Age and Ageing 2005; **34:** 331–338
doi:10.1093/ageing/afi102

Early assessment by a mobile stroke team: a randomised controlled trial

PAOLA DEY[1], MIRIAM WOODMAN[2], ALAN GIBBS[3], ROBERT STEELE[4], S. JILL STOCKS[5], SUSAN WAGSTAFF[6], VENEET KHANNA[7], MOHAN DATTA CHAUDHURI[8]

[1]Formerly University of Manchester (contact details below)
[2]Formerly Manchester Health Authority, Gateway House, Piccadilly South, Manchester, UK
[3]University of Manchester, Centre for Cancer Epidemiology, Kinnaird Road, Manchester M20 4QL, UK
[4]Formerly Central Liverpool Primary Care Trust, Hartington Road Family Clinic, Hartington Road, Liverpool L8 0SQ, UK
[5]University of Manchester, Stopford Building, Oxford Road, Manchester M13 9PL, UK
[6]Stockport NHS Foundation Trust, Stepping Hill Hospital, Poplar Grove, Stockport SK2 7JE, UK
[7]North Manchester General Hospital, Pennine Acute Hospitals NHS Trust, Delaunays Road, Crumpsall, Manchester M8 5RB, UK
[8]Stockport NHS Foundation Trust, Stepping Hill Hospital, Poplar Grove, Stockport SK2 7JE

Address correspondence to: P. Dey, Bury Primary Care Trust, Inwood House, 5 Castlecroft Road, Bury BL9 0EN, UK. Fax: (+44) 0161 778 2111. Email: PaolaDey62@hotmail.com

Abstract

Background: there is overwhelming evidence of the effectiveness of specialist stroke rehabilitation, but more limited evidence of the effectiveness of organised stroke care during the acute phase of stroke.
Objective: to determine the impact on outcome of access to a mobile team during the acute phase of stroke among patients admitted to general wards.
Study population: 308 patients admitted to one of two hospitals within 5 days of the onset of a clinically diagnosed stroke.
Study design: randomised controlled trial.
Study groups: following admission, patients in the intervention arm were visited by members of a mobile stroke team who advised clinical staff on appropriate and timely investigation and management. They co-ordinated early input from therapy groups and identified those ready for transfer to the stroke rehabilitation unit. Patients in the control arm were not visited by the mobile stroke team.
Main outcome measure: all-cause mortality measured at 6 weeks and 12 months.
Results: there was no statistically significant difference observed between study groups in mortality at 6 weeks (95% CI_{adj} −7.4 to 7.4%) nor at 12 months (95% CI_{adj} −4.1 to 15.9%). There were also no differences observed between study groups in morbidity outcomes or health-related quality of life measured at 12 months.
Conclusion: the trial was terminated before the necessary sample size was collected but findings suggest that the mobile stroke team failed to confer significant long-term mortality benefit compared with general ward-based care alone.

Keywords: *cerebrovascular accident, patient team care, randomised controlled trial, elderly*

Introduction

The Cochrane systematic review provides overwhelming evidence that organised inpatient stroke care reduces death, dependency and institutionalisation [1]. In the trials contributing to this review, organised inpatient stroke care could be provided on discrete wards or by mobile teams during either the acute or post-acute phase of the stroke. Variations in early management of stroke have been observed [2, 3], and some suggest that this may be reduced when patients in the acute phase of stroke are managed in specialist units [4]. However, while a sub-analysis of trials of organised care during the post-acute phase of stroke has confirmed the effectiveness of specialist stroke rehabilitation [5], there are insufficient data to draw similar conclusions for organised stroke care in the acute phase of stroke: trials of acute stroke wards, which accept patients immediately but discharge early, are too small to be conclusive [1, 6]. There are also concerns about the additional resources required to establish a direct admissions stroke unit or an acute stroke ward [7]. In other areas, outreach initiatives have successfully promoted clinical adherence to guidelines [8]. Therefore, we designed a randomised controlled trial to examine the impact on outcome of immediate access to a mobile stroke team who attempted to promote adherence of clinical and ward staff to guidelines on effective management during the acute phase of stroke.

Methods

The study was undertaken at two district general hospitals in the North West of England that had stroke rehabilitation units but did not have either a direct admissions stroke unit or an acute stroke ward. Patients were eligible for the trial if they had been admitted to hospital within 5 days of the onset of a clinically diagnosed stroke, and did not have a myocardial infarction or fracture.

