Early supported hospital discharge following acute stroke: pilot study results

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Objective: To establish the feasibility and method of evaluation of an early supported hospital discharge policy for patients with acute stroke.
Design: A randomized controlled trial comparing an early supported discharge service to conventional care.
Setting: Three acute hospitals in Newcastle upon Tyne.
Subjects: Ninety-two eligible patients with acute stroke admitted between 1 February 1995 and 31 January 1996.
Main outcome measures: Placement, length of stay, readmission rates, mortality, functional ability (Nottingham Extended Activities of Daily Living (ADL) Scale), handicap (Oxford Handicap Scale), global health status (Dartmouth Coop Function Charts) and carer stress (General Health Questionnaire 30 item).
Results: The median length of stay for patients randomized to early supported discharge was 13 days compared to 22 days in the conventional care group ($p = 0.02$). The median Barthel ADL Index at seven days post stroke of patients randomized to early supported discharge was 15, and 13 for those randomized to conventional care (NS). At three months post stroke the median Nottingham EADL score of patients randomized to early supported discharge was 10 compared to 7 for those who received conventional care (NS). There were no statistically significant differences in the global health status of patients or carer stress.
Conclusion: An early supported discharge service following acute stroke with individualized rehabilitation in the community is feasible and can be evaluated by a randomized controlled trial but a larger multicentre trial is needed before such a service is widely adopted.

Introduction

Pressures to reduce the length of hospital stay and shift resources from hospital to community have encouraged many health authorities to plan and develop hospital at home or early discharge schemes. Evidence of the effectiveness and comparative costs of these innovations from sound randomized studies is sparse.[1] Given that there is convincing evidence of the effectiveness of organized inpatient stroke services it is important to ensure that stroke patients and their carers are not disadvantaged as a result of an early discharge policy.[2,3]

Domiciliary rehabilitation following a short inpatient stay allows goals to be set in the con-

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text of the patient's own environment and gives patients and carers more involvement in decision-making. Early discharge with appropriate support may improve functional abilities as a result of rehabilitation goals being set in a familiar environment. By avoiding a prolonged hospital stay the patient and family may have increased confidence and the patient may experience less social isolation and improved psychological well-being.

We report the findings of a pilot study for a pragmatic randomized controlled trial which aimed to establish the feasibility and method of evaluation of an early supported hospital discharge policy following acute stroke.

Method

The Stroke Discharge Service

The Stroke Discharge Team was community based, providing an inreach service to each of the three local acute hospitals (Freeman Hospital, the Royal Victoria Infirmary and Newcastle General Hospital). The structure of the team was a pragmatic decision, based upon the anticipated workload, the available resources and views of the leaders of local services. The team consisted of a service coordinator (this is currently a job-share between an occupational therapist and physiotherapist); 1.25 whole time equivalent (wte) senior occupational therapists; 0.75 wte senior physiotherapist; 0.5 wte speech and language therapist; 0.5 wte social worker; 0.3 wte occupational therapy technician and 1.0 wte secretary. Nursing posts were not established as the district nursing service preferred that nursing care for stroke patients was provided by the primary care team. Postdischarge medical care was provided by the patient's general practitioner with support as required from a consultant with an interest in stroke medicine. Home care services, when required, were provided to patients randomized to early supported discharge by Newcastle City Health Trust. Home care workers were given specific training in the needs and care of stroke patients.

Prior to implementing the new service there was an opportunity for the Stroke Discharge Team to develop methods of interdisciplinary working and communication systems with patients and carers, within the team and with other professionals in health and social services. These included weekly interdisciplinary team meetings; a key worker approach; multiprofessional case notes; a patient-held record which remained with the patient and to which patient and carer were encouraged to contribute; information sheets for patients and their family; review meetings involving patients and carers in their own homes.

The team aimed to establish a relationship with referred stroke patients and their families early during their hospital stay and members liaised closely with ward and rehabilitation staff, attended ward multidisciplinary meetings, and on occasion carried out joint assessments. In partnership with the patient and carer, and the ward and community staff, the team attempted to plan and provide a smooth organized discharge and to identify continuing rehabilitation and social needs.

