients with traumatic brain injury in the early months after the injury.
2. It is likely that early intensive rehabilitation speeds up recovery but does not change the final outcome.
3. More patients return to work in the early months after the injury suggesting that intensive rehabilitation is cost-effective.

Introduction

The quantity of rehabilitation provided to patients following traumatic brain injury (TBI) varies from less than 1 hour to 8 hours per day. To date, three observational studies¹⁻³ and two randomised controlled trials^{4,5} have reported on the relationship between the intensity of rehabilitation and the outcome of TBI patients. The results were inconsistent. The aim of this study was to evaluate the effects of intensive rehabilitation on the functional outcome in patients with TBI.

Methods

This study was conducted from August 1996 to July 1998. This was a randomised controlled assessor-blind trial, comparing two groups of patients receiving different intensities of rehabilitation programme. The study group received 4 hours and the control group 2 hours of rehabilitation per day. Sixty-eight patients with moderate and severe TBI, aged 12 to 65 years, were recruited for randomisation to detect an improvement of one level of independence in Functional Independent Measurement (FIM) [level of significance=0.05 and power=0.8].

The patients were recruited from the Division of Neurosurgery, Prince of Wales Hospital. After the acute head injury, when the patients regained consciousness and were able to participate in rehabilitation, they were transferred to a convalescence hospital, the Shatin Cheshire Home for rehabilitation. The rehabilitation programme was composed of physiotherapy, occupational therapy, and speech therapy for up to 6 months. Glasgow Outcome Scale (GOS), FIM, and Neurobehavioural Cognitive Status Examination (NCSE) were assessed before the start of rehabilitation, then monthly for 6 months and then bi-monthly for up to 1-year post-injury.

Results

The two groups of patients were similar in terms of demographic data, causes, and severity of TBI. All patients completed the rehabilitation programme and there was no loss to follow-up. The mean length-of-stay in the acute hospital was identical for both groups (mean, 22; standard deviation [SD], 15 days). During the early months of rehabilitation, especially at 2 and 3 months after the start of rehabilitation, significantly more patients in the study group achieved full FIM scores and good GOS. More patients in the study group returned to work (full FIM 47% vs 19%, 95% confidence interval [Absolute Benefit Increase, ABI] 0.06-0.50, P=0.016 at 3 months; good GOS 28% vs 8%, 95% confidence interval [ABI] 0.02-0.38, P=0.033 at 2 months; 34% vs 14%, 95% confidence interval [ABI] 0.10-0.30, P=0.047 at 3 months) [Fig]. However, the control group gradually caught up and the difference between the two groups diminished towards the end of the study. There was no significant difference between the two groups in terms of final FIM and NCSE scores. Comparing costs (salary of therapists for the additional hours of therapy versus financial gain to patients who returned to work and stopped receiving social financial allowance), the intensive rehabilitation programme saved HK\$6000 per patient.

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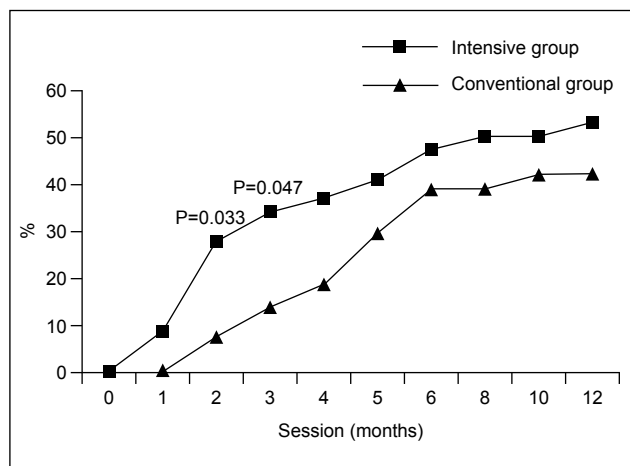


Fig. Percentage of patients achieving good Glasgow Outcome Scale versus time (post-randomisation)

Statistical significance was demonstrated at months 2 and 3

Discussion

It is generally accepted that rehabilitation is effective for patients with brain injury. The question of how much is appropriate and adequate has not been resolved. The length of hospital stay in TBI patients can be reduced by 31% when the quantity of rehabilitation is increased from 5 hours to 8 hours.¹ In a cohort of 95 patients, increasing the intensity of rehabilitation and length of hospital stay was shown to improve both physical and cognitive functions.⁵ However in a retrospective study, Heinmann et al² failed to demonstrate an advantage with intensive rehabilitation. More recently, two randomised controlled trials have provided evidence to support the hypothesis of added benefits of enhanced rehabilitation.^{3,4} Resolving this question was the primary aim of this study.

Most of the functional recovery after TBI occurs in the first 6 months following injury. Our results probably represent the tendency of a more natural recovery in the

conventional group and a faster recovery by early and intensive rehabilitation in the study group. Early intensive rehabilitation appears to speed up recovery rather than change the final outcome.

From a global analysis, we have demonstrated that intensive rehabilitation is cost-effective for severe and moderate TBI patients. Although the money saved by early return to work is modest and not directly recouped by the hospital, improved morale generated appears to benefit the patients, their families, and society at large.

Conclusions

This study suggests that early intensive rehabilitation improves functional outcome for patients with TBI in the early months post-injury. It is likely that the intensive rehabilitation speeds up the recovery rather than changes the final outcome. From a global perspective, intensive rehabilitation is cost-effective because the patients return to work early.

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