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Sooner and healthier: a randomised controlled trial and interview study of an early discharge rehabilitation service for older people

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Abstract

Background: hospitals are under pressure from admissions of increasing numbers of older people. Older people may suffer unnecessary activity limitation after acute illnesses through lack of appropriate rehabilitation.

Objective: to evaluate an early discharge and rehabilitation service for older people.

Design: a randomised controlled trial comparing an early discharge and rehabilitation with standard hospital aftercare. Outcome measures assessed at 3 and 12 months were the Barthel Index, Nottingham Extended Activities of Daily Living and EuroQol (for patients) the General Health Questionnaire (for patients and carers). Use of services over 12 months was recorded. An interview study of patients and staff was conducted.

Setting and intervention: the early discharge and rehabilitation service offered a home-based rehabilitation and care programme for up to 4 weeks.

Participants: 370 hospitalised older medical and surgical patients were included in the randomised controlled trial. Twenty patients and 11 staff were interviewed.

Results: subjects in the early discharge rehabilitation service group used fewer days in hospital at 3 months (mean difference 9, median difference 4 days, 95% CI of median difference 2–8). At 3 months the early discharge and rehabilitation service patients had better Barthel scores (mean difference 1.2, 95% CI 0.4–1.9), Nottingham Extended Activities of Daily Living kitchen scores (mean difference 1.2, 95% CI 0.2–2.3), Nottingham Extended Activities of Daily Living domestic scores (mean difference 1.1, 95% CI 0.2–2.0) and General Health Questionnaire scores (mean difference 2.4, 95% CI 0.7–4.1). Significant Nottingham Extended Activities of Daily Living domestic and General Health Questionnaire benefits remained at 12 months. The early discharge and rehabilitation service carers had better General Health Questionnaire scores at 3 months (mean difference 2.0, 95% CI 0.1–3.8). The interviews suggested that the early discharge and rehabilitation service was patient-centred, set clear goals, worked as a team, and considered physical, psychological, social and environmental issues. It was found to be highly satisfactory.

Conclusions: some older people can be discharged from hospital sooner, with better health outcomes using a well-staffed and organised patient-centred early discharge service providing rehabilitation.

Keywords: *rehabilitation, patient discharge, randomised controlled trial*

Introduction

Hospitals in many countries are working above their ideal capacity [1]. Adequate rehabilitation may not take place because acute medical care has priority [2]. Patients who are in need of rehabilitation, who tend to be elderly, may consequently suffer worse outcomes. A service to expedite the discharge of older people from hospital by the provision of care and rehabilitation services in their own homes is a potential solution.

Meta-analyses of previous studies show that the length of hospital stay can be shortened by such services [3–5] but evidence on their effect upon health outcomes is conflicting. In stroke, a condition that is sensitive to the organisation of care [6], one study [7] showed no functional benefit of an early discharge service, in another [8] there was a functional benefit, and in yet another [9] those in receipt of the early discharge service had greater psychosocial dysfunction. Although a possible explanation for these findings could be the play of chance we would argue that it is not reasonable to expect all early discharge schemes to be equally effective. Some services will have no effect if they select people who cannot benefit, or fail to deliver effective interventions. Some services might be beneficial if they deliver otherwise unavailable rehabilitation interventions in an organised manner, to people with activity limitation and related emotional distress.

We evaluated an early discharge and rehabilitation service (EDRS) in Nottingham, UK. We report in this paper a randomised controlled trial, the principal aim of which was to examine the effect of this service upon the activity limitation and well-being of the users and upon the well-being of their carers. It also examined the effect of the service on the use of health and social resources. We also undertook an interview study to assess the acceptability of the service and to illuminate the relationship between process and outcome.

Methods

Intervention and setting

Nottingham has a population of approximately 650,000 and two acute hospitals through which there are about 17,500 medical admissions of people aged 75 or above each year. A new EDRS was established in 1998. A 9-month development phase was undertaken before the randomised trial began to clarify working practices and pilot trial documentation and methods.

Referral criteria were that patients should be aged 65 or above, reside within the Nottingham Health Authority boundary, be medically fit for discharge and have rehabilitation needs that could be met at home with a home-based package of care and rehabilitation. People in need of constant or overnight care were excluded, as were those admitted from or discharged to institutional care. Participants were allocated either to receive assessment and input from the EDRS, or to receive usual hospital care.