Researchers identified potential participants from the medical admissions unit and ward staff, and confirmed eligibility with the relevant medical team. After written consent was obtained from the patient or, when this was not feasible, assent from the next-of-kin, researchers assessed stroke severity and pre-stroke function using the Canadian Neurological Scale (CNS) and Barthel Index (BI) respectively [9, 10]. Patients were randomised by an offsite office using a computer-generated schedule which stratified patients by centre. Within each stratum, patients were allocated to either an intervention or control group. For the first 3 months patients were allocated using a simple computer-generated random number procedure. After this period, allocation was by a minimisation procedure, with a 7 in 10 random element, using the following characteristics: age, time from symptom onset, previous stroke, CNS and pre-stroke BI. Recruiters remained unaware of the grouping of minimisation factors.

When patients were allocated to the intervention group, the researcher forwarded their details to a mobile stroke team, which included a consultant with a special interest in stroke and a senior therapist. The team visited patients within 12 hours of randomisation. They did not take over clinical responsibility for the patient, which remained with the admitting clinicians and ward staff, but were expected to advise the responsible clinical team, nursing staff and therapists on acute stroke management using evidence-based guidelines agreed at both hospitals before the trial commenced. The mobile team advised clinical and nursing staff on the management of acute complications; prompted early investigation e.g. CT scans within 48 hours of admission and, in appropriate patients, Doppler scans; encouraged timely assessment of swallowing, nutritional status, skin integrity, cognition and mood; co-ordinated early input from therapy groups, including physiotherapists for positioning and early mobilisation and speech and language therapists for assessment of swallowing and communication; promoted early initiation of preventative measures, for example, antiplatelet therapy and anticoagulation, if appropriate, and identified patients who were ready for transfer to the stroke rehabilitation unit. The therapy co-ordinator did not undertake therapy on study patients. The team revisited the patient as necessary to review progress. Members of the team could visit patients separately, but were expected to meet regularly to discuss the case. The team recorded adherence to stroke management guidelines on a short proforma when visiting patients. They reviewed acute stroke management guidelines annually and modified them to take account of the Royal College of Physicians of London guidelines for stroke, when these became available [11]. Patients in the control group received usual ward-based care during the acute phase of their stroke and were referred to the stroke rehabilitation unit on request of the clinician of care.

Status of all patients and, if appropriate, date of death were confirmed by the Office of National Statistics. An independent clinician, blind to study allocation, reviewed cause of death from data held in clinical records. Patients were visited at 6 weeks and 12 months after randomisation when place of residence was confirmed and functional outcome and quality of life assessed using the BI, Nottingham Extended Activities of Daily Living Scale, Frenchay Aphasia Screening Test, Simple Questions, EuroQol and the Hospital Anxiety and Depression Scale [10, 12–16]. Twelve month assessments were conducted by researchers blind to the study allocation, with adequacy of blinding determined by asking the therapist to guess the patient's study group. The frequency with which they guessed correctly did not differ significantly from 0.5 ($P=0.63$). The uptake of CT scan, antiplatelet therapy, physiotherapy and speech therapy was identified retrospectively from information held in case records. Access to the stroke rehabilitation unit was only measured in one centre, because the other was recruiting medically stable stroke patients to another trial comparing the effectiveness of home and hospital-based stroke rehabilitation, using allocation to this trial as a minimisation factor.

With the agreement of the steering group, eligibility criteria were modified soon after commencement to extend the time from symptom onset to admission from 3 to 5 days because some patients experienced delay in referral to hospital, and to include patients on anticoagulants. Local research ethics committees approved the trial.

The main outcome measure was all-cause mortality, which was measured at 6 weeks and 12 months, and secondary measures were death or dependency, defined as a score of 18 or less on the BI, and death or institutionalised care, defined as hospital, hospice, nursing or residential home [1]. An intention-to-treat approach to analysis was adopted with all recruited patients maintained in the analysis. For primary and secondary measures, standardised differences and their 95% confidence intervals for differences in percentages were calculated to take into account stratification by centre, and treatment groups compared using the Mantel Haensel χ^2 statistic. The Kaplan–Meier method was used to estimate survival to 12 months and the magnitude of the treatment difference estimated using the hazards ratio, allowing for stratification by centre.

In a previous study, the 6-week mortality of patients admitted to an acute stroke unit and to general wards was 7.3 and 17.3% respectively [17]. We considered a difference of 7% at 6 weeks to be clinically important. To detect a 7% mortality reduction, it was estimated that 816 patients were required for 80% study power at the 5% two-sided significance level and that sufficient patients could be recruited within 2 years if 85% of the 600 stroke patients admitted to the two hospitals each year were eligible and 90% of eligible patients consented. We expected that any clinically important difference at 6 weeks should be maintained in the long term. The trial commenced in November 1999 but, after withdrawal of one centre, was terminated in February 2002, on the advice of the data monitoring committee, when it

became clear that the necessary sample size could not be recruited within a reasonable time frame.

