

Effectiveness Bulletins

Formal rehabilitation after stroke

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About 100 000 first ever strokes occur in Britain each year (2/1000 population/year¹); one in four occur in people under 65 years old. As the incidence increases with age demographic changes over the next 20 years could result in stroke becoming an increasing cause of mortality and morbidity, placing more strain on hospital and community resources.² Around 4% of the NHS budget is spent annually on cerebrovascular disease, most of which is directed towards the aftermath of stroke.³ Up to 75% of patients who have a stroke are admitted to hospital,^{4 5} and about 12% of those who survive are in institutional care one year after their stroke.⁶

The organisation of rehabilitation at a local level is diverse⁷: services can be based in general wards, specialised stroke "units," dedicated general rehabilitation departments, and the community. The range of services that constitute a package of formal rehabilitation care include those provided by nurses, remedial therapists, physiotherapists, occupational therapists and speech therapists, doctors, social workers, counsellors, orthopodists, chiropractors, among many others. Various aids and adaptations are used by patients with stroke, and there are also several different schools of training and practice within different remedial therapy disciplines. There is pressure for development and coordination of an integrated stroke service which includes acute and long term care.^{2 7} Though formal rehabilitation for patients usually starts around one week after a stroke, the general and nursing care that patients receive in hospital or in the community immediately after their stroke (that is, within the first week) may also have a rehabilitative effect.

This article explores the effectiveness of rehabilitation after stroke according to the

framework outlined in the box. Each of the points is considered in turn, concentrating on evidence available from randomised controlled trials.

IS REHABILITATION AFTER STROKE EFFECTIVE? Smith *et al* showed an improvement in activities of daily living (ADL) for patients receiving "intensive" and "conventional" occupational therapy and physiotherapy up to six months after discharge compared with a control group who received no formal rehabilitation.⁸ The group receiving intensive treatment attended an outpatient department for four full days a week whereas those receiving conventional rehabilitation attended for three half days a week. The extra improvement achieved by the treated groups could have amounted to an individual being able to dress and wash without help. However, the study excluded nearly 64% of patients, examining only those with a moderate disability, reducing the possibility for generalisation to other stroke patients. In a recent study by Wade *et al* elderly patients with stroke who had difficulties in mobility showed a 4 s(9%) decrease in the time taken to walk 10 m after physiotherapy.⁹ However, after cessation of treatment the patients experienced an underlying gradual decline in mobility, raising the question whether the improvement was at least partially due to a placebo effect.

In an American study of aphasia an improved outcome was observed for patients treated by speech therapists compared with those receiving no treatment.¹⁰ Most of the overall improvement was due to spontaneous recovery. As the measurement of outcome did not extend beyond 24 weeks the longer term effects of treatment were not shown, and the drop out rate was high, at 23%. In contrast, a British study found no difference in the improvement of groups receiving and not receiving speech therapy. However, the amount of therapy received by the treatment group was small (twice weekly sessions over 24 weeks), and, furthermore, only 45% of the group receiving therapy completed the trial.¹¹

WHEN IS REHABILITATION MOST EFFECTIVE? There is recent evidence that physiotherapy produces a slight improvement in mobility when given to a group of elderly patients one

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Steps in assessing evidence for rehabilitation

- 1 Is rehabilitation after stroke effective?
- 2 When is rehabilitation most effective?
- 3 Where should rehabilitation be provided?
- 4 How much rehabilitation should be provided?
- 5 Who should provide rehabilitation – professionals or volunteers?
- 6 What are the cost implications?

year after stroke⁹; those receiving community physiotherapy showed some improvement compared with a control group. Similarly, a measurable improvement in the language abilities of patients with stroke was shown when patients were given 12 weeks' speech therapy for one to 24 weeks after their stroke, compared with a control group receiving no therapy.¹⁰ When this control group was given the same package of speech therapy 12 weeks later they showed similar improvement, suggesting that the exact timing of therapy is not crucial.

WHERE SHOULD REHABILITATION BE PROVIDED?

