

ORIGINAL REPORT

EARLY SUPPORTED DISCHARGE AFTER STROKE AND CONTINUED REHABILITATION AT HOME COORDINATED AND DELIVERED BY A STROKE UNIT IN AN URBAN AREA*

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Objective: To explore the characteristics and outcome of patients after stroke admitted to early supported discharge (ESD) services, and to investigate changes over time.

Study populations: Patients admitted between June 1997 and September 1998 and participating in a follow-up study ($n=87$) and all patients admitted in 2005–06 ($n=226$).

Background populations: All stroke cases in Malmö alive 3 months after stroke in June 1997 to September 1998 ($n=514$) and 2005–06 ($n=1353$).

Results: There were no differences in age, gender, proportion living alone or Katz Index distribution between the 2 study populations. The Katz Index improved between start and end of ESD ($p<0.001$). Patients admitted to ESD services did not differ from the background populations with regard to gender or age, but were less often living alone in 2005–06 ($p=0.002$). The mean duration of the ESD input was shorter in 2005–06 ($p<0.001$). In 1997–98 the participants were satisfied with most of the dimensions of care; the proportion of patients having activity limitations decreased during the first 6 months after stroke.

Conclusion: The use of ESD was feasible in the routine setting of an urban stroke unit. The input of the ESD services per patient decreased over time, perhaps indicating an improvement in use of healthcare resources.

Key words: early supported discharge (ESD), stroke, rehabilitation, stroke unit, hospital-based home care services.

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INTRODUCTION

Stroke is the primary cause of adult disability in industrialized countries (1). According to the National Guidelines for Stroke Care (2), 95% of all patients after stroke in Sweden are admitted to hospital and stroke is the somatic disease responsible for

most days in hospital, with an important part of total stroke costs burdening the municipalities. Alternatives to inpatient stroke rehabilitation are needed both to improve outcome and to reduce costs. The Stroke Unit Trialist Collaboration (3) has proven that organized inpatient stroke unit care is effective in reducing death rates and disability in patients after stroke. Little is known, however, as claimed by the Swedish National Guidelines for Stroke Care (2) and Langhorne et al. (4), about the most appropriate way to organize stroke care after discharge from the stroke unit. In a meta-analysis of individual patients' data presented by Langhorne et al. (4) and Langhorne & Holmqvist (5), early supported discharge (ESD) and continued rehabilitation at home after stroke is shown to reduce long-term dependency and admission to institutional care as well as shortening hospital stays for a selected group of stroke patients. Several modalities of delivery of care are included in ESD; the models where the multidisciplinary ESD team both coordinated discharge from hospital and provided rehabilitation at home seemed to give most benefit (4). Fjaertoft et al. (6) and Thorsén et al. (7) showed that ESD had a sustained effect after long-term follow-up, and Thorsén et al. (8) showed that ESD was favourable with regard to resource use 5 years after stroke. Larsen et al. (9) postulated that ESD represents a new organizational orientation of rehabilitation and that its introduction may be delayed or blocked by a conflict of responsibility and/or financial interests between hospitals and municipalities.

Stroke care in the city of Malmö

Malmö, the third largest town in Sweden, has 270,000 inhabitants. The age-specific annual incidence of stroke was 26.1/10,000 for men and 27.2/10,000 for women in 1989–99 (10). Malmö University Hospital is the only hospital in the city. In 1997, a stroke unit was organized within the Department of Neurology to offer evidence-based stroke care, comprising acute stroke treatment as well as rehabilitation. From the stroke unit most patients are discharged home, a few younger patients with major disabilities are referred to a rehabilitation clinic in a neighbouring county, approximately 10% of patients are referred to the department of geriatrics and approximately 15% are discharged to municipal nursing homes. In spite of increasing stroke incidence in Malmö (11), the number of beds in the Malmö Stroke Unit decreased by 33%, from 33 to 22, between 1997 and 2005.

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ESD services in Malmö

ESD services in Malmö commenced in 1997 and correspond to the subgroup described by Langhorne et al. (4) where the ESD team coordinate discharge from hospital and post-discharge care and provide rehabilitation at home.

To encourage good cooperation between health and social services, the setting up of the Stroke Unit was preceded by a series of meetings in which representatives from the municipality and primary care were invited to participate. The established practice for coordination of discharge of patients admitted to our ESD services was found to be in accordance with the national Swedish rules for cooperation between the health and social services, in effect since 2003.

