

PAPERS AND ORIGINALS

How much physical therapy for patients with stroke?

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British Medical Journal, 1978, 1, 1307-1310**Summary and conclusions**

The use of physiotherapy, occupational therapy, and speech therapy for patients with stroke was investigated, and the three treatments were compared. Out of 135 patients with stroke surviving at two weeks, 107 received physiotherapy, but only 35 received occupational therapy and 19 speech therapy. Those who received most physiotherapy were the most severely disabled and had the worst prognosis, and, although almost no recovery occurred after six months, 30 patients continued with treatment beyond this time. Stiff and painful shoulders were present in 21 of the patients by two weeks and had developed in a further 37 by one year. Physiotherapy did not prevent this.

The objectives of physiotherapy for patients with stroke need careful definition, with emphasis on treatment in the early months. Alternative treatment, possibly carried out by volunteers or more simply trained personnel, merits further consideration.

Introduction

Medical and surgical treatment of stroke is limited. The main therapeutic approach is therefore through rehabilitation, which is aimed at limiting the extent of the disability and enabling the patient to regain maximum independence. The place of physical therapy in rehabilitation is disputed. Some authors have reported recovery after little or no physical therapy,¹⁻³

while others have attributed benefit to it.⁴⁻⁷ Some trials have shown little difference between formal rehabilitation programmes and simpler functional care.^{8,9} Such comparative trials are difficult to assess,¹⁰ however, since management must conform to individual needs and realistic goals must be set for each patient.^{11,12}

Physical therapy starting early in the course of the stroke is generally regarded as being more effective than that starting later.^{11,13-15} Selecting patients for treatment is difficult; in one study¹⁶ 20% of referrals were thought to be inappropriate, and in another only 58% of survivors admitted to hospital received physical treatment.¹⁷

Physiotherapy, occupational therapy, and speech therapy form the basis of stroke rehabilitation. We report the details of the treatment given to a representative sample of patients with fresh stroke, and examine the factors that determined the type of physical therapy and the extent to which the amount of treatment related to the severity of the stroke.

Methods, results, and comment

One hundred and thirty-five patients in south Manchester who during a period of six months had suffered a fresh stroke and survived for two weeks were registered and followed up for the subsequent year. Our purpose was to relate outcome in terms of physical disability to treatment, and so a stroke was defined as any degree of hemiparesis of sudden onset lasting for more than 24 hours. The selection of patients, type of medical care given, and associated clinical factors have been described.¹⁸ Seventy-two of the patients (53%) were men; 34 (25%) were aged under 65 years and 47 (35%) over 75 years. The stroke was right-sided in 69 patients (51%). Dysphasia was present in 39 (29%) and dysarthria in 45 (33%) (8 patients (6%) had both dysarthria and dysphasia). The degree of disability may be judged by the fact that two weeks after the stroke 15 patients (11%) were independent in all activities and a further 30 (22%) were dependent but could manage personal care; 74 (55%) were bedfast or chairbound and only 16 (12%) could leave the home. The methods of assessment used and rate of change in function over the first year in these patients have been described.^{19,20} We found that 86 patients (64%) were dependent for all activities at the start of the stroke; only 48 (56%) of these subsequently improved, 47 within six months. Altogether there was little recovery beyond six months after the stroke, although 16-20% of those who were moderately or seriously disabled continued to improve between three and six months.

Eighty-six (64%) of the patients were admitted to hospital during the first two weeks after their stroke, 59 (44%) to general medical

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wards and 27 (20%) to geriatric wards. A further 16 (12%) were admitted between three and 38 weeks after the stroke. Twelve patients (9%) admitted initially to medical wards were subsequently transferred to geriatric wards. All patients were admitted to one of six hospitals (five general and one geriatric), all of which provided physiotherapy, three speech therapy, and two occupational therapy during the study period.

Table I shows the time after the stroke at which the various types of treatment were begun and their duration. During the year 107 patients (79%) received physiotherapy, 35 (26%) occupational therapy, and 19 (14%) speech therapy (that is 25% of the patients with dysphasia or dysarthria or both). Most patients given physiotherapy (73 (68%)) started treatment within the first two weeks; occupational therapy began later in a larger proportion of patients, and 10 (53%) of those receiving speech therapy began treatment after the second but before the eighth week. Fifteen days or less of treatment were given to 23 patients (22%) receiving physiotherapy and 13 (38%) receiving occupational therapy but to 9 (47%) of those receiving speech therapy. The amount of treatment given was greatest in the physiotherapy department, 59 patients (55%) receiving more than 30 days' treatment compared with 11 (31%) receiving more than 30 days' occupational therapy and 5 (26%) speech therapy. The therapist's assessment of the reason for stopping treatment is shown in table I.

