

Evaluation of a multiprofessional community stroke team: a randomized controlled trial

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Objectives: There is inconclusive evidence of the effectiveness of stroke rehabilitation by a community stroke team. The aim was to evaluate a specialist multiprofessional team in a community setting.

Design: Randomized controlled trial.

Setting: Community.

Participants: Stroke patients and their informal carers who were referred to receive rehabilitation from a community stroke team.

Outcome measures: Barthel Index, Extended Activities of Daily Living Scale (EADL), General Health Questionnaire (GHQ-12) by patient and carer, Carer Strain Index (CSI), Euroqol, knowledge of stroke and satisfaction with services six months after recruitment.

Results: There were no significant differences between patients who received rehabilitation from community stroke team ($n = 189$) and those who received routine care ($n = 232$) in their independence in activities of daily living, mood, quality of life or knowledge of stroke. The patients in the community stroke team group were significantly more satisfied with the emotional support they had received ($p < 0.01$). There were no significant differences between the groups in satisfaction with practical help or overall satisfaction. Carers of patients in the community stroke team were under significantly less strain than carers in the routine care group ($p < 0.04$). Carers of patients in the community stroke team group were significantly more satisfied with their knowledge of stroke ($p < 0.01$) and were more satisfied overall ($p < 0.01$).

Conclusions: The patients treated by the community stroke team were more satisfied with the emotional support they received and had equivalent outcomes in terms of independence in activities of daily living and mood. Their carers were under less strain and were more satisfied with their knowledge of stroke recovery, the emotional support they received and overall satisfaction with services. The results support the provision of rehabilitation by a community-based specialist multiprofessional team.

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Introduction

Historically, stroke rehabilitation has been primarily a hospital-based activity. However in the last decade there has been a significant change of focus towards community-based rehabilitation, mainly due to the increasing cost of hospital services and recognition of the importance of local health facilities.

Rehabilitation may be provided in different ways on discharge from hospital. Patients may attend hospital outpatient departments, day hospitals, rehabilitation centres or receive rehabilitation in their own home. In addition rehabilitation may be provided, either by a single professional group or by a multiprofessional team. Geddes and Chamberlain¹ compared six community services providing co-ordinated multidisciplinary treatment to stroke patients. Their findings indicated that community rehabilitation teams differed in their target populations and in the timing and duration of intervention, thus making comparisons between teams difficult.

Comparisons between hospital and community-based services have produced conflicting results. Forster and Young² demonstrated that patients randomly allocated to a community physiotherapy service showed better outcome in functional abilities (climbing stairs and higher social functioning score, as measured by the Frenchay Activities Index) than those randomly allocated to attend a day hospital. Walker *et al.*³ showed that occupational therapy for stroke patients not admitted to hospital conferred lower levels of disability and handicap and reduced the strain of the carer. Roderick *et al.*⁴ found no significant difference in effectiveness of domiciliary and geriatric day-hospital care, measured by functional improvement, mobility, mental state, social activity and quality of life. Gladman *et al.*⁵ evaluated a community rehabilitation service, comprising both occupational therapy and physiotherapy, in comparison with both hospital outpatients and day hospitals, and found a significant difference in outcome in a small subgroup of younger patients.

Community teams have also been established which provide more than occupational therapy and physiotherapy. Some of these have been used as a means of speeding up the discharge of

patients from hospital⁶ but have not shown significant benefits in terms of functional or emotional outcomes. A systematic review of therapy-based rehabilitation services for stroke patients living at home⁷ found that patients who receive therapy-based rehabilitation services were more likely to have a better outcome, in terms of independence and achievement of maximum level of function in all aspects of daily life.

The Nottingham Community Stroke Team was established in 1995 to provide rehabilitation for stroke patients discharged from hospital and those who had never been admitted to hospital. The team included occupational therapists, physiotherapists, speech and language therapists and a mental health nurse. The unique feature of this team, which made it worth evaluating, was the multiprofessional nature, especially the inclusion of a mental health nurse. This was particularly relevant, as in a recent survey of community neurorehabilitation teams, McMillan and Ledder⁸ commented that too little provision was made within teams to deal with psychosocial problems.

