

Rehabilitation after stroke: cost-effectiveness analyses

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INTRODUCTION

Cerebrovascular accidents have a high incidence in industrial societies¹, and the number of survivors with residual deficits provides a large pool of potential candidates for rehabilitation services. As strokes constitute the largest group submitted for rehabilitation², there are many studies on treatment effectiveness. There is, however, considerable controversy about the benefits of stroke rehabilitation. Totalling of costs, to enable cost-effectiveness analysis, has been rare, although it is possible to make cost extrapolations from some of the effectiveness research.

Rehabilitation services vary widely in scope and in how they are integrated into the organization of medical treatment. Most share a treatment philosophy, however. The complex nature of presenting problems and the ambitious scope of treatment goals require a team of specialists trained in physical and cognitive restoration. Such an array of professionals is obviously costly, so efficiency is crucial. In the USA, where there are intense struggles to contain the rise of health care costs, there have been increasing challenges to the traditional approach, including proposals for fewer team members, lower levels of training, or reductions in treatment intensity³.

It is common to speak of 'cost-effectiveness' as treatment that results in acceptable outcomes at a reasonable cost. This seemingly straightforward definition proves to be inadequate, however, when examined closely, and is a source of frustration in communication between research investigators charged with identifying cost-effective treatment and those using such information. In the form of analysis used in economics and programme evaluation, cost-effectiveness involves a comparison between two treatment alternatives using the same measures of effectiveness and costs⁴. If treatment effects are assumed to be long-term, the benefits and costs of treatment would be projected over time with costs discounted for inflation.

Throughout medical research, effectiveness has received far more attention than costs. Proof of effectiveness requires good research designs, which are less common than might be assumed. As clinicians need to be aware of the requirements of cost-effectiveness analysis and what it yields, there are

increasing efforts to educate practitioners in what has been called 'clinical economics'⁵.

STROKE REHABILITATION EFFECTIVENESS

The first step in establishing cost-effectiveness is to examine treatment effectiveness; there is no point in attempting to attach costs unless it can be shown that the patient improves as a result of rehabilitation. There has been much controversy about the merits of stroke rehabilitation. Several reviewers have examined outcome research and have concluded, usually with qualifications, that focused or comprehensive rehabilitation for stroke gives better results than more limited programmes^{6,7}. Others believe the case is unproven, with spontaneous recovery accounting for most of the benefit^{8,9}. Interpretation of results has been hindered by methodological heterogeneity¹⁰—lack of uniformity in designating diagnosis, age, outcome criteria, and measuring instruments. Many studies ignore the interval between stroke onset and treatment, a crucial variable. In 1989 a conference on methodological issues in stroke outcome research was convened to improve consensus on research designs and measures¹¹.

Randomized clinical trials

From a research design standpoint there is little question that a controlled clinical trial in which subjects are randomly assigned to two or more groups is the most powerful way to determine the differential effect of treatment. The wide variety of comparisons that can be made in stroke rehabilitation, even in a randomized clinical trial, still makes the search for effective treatment difficult. Ottenbacher and Jannell¹² searched the available literature for the results of clinical trials in stroke rehabilitation. Using a strict set of criteria, they identified 36 studies with randomization, which they subjected to meta-analysis, a quantitative method of combining treatment effects. They concluded that programmes of focused stroke rehabilitation may improve functional performance in some patients. Larger treatment effects were found with early intervention. An examination of the titles of the studies reviewed shows, however, that procedures ranged from electrical stimulation of the wrist to comprehensive programmes of care. All one can conclude is that a variety of procedures are effective in stroke rehabilitation.

The most meaningful comparisons are those at a programme level as, for example, between a dedicated stroke unit in a hospital and some alternative form of care. Most such comparisons have come from studies in the UK or Scandinavia. There is ample evidence that patients fare better in specialized stroke units than in general medical care, in terms of functional status, return to home, and rate of institutionalization¹³⁻¹⁵.

Cost-effectiveness of stroke rehabilitation

An early review of the cost-benefits of medical rehabilitation¹⁶ found scant evidence for the cost-effectiveness of stroke rehabilitation. A frequently quoted study by Lehmann and associates¹⁷ did find that treatment for patients for 9 months after onset resulted in lower long-term nursing home costs. Costs have been infrequently addressed, however.

Although randomized prospective studies have demonstrated the effectiveness of stroke units over conventional care, as mentioned above, most of this research is based on small samples without examining costs. The most persuasive evidence in favour of stroke units comes from a population-based study in Denmark¹⁸ which examined two neighbouring communities, one with a dedicated stroke unit which did all the treatment and rehabilitation for patients in the region and one which treated patients on general neurological and medical wards. Treatment on the stroke unit reduced the relative risk of death by 50%, reduced the relative risk of discharge to nursing home by 40% and almost doubled the relative chance of home discharge. Length of hospital stay was reduced by 30%, a saving of 1313 bed-days per 100 stroke patients. As stroke units provide expert management of the disease in addition to rehabilitation, there is more here than simply a test of rehabilitation, but the integration of care into one unit seems the system of choice.

Several groups have examined the cost-effectiveness of the day hospital, in relation to either home care or hospital-based outpatient services. A New Zealand study¹⁹ found the day hospital improved mental and physical functioning significantly more than outpatient rehabilitation, but costs were much higher. Investigations that randomized elderly stroke patients between home rehabilitation and hospital-based services in the UK, including geriatric day hospitals, revealed little difference in outcomes between services, although home therapy proved to be cheaper²⁰. A Hong Kong study of geriatric day hospital and conventional medical care found no differences in functional outcomes or costs²¹. The geriatric day hospital does not appear to offer significantly better benefits than other forms of rehabilitation in either effectiveness or costs. Conclusions from these comparisons, from three different countries, are problematic because the delivery of care could be quite different in each.

In the USA there is great interest in reducing the cost of inpatient rehabilitation by providing treatment at a lower level of care in skilled nursing facilities, particularly for stroke patients. Thus far there has been limited research on the topic. A recent comparison of these two levels of care for stroke²² found the two populations similar on admission. Functional status and disposition at discharge were also similar. Hospital-based patients received twice as much therapy; therapy charges were also double. Costs (charges) per patient who returned home were \$41 129 per case in the hospital setting and \$18 129 in the skilled nursing facility. Charges per unit of functional status gain were \$960 and \$591, respectively. The authors concluded that rehabilitation for stroke was more cost-effective in the skilled nursing facility but cautioned that more research was needed to form policies regarding nursing home rehabilitation.

CONCLUSIONS

Although the evidence is not all on the side of the dedicated stroke unit, this system of treatment seems preferable. The high incidence of stroke precludes these services for all cases, however. Definitive research comparing various levels of care is still needed, but the first step is better description of programmes of treatment. We cannot assume that inpatient care, day hospitals, outpatient services, or home care are the same everywhere. More attention must also be paid to measures of function and outcome.

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