Table II shows factors associated with whether physiotherapy was given. There was close correlation between the likelihood of receiving physiotherapy and being admitted to hospital rather than kept at home. There was no difference in the likelihood of receiving physiotherapy between patients admitted to general medical and geriatric

TABLE I—Details of treatment given to patients with stroke. Figures are numbers (percentages) of patients

	Physiotherapy (n = 107)	Occupational therapy (n = 35)	Speech therapy (n = 19)
Interval between onset of stroke and start of treatment:			
≤ 2 weeks	73 (68)	17 (49)	5 (26)
3-8 weeks	23 (21)	7 (20)	10 (53)
9-26 weeks	6 (6)	6 (17)	3 (16)
> 27 weeks	5 (5)	5 (14)	1 (5)
Total	107 (100)	35 (100)	19 (100)
Duration of treatment:			
1-15 days	23 (22)	13 (38)	9 (47)
16-30 days	25 (23)	11 (31)	5 (27)
31-75 days	29 (27)	6 (17)	1 (6)
> 76 days	30 (28)	5 (14)	4 (20)
Total	107 (100)	35 (100)	19 (100)
Reasons for stopping treatment and proportions continuing for over 1 year:			
Good progress	38 (36)	14 (38)	3 (16)
Discharged or transferred from hospital	19 (18)	3 (9)	4 (21)
No progress, or at patient's request	11 (10)	13 (38)	6 (32)
Died, or other reason	28 (26)	3 (9)	2 (10)
Treatment continued more than 1 year after stroke	11 (10)	2 (6)	4 (21)
Total	107 (100)	35 (100)	19 (100)

TABLE II—Features of patients and presence of abnormalities according to whether physiotherapy received. Figures are numbers (percentages) of patients

	Treatment		Significance
	No physiotherapy (n = 28)	Physiotherapy (n = 107)	
Admitted to hospital:			
No	24 (86)	9 (8)	} $\chi^2 = 71.81$; } $P < 0.0005$
Yes	4 (14)	98 (92)	
Dysphasia:			
Absent	25 (89)	71 (66)	} $\chi^2 = 5.6803$; } $P < 0.02$
Present	3 (11)	36 (34)	
Picture abnormality:			
Absent	22 (79)	49 (46)	} $\chi^2 = 9.56$; } $P < 0.01$
Present	6 (21)	58 (54)	
Loss of position sense:			
Absent	24 (86)	71 (66)	} $\chi^2 = 3.909$; } $P < 0.05$
Present	4 (14)	36 (34)	
Power score*:			
1-3	4 (14)	31 (29)	} $\chi^2 = 22.152$; } $Df = 2$; } $P < 0.0005$
4-8	4 (14)	50 (47)	
9	20 (72)	26 (24)	
Activities of daily living score†:			
1-3	19 (68)	31 (29)	} $\chi^2 = 15.87$; } $P < 0.001$
4-5	1 (4)	29 (27)	
6-7	8 (28)	47 (44)	

*Most severe power loss scored 1; normal scored. †Optimum score was 1.

TABLE III—Initial clinical state and ability of patients related to amount of physiotherapy received. Number (percentage) of patients given