The Nottingham Community Stroke Team was thought to offer advantages over the routine service because all members were based in the same department and discussed each patient regularly on a group basis. A systematic review of post-acute stroke rehabilitation by Langhorne *et al.*⁹ found the level of organization in the multidisciplinary team to be significant in determining patients' outcome. The community stroke team treated exclusively stroke patients and therefore was predicted to have a level of expertise, which would enable them to provide a better service than that provided by nonspecialist services. When originally established the Nottingham Community Stroke Team provided a service to a specific geographical area. An evaluation of the service using qualitative methods (EA Hart, unpublished report) indicated that the service was highly valued by those who received it and suggested that it was worth developing further. An extension of the service to other areas was planned, which provided an opportunity to evaluate the service using quantitative methods. The present study was designed to assess whether rehabilitation by a specialist multiprofessional team improved the outcome, in terms of functional abilities, mood, quality of life and satisfac-

tion with care, as compared with conventional outpatient rehabilitation services.

Method

All patients referred to Nottingham Community Stroke Team were considered for inclusion in the study. The team accepted referrals of anyone who had had a stroke within the previous two years, who was over 16 years and needed intervention from more than one rehabilitation discipline. The majority of patients were referred on discharge from hospital but those not admitted to hospital had to have been seen by a stroke specialist for confirmation of the diagnosis. Patients were excluded if they lived outside the geographical area of the study or had been treated by the community stroke team in the previous two years. Biographical details, including age and gender were recorded. Patients referred were then randomly allocated to intervention groups by telephoning a central randomization service, which held a computer-generated random allocation sequence. Random allocation was initially 50:50 to the two groups, but was changed to 60:40 in favour of the routine care group, when staff shortages meant the community stroke team could not cope with the number of people allocated to them.

The two intervention groups were group A (routine care) and group B (community stroke team).

Group A routine care

This group received the routine rehabilitation services available to patients in each area covered. This included day hospitals, outpatients departments and social services occupational therapy. No attempt was made to influence the content of the service. Following randomization a letter was sent to the referring agent informing them that the patient had been allocated to routine care and offering them a list of alternative rehabilitation services in the area. If the referring agent was a patient, then the patient was given the contact details of the Stroke Association Information Service and advised to contact this service for further advice.

Group B community stroke team

Patients were seen by the community stroke team and discussed at team meetings. This team provided co-ordinated multidisciplinary rehabilitation in the community. The team exclusively treated stroke patients and therefore provided a specialist service. Patients received an initial assessment visit at home by two members of the team. The patients were then discussed at the weekly team meeting. Following this the team allocated therapists according to the nature of the patients' problems. All patients were seen in their own homes and were treated for as long as it was considered they were benefiting. The intervention given to patients was recorded so that it was known which team members saw patients and the time allocated by each member of the team.

At six months after stroke all patients (group A and group B) were contacted by letter. They were asked to consent to be in a study to evaluate the input of a community stroke team (CST). A consent form and the outcome questionnaire were enclosed with the letter. If patients were unable to give informed consent themselves, a relative was asked to give assent. A translation of the explanation and consent form was obtained for those who were unable to understand English. Consent was obtained after random allocation as it was considered that this would reduce bias due to lower expectations of those in the routine care group. It also reduced the need for patients to be seen individually at the time of referral. Ethical approval was granted by the Local Research Ethics Committee.

The outcome of patients giving consent was assessed six months after referral. The letter was accompanied by the outcome questionnaire, which patients were asked to complete and return by post. The letter included an offer of an assistant to visit and help with completing the questionnaires if necessary. The outcome questionnaire comprised:

- *Barthel Index*¹⁰ as a measure of functional independence in personal activities of daily living.
- *Extended ADL*¹¹ as a measure of independence in instrumental activities of daily living.

- *General Health Questionnaire 12 (GHQ-12)*¹² a short measure of mood, which was suitable for postal administration.
- *Euroqol*¹³ thermometer form was used to assess overall quality of life. Patients were asked to mark their state of health on a line from 0 to 100.
- *Satisfaction with care* Patients were asked to rate their satisfaction with practical help, emotional help and overall satisfaction with services received on 4-point Likert scales. For example:

Overall how satisfied are you with the community services that you have received? (please tick one box)

Very satisfied
 Satisfied
 Dissatisfied
 Very dissatisfied

- *Knowledge of stroke* Patients were asked to rate their satisfaction with the knowledge they had about the extent to which they would recover from the stroke in the format:

Are you satisfied with your knowledge about the extent to which you will recover from your stroke? (please tick one box)

Yes, I am very satisfied
 Yes, I am moderately satisfied
 No, I am slightly dissatisfied
 No, I am very dissatisfied

The carer was asked to complete the

- *GHQ-12*¹² with respect to themselves.
- *Carer Strain Index*,¹⁴ as an indication of the burden of caring.
- *Satisfaction with care* Carers were asked to rate their satisfaction with practical help, emotional help and overall satisfaction with services received.
- *Knowledge of stroke* Carers were asked to rate their satisfaction with the knowledge they had about the extent to which the patient would recover from the stroke.