There is little agreement on the definition of a stroke "unit." It ranges from a specialised multidisciplinary team which provides services wherever a patient is situated to a defined ward of variable size in which care is provided by a stroke team. Common features of stroke units include a multidisciplinary and coordinated approach to service provision. Several studies have compared the effectiveness of rehabilitation provided in a stroke unit with conventional care in a general medical ward.¹²⁻²²

A significant advantage was described in elderly patients who received a non-intensive rehabilitation regimen in a stroke unit compared with those receiving a similar mix of therapies in general medical wards, when measured around 60 days after stroke.¹²⁻¹⁴ When those who had died during this period were excluded from the results 62% of those in the stroke unit and 45% of the control group were found to be functionally "independent," but the difference between the groups was not present after a year. A maintained improvement after one year was shown with 63% of patients treated in a stroke unit and 45% of those treated in a general medical ward living at home at the end of one year.¹⁸ Those in the stroke unit also had a significantly improved ADL score. It is not clear, however, to what extent the improvement was attributable to enhanced medical care during acute stroke or to subsequent rehabilitation. A common finding is that the rate of recovery is more rapid in stroke units. However, the evidence is conflicting for longer term effects. It is also important to note that the costs of rehabilitation in a stroke unit may not differ significantly from those incurred through treatment in general medical wards.¹⁹ In one study the amount of rehabilitation was in fact less for the group in the stroke unit than for that in the general medical ward.¹⁴

Though one study failed to show any reduction in hospital use from the introduction of domiciliary based home care service for patients with stroke,²³ recent evidence suggests that rehabilitation can be provided in an effective way in the community.^{9 24 25} A recent trial of day hospital care compared with home based physiotherapy showed a significant, though modest, improvement in outcome for patients

receiving physiotherapy at home when measured at six months.^{24 25} The two approaches were comparable in terms of carer stress.

HOW MUCH REHABILITATION SHOULD BE PROVIDED?

Intensive rehabilitation, defined as attendance at an outpatient department for four full days per week, may benefit a "middle band" (around 10%) of disabled stroke patients healthy enough to undergo the rigours of an intensive occupational and physiotherapy regimen.⁸ However, the advantage beyond what would be expected from less intensive therapy (that is, three half days per week) is limited and may not be sustained.²⁶ Any improvements that may occur for the individual patient^{8 26 27} must be considered along with the personal costs associated with intensive rehabilitation regimens, in terms of time and physical discomfort.²⁸

For speech therapy an American study showed an improved outcome from an average of nine hours' treatment a week for aphasic patients¹⁰ whereas a British study found no significant improvement in outcome for patients receiving only two hours of speech therapy per week (corresponding to the level of treatment for many patients with stroke in the NHS).¹¹ These findings, however, must be interpreted with caution as the patients in the two studies may not have been comparable.

WHO SHOULD PROVIDE REHABILITATION – PROFESSIONALS OR VOLUNTEERS?

Many patients with stroke who have a disability are never admitted to hospital but receive informal rehabilitation from carers, family, and friends. The only area in which the use of volunteers in rehabilitation has been evaluated is in speech therapy. Around a third of those surviving a stroke experience speech difficulties as a result (aphasia or dysphasia).¹¹ Volunteers are used in various guises to help in treating speech difficulties related to stroke.^{10 29 30} In one trial speech therapists and professionally supported volunteers were compared for their effectiveness.²⁹ Both patient groups receiving help from either source improved, and their progress was not significantly different. The trial had a high drop out rate of 38% and a low (but representative) treatment level provided by qualified speech therapists (30 hours during 15-20 weeks, an average of 1.5 h/week). Thus professionally supported volunteers seem to be as effective as professional speech therapists at these low levels of therapy provision. Another British study found no significant difference between treatment from professional speech therapists and trained volunteers³⁰ but was too small to be able to detect a significant difference. An American study, with a high drop out rate (23%), comparing a group of patients with speech difficulties treated at home by volunteers with a group receiving no treatment, showed an increased improvement with treatment, although the difference was not significant.