	No of days of physiotherapy*		Significance
	≤ 45	46	
<i>All patients receiving physiotherapy (n = 107)</i>			
Faecal incontinence:			
Absent	46 (43)	25 (23)	} $\chi^2 = 4.06$; } $P < 0.05$
Present	16 (15)	20 (19)	
Sensory loss:			
Absent	45 (42)	24 (22)	} $\chi^2 = 4.21$; } $P < 0.05$
Present	17 (16)	21 (20)	
Start of physiotherapy:			
Within 2 weeks	48 (45)	26 (24)	} $\chi^2 = 4.72$; } $P < 0.05$
After 2 weeks	14 (13)	19 (18)	
Activities of daily living score:			
1-3	21 (20)	10 (9)	} $\chi^2 = 9.01$; } $P < 0.02$
4-5	10 (9)	19 (18)	
6-7	31 (29)	16 (15)	
<i>Patients with normal or increased tone (n = 96)</i>			
Tone:			
Normal	21 (22)	5 (5)	} $\chi^2 = 6.43$; } $P < 0.02$
Increased	31 (32)	39 (41)	
<i>Patients surviving one year (n = 73)</i>			
Power score:			
Good	28 (38)	11 (15)	} $\chi^2 = 16.93$; } $P < 0.001$
Moderate/bad	8 (11)	26 (36)	
<i>Patients surviving one year but unable to leave house (n = 65)</i>			
Mobility:			
Housebound	18 (28)	6 (9)	} $\chi^2 = 11.37$; } $P < 0.001$
Chairbound	13 (20)	28 (43)	

*No of days of physiotherapy not affected by age, sex, dysphasia, depression, side of stroke, dependency, previous strokes, or mobility and activities of daily living profile before stroke.

TABLE IV—Change in function according to number of days of physiotherapy. Number (percentage) of patients given

	No of days of physiotherapy		Significance
	≤ 45	> 46	
Incontinence of urine last present:			
Within 2 months	25 (23)	5 (5)	} $\chi^2 = 23.21$; } $P < 0.001$
After 2 months	6 (6)	23 (21)	
Incontinence of urine at six months:			
Improved	26 (24)	9 (8)	} $\chi^2 = 16.1$; } $P < 0.001$
Remained same	4 (4)	17 (16)	
Activities of daily living profile at 6 months:			
Bad or medium, but improved	23 (21)	17 (16)	} $\chi^2 = 7.56$; } $P < 0.01$
Bad or medium, but not improved*	5 (5)	18 (17)	
Walking on own:			
Within 2 months	33 (31)	14 (13)	} $\chi^2 = 10.05$; } $P < 0.005$
Between 2 and 12 months	4 (4)	12 (11)	
Never	25 (23)	19 (18)	
Time till maximum recovery on disability score			
< 2 months	50 (47)	22 (21)	} $\chi^2 = 11.95$; } $P < 0.001$
> 2 months	12 (11)	23 (21)	

*Of those whose activities of daily living profile was bad throughout, 11 were still receiving physiotherapy after 76 days.

wards. Patients surviving six months or longer, however, were more likely to receive physiotherapy if admitted to a geriatric ward ($\chi^2 = 10.56$, $P < 0.005$). Patients were also more likely to receive physiotherapy if the stroke was severe, as shown by the power score and the activities of daily living score, and if it had caused certain non-motor effects—for instance, patients with dysphasia were more likely to receive physiotherapy than those with normal speech, as were patients with visuospatial disorders or loss of position sense. These last factors may have increased the likelihood of treatment in as much as they also predisposed to admission to hospital.¹⁸

Of the patients receiving physiotherapy, 62 (58%) were treated for up to 45 days and 45 (42%) for 46 days or longer. Forty-five days represented about three months' treatment from the start of the stroke. Table III compares the initial clinical state and ability of patients who received up to 45 days of treatment with those of patients who received more. Generally, the patients who started in the worst state received most physiotherapy, and this was not affected by factors relating to the patient's condition before the stroke—namely, sex, age, mobility, and previous strokes. When change in functional capacity was related to the amount of physiotherapy we found that the patients whose progress was poorest during their rehabilitation period received most physiotherapy (see table IV).

Passive movement of the shoulder becomes restricted in many patients with stroke either because of trauma to the joint capsule caused by inept handling or because the shoulder joint is never exercised. One objective of physiotherapy is to minimise the development of painful limitation of passive movement of the shoulder, although this development depends not only on the input of physiotherapy but also on the way in which other attendants move the patient's shoulder. Of the 135 patients studied, 114 (84%) had no limitation of movement when first seen two weeks after their stroke. Seventeen (13%) had some limitation and 4 (3%) severe limitation. By the end of the year 37 (32%) of the patients who had started without limitation of movement had developed it, 18 (16%) by 14 weeks after the stroke and 19 (17%) thereafter. Pain and stiffness developed more commonly in patients who received physiotherapy than those who did not, and in patients who received more than 15 days' physiotherapy than those who received less. There was no difference in whether limitation of passive movement developed between patients who had more or less than 45 days' physiotherapy (see table V). The speed with which limitation of movement developed was not related to the amount of physiotherapy received. Passive movement was not affected in any way by whether occupational therapy was given or the amount given.