Langhorne et al. (4) have established that ESD is evidence-based stroke care, but many questions remain about the feasibility of ESD in the routine setting. Meijer & Van Limbeek (12) found that the more important questions concern which patients are eligible for ESD and how to overcome the barriers between municipalities and health authorities, the latter being in accordance with Larsen et al. (9). Some light can be shed on these issues by studying the characteristics of functioning ESD services and of the patients admitted to them.

Accordingly, the aim of this study was to explore the characteristics and outcome of the patients admitted to ESD services in the routine setting of a large stroke unit and to investigate whether the ESD population differed from the background stroke population. A further aim was to investigate whether the characteristics of the ESD services and of the patients admitted to them had changed during the first 8 years the services had been offered at our centre.

METHODS

Organization of the ESD services

After the early identification of a patient suitable for ESD, a multi-disciplinary team from the stroke unit performed a pre-discharge home visit and, together with the patient and carer and, when needed, a municipal coordinator, planned discharge from the hospital and post-discharge care. Discharge from the stroke unit occurred when the patients were medically stable and, if needed, home help service from the municipality had been arranged. For the patients with major disabilities, discharge from the ward coincided with the attainment of independence in toileting, or when toileting could be achieved by the patient with help of 2 persons (informal caregivers and/or municipal help services). The home rehabilitation programme was modified after the model developed in South-West Stockholm, Sweden (13–16). Rehabilitation most often started on the day of discharge and was highly individualized with regard to content, duration and intensity. For example, during the first week, the number of home visits varied from twice daily to once a week. The interventions included counselling and guidance of caregivers and, when needed, of the municipal help services. An occupational therapist (OT) and/or a physiotherapist (PT), under the medical supervision of a senior neurologist, mainly delivered the ESD services. The ESD team had access to nursing expertise from the stroke unit, but when nursing in the home environment was required it was provided by community nurses. When needed, a speech therapist and/or social worker from the stroke unit participated in ESD, and the patient could also be referred to a neuropsychologist within the stroke unit if necessary. The teamwork was coordinated through a weekly multidisciplinary team meeting. Activities of daily living (ADL) taxonomy by Sonn et al. (17) was used to assess ADL

performance, and to plan rehabilitation. The ADL taxonomy comprises 12 defined activities of self-care (personal activities, P-ADL), home maintenance (extended activities, E-ADL) and communication, built up of sequences of actions (varying from 2 to 6). The instrument also has room for additional activities, based on individual needs, whilst not eligible for presentation in this study. The patients were discharged from the ESD services when the pre-established rehabilitation goals had been achieved. If the patients needed further rehabilitation they were mainly referred to municipal or primary care.

Patients admitted to the ESD services

All patients after acute stroke admitted to the Malmö stroke unit and in need of training in any activity of P-ADL, and all patients after stroke having complex cognitive deficits requiring specialized training in E-ADL, were considered for admission to the ESD services. Furthermore, patients whose rehabilitation needs/potential were difficult to assess properly in the less demanding inpatient setting were also considered for admission to the ESD services. Patients with severe pre-stroke dementia, severe alcohol or drug abuse, or home conditions completely unsuitable for the purpose, and patients who could not be safely discharged to their home environment were not admitted to the ESD services. Lack of safety was considered to be present when patients living alone had cognitive impairment that seriously affected insight and/or communication skills. In this paper we present 2 study populations, one consisting of patients admitted to the ESD services in June 1997 to September 1998 and participating in the follow-up study and the other consisting of all patients after acute stroke admitted to the ESD services in 2005 and 2006. The variables studied in both study populations were age, gender, proportion living alone and Katz ADL Index (18) at start and end of ESD. Length of stay (LOS), consisting of length of hospital stay at the stroke unit plus, when applicable, length of stay at the department of geriatrics, ESD duration in days, hours and number of sessions, and proportion of patients receiving physiotherapy and occupational therapy were also studied. The proportion of first-ever stroke and stroke subtypes were recorded in 1997–98, as was the proportion of patients with limited activity performance (dependence in any action/s within each of the reported activities) at the start and end of ESD, and at the time of the 6- and 12-month follow-up.