Results

During the study period, 1,172 patients with a clinical diagnosis of stroke were admitted, of whom 517 (44%) were not eligible and 347 (30%) eligible patients were not recruited (Figure 1): 244 patients were deemed to be ineligible because they were admitted under the care of one of the mobile team and 173 eligible patients were not recruited because the next-of-kin could not be identified in time to obtain assent. Of the remaining 308 (26%) patients, 157 (51%) were allocated to the intervention group and 151 (49%) to the control group. Baseline characteristics were similar across study groups (Table 1). The majority of patients were

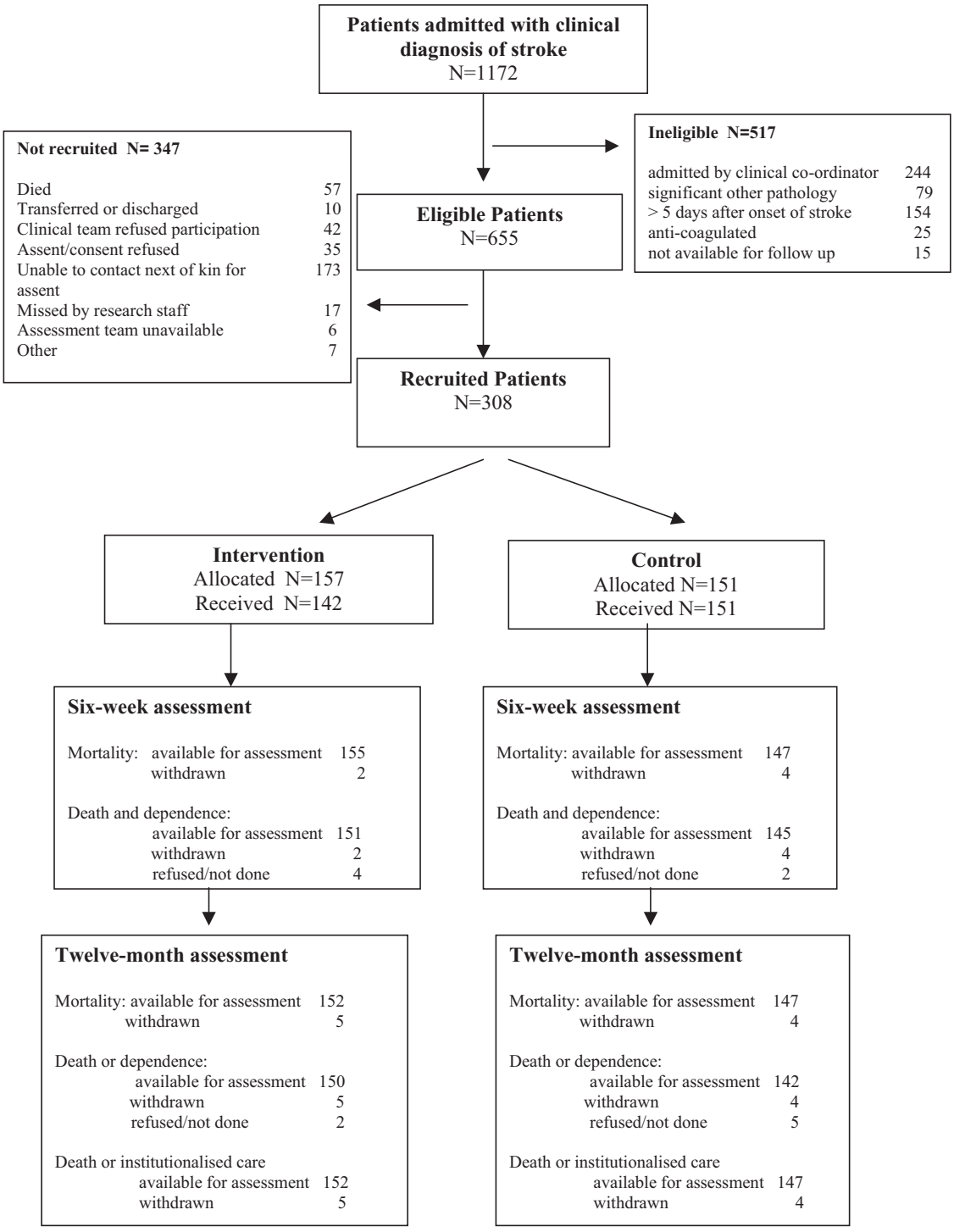


Figure 1. Trial profile.