Patients allocated to 'usual hospital care' were managed in hospital until fit for home, using existing after-care services as required. After-care services comprised hospital out-patient department rehabilitation, geriatric day hospitals, and all usual social services.

The EDRS was staffed by two occupational therapists, two physiotherapists, three nurses, a Community Care Officer (liaising with social services), seven rehabilitation assistants, and secretarial support. There were no doctors in the EDRS: medical care was given by the hospital team while in hospital and by the general practitioner when at home. The therapists and nurses were professionally registered. The rehabilitation assistants were care workers or auxiliary nurses who had been trained for this role during the pilot phase by the professional staff. Visits from the EDRS could be for the purpose of assessment or monitoring, the provision of rehabilitation therapies, or the provision of assistance and care.

The EDRS aimed to assess the patient and arrange discharge as soon as possible. Up to four visits per day could be provided, up to 7 days per week, between the hours of 8am and 10pm. The package of care could last up to 4 weeks and was tailored to individual needs. Some patients, when assessed in hospital by the EDRS, were deemed not to require any further input. All standard after-care services were available, if required, for those allocated to the EDRS.

Randomised controlled trial

Participants were identified from medical and surgical hospital wards, according to the referral criteria. Written consent or carer assent was obtained. The local research ethics committee approved the study.

A single researcher (ALC) collected baseline data. A telephone randomisation service was used for allocation using computer generated balanced randomisation within strata. Stratification was by diagnostic group (stroke, fracture, or other medical/surgical condition) and by Barthel Index [11, 12] at randomisation ($\leq 14/20$, $> 14/20$).

Health outcomes were recorded at 3 and 12 months including survival, place of residence, Barthel Index, Nottingham Extended ADL score [13], psychological well-being (General Health Questionnaire 12 item version [14]), and global quality of life (Euroqol EQ-5D [15]) score. Carers also completed the 12 item General Health Questionnaire. Outcomes were assessed by post. Incomplete responses were clarified by telephone by a research secretary who was masked to treatment allocation and independent of clinical services. An independent researcher masked to allocation visited participants with remaining incomplete responses.

Another researcher masked to treatment allocation collected resource use from service records including the number of days from trial entry to discharge, the number and duration of any hospital re-admissions, the use of out-patient hospital services, general practitioner services and social services. Use of EDRS resources were determined at the end of the study using the service's routine records.

We aimed to detect health benefits of two points on the Nottingham Extended ADL scale (with 90% power, a significance level of 5%, assuming a standard deviation of 6.3) requiring a total sample size of 350 patients.

Health outcomes were compared using linear regression to adjust for baseline factors using data from completed questionnaires only. Analysis of service data was by intention to treat. The distribution of length of stay data was skewed, so group differences were tested by comparing the medians.

Interview study

Local research ethics committee approval was obtained.

Consenting patients were interviewed before hospital discharge, 4 weeks and 3 months after discharge. Before discharge, patients described their hospital experiences and their thoughts about returning home. After discharge they were asked whether their needs were being met, their feelings about being at home and their experiences of services received.

EDRS staff responsible for the interviewed participants were interviewed 6–8 weeks after the care episode. They were asked about the organisational and practical factors that influenced their care.

Interviews were tape recorded and transcribed. A constant comparative method of analysis was used [10]. For further details of the methods used (sampling, analysis) please see Appendix 1 in the supplementary data on the journal website (<http://www.ageing.oupjournals.org>).

Randomised controlled trial results

Participant flow and recruitment

During one year, 370 subjects were recruited beginning 19 July 1999. The flow of participants is shown in Figure 1.