An independent assessor visited patients who were unable to complete the assessments themselves or who sought help, and helped them to complete the outcome questionnaires. This assessor

was blind to the intervention group. The outcome assessment was administered by a bilingual co-worker for patients who did not speak English.

Results

There were 428 patients recruited and randomized between March 2000 and April 2002. Seven patients (three CST, four routine care) were recruited twice in error. Only outcomes from their initial recruitment were used in the results. The recruitment of patients is shown in Figure 1. Of the 421 patients recruited, 189 were allocated to the CST and 232 to routine care. Of these 188 (45%) completed the outcome assessments at six months after randomization; 88 (47%) from the CST group and 100 (43%) from the routine care group. The reasons for failure to complete the outcome assessments are shown in Figure 1. There were 141 carers who completed the assessments at six months (66 CST group, 75 routine care).

The two groups were compared on baseline variables. Results are shown in Table 1. This showed that patients in the intervention and the control group were comparable on age and gender. Patients who were followed-up were compared with those who failed to complete the outcome assessments. There were no significant differences in age ($t = 1.22$ $p = 0.23$) or gender ($\chi^2 = 0.01$, $p = 0.99$).

The CST group received between 0 and 115 sessions of intervention from the team (Median 18, interquartile range (IQR) 10–42), which included 0–95 hours direct contact (median 13, IQR 6–33 hours) and involved 1–76 hours indirect time (median 10, IQR 5–21 hours). The direct contact comprised on average 4.8 hours physiotherapy, 3.8 hours occupational therapy, 2.0 hours speech and language therapy, 1.9 hours with a mental health nurse and 0.5 hours with a rehabilitation support worker.

Comparison of the groups using a Mann–Whitney *U*-test showed no significant differences on independence in personal or instrumental activities of daily living or patients' mood. Results are shown in Table 2. There were no significant differences between the groups in knowledge of the

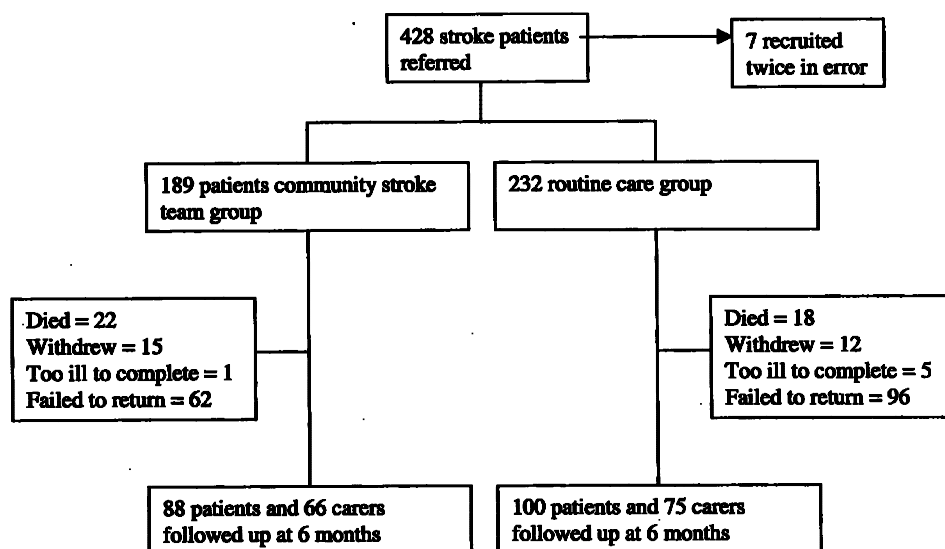


Figure 1 Recruitment and follow-up of participants.