Table 1. Distribution of baseline characteristics and diagnosis across study groups

		Intervention $n=157$	Control $n=151$
Age	<65 years	35 (22%)	30 (20%)
	65–74 years	49 (31%)	46 (30%)
	75–84 years	49 (31%)	48 (32%)
	85 + years	24 (15%)	27 (18%)
Sex	Male	85 (54%)	77 (51%)
Canadian Neurological Scale	<5	33 (21%)	32 (22%)
	5–9	60 (38%)	60 (40%)
	>9	64 (41%)	59 (39%)
Time from symptom onset to admission	1 day	142 (90%)	134 (89%)
	2 days	10 (6%)	12 (8%)
	3 to 5 days	5 (3%)	5 (3%)
Prestroke Barthels Index	0–14	12 (8%)	10 (7%)
	15–19	48 (31%)	45 (30%)
	20	97 (62%)	96 (64%)
Previous history of stroke		40 (25%)	39 (26%)
Time from admission to randomisation	Median days (IQR)	2 (1–3)	2 (1–3)
Diagnosis	Cerebral infarct/unspecified	135 (86%)	128 (85%)
	Cerebral haemorrhage	15 (10%)	13 (9%)
	Tumour	2 (1%)	3 (2%)
	Other	4 (3%)	6 (4%)
	Not known	1 (<1%)	1 (<1%)

admitted within 1 day of the onset of their stroke and most randomised within 2 days of admission (Table 1). Twenty-eight (9%) patients were diagnosed with cerebral haemorrhage. Fifteen patients were found not to have cerebrovascular disease (Table 1).

Most intervention group patients ($n=142$, 90%) were visited by at least one mobile team member, and 109 (69%) patients were visited by both. There were no significant differences between study groups in the uptake of CT scans (diff=2.1%; 95% CI −3.0 to 7.5) or antiplatelet therapy (diff=−0.8%; 95% CI −10.8 to 9.3), or in the proportion of patients transferred to the stroke rehabilitation unit (diff=1.6%; 95% CI −10.5 to 13.5) (Table 2). Compared with control group patients, intervention group patients were transferred significantly earlier to the stroke rehabilitation unit (mean number of days 14.7 versus 24.4; 95% CI −17.0 to −2.57; $t=-2.73$, d.f.=49.5, $P=0.009$), but time to uptake of other interventions was similar across study groups (Table 2).

Outcome status was determined for 302 (98%) patients at 6 weeks and 299 (97%) at 12 months. There was no statistically significant difference observed between study groups in mortality at 6 weeks (12.3% versus 12.2%; $\text{diff}_{adj}=0.01\%$; 95% CI_{adj} −7.4 to 7.4; $\chi^2_{MH}=0.028$, d.f.=1, $P=0.87$), nor at 12 months (29.6% versus 23.8%; $\text{diff}_{adj}=5.9\%$; 95% CI_{adj} −4.1 to 15.9; $\chi^2_{MH}=1.30$, d.f.=1, $P=0.25$) (Table 2). Compared with the control group, there was a non-significant increase in the risk of death in the intervention group (hazards ratio=1.27 (95% CI 0.821–1.972)) (Figure 2). Most deaths occurred before discharge ($n=50$, 63%) and the most common causes were stroke or further embolic episode ($n=35$, 44%) and chest infection or aspiration pneumonia ($n=33$, 41%).

There were no significant differences between the two groups in the percentage of patients at 12 months who died or were in institutional care ($\text{diff}_{adj}=4.2$; 95% CI_{adj} −6.8 to 15.1; $\chi^2_{MH}=0.56$, d.f.=1, $P=0.45$) or were dead or dependent ($\text{diff}_{adj}=-6.1$;95% CI_{adj} −17.1 to 4.9; $\chi^2_{MH}=1.20$; d.f.=1, $P=0.27$) (Table 2). Nor were any statistically significant differences observed between study groups in other functional outcomes or quality of life measures at 12 months (Table 2).

Discussion

In this study, the largest trial reported to date, access to a mobile team failed to confer significant mortality and/or morbidity benefit compared with standard care. Even though the trial was terminated early, we can still exclude a mortality benefit of the desired magnitude of 7% at 6 weeks with at least 90% confidence. At 12 months, the direction of effect favoured the control group and a benefit from the intervention can be excluded with 99% confidence. Our main outcome measure was mortality because it limits observer and ascertainment bias. Others have used this outcome to assess effectiveness of organised stroke care [1].

Just over two-thirds of patients were visited by both members of the mobile team, which could have diluted any potential benefit of the intervention. However, we do not feel that this can fully explain the observed lack of effect. In one centre, 85% of patients in the intervention group were seen by both members of the team, but the magnitude of treatment effect was similar to the centre with lower compliance (5.0 and 6.8% at 12 months).

Although patients in the intervention group experienced a significant reduction in the time to transfer to the stroke rehabilitation unit, the percentage of patients transferred did not differ significantly between study groups. A similar proportion (14%) of patients in both study groups was also transferred to general rehabilitation wards, which suggests an unmet need for specialist stroke rehabilitation.