Home visits were carried out by a member of the team without the patient. This allowed carers an opportunity to express concerns and worries away from the clinical setting. On the day of discharge a member of the team brought the patient home, providing encouragement and support at what was a stressful time for many patients and carers. In addition, this was an opportunity to reassure the patient and carer that plans for rehabilitation and social support were in place.

The stroke discharge rehabilitation service was available five days per week but the home care component of the service was available 24 h per day and seven days per week if required. There was no time limit as to how long members of the team continued to be involved with individual patients. We were initially concerned that there would be difficulties with withdrawal of the service. This proved not to be the case as patients and carers, on the whole, felt able to take continued responsibility for their rehabilitation. There was a small group of patients who required continuing social support which was provided by social services. The stroke discharge service was withdrawn gradually and a contact name and number was provided to patients in case of subsequent queries or problems.

Inpatient and outpatient care was provided for

the control group by conventional hospital and community services. At the time of the study one of the three participating hospitals had a dedicated inpatient stroke service. In the other two hospitals stroke patients were cared for on general medical or care of the elderly wards. Discharge planning and services post discharge for patients randomized to conventional care were arranged and provided according to the usual practice of each participating ward or unit. Community support was provided by the primary care team, community rehabilitation services, outpatient services and social services as appropriate.

Case ascertainment

All patients admitted with acute stroke to the three Newcastle acute hospitals between 1 February 1995 and 31 January 1996 were identified by the study team within 48 h of admission.

Eligibility criteria

Patients were eligible to be invited to participate in the study if (a) their home address was in Newcastle, (b) they were not living in residential or nursing home care prior to the incident stroke, (c) they were not severely handicapped prior to the incident stroke (Oxford Handicap Scale 0–3)[4], (d) they had no other condition likely to preclude rehabilitation, and (e) they were medically stable with a Barthel Activities of Daily Living Index[5] between 5 and 19 at 72 h post stroke.

Consent and randomization

A two-stage randomized consent design was used.[6] Consent was initially sought from all eligible patients to data collection. Patients and carers who agreed to participate were then interviewed by the research associate (JS). On completion of the initial interview patients were randomized to 'early supported discharge' (ESD) or 'conventional care' (CC) by a central computerized randomization service. Participants were stratified by presence of resident carer and stroke severity (continence of urine at 24 h post stroke).[7] No further consent was sought from patients randomized to conventional care. Permission to approach patients randomized to early supported discharge was obtained from their consultant and general practitioner before further consent was sought from the patient and family. Patients randomized to early supported discharge who agreed to participate were then assessed by a member of the Stroke Discharge Team. We chose to use a two-stage randomized consent rather than the more commonly used one-stage approach. By taking this approach all patients were aware that they were participating in a research study but they consented only to treatments that they received, not hypothetical scenarios. The study was approved by Newcastle and North Tyneside Joint Ethics Committee.

Follow-up

Patients were interviewed between 7 and 10 days post discharge and three months post stroke. Details of the patient's Barthel ADL Index seven days post stroke was obtained from nursing staff. At follow-up interviews blinding to the randomization group was not possible as it soon became apparent at the discharge interview to which group the patient had been allocated. The interviewer was, however, independent of the health service; not involved in the care of patients in either group and had no contact with patients and carers between interviews. At three months post stroke face-to-face interviews were conducted with the patient in their own home or on the ward if they remained in hospital. The following data were obtained: survival, placement, readmissions, Nottingham Extended ADL Scale,[8] Oxford Handicap Scale,[4] Wakefield Depression Inventory,[9] Dartmouth Coop Function Charts (global health status).[10] Carers were asked to self-complete the General Health Questionnaire (30 item).[11]

Analysis

All subjects were included on an intention-to-treat basis.[12] In bivariate analysis significance levels of chi-square and Mann–Whitney *U*-test are reported.