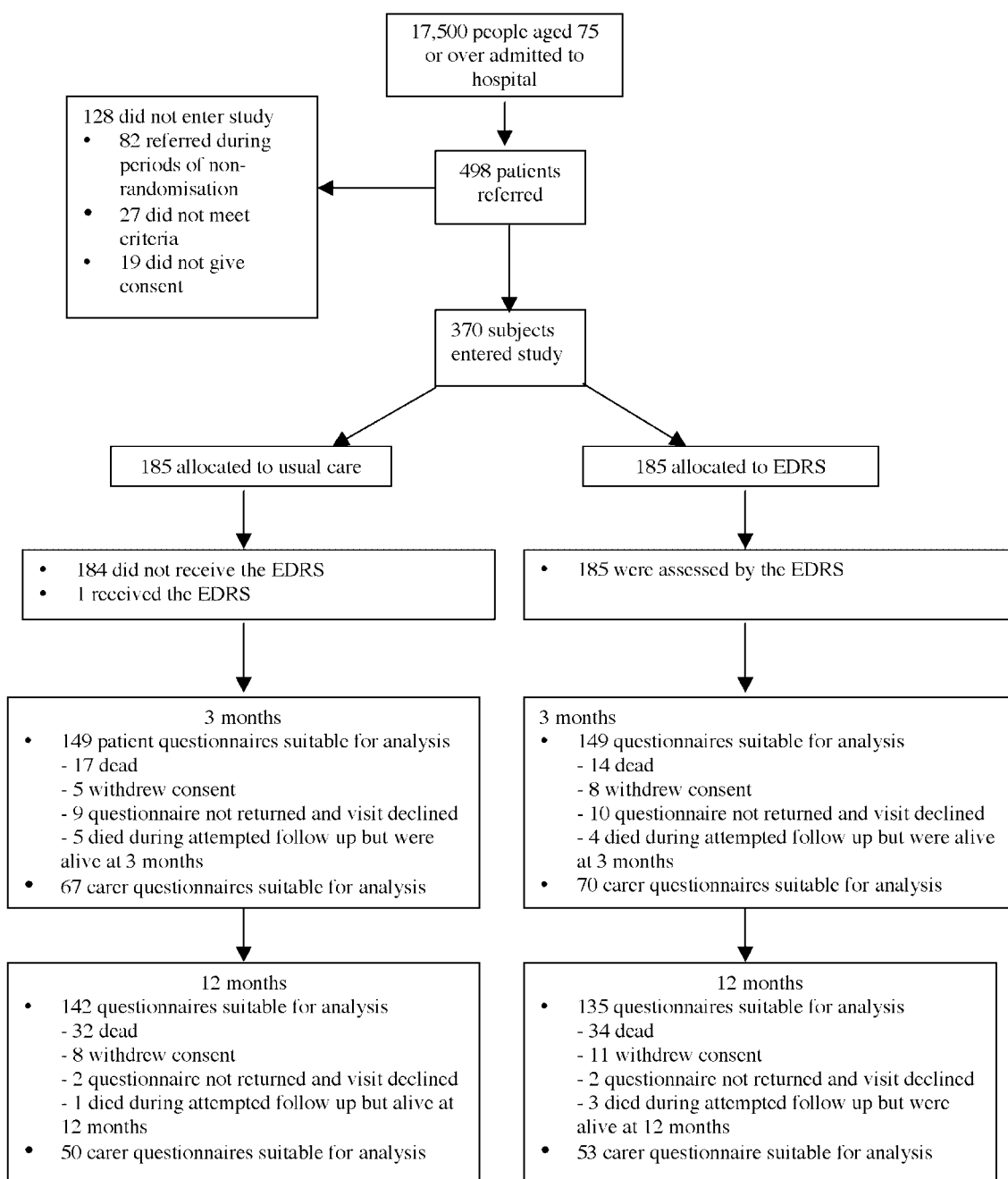


Figure 1. Flow of participants in RCT.

Baseline data

Baseline characteristics of the groups were well-matched (Table 1). The population was elderly, with residual activity limitation arising from typical conditions causing admission to hospital.

Interventions

Of the 185 people randomised to the EDRS 140 (76%) received services from it and the remainder were assessed by the EDRS as not in need of it. One patient who was allocated to usual hospital care inadvertently received input from the EDRS following a subsequent re-admission to hospital. The EDRS provided a mean of 22 visits per participant.

Table 2 shows that participants allocated to the EDRS were discharged sooner than those in the usual hospital care group (median difference 4 days, mean difference 9 days). This reduction in the time spent in hospital was not offset by a greater re-admission rate or longer re-admissions. EDRS patients were less likely to receive outpatient rehabilitation in a geriatric day hospital but otherwise input from other health and social services was similar.

Outcomes

There was no significant difference in survival or residential status between the groups at 3 or 12 months (Table 3).