Depression also seemed to be related to treatment (table VI). Patients who were depressed throughout the study were more likely to have had 46 days or more of physiotherapy ($\chi^2=8.164$, $P<0.005$). There was a positive relation between depression and occupational therapy inasmuch as patients who were initially depressed and remained depressed after a year were more likely to have had occupational therapy than those who were initially depressed and improved.

TABLE V—Proportions of patients with limitation of passive movement of shoulder according to whether they received physiotherapy and amount given. Figures are numbers (percentages of patients)

		Limitation of passive movement of shoulder		Significance
		Absent	Present	
<i>All patients (n = 135)</i>				
No physiotherapy	22 (16)	6 (4)	} $\chi^2 = 6.69$; } $P < 0.01$
Physiotherapy	55 (41)	52 (39)	
<i>Duration of physiotherapy (n = 107)</i>				
≤ 15 days	17 (16)	7 (7)	} $\chi^2 = 4.68$; } $P < 0.05$
> 16 days	38 (35)	45 (42)	

TABLE VI—Improvement in depression at one year according to whether patients received occupational therapy. Number (percentage) of patients given

	Not improved	Improved	Significance
No occupational therapy	6 (18)	11 (33)	} $\chi^2 = 5.24$; } $P < 0.025$
Occupational therapy	12 (37)	4 (12)	

Discussion

This paper does not, however, afford a comparison of the effect of physical treatment on the progress and recovery from stroke in matching treated and untreated groups. This vital information can be obtained only from a prospective trial such as that being carried out by the MRC unit at Northwick Park Hospital.

Admission to hospital of patients in our study was affected by both the severity of the stroke and social factors.¹⁸ While 57 (56%) of those admitted were unable to turn in bed unaided and 71 (70%) unable to stand unaided, many who were similarly disabled remained at home. Nine (26%) of those not admitted were unable to turn in bed unaided and 11 (33%) unable to stand unaided. Admission was also affected by the relation between the patient and the person who would care for him at home, being more likely if this person was the spouse rather than a child or daughter-in-law; and by the social class of this relative (if she was in social class I or II the patient was more likely to be kept at home). Since treatment was given mainly to patients admitted to hospital this suggests that resources are

not always used where need is greatest. Furthermore, we found that among the patients the amount of treatment given clearly related to the severity of the disability rather than the potential for improvement. The most disabled received the most treatment, as did those with the most severe associated factors, such as faecal incontinence, spasticity, and sensory loss. The change over time showed that patients who improved least received most treatment—for example, those who were incontinent of urine after several months, those who never walked, and those whose activities of daily living profile did not show any improvement. Out of 23 patients whose activities of daily living profile remained bad throughout, 11 (48%) received more than 76 days (five to six months) of physiotherapy each. This suggests that physiotherapy is continued for many patients simply because they are in hospital. It is already clear from both the Manchester¹⁸ series and others^{9, 21, 22} that the potential for recovering from stroke after six months is minimal.

Two developments are necessary. Firstly, a reliable method of predicting prognosis in patients with stroke so that physiotherapy may be concentrated on those with the optimum prospect of recovery and only while measurable improvement is occurring. The use of various scores for this purpose was discussed by Andrews,¹⁹ who showed that two scores (of disability and independence) were the most sensitive to change over time, although not necessarily to potential for recovery. Secondly, a clear appraisal is needed of the objectives of physiotherapy and of alternatives for the longer-term treatment of those patients with stroke whose disability is great and recovery poor. Such alternative treatment might be group sessions organised by, for instance, a remedial gymnast or physical training teacher. This might be linked with the clubs for patients with stroke that are developing rapidly throughout the country with considerable support from the Chest, Heart, and Stroke Association.