Results

Figure 1 describes the progress of patients through the randomized trial. Four hundred and two stroke patients who were resident in New-

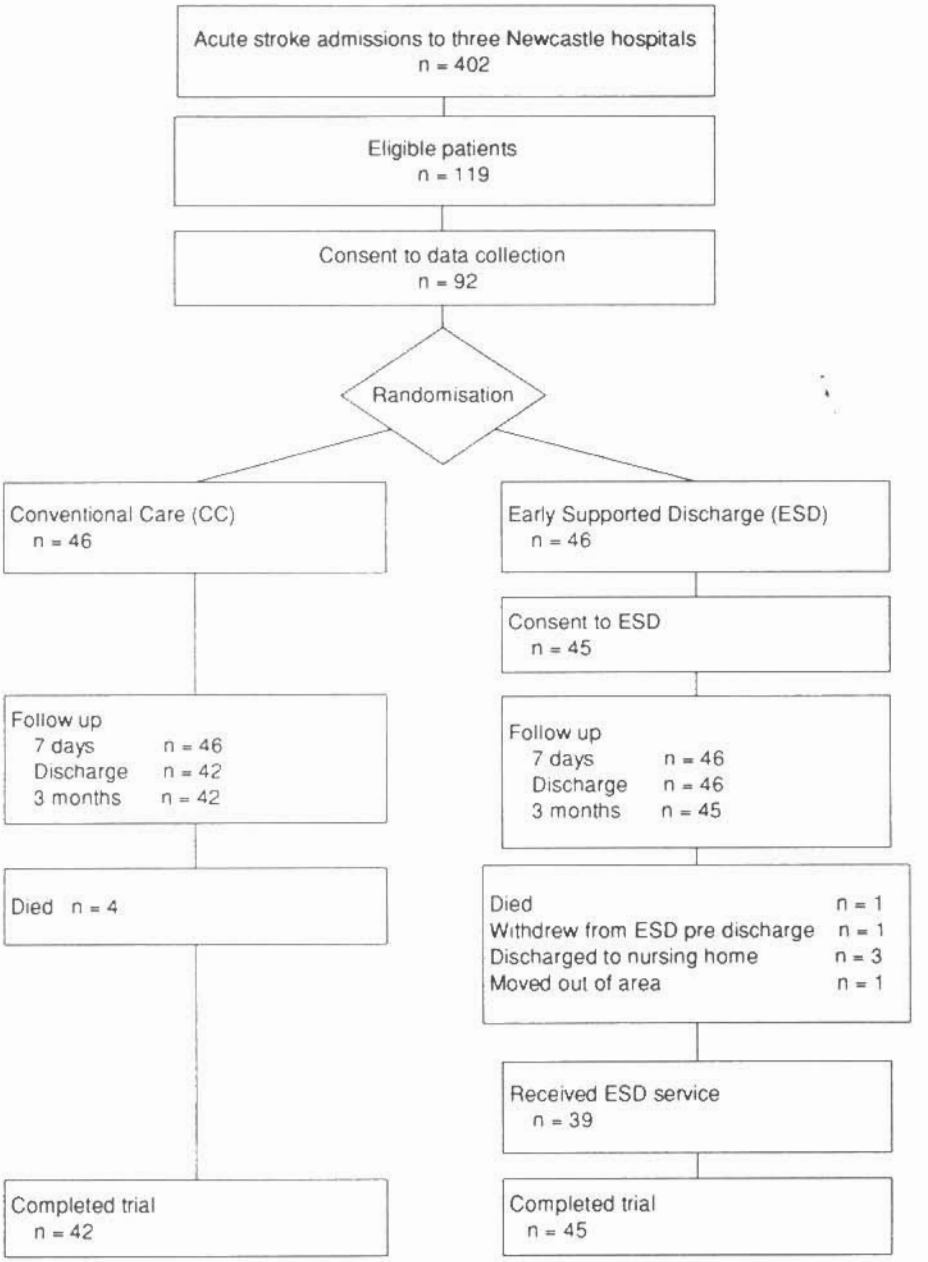

Figure 1 Progress of patients through pilot study

castle were notified over the 12 month study period, of whom 119 (30%) were eligible; 92 (77%) were recruited to the study and 46 randomized to each group. Reasons for exclusion are given in Table 1. The randomized groups had similar clinical, demographic and social characteristics (Table 2). At randomization all patients had a Barthel score between 5 and 19. At seven days post stroke four patients randomized to ESD and one in the CC group had deteriorated to have a score of less than 5. Seven patients randomized to ESD and six of those randomized to CC had a Barthel score of 20 at seven days post stroke.

