Rehabilitation efforts following stroke are provided by a number of clinical specialists: rehabilitation nurses, physical therapists, occupational therapists, speech therapists, social workers, and physicians. The concept of a stroke rehabilitation team has developed as a means of focusing these diverse backgrounds on the specific needs of individual patients. It is reasonable to expect some documentation of the benefit of such a therapist-intensive rehabilitation program.

The most easily validated rehabilitation techniques consist of bracing and use of ambulation assist devices. Fitting patients with an ankle brace and giving them a cane does not assure that they will walk or that if they do they will do so safely. Patients require instruction in proper sequencing of the cane and hemiplegic leg plus time and practice to incorporate these devices into automatic movements. Once the patient has learned to use these devices, their efficacy can be easily demonstrated by taking them away and asking the patient to walk. A prospective randomized trial to document a result that is so easily demonstrated is pointless.

There are other rehabilitation techniques that are much more difficult to validate. For example, the physical therapy facilitation techniques popularized by Brunnstrom are often contradictory to those advocated by Bobath. Occupational therapy techniques for prophylaxis and management of shoulder-hand syndrome vary widely. The role of specific cognitive and perceptual retraining techniques has not been validated. The role of the social worker and family education programs in setting up a home care plan for patients who would otherwise need chronic institutional care seems logical but likewise deserves careful evaluation.

The simplest experimental design to assess the overall benefit of a stroke rehabilitation program would be that of a randomized study with patients matched for age, sex, side of stroke, and severity of neurologic and functional impairment. One half of the study population would receive rehabilitation and the other half would not. Three end points would be of interest: (1) the final level of functional outcome, (2) the time interval required to reach the outcome goal, and (3) the number of patients discharged to home vs institutional care. A second set of analyses would categorize patients according to severity of neurologic and functional deficits to assess whether there was a differential benefit for more impaired patients vs those with less significant impairments. Such a study, with a control population deprived of bracing, physical therapy, and occupational therapy, has not been performed, largely for ethical reasons. Studies of rehabilitation outcome have therefore compared the effects of stroke rehabilitation units with less focused rehabilitation efforts, or have relied on data on the outcome of large cohorts of patients who have entered a stroke rehabilitation program. This latter source of data is suspect because of natural selection factors that bias the data; ie, those patients able to walk into a stroke rehabilitation center are the ones most likely to walk out.

The most persuasive studies have prospectively randomized patients to either rehabilitation or routine care groups. The first such study, by Feigenson et al., of the United States, compared the outcome of patients prospectively randomized either to a designated stroke rehabilitation unit or to a general rehabilitation unit. Those receiving specialized stroke rehabilitation care showed greater improvement both in activities of daily living (ADL) and in mobility function. Subsequent studies by Smith et al., of the United Kingdom, and Strand et al., of Sweden, using prospective randomization of patients either to focused stroke rehabilitation units or to medical nursing units, also documented statistically significant ADL and ambulation benefits for the groups receiving focused stroke rehabilitation. Physical therapy and occupational therapy were provided on the medical units, but there was no coordinated team effort that focused the activities of the therapists, nursing, social worker, and physician staff on the patient's functional deficits. Other less rigidly randomized studies, and those using historical controls, have given similar results.

These studies can be summarized by saying that there is an international consensus (based on prospective randomized controlled trials) that focused stroke rehabilitation programs result in improved ADL and mobility function, compared with less focused medical-nursing supportive care. We are aware of only two controlled studies of stroke rehabilitation outcome that failed to demonstrate greater functional improvement in the rehabilitation group. The first, by Waylonis et al., studied the effect of introducing a stroke rehabilitation team into a small community hospital. In this study, the outcome of the control population is poorly documented, making data analysis difficult. In a second randomized controlled study, by Peacock et al., a trend for better functional outcome scores for the rehabilitation group was found, but the number of patients included was too small to expect statistically significant differences.

The studies by Smith et al. and Strand et al. allow comment concerning home vs institutional placement following inpatient rehabilitation vs medical-nursing care. The length of time prior to returning home and the final number of patients requiring institutional placement were both less for the rehabilitation hospital group. This probably reflects the fact that one of the focuses of the rehabilitation program is to teach the patients self-care, transfer, and ambulation techniques. Patients not reaching independence in these areas are at least able to assist with function. Family members are trained in stand-pivot transfer and ambulatory guarding techniques based on body mechanics. These techniques, when practiced and mastered...
by an aged spouse, can allow the patient to be managed by family at home.

There are a number of studies that have tried to determine which patients will show the greatest improvement in function or will reach independence following stroke rehabilitation.11,12 Unfavorable prognostic features include advanced age, severe weakness, proprioceptive sensory loss, visuospatial neglect, and incontinence.13 Factor analysis studies using combinations of the above features have not produced clinically useful predictive formulas.14 Patients with all the above features, although they are unlikely to be independent, may show significant functional gains and return home with family.

There are no data concerning the optimum length of rehabilitation hospital stay. A common practice is to score ADL and mobility function and to continue the inpatient program as long as these scores are improving. When the scores plateau, then a home care system is finalized to meet any residual dependency needs.

The prospective randomized studies quoted above indicate that both the rehabilitation group and the medical-nursing patient groups have equal mortality and medical complication rates.

Careful review of the articles referenced above shows that all the control groups had access to physical therapy, occupational therapy, nursing care, and medical supervision. The manner in which these services were made available on the medical-nursing wards was not coordinated, and the needs of the stroke patient were not specifically stressed. The availability of these services is part of current state-of-the-art health care. The same health care dollars invested in treating patients with stroke on scattered hospital wards by different nurses, therapists, and private physicians should be invested in clustering these patients under the care of a stroke rehabilitation team, with much better outcome results. Such teams, because of their focus and experience, enhance the effects of therapy and improve outcome.

There is no evidence that current rehabilitation methods affect the natural recovery of motor, sensory, coordination, or visual deficits following stroke. They do allow the patient to cope with residual deficits more effectively and with greater independence. They teach the family how to provide any additional assistance necessary so that the patient is able to return to the community, avoiding institutional placement.

References


Focused Stroke Rehabilitation Programs Do Not Improve Outcome

Bruce H. Dobkin, MD

Neurologists have a growing interest in supervising the rehabilitation of patients with stroke and other neurologic diseases.1 While it is a natural extension of what we do as physicians, inpatient rehabilitation is also a growing production: 72 free-standing and 423 critical care hospital units received $210 million in 1987 from Medicare, all of which was excluded from the prospective payment system.2 As neurologists enter this stage, we should try to leave in the wings the chorus of rehabilitation specialists who lament that they cannot examine whether or not their programs improve important outcomes over those of the natural history of recovery, ie, when patients do not receive any therapy or when their therapy is nonspecific.

A typical conclusion that was reached in 1 of the 38 studies that has published its outcomes in a refereed journal states:3

Despite these methodologic limitations, this study confirmed the findings of prior investigations that patients improve function during stroke rehabilitation and have minimal decline three months later. These findings support the utilization of rehabilitation services regardless of age, sex, side of hemiparesis, or degree of initial impairment.

This is a glowing review of a program, but the playwright is the critic for his own production. The literature and experience do support the notion that survivors of an acute stroke improve, but are these gains a consequence of the inpatient rehabilitation effort? While therapy might have seemed to have been of benefit, how improvement came about has not been made clear. Could the outcome have been facilitated by any physical or behavioral art, perhaps spurred on by spontaneous recovery?4 Does the course toward recovery depend on specific interventions? If so, do gains in one neurologic impairment, eg, visuoperceptual skills, that follow a particular training

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Accepted for publication October 1, 1988.
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