Disappointingly, painful limitation of shoulder movement was not affected by the amount of physiotherapy given or the time at which it was started, although the limitation was worse in patients receiving physiotherapy simply because of the minimal disability in several of those not receiving physiotherapy. This emphasises that trauma to the shoulder may be inflicted by anyone who handles the patient—for example, a nurse, orderly, or relative—and may partly be attributable to the weight of the paralysed arm dragging on the shoulder joint. It argues the need for training the whole hospital team in managing patients with stroke and educating relatives. There is also a need for support such as by a Denton sling for the paralysed arm when it is not being exercised. Hurd *et al*²³ showed that subluxation of the shoulder occurred in a group of patients when the use of shoulder slings was temporarily abandoned. Nevertheless, the opposite view—that slings make no difference to the incidence of pain and subluxation or the range of shoulder movement—has also been expounded.²⁴

Much less occupational therapy than physiotherapy was given, and it was begun later in the course of the stroke (24% of the patients receiving occupational therapy started after eight weeks compared with 11% starting physiotherapy), which probably reflects its lesser availability. Our study did not permit an assessment of the value of occupational therapy to patients with strokes—for example, patients receiving occupational therapy were more likely to be depressed than those not receiving it, because patients with more severe strokes are more depressed. Improvement in depression, however, was not more likely in those who received occupational therapy. Occupational therapy was given for a more limited period than physiotherapy (31% received more than 30 days compared with 52% who were given physiotherapy).

One-third of the patients with dysphasia received speech therapy, again reflecting the limited availability of therapists. Three-quarters of the patients who received speech therapy began it more than two weeks after the onset of the stroke, although over half began between three and eight weeks. This may be later than desirable if the speech therapist is to act as

the patient's interpreter and support. Forty-two per cent received under five days' speech therapy, which reflects the important part played in speech therapy by assessment, as these patients were judged to be unsuitable for treatment because their defect was either minimal or too severe. Once accepted for speech therapy patients tended to receive it for a longer time; 21% of those treated were still receiving speech therapy more than one year after the stroke, compared with 10% of those receiving physiotherapy and 6% of those receiving occupational therapy.

The therapists' judgment of good progress as an indicator for stopping treatment was similar for occupational therapy and physiotherapy (37% and 38% of cases treated). Far fewer patients, however, stopped physiotherapy than occupational therapy and speech therapy because of lack of progress.

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Subarachnoid haemorrhage: long-term follow-up results of late surgical versus conservative treatment

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Summary and conclusions

During 1964-9, 178 patients with subarachnoid haemorrhage from a single intracranial arterial aneurysm were allocated at random to receive operative or conservative treatment at an average of seven weeks after bleeding. During the follow-up fatal rebleeding episodes occurred in six of the 86 patients treated surgically and 16 of the 92 treated conservatively. This difference was significant. Fatal rebleeding occurred on average 40 months after the first episode. Deaths from all causes occurred in 17 of the 86 patients treated surgically and 22 of the 92 treated conservatively. Life-table analysis of the chances of surviving 1, 5, and 11 years gave probabilities of 95 and 91%, 87 and 86%, and 76 and 75% in the two treatment groups respectively. Of the 139 patients alive after a mean follow-up of nine years, 130 (94%) were fully independent in their daily lives, and only 43 (31%) were unable to work. The method of treatment did not affect the quality of survival.

The results show that fatal rebleeding may occur even many years after the first episode. Nevertheless, if the

patient is in good condition seven weeks after a haemorrhage from a single intracranial arterial aneurysm the outcome is good irrespective of whether operation is performed at this late stage.

Introduction

A few randomised clinical trials of surgery for intracranial arterial aneurysm have been reported,¹⁻⁶ but data on long-term follow-up are scarce.⁷⁻⁹ We therefore report the results of a follow-up of patients who had been included in a controlled trial of late surgery for aneurysm an average of nine years previously.¹ The patients had been allocated to receive either surgical or conservative treatment at an average of seven weeks after the haemorrhage. Patients who survive in good condition this long after a bleeding episode are already set on a recovery course and are also likely to do well at operation. A decision to operate at this late stage is thus not a foregone conclusion. The results provide data on aneurysmal disease and its possible association with other vascular disorders.

Patients and methods

Between 1 April 1964 and 31 March 1969, 178 patients with subarachnoid haemorrhage from a single intracranial arterial aneurysm were allocated at random to receive either operative or conservative treatment. The mean delay between the bleeding episode and the decision to treat was seven weeks. Reasons for the delay were a shortage of neurosurgical resources and an unawareness of the importance of the time factor.

The patients were carefully matched for age, sex, blood pressure, state of consciousness, and site of the aneurysm, according to the principles of McKissock *et al.*¹⁻³ Eighty-six underwent surgery and

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