Table 1. Baseline demographic characteristics

Characteristic	EDRS <i>n</i> = 185	Control <i>n</i> = 185	Both groups <i>n</i> = 370
Median age (IQR)	80 (73–85)	79 (72–86)	80 (73–85)
Female	132 (71%)	114 (62%)	246 (67%)
Living alone	127 (69%)	120 (65%)	247 (67%)
Ethnic minority	6 (3%)	14 (8%)	20 (5%)
Communication difficulty ^a	40 (22%)	41 (22%)	81 (22%)
Cognitive deficit ^b	34 (18%)	30 (16%)	64 (17%)
Pre-admission median Barthel score (IQR)	18 (17–20)	18 (17–20)	18 (17–20)
Median (IQR, mean) Barthel score at randomisation	15 (13–16, 14)	15 (13–16, 14)	15 (13–16, 14)
Median (IQR, mean) days in hospital at randomisation	12 (8–28, 26)	14 (7–28, 24)	13.5 (7–28, 25)
Principal diagnostic condition ^c			
Fracture	53 (29%)	52 (28%)	105 (28%)
Neurological	49 (26%)	48 (26%)	97 (26%)
Cardio-respiratory	22 (11%)	28 (15%)	50 (14%)
Musculoskeletal	18 (10%)	10 (5%)	28 (8%)
Gastroenterological	9 (5%)	11 (6%)	20 (5%)
Infection	8 (4%)	6 (3%)	14 (4%)
Peripheral vascular	7 (4%)	3 (2%)	10 (3%)
Other medical or surgical condition	3 (2%)	4 (2%)	7 (2%)
Non-specific condition	16 (8%)	23 (12%)	39 (11%)

^aBlind, deaf or dysphasic as assessed by researcher.

^bClifton Assessment Procedure for the Elderly (CAPE) [16] information/orientation sub-scale score < 8.

^cSummary of medical notes classified into these empirical categories (by JRG, geriatrician) who was blind to group allocation.

Table 2. Service outcomes

	EDRS <i>n</i> = 185	Control <i>n</i> = 185	Comparison
Median, IQR visits from EDRS (mean)	8, IQR 5–31 (22)	–	–
Median, IQR (mean) length of stay from randomisation to discharge	6, IQR 4–13 (12)	13, IQR 6–24 (21)	Median difference 4 (95% CI 3–7)
Median, IQR (mean) hospital bed days used from randomisation to 3 months	9, IQR 4–22 (17)	18, IQR 7–34 (23)	Median difference 5 (95% CI 2–8)
Median (mean) hospital bed days used from randomisation to 12 months	15, IQR 6–45 (29)	21, IQR 9–50 (39)	Median difference 4 (95% CI 1–9)
Mean hospital out-patient visits over 12 months	3.4	3.3	<i>t</i> -test <i>P</i> = 0.85
Mean GP visits over 12 months	6.0	6.7	<i>t</i> -test <i>P</i> = 0.16
Number of patients re-admitted to hospital by 3 months	49 (26%)	40 (22%)	RR = 1.21 (0.85–1.76)
Number of patients re-admitted to hospital by 12 months	102 (55%)	90 (49%)	RR = 1.13 (0.93–1.38)
Number of patients permanently or temporarily admitted to residential/nursing homes by 3 months	19 (10%)	23 (12%)	RR = 0.83 (0.47–1.46)
Number of patients permanently or temporarily admitted to residential/nursing homes by 12 months	35 (19%)	43 (23%)	RR = 0.81 (0.55–1.21)
Number attending geriatric day hospital over 12 months	21 (11%)	57 (31%)	RR = 0.47 (0.23–0.56)
Number in receipt of social services care over 12 months	145 (78%)	151 (82%)	RR = 0.96 (0.87–1.06)

RR = relative risk (95% confidence intervals).

Table 3. Overall outcomes at 3 and 12 months

	EDRS <i>n</i> = 185	Control <i>n</i> = 185	Relative risk (95% CI)
3 months			
Dead	14 (8%)	17 (9%)	0.82 (0.42–1.62)
In institution, including hospital	23 (12%)	32 (17%)	0.72 (0.44–1.18)
Dead or in institution	37 (20%)	49 (27%)	0.76 (0.52–1.10)
12 months			
Dead	34 (18%)	32 (17%)	1.06 (0.69–1.65)
In institution, including hospital	29 (16%)	33 (18%)	0.88 (0.56–1.39)
Dead or in institution	63 (34%)	65 (35%)	1.02 (0.88–1.18)

At 3 months the EDRS group was less disabled in terms of personal ADL ability, kitchen and domestic function, and psychological well-being was better (lower GHQ scores) (Table 4). At 3 months the carers of the subjects in the EDRS group (*n* = 70) had significantly better psychological well-being than those in the usual hospital care group (*n* = 67).