Background populations

Background data are retrieved from the Swedish National Quality Assessment Register of Stroke Incidents (Riks-Stroke) (19). Since 1996 patients with brain infarction (BI), intracerebral haemorrhage (ICH), and undetermined stroke (UND) (ICD10-I64) have been registered in the acute phase and then followed up by a telephone interview 3 months after stroke. Before 2005 less than 75% of all stroke cases were registered. Since 2005 complete and validated records of all acute stroke cases at Malmö University Hospital have been achieved. Among other measures, the medical records of all cases of probable acute stroke from the hospital discharge record are reviewed first by a specially trained nurse and then by a senior neurologist.

Only the stroke cases surviving 3 months after stroke were used for the comparisons with the study populations. The variables recorded were age, gender, proportion living alone, proportion of first-ever stroke and stroke subtypes, and LOS.

Six- and 12-month follow-up (1997–98 study population)

All patients with BI and ICH admitted to the ESD services between June 1997 and September 1998 were invited to participate in the study. Data on presenting neurological symptoms were retrieved from the records of the initial neurological examination performed at the stroke unit. Patients who could not participate in the follow-up, or who died, or had a stroke recurrence within 6 months from the index stroke, were excluded. The follow-up was conducted by an OT from the department of neurology who had no contact with the ESD services. Six months after the stroke, a questionnaire about need for and satisfaction with quality of care (13), and study-specific questions about need for assistance, was sent to the patients. The OT visited the patient at home some days later to collect the data and, if needed, to assist the patient in completing the questions;

Table I. Patient characteristics and length of stay (LOS) in the subjects admitted to the early supported discharge (ESD) services after stroke and in the background populations in 1997–98 and 2005–06

	June 1997–Sept 1998		Jan 2005–Dec 2006	
	ESD n=87	Riks-Stroke n=514	ESD n=226	Riks-Stroke n=1353
Age, years				
Median (min–max)	74 (41–89)	76 (30–94)	75 (21–101)	76 (21–101)
Mean (SD)	72.18 (9.18)	73.96 (10.91)	72.73 (11.71)	74.35 (12.47)
Females, %	48.3	47.1	47.3	49.2
Living alone, %	42.5	43.8	42.9	50.8
First-ever stroke, n (%)	69 (79.3)	327 (63.6)		1081 (79.9)
Stroke subtype, n (%)*				
Ischaemic stroke	74 (85.1)	401 (78)		1170 (86.5)
Intracerebral haemorrhage	13 (14.9)	50 (9.7)		141 (10.4)
Undetermined		63 (12.3)		42 (3.1)
LOS, days				
Median (min–max)	15 (1–69)	9 (1–99)	10 (1–50)	7 (1–218)
Mean (SD)	18 (13)	16.84 (19.83)	11 (7)	18.6 (28.9)

*Data not collected for study population 2005–06.

SD: standard deviation; Riks-Stroke: the Swedish National Quality Assessment Register of Stroke Incidents.

furthermore, the OT asked about current activity status and filled in the ADL taxonomy, although this was based solely on interview. Twelve months after stroke the OT conducted a telephone interview with the patients/caregivers and filled in the ADL taxonomy.

Statistical methods

The characteristics of the study and background populations were analysed by means of descriptive statistics. In the study population from 1997 to 1998, differences in the number of patients having limitations in the performance of each of the 7 first activities in the ADL taxonomy (any action/s within each activity) between start of ESD and at follow-up, were calculated by use of the McNemar test. The Wilcoxon signed-rank test was used to calculate changes in Katz Index distribution between the start and end of ESD in the study populations. In comparing the 2 study populations, differences in mean scores for age and for ESD services duration (days, hours and number of sessions) were tested by the *t*-test for independent samples, while the Mann-Whitney *U* test was used to compare Katz Index distribution at start of ESD. The *t*-test for independent samples was used to test differences in mean age between the study populations and the background population. The χ^2 test was used to compare gender, proportion living alone, and proportion receiving physiotherapy or occupational therapy between the study populations and/or background populations. To produce a normal distribution of the LOS data a logarithmic transformation of LOS (logLOS) was performed. Log LOS in the study and in the background populations was compared by means of the one-way analysis of variance (ANOVA) and *post-hoc* test Sidak. Probability values of 0.05 or less were considered statistically significant. Data were analysed using SPSS 12.0.1 for Windows.