Table 2. Comparison of process measures and outcomes between study groups

	Intervention $n=157$	Control $n=151$	Difference	Significance test	95% CI for difference
Clinical activity *n* (%)					
CT scan	151 (96.2%)	142 (94.0%)	2.1%	$\chi^2=0.37$, d.f. = 1, $P=0.54$	−3.0 to 7.5
CT scan within 48 hours of admission	74 (47.1%)	64 (42.4%)	4.8%	$\chi^2=0.70$, d.f. = 1, $P=0.40$	−6.3 to 15.6
Antiplatelet therapy[a]	111 (70.7%)	108 (71.5%)	−0.82%	$\chi^2=0.001$, d.f. = 1, $P=0.97$	−10.8 to 9.3
Physiotherapy referral	132 (85.2%)	128 (85.9%)	−0.75%	$\chi^2=0.0005$, d.f. = 1, $P=0.98$	−8.7 to 7.3
Missing	2	2			
Referral for SALT swallowing assessment	83 (54.2%)	79 (52.7%)	1.6%	$\chi^2=0.03$, d.f. = 1, $P=0.87$	−9.5 to 12.6
Missing	4	1			
Transferred to stroke rehabilitation unit[b]	34 (30.9%)	32 (29.4%)	1.6%	$\chi^2=0.011$, d.f. = 1, $P=0.92$	−10.5 to 13.5
Mean (SD) time in days from admission to:					
Starting antiplatelet therapy	5.9 (6.5)	5.6 (4.8)	0.34	$t=0.43$, d.f. = 197, $P=0.66$	−1.25 to 1.95
Missing	10	10			
Physiotherapy referral	2.4 (1.88)	3.0 (3.10)	−0.59	$t=-1.84$, d.f. = 206, $P=0.067$	−1.22 to 0.04
Missing	0	1			
Referral for SALT swallowing assessment	1.7 (4.65)	2.9 (7.77)	−1.2	$t=-1.24$, d.f. = 160, $P=0.22$	−3.2 to 0.74
Transfer to stroke rehabilitation unit[b]	14.7 (10.32)	24.4 (17.59)	−9.8	$t=-2.73$, d.f. = 49.5, $P=0.009$	−17.0 to −2.57
Primary and secondary outcome measures at 6 weeks					
Mortality *n* (%)	19 (12.3%)	18 (12.2%)	0.013%	$\chi^2_{MH}=0.028$; d.f. = 1, $P=0.87$	−7.4 to 7.4
Missing	2	4			
Death or dependence *n* (%)	94 (62.3%)	96 (66.2%)	−4.0%	$\chi^2_{MH}=0.73$; d.f. = 1, $P=0.39$	−14.5 to 7.2
Missing	6	6			
Primary and secondary outcome measures at 12 months					
Mortality *n* (%)	45 (29.6%)	35 (23.8%)	5.9%	$\chi^2_{MH}=1.30$; d.f. = 1, $P=0.25$	−4.1 to 15.9
Missing	5	4			
Death or dependence *n* (%)	91 (60.7%)	95 (66.9%)	−6.1%	$\chi^2_{MH}=1.20$; d.f. = 1, $P=0.27$	−17.1 to 4.9
Missing	7	9			
Death or institutionalisation *n* (%)	60 (39.5%)	52 (35.4%)	4.2%	$\chi^2_{MH}=0.56$; d.f. = 1, $P=0.45$	−6.8 to 15.1
Missing	5	4			
Simple questions at 12 months *n* (%)					
Good	23 (15.3%)	15 (10.7%)			
Indifferent	25 (16.7%)	31 (22.1%)		$\chi^2=3.271$, d.f. = 3, $P=0.352$	
Poor	57 (38.0%)	59 (42.1%)			
Dead	45 (30.0%)	35 (25.0%)			
Missing	7	1			
	Intervention $n=112$[c]	Control $n=116$[c]			
Nottingham Extended ADL at 12 months					
Mobility median(range)	4 (0–6)	2 (0–6)	2	$Z=1.24$, $P=0.214$	
Kitchen median(range)	4 (0–5)	4 (0–5)	0	$Z=1.29$, $P=0.199$	
Domestic median(range)	1 (0–4)	1 (0–4)	0	$Z=1.26$, $P=0.208$	
Leisure median(range)	3 (0–6)	2 (0–6)	1	$Z=1.42$, $P=0.155$	
Missing	9	13			
Frenchay Aphasia Screening Test at 12 months[d]					
Mean (SD)	17.1 (3.6)	16.3 (4.6)	0.85	$t=1.49$, d.f. = 205, $P=0.138$	−0.28 to 2.0
Aphasic *n* (%)	30 (28.8%)	31 (30.1%)	−2.3%	$\chi^2=0.02$, d.f. = 1, $P=0.964$	−13.5 to 11.2
Missing	8	13			
EuroQol at 12 months					
Mean (SD) self-rated score	65.7 (19.4)	64.2 (21.2)	1.54	$t=0.537$, d.f. = 199, $P=0.592$	−4.1 to 7.2
Missing	9	18			
Mean (SD) weighted score	0.55 (0.349)	0.51 (0.366)	0.034	$t=0.678$, d.f. = 203, $P=0.5$	−0.07 to 0.13
Missing	9	14			
Hospital Anxiety and Depression Scale at 12 months					
Mean (SD) anxiety score	5.8 (4.45)	5.5 (3.87)	0.37	$t=0.63$, d.f. = 199, $P=0.53$	−0.79 to 1.53
Mean (SD) depression score	6.1 (4.04)	6.1 (4.20)	0.06	$t=0.10$, d.f. = 199, $P=0.92$	−1.09 to 1.20
Missing	10	17			