At 12 months benefits in favour of the EDRS persisted but, apart from domestic function and patient well-being, were no greater than those which could have arisen by chance.

The unadjusted analyses were similar to those from the regression analysis and are not reported.

Interview study results

There were 64 interviews of 20 participants (12 in receipt of the EDRS arm and 8 in the control group of the RCT), and 15 interviews of 11 staff members.

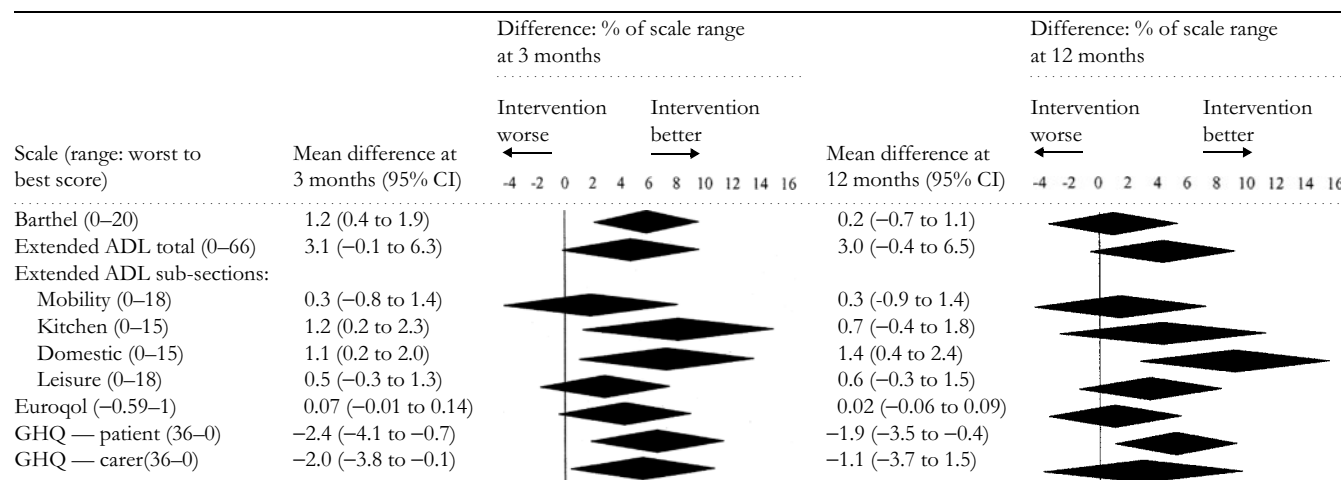
Before discharge, most participants were anxious about returning home, but keen to do so – irrespective of their trial allocation group. Many felt vulnerable, feared not being able to cope with day to day activities, and were concerned about being a burden upon their families.

Once home, patients in both allocation groups felt they had improved. However, they described chronic symptoms

such as pain, loneliness, fatigue, and reduced mobility such as climbing stairs or getting outdoors. Lack of confidence and anxiety about their difficulties were expressed.

Those who had experienced it described the EDRS in highly positive terms, and this praise contrasted with their descriptions of other services they had received. Furthermore, patients who had not experienced the EDRS did not describe their after care in such positive terms, although largely they were grateful for what they had received. EDRS patients liked receiving care at home, rather than elsewhere. EDRS patients felt that they had been treated with kindness and respect. EDRS patients described instances of good communication with the EDRS service, which contrasted with experiences described by these and other interviewees about other services. EDRS patients described how their views were sought in setting the objectives of treatment within the confines of the intervention period. They described how there was close attention to detail in the assessment and the delivery of the treatment package. Specific interventions EDRS patients described included the timely provision of equipment and the prescription of exercise regimes, but they were particularly complimentary about the ability of the service to provide frequent visits for care or rehabilitation soon after discharge when anxiety was

Table 4. Health outcomes at 3 and 12 months



Analysis was by linear regression. All models were adjusted for baseline characteristics of age, gender, whether participants lived alone, had carers and their level of activity limitation prior to admission to hospital. The two stratification factors (baseline activity limitation and diagnostic group) were also adjusted for in all models. In addition to this, patient and carer GHQ was adjusted for socio-economic status and carer GHQ was adjusted for frequency of care and relationship with participant. Examination of the residuals for each outcome measure showed no serious departures from the model assumptions.

at its greatest. EDRS patients recognised the care and rehabilitation interventions as being helpful, and the staff as being skilled.