The median length of stay of patients randomized to early supported discharge was significantly less (13 days) than those randomized to conventional care (22 days) ($p = 0.02$) (Table 3). The two groups did not differ in readmission rates.

Table 1 Reasons for exclusion

	n	%
Stroke patients resident in Newcastle	402	
Admitted from residential or nursing home	36	9
Previously severely handicapped (Oxford Handicap Scale 4 or 5)	30	7
Comorbid condition likely to preclude rehabilitation	14	3
Not medically stable 72 h post stroke	36	9
Barthel ADL Index < 5 at 72 h	136	34
Barthel ADL Index > 19 at 72 h	31	8
Eligible to participate in study	119	30
Unable to gain consent (stage 1)	9	
Participating in acute intervention drug trial	11	
Other reason for not randomizing	7	
Randomized	92	23

Table 2 Characteristic of subjects at admission

Demography	Early supported discharge (*n* = 46)		Conventional care (*n* = 46)	
Age in years: median [range]	73	[47–93]	73	[44–91]
Gender: female	20	(43%)	22	(48%)
Living alone	22	(48%)	21	(46%)
Stroke severity				
Continence of urine at 24 h	42	(91%)	41	(89%)
Barthel ADL Index at seven days post stroke: median [range]	15	[2–20]	13	[2–20]
Stroke subtypes[13]				
Total anterior circulation syndrome (TACS)	3	(7%)	6	(13%)
Partial anterior circulation syndrome (PACS)	19	(41%)	19	(41%)
Lacunar syndrome (LACS)	17	(37%)	18	(39%)
Posterior circulation syndrome (POCS)	6	(13%)	1	(2%)
Other	1	(2%)	2	(4%)

One patient randomized to early supported discharge did not wish to see members of the Stroke Discharge Team and another withdrew from the early discharge scheme during their inpatient stay. One patient was discharged to an address outside the study area. Three patients who were randomized to early supported discharge deteriorated during their hospital stay. The Stroke Discharge Team continued to assess these patients over several weeks but all three patients were finally discharged to nursing home care. All six patients were included in the intention-to-treat analysis.

The Stroke Discharge Team was involved with patients for a median of nine weeks (range 1–44 weeks) and the median number of visits from therapy staff was 28 (range 5–231). Home care was required by 23 patients. Details of the service provision and the comparative costs of the services received by both randomization groups are reported elsewhere.[13]

Five patients died prior to the three-month assessment (one in the early supported discharge group and four who were randomized to conventional care). Three-month assessments were completed for all 87 surviving patients. Completeness rates for the Nottingham Extended ADL Scale and Oxford Handicap Scale were

Table 3 Length of stay and placement

	Early supported discharge (n = 46)	Conventional care (n = 46)	p-value
Mortality	1 (2%)	4 (10%)	
Initial length of stay (days): median [interquartile ranges]	13 [8–25]	22 [10–57]	$p = 0.02$
Number of patients readmitted	5 (11%)	5 (12%)	
Length of stay including readmissions (days): median [interquartile ranges]	14 [8–31]	23 [11–58]	$p = 0.03$
Discharged to residential or nursing home	3 (7%)	5 (12%)	

100% and 75% for the Dartmouth Coop Charts. GHQ-30 was completed by 41/42 (98%) carers who lived with the patient.

We were unable to obtain depression scores using the Wakefield Depression Inventory for 43/87 (49%) patients. In 41 cases this was because they could not answer one of the component statements 'I feel anxious when I go out of the house on my own' as they never went out alone. As a result we were unable to produce a total score.