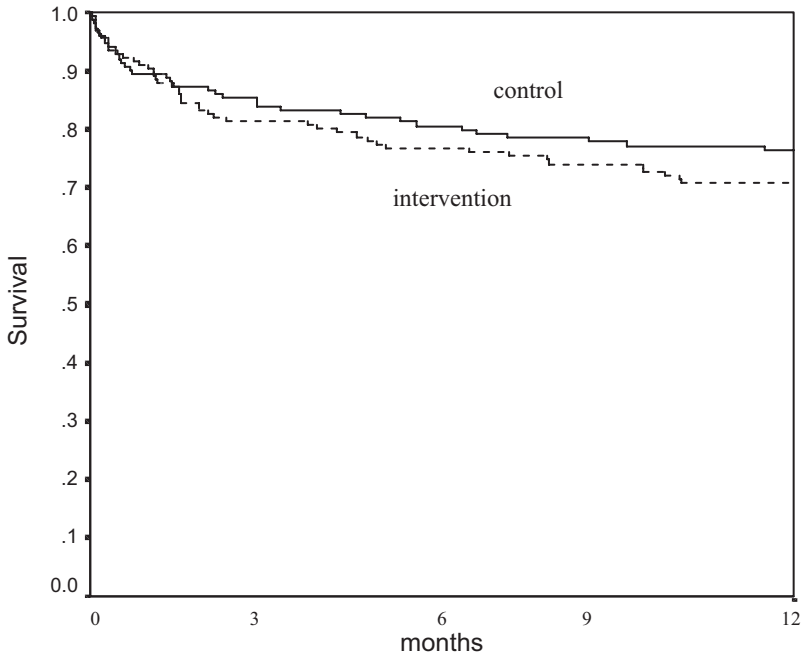
SALT=speech and language therapy.

[a]Frequency of commencement of antiplatelet therapy in subjects with non-haemorrhagic stroke: intervention 107 (79.3%), control 103 (80.5%).

[b]Measured in one centre only: intervention group $n=110$ subjects, control group $n=109$ subjects.

[c]Number alive at 12 months.

[d]For comprehension and expression—using age cut-offs.



Numbers at risk

Intervention	157	124	116	112	107
Control	151	123	118	114	112

Figure 2. Proportion surviving to 12 months.

Limitations of the study

We failed to recruit three-quarters of stroke patients admitted during the study period. One-fifth were ineligible because they were admitted under the mobile team consultant, and in a further 18% assent could not be obtained. These latter patients were more likely to have severe neurological deficit.

Given the nature of the intervention, it was not possible to blind patients, carers or care-givers. Therefore, contamination between the study groups is a possibility. Cluster randomisation can minimise the risk of internal contamination, but we rejected this design because the most appropriate unit of randomisation would have been the hospital, and it was not possible to fund a study involving a large number of trusts. Other trials of organised stroke care have also been subject to this type of bias, but have still produced positive findings [1].

Comparison with other studies

Four other trials have also failed to demonstrate a benefit from access to a mobile stroke team, but most pre-dated the introduction of routine CT scanning and some focused on rehabilitation [18–21]. Our mobile team members were advisory from only two disciplines. They may have been ineffective because they were unable to modify health professional behaviour. Uptake of effective interventions did not differ between study groups in our trial and, in the main, the standard of acute stroke care management was good on the general wards [3]. Only 38% of patients were randomised within 24 hours of admission, and there was only limited evidence of earlier intervention in the mobile team arm (Table 2). The mobile team was only available during normal working hours from Monday to Friday, and it was not always immediately apparent that a patient had had a stroke on admission. Direct admission to an acute stroke unit may further foreshorten delays in intervention, and it has been suggested that mortality and morbidity benefits follow from early access to continuous, skilled nursing care, which is provided by these units [18]. In a recent trial, fewer deaths were observed among patients with moderate severity stroke who were directly admitted to a discrete combined acute and rehabilitation unit compared with similar patients on a general ward afforded outreach assessment by a mobile team [18]. However, while acute care differed between the two study groups, there was also a substantial difference in the quantity and quality of rehabilitation [22]. Others suggest that acute stroke complications are reduced through better attention to physiological parameters, e.g. blood pressure, hydration, temperature and oxygenation [4], but while recent trials of intensive monitoring in the early phase of stroke are promising, they remain too small to be conclusive [6].