The EDRS staff who were interviewed described a service that they recognised was better staffed than usual after-care services in which they had worked, and unusual in being able to provide both social care and rehabilitation in a co-ordinated way. They worked within an explicit team ethos in which physical, psychological, social and environmental issues were all legitimate areas for intervention, for all members of staff irrespective of their professional background. They were also explicit in the importance of the patient's views and participation in rehabilitation, and felt that the home setting facilitated this style of practice.

For further details of the interview study results please see Appendix 2 in the supplementary data on the journal website (<http://www.ageing.oupjournals.org>).

Discussion

We have shown that an early discharge and rehabilitation service for older people reduced their length of stay in hospital and improved their health in terms of activity limitation and psychological well-being in the short term. Furthermore, their carers had better psychological well-being. Benefits in terms of reduced activity limitation and better mood were evident one year later. These health gains were achieved by home-based intensive rehabilitation and support, providing a mean of 22 visits over a maximum of 4 weeks.

Most previous studies of early supported discharge schemes have not shown differences in health outcomes between early discharge and conventional services [5]. Our study used robust methods for random allocation, and blinded follow up. Inevitably when assessing outcomes in terms of activity limitation and mood, a perfect intention to treat analysis was not possible due to non-responders. However, the drop-out rate was low and similar in the two groups, and is unlikely to have biased the results. Ours is a large study and chance is unlikely to explain our results. A more likely explanation is that the improved outcomes seen were genuine.

There are several reasons why this service could have led to better health outcomes. Clinicians were not masked to allocation, and this may have affected their practice. The EDRS may have been better resourced than services in previous studies, or better organised. 'Usual care' in Nottingham may be worse than usual care elsewhere (although we have no reason to believe them to be so).

Our interview study provides explanations other than the play of chance to explain our findings. It showed that the EDRS delivered skilled assessment, negotiated treatment goals that were meaningful to the patient, and met them with a co-ordinated team. Interventions included functional rehabilitation training, the teaching of skills, information giving and advice, overcoming emotional barriers to task performance, the provision of aids and appliances and the provision of personal and domestic care. Patients reported that the emotional support derived from this approach improved their confidence and morale, and we postulate that this led both to greater task performance and psychological well-being.

Our findings can guide those commissioning and delivering such services. For example, we have observed the benefit of an organised, person-centred rehabilitation service, rather than proved the inherent superiority of one setting (home) for its delivery over another (hospital). Our findings should not be extrapolated to early discharge services where untrained staff assess and plan rehabilitation, staff numbers are inadequate, the delivery of services is inflexible or limited, or where teams do not really exist or team morale is low. The benefits of a service such as this over usual care may be less in settings where usual care is more organised, person-centred and rehabilitation-focused.

This type of service alone is unlikely to make a major impact upon the overall provision of hospital services for older people. Surveys suggesting that up to 20% of older people might be able to use such services [17] may overestimate the impact that is possible in real life. Despite our extensive pilot work to maximise referral rates, only 2% of all medical admissions to hospital of older people were referred to the service. This well staffed EDRS reduced hospital bed usage, but this advantage will be reduced or lost if the early discharge service is inadequately resourced, for example if a waiting list is required.

We have shown that there is a need for rehabilitation services after acute hospital care for some older people, and we have described a service that provided effective rehabilitation at home.

Key points

- Early discharge and rehabilitation services can not only shorten the length of hospital stay of elderly patients, but also improve their levels of activity and their psychological well-being.
 - Early discharge and rehabilitation services can improve the psychological well-being of the carers of those discharged early.
 - Satisfactory early discharge services can be provided if they are adequately resourced so that they can provide frequent visits by trained, organised staff.
 - A person-centred style of care, meeting the specification described above, helps to overcome patients' lack of confidence, and this may lead to better health outcomes.
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