WHAT ARE THE COST IMPLICATIONS?

There are no recent studies assessing the cost effectiveness of stroke rehabilitation despite the considerable resources allocated to such rehabilitation. Differences in the effectiveness of strategies of care may be limited to variations in the rate of improvement. If two programmes are equally effective then adopting the least costly alternative will result in savings that can be used elsewhere. If the two programmes are not equally effective then the question becomes what extra benefits are obtained, and at what cost. More active approaches to rehabilitation, leading to shorter stays, may not reduce costs per case if more staff are ultimately required. Whether released beds represent a saving depends on how they are used. The long term effect may be increased total expenditure due to a greater turnover of patients. There are clear cost implications, particularly in the light of the changes in community care arrangements, related to the use of volunteers or unqualified health care workers for speech therapy or other duties.

It is important that the cost effectiveness of different aspects of rehabilitation after stroke (both in the organisation of rehabilitation and its specific interventions) is examined so that resources can be used to the best benefit of the patient.³¹ It is essential to measure the resource implications of different strategies.

Discussion

A review of the available literature on the effectiveness of rehabilitation after stroke raises several methodological issues. Firstly, studies typically attempt to compare different packages of rehabilitation, although the elements of the packages are usually inadequately described. Secondly, many studies have not taken into account "spontaneous" improvement after stroke which occurs with or without formal rehabilitation. Most survivors of stroke recover rapidly during the first three months, regardless of whether or not they receive formal rehabilitation. This spontaneous recovery can be impressive, though the rate of improvement diminishes, and it is most unusual for improvement to continue beyond one year after stroke. Thirdly, various outcome measures have been used in the studies – for example, several different ADL scales, including Barthel, Rankin disability scale, Frenchay activities index of social functioning, Nottingham health profile, and so on. Many of them have not been adequately validated, some are not sensitive to change, and it is often unclear which aspects of disability are being measured. It is difficult to compare or combine the results of different trials when different outcome measures have been used.

Linking this latter point with the known variability in treatment provided raises the question of whether audit might offer a way forward, through the development of clinical protocols based on available evidence of effectiveness and informed by local practice.

The problem remains that at present no definitive standard is evident. Currently, success in rehabilitation is measured against the concept of a return to pre-morbid functioning and usually to ideal functioning. In contrast, rehabilitation itself is tailored to meet the individual needs of a patient and carer. Counselling of both patient and carer to explain and appraise the potential for functional recovery is an integral part of the rehabilitation process. A fairer gauge of success for rehabilitation may be to set and measure it against individually agreed patient goals for recovery.³²

Finally, this aspect of care, like many others in health care, highlights the necessity for systematic evaluation of current and alternative modes of treatment provision. Professional groups who have taken part in or commissioned studies of effectiveness are to be commended. The longer term aim must be to provide an effective and acceptable health service which routinely seeks to maximise health outcome for the patient. Within rehabilitation after stroke there is an urgent need for more and better quality research.

Conclusion

Despite the paucity and often poor quality of trials in rehabilitation research several general conclusions can be drawn.

- Physiotherapy and occupational therapy after stroke seem to be effective whereas the evidence for speech therapy for aphasia after stroke at currently provided levels is conflicting
- There is no convincing evidence that the timing of therapy affects long term outcome
- Well organised multidisciplinary rehabilitation increases the rate of improvement in patients with stroke, though long term effectiveness is unclear
- Intensive speech therapy for aphasia results in improved outcomes; intensive physiotherapy also results in improved outcome but is applicable to only a minority of disabled patients with stroke
- Professionally supported volunteers may be as effective as speech therapists and other qualified therapists
- There is sufficient evidence to suggest that access to remedial therapy services (speech therapy, occupational therapy, and physiotherapy) should be provided both in hospital and in the community, over and above nursing care, for survivors of the acute phase of stroke.

In general, more research of better quality is required to establish which aspects of rehabilitation are most effective and what organisational forms it should take. The lack of reliable evidence should not be interpreted as an implication that rehabilitation after stroke is ineffective.

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