Service and research implications

In response to the National Service Framework for older people many UK hospitals have established discrete acute stroke units with immediate admission [23], but a recent survey suggests that these units have a median of 14.5 beds and often employ admission criteria based on age or stroke severity [24], which may limit access to specialist stroke rehabilitation for which there is unequivocal evidence [5]. In contrast, a Danish stroke unit (providing both acute assessment and rehabilitation) reporting direct admission of all hospitalised stroke patients has 61 beds for a catchment population of 124,000 [25]. However, a recent economic analysis of this trial suggests that the observed benefits may not justify the additional costs of this type of intervention [7]. Our study suggests that there is no benefit to patients of providing outreach acute care, but further research may be warranted into the cost-effectiveness of acute stroke units.

Key points

- There is overwhelming evidence of the effectiveness of specialist stroke rehabilitation, but more limited evidence of the effectiveness of organised stroke care during the acute phase of stroke.
- Organised inpatient stroke care could be provided on discrete wards or by mobile teams during the acute phase of the stroke.
- In a randomised controlled trial, we failed to demonstrate that early access to a mobile stroke team during the acute phase of stroke conferred significant mortality or morbidity benefit compared with general ward-based care alone.
- Further research is warranted into the cost-effectiveness of discrete acute stroke units, which also promote access to specialist stroke rehabilitation for which there is unequivocal evidence.

Acknowledgements

We would like to acknowledge the contribution to this study of the members of the mobile teams, all research staff including the community therapists, the independent clinician and members of the trial steering committee, data monitoring committee and project teams. We are very grateful for all the support we received from staff at all participating trusts and to the patients and their relatives who participated in the study.

Declaration of conflicts of interest

None declared.

Declaration of funding sources

The study was funded by the National Health Service Executive North West Research & Development directorate. The sponsors played no role in the design, execution, analysis and interpretation, or writing of the study.

References

1. Stroke Unit Trialists' Collaboration. Organised inpatient (stroke unit) care for stroke (Cochrane Review). In The Cochrane Library, Issue 3, 2004. Chichester, UK: John Wiley and Sons Ltd.
2. Lindley RI, Amayo EO, Marshal J *et al*. Hospital services for patients with acute stroke in the UK: The Stroke Association. Survey of Consultant Opinion. Age Ageing 1995; 24: 525–32.
3. Clinical Effectiveness and Evaluation Unit. Royal College of Physicians of London. Concise report on the National Sentinel Stroke Audit 2001/2. July 2002. www.rcplondon.ac.uk/college/ceeu/strokeconciseauditreport.pdf.
4. Warlow C, Sudlow C, Dennis M, Wardlaw J, Sandercock P. Stroke. Lancet 2003; 362: 1211–24.
5. Langhorne P, Duncan P. Does the organisation of postacute stroke care really matter? Stroke 2001; 32: 268–74.
6. Sulter G, Elting JW, Langedijk M, Maurits NM, De Keyser J. Admitting acute ischemic stroke patients to a stroke care monitoring unit versus a conventional stroke unit: a randomised pilot study. Stroke 2003; 34: 101–4.
7. Patel A, Knapp M, Perez I, Evans A, Kalra L. Alternative strategies for stroke care: cost-effectiveness and cost-utility analyses from a prospective randomised controlled trial. Stroke 2004; 35: 196–203.
8. Thomson O'Brien MA, Oxman AD, Davis DA, Haynes RB, Freemantle N, Harvey EL. Educational outreach visits: effects on professional practice and health care outcomes (Cochrane Review). In The Cochrane Library, Issue 3, 2004. Chichester, UK: John Wiley & Sons, Ltd.
9. Côté R, Hachinski VC, Shurvell BT, Norris JW, Wolfson C. The Canadian Neurological Scale: a preliminary study in acute stroke. Stroke 1986; 17: 731–7.
10. Mahoney FI, Barthel DW. Functional evaluation: the Barthel Index. Maryland State Med J 1965; 14: 61–5.
11. Royal College of Physicians of London. National Clinical Guidelines for Stroke. 1st edition. London, 2000.
12. Lincoln NB, Gladman JR. The Extended Activities of Daily Living scale: a further validation. Disabil Rehabil 1992; 14: 41–3.
13. Dorman P, Dennis M, Sandercock P, on behalf of the United Kingdom Collaborators in the International Stroke Trial (IST). Are the modified 'simple questions' a valid and reliable measure of health related quality of life after stroke? J Neurol Neurosurg Psychiatry 2000; 69: 487–93.
14. Enderby P, Wood V, Wade D. Frenchay aphasia screening test. Manual. London: Whurr Publishers Ltd, 1997.
15. Brooks R with the EuroQol Group. EuroQol: the current state of play. Health Policy 1996; 37: 53–72.
16. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. Acta Psychiatr Scand 1983; 67: 361–70.
17. Indredavik B, Bakke F, SlØrdahl SA, Rokseth R, Håheim LL. Stroke unit treatment. 10 year follow up. Stroke 1999; 30: 1524–7.
18. Kalra L, Evans A, Perez I, Knapp M, Donaldson N, Swift CG. Alternative strategies for stroke care: a prospective randomised controlled trial. Lancet 2000; 356: 894–9.
19. Wood-Dauphinee S, Shapiro S, Bass E *et al*. A randomised trial of team care following stroke. Stroke 1984; 15: 864–72.
20. Hamrin E. II Early activation in stroke: does it make a difference? Scand J Rehabil Med 1982; 14: 101–9.
21. Feldman DJ, Lee PR, Unterecker J, Lloyd K, Rusk HA, Toole A. A comparison of functionally orientated medical care and formal rehabilitation in the management of patients with hemiplegia due to cerebrovascular disease. J Chron Dis 1962; 15: 297–310.