RESULTS

Patient characteristics, outcome and patient satisfaction

A total of 106 patients after acute stroke completed the ESD programme between June 1997 and September 1998; 4 died and 3 had stroke recurrence within 6 months after the index stroke; 3 could not be reached by telephone; 2 did not understand the questionnaires; and 7 declined to participate. Thus, 87 patients both completed the ESD programme and participated in the 6-month follow-up, while only 84 returned the questionnaires about satisfaction of care. After the 6-month follow-up 2 patients died and 16 declined further participation

and, thus, 69 patients participated in the follow-up 12 months after stroke. Descriptive statistics summarizing the characteristics of the 87 subjects are presented in Table I, and the distribution of age, gender and proportion of patients in lone households is shown in Fig. 1. Twenty-two patients (25%) had disabilities affecting daily life prior to actual stroke, 6 (7%) due to previous stroke and 16 (18%) due to other causes. The main presenting neurological symptoms were one or more of: motor weakness, right 34 (39%), left 37 (43%); sensory deficit, right 19 (23%), left 19 (23%); aphasia 33 (38%); neglect and/or visuospatial dysfunction 16 (18%); hemianopia 14 (16%); affected balance without motor weakness 7 (8%). Dependency in P-ADL, measured by the Katz Index, improved significantly between start and end of ESD ($p < 0.001$) (Table II). The proportion of patients having activity limitations, one or more actions within each activity according to the ADL taxonomy of Sonn et al. (17), in the performance of P-ADL and communication, decreased between start and end of ESD for all self-care activities and communication as well, while a decreased proportion between the end of ESD and the 6-month follow-up was seen only for transfer and dressing (Fig. 2). No

Table II. Dependency in personal activities of daily living (P-ADL), measured by the Katz Index, at start and end of rehabilitation at home of patients after stroke after early supported discharge (ESD) in 1997–98 and 2005–06

ADL grade according to Katz Index	Katz in 1997–98 (n=87)		Katz in 2005–06 (n=222)	
	At start of ESD, amount (%)	At end of ESD, amount (%)	At start of ESD, amount (%)	At end of ESD, amount (%)
A	23 (6)	50 (57)	67 (30)	121 (55)
B	16 (18)	13 (15)	47 (21)	43 (19)
C	15 (17)	14 (16)	46 (21)	29 (13)
D	6 (7)	2 (2)	22 (10)	6 (3)
E	21 (24)	7 (8)	12 (5)	4 (2)
F	6 (7)	1 (1)	20 (9)	10 (4)
G	0 (0)	0 (0)	11 (5)	9 (4)

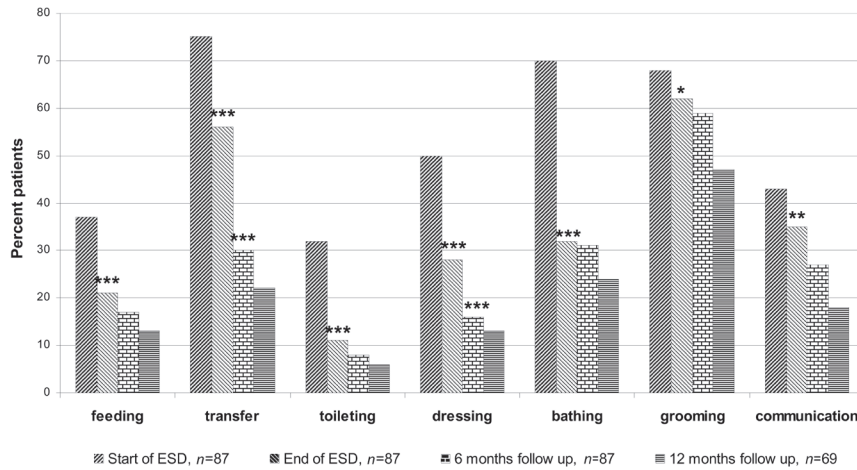


Fig. 1. Proportions of patients admitted to the early supported discharge (ESD) services after acute stroke in 1997–98 with any limitation in the performance of the activities of daily living (ADL) categorised by the ADL-taxonomy (17), at different points in time. The p-values indicating the significance of the difference between the column marked with asterisk(s) and the preceding bar are indicated by * <0.05 , ** <0.01 and *** <0.001 .

change was seen between 6- and 12-month follow-up (Fig. 2). Six months after stroke 76% of the 87 patients needed some assistance from family caregivers, 18% needed help more than 10 h per week, 34% had community home-help service, 11% had more than 10 h home-help service per week. Most of the 84 patients who returned the questionnaire about need of and satisfaction with quality of care (13) were satisfied with or neutral about the different dimensions of care 6 months after stroke (Table III).

Descriptive statistics summarizing the characteristics of the 226 patients after acute stroke who were admitted to the