No statistically significant differences were found between groups in terms of functional abilities, handicap, global health status, mortality or carer stress at three months post stroke (Table 4), although those in the early supported discharge group appeared to be participating in more extended activities of daily living than the

Table 4 Outcomes at three months post stroke

	Early supported discharge (n = 45)	Conventional care (n = 42)
Oxford Handicap Scale		
0–2	28 (62%)	22 (52%)
3	8 (18%)	10 (24%)
4–5	9 (20%)	10 (24%)
Nottingham Extended ADL: median [range]		
Mobility	3 [0–6]	1 [0–6]
Kitchen	4 [0–5]	3 [0–5]
Domestic	1 [0–4]	0 [0–5]
Leisure	2 [0–4]	2 [0–6]
Total	10 [0–18]	7 [0–21]
Dartmouth Coop Global Health Status: median [range]		
Physical fitness	5 [1–5]	5 [3–5]
Feelings	2 [1–5]	2 [1–5]
Daily activities	3 [1–5]	3 [1–5]
Social activities	3 [1–5]	4 [1–5]
Pain	3 [1–5]	3 [1–5]
Change in health	2 [1–5]	2 [1–5]
Overall health	3 [1–5]	3 [2–5]
Social support	1 [1–4]	1 [1–5]
Quality of life	2 [1–5]	3 [1–5]
General Health Questionnaire (GHQ) carers		
	(n = 22)	(n = 19)
Median [range]	5 [0–21]	5 [1–27]

conventional care group. The pilot study was however not adequately powered to identify differences in these outcomes.

Discussion

A short inpatient stay following stroke enables accurate diagnosis and evaluation of medical, rehabilitation and social needs. A long period in hospital may result in dependent behaviour and can make reintegration into the family and community difficult.[15] Skills may also be lost following discharge.[16] The Stroke Discharge Team aimed to provide a smooth, well-organized discharge with intensive support and domiciliary rehabilitation as required. By working across the primary and secondary care interface, continuity and coordination of care was ensured with the aim of enabling patients to realize their maximal potential in their own environment.

With current emphasis on care in the community, early supported hospital discharge following stroke appears an attractive option for both purchasers and providers of health care. However, given the strength of evidence for the effectiveness of organized inpatient stroke care it is vital that hospital-at-home or early supported discharge schemes for stroke patients are formally evaluated. We have established that early supported discharge is feasible following acute stroke with a significant saving of bed days.

We were keen for the inclusion criteria to be as broad as possible to enable the stroke discharge service to be offered to patients with a broad spectrum of disability. Patients with a Barthel ADL Index of less than 5 at 72 h were excluded because in such situations we considered it inappropriate to seek consent for a study of early supported discharge from the relatives of patients with a very severe and often life-threatening neurological deficit. A low Barthel ADL Index in the first week after stroke has been shown to be a powerful predictor of poor outcome but nevertheless organized inpatient stroke services have been shown to improve outcome.[17,18]

One in three stroke admissions fulfilled our eligibility criteria. The 72 h post stroke time window was selected for research purposes to allow casemix data to be collected prospectively but obviously in clinical practice this restriction would not apply. We did review patients who were not medically stable or who had a Barthel ADL Index of less than 5 at 72 h again at seven days post stroke to see if altering the time window would significantly alter recruitment but this was not the case. For patients who were initially excluded because they were severely dependent we considered including them once they had improved to a Barthel ADL Index of 5 or above. This would have meant regularly reviewing patients on several wards in five hospitals across the city (three acute and two rehabilitation) which was not logistically possible.

We have successfully piloted a method of evaluation but given the sample size we are unable to comment on effectiveness. In any study it is important to use instruments that are valid, appropriate and acceptable to the study subjects.[19,20] The method and instruments used in the pilot study were acceptable to patients, carers and staff with the exception of the Wakefield Depression Inventory and are transferable to a larger study. There are difficulties in calculating a score when not all of the items have been completed as we found with the Wakefield Depression Inventory. A previous study found that 69% of stroke patients were able to complete the Wakefield Depression Inventory six months post stroke.[21] Some well-validated scales have developed guidelines for computing total scores when items are missing, e.g. SF36.[22] We were unable to find similar guidelines for the Wakefield Depression Inventory.

The introduction of major new regimes for common conditions has often been vitiated by lack of well-conducted controlled trials into the benefits or otherwise of such treatments. A larger multicentre pragmatic trial with an economic evaluation with a sample size of 550 is needed to provide sufficient power in order to determine efficacy and cost effectiveness before early discharge policies for stroke patients are widely implemented.

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