22. Evans A, Perez I, Harraf F *et al.* Can differences in management processes explain different outcomes between stroke unit and stroke-team care? Lancet 2001; 358: 1586–92.
23. Department of Health. National Service Framework for older people. HMSO, 2001.
24. Rodgers H, Dennis M, Cohen D, Rudd A. British Association of Stroke Physicians: benchmarking survey of stroke services. Age Ageing 2003; 32: 211–7.
25. Jørgensen HS, Nakayama H, Raaschou HO *et al.* The effect of a stroke unit: reductions in mortality, discharge rate to nursing home, length of hospital stay and cost: a community based study. Stroke 1995; 26: 1178–82.

Received 27 August 2004; accepted in revised form 4 January 2005

Age and Ageing 2005; **34:** 338–343
doi:10.1093/ageing/afi116

Post-discharge home-based support for older cardiac patients: a randomised controlled trial

ALAN J. SINCLAIR[1], SIMON P. CONROY[2], MICHAEL DAVIES[3], ANTONY J. BAYER[4]

[1]Successful Ageing Programme, Section of Geriatric Medicine and Gerontology, Centre for Health Services Studies, Warwick Business School, The University of Warwick, Coventry CV4 7AL, UK
[2]Ageing and Disability Research Unit, B98, Medical School, Queen's Medical Centre, Nottingham NG7 2UH, UK
[3]Department of Cardiology, Selly Oak Hospital, Birmingham B29 6JD, UK
[4]Department of Geriatric Medicine, Wales College of Medicine, Cardiff University, Llandough Hospital, Penarth CF64 2XX, UK

Address correspondence to: A. J. Sinclair. Fax: (+44) 24 7652 4963. Email: alan.sinclair@wbs.ac.uk

Abstract

Background: hospital and exercise-based cardiac rehabilitation programmes do not suit many older patients and home-based rehabilitation may be more effective.
Objective: to evaluate a home-based intervention for patients aged 65 years or over discharged home from hospital after emergency admission for suspected myocardial infarction.
Design: a single-blind randomised controlled trial comparing home-based intervention by a nurse with usual care.
Subjects: patients aged 65 years or over discharged home after hospitalisation with suspected myocardial infarction ($n=324$).
Intervention: home-based intervention ($n=163$) consisted of home visits at 1–2 and 6–8 weeks after hospital discharge by a nurse who encouraged compliance with and knowledge of their treatment regimen, offered support and guidance about resuming daily activities, and involved other community services as appropriate.
Measurements: up to 100 days after admission, data were collected on deaths, hospital readmissions and use of outpatient services. Survivors were sent a postal questionnaire to assess activities of daily living and quality of life.
Results: at 100 day follow-up there was no difference in deaths, activities of daily living or overall quality of life, but those in the intervention group scored significantly better on the confidence and self-esteem subsections. The intervention group had fewer hospital readmissions (35 versus 51, relative risk 0.68, 95% CI 0.47–0.98, $P<0.05$) and fewer days of hospitalisation after initial discharge (mean difference −1.7, 95% CI −2.09 to −1.31, $P<0.05$). A total of 42/43 individuals in the intervention group had resumed driving at follow-up, compared with 32/43 in the usual care group (observed difference between proportions 23%, 95% CI 9–37%, $P<0.05$).
Conclusion: amongst older patients discharged home after hospitalisation for suspected myocardial infarction, home-based nurse intervention may improve confidence and self-esteem, and reduce early hospital readmissions.

Keywords: *elderly people, myocardial infarction, ischaemic heart disease, cardiac rehabilitation*