Table 1 Baseline characteristics of patients in community stroke team and routine care groups

	Community stroke team	Routine care	Comparison ^a <i>p</i> -value
Patients (<i>n</i>)	189	232	
Gender			
Men	94	128	0.27
Women	95	104	
Age			
Mean	72.8	71.2	0.17
SD	11.4	11.5	
Range	22–92	25–101	

^aGroups were compared using χ^2 for gender and *t*-test for age.

resources available to assist in adjusting to stroke. Comparison of groups on knowledge of stroke recovery showed no significant differences. Patients in the CST group were significantly more satisfied with the emotional help they received. There were no significant differences between the groups in overall satisfaction or in satisfaction with practical help received.

Results of carer outcomes are shown in Table 2. There were no significant differences between

groups in carers' mood. Carer strain was significantly less for carers of patients seen by the CST than carers of patients in the routine care group. The carers in the CST group were significantly more satisfied with their knowledge of stroke and had a higher overall satisfaction than the routine care group.

Discussion

Rehabilitation by a community stroke team produced equivalent outcomes to routine services in terms of independence in ADL and mood. This suggests that all patients improved but it did not matter where rehabilitation was provided. However, the CST service provided greater emotional support for patients and had benefits for carers in terms of both satisfaction and reduced strain. Thus the results suggest advantages of treatment by a CST relative to routine care, comprising hospital outpatient services and social services OT. The lack of differences in functional outcome is similar to other studies of community rehabilitation.^{4,5} Mood has also not previously been shown to differ according to the location of rehabilitation.^{2,5} One problem with interpreting this finding is the lack of information on services received

by the control group. This information was not collected, as it was known that information from patients would be unreliable¹⁵ and it was not practical to trace all hospital and social services

Clinical messages

- Community rehabilitation produced equivalent outcome to routine outpatient rehabilitation in functional abilities and mood but provided more emotional support.
- Carers of patients treated by the community stroke team were under less strain and more satisfied with the rehabilitation services they received than those who received routine care.
- Rehabilitation by a community stroke team had particular benefits for carers of stroke patients.

attendance registers. The detail of treatment given to the intervention group was also difficult to quantify. Although the number of sessions, hours of direct contact and indirect time were recorded, this provides little insight into the interventions that took place. This information is probably better obtained through qualitative methods or observation.

The benefits, in terms of satisfaction and knowledge, were comparable to other trials of community support services¹⁶ suggesting it does not matter who provides information and support, but simply that it is available.

There are limitations to the study, which need to be taken into account when interpreting the data. It was assumed that groups were comparable at baseline because they were randomly allocated. Consent was not obtained before randomization, so the number of patients refusing to participate was relatively high. However, it was comparable in both groups. The procedure of obtaining consent for follow-up rather than

Table 2 Comparison of outcomes six months after randomization

	Community stroke team			Routine care			Comparison ^a
	<i>n</i>	Median	IQR	<i>n</i>	Median	IQR	<i>p</i> -value
Patient outcomes							
Barthel	90	16	12–18	103	16	12–19	0.83
Mobility	89	6	3–11	101	7	1–13	0.98
Kitchen	90	9	3–14	103	9	3–14	0.70
Domestic	88	3	0–9	100	2.5	0–8	0.67
Leisure	89	6	3–9	101	7	3–9	0.34
EADL	86	24	13–38	98	25.5	11–39	0.94
GHQ-12	87	13	10–21	97	15	11–23	0.79
Euroquol	85	52	41–78	95	55	40–72	0.75
Satisfaction with:							
Knowledge	86	2	2–3	100	2	1–3	0.24
Practical help	69	3	2–3	70	3	2–3	0.39
Emotional support	47	3	2–3	55	2	2–3	0.02*
Overall satisfaction	86	3	2–3	93	2	2–3	0.08
Carer outcomes							
GHQ-12	64	13	10–16	71	14	10–18	0.29
CSI	59	8	5–10	67	10	6–12	0.03*
Carer Euroquol	61	73	55–91	69	75	54–86	0.97
Satisfaction with:							
Knowledge	64	2	2–3	74	2	1–3	0.03*
Practical help	55	3	2–3	58	3	2–3	0.35
Emotional support	32	3	2–3	26	3	2–3	0.50
Overall satisfaction	64	2	2–3	72	2	1–3	0.01*

^aGroups were compared using Mann–Whitney *U*-test for ordinal data. χ^2 was used for categorical responses.

*Significant difference favours the intervention group.

randomization had several advantages. Concerns were not raised in people who were allocated to routine care, that they were receiving a second rate service. Also it would have been time consuming to seek informed consent from all those referred to the service and delayed the onset of intervention. Consent to follow-up could be done by letter and required substantially less time and therefore less research resources. Postal follow-up had the advantages that the assessor could remain blind to the intervention group. However, some questionnaires were either not returned or returned incomplete and complete data could not be obtained. Although attempts were made to obtain missing information by telephone contact or visits, some participants and carers refused to answer some questions. It is possible that those least satisfied with the services would be the people who did not reply. However, this should have affected patients in each group and therefore is unlikely to have biased the results.

The community stroke team comprised several members and there were changes of staffing levels over the study period. This led to variation in the level of input from different professions that could be provided. It is however representative of clinical practice, in which staff changes are frequent. The team aimed to provide treatment for as long as was needed. In practice most patients and carers were seen for relatively few sessions, with only a minority receiving prolonged rehabilitation. One disadvantage of a community team is that time is spent travelling. However, travel accounted for only about a tenth of therapists' time. The main advantage was that skills could be taught in the environment in which they would be used and intervention could be tailored to the patients' home circumstances. It was also much easier to involve carers in the rehabilitation programme.

The follow-up period was confined to six months. This is likely to have been sufficient to detect the benefits of intervention, as most trials have found benefits of rehabilitation early after randomization and decreasing benefits over time.³ It is however possible that outcomes would be different if assessed later after the services were provided.

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References

- Geddes JML, Chamberlain MA. Home-based rehabilitation for people with stroke: a comparative study of six community services providing co-ordinated, multidisciplinary treatment. *Clin Rehabil* 2001; **15**: 589–99.
- Forster A, Young J. Specialist nurse support for patients with stroke in the community: a randomised controlled trial. *BMJ* 1992; **7**: 135–39.
- Walker MF, Gladman JRF, Lincoln NB, Siemonsma P, Whiteley T. Occupational therapy for stroke patients not admitted to hospital: a randomised controlled trial. *Lancet* 1999; **354**: 278–80.
- Roderick P, Low J, Day R *et al*. Stroke rehabilitation after hospital discharge: a randomized trial comparing domiciliary and day-hospital care. *Age Ageing* 2001; **30**: 303–10.
- Gladman JR, Lincoln N, Barer DH. A randomised controlled trial of domiciliary and hospital based rehabilitation for stroke patients after discharge from hospital. *J Neurol Neurosurg Psychiatry* 1993; **56**: 960–66.
- Early Supported Discharge Trialists. Services for reducing duration of hospital care for acute stroke patients (Cochrane Review). In: *The Cochrane Library*, Issue 1. Oxford: Update Software, 2003.
- Out-patient Service Trialists. Therapy-based rehabilitation services for stroke patients at home (Cochrane Review). In: *The Cochrane Library*, Issue 1. Oxford: Update Software, 2003.
- McMillan TM, Ledder H. A survey of services provided by community neurorehabilitation teams in South East England. *Clin Rehabil* 2001; **15**: 582–88.
- Langhorne P, Duncan P. Does the organisation of post acute stroke care really matter? *Stroke* 2001; **32**: 268–74.
- Wade DT, Collin C. The Barthel ADL Index: a standard measure of physical disability? *Int Disabil Stud* 1988; **10**: 64–67.
- Nouri F, Lincoln NB. An extended activities of daily living scale for stroke patients. *Clin Rehabil* 1987; **1**: 301–305.
- Goldberg D. *General Health Questionnaire (GHQ-12)*. Windsor: NFER-Nelson, 1992.
- EuroQoL Group. *EuroQoL Group Newsletter*. EuroQoL Group Business Management, 2000.

- 14 Robinson BC. Validation of a caregiver strain index. *J Gerontol* 1983; **38**: 344–48.
- 15 Luther A, Lincoln NB, Grant F. Reliability of stroke patients' reports on rehabilitation services received. *Clin Rehabil* 1998; **12**: 238–44.
- 16 Lincoln NB, Francis VM, Lilley SA, Sharma JC, Summerfield M. Evaluation of a stroke family support organiser: a randomized controlled trial. *Stroke* 2003; **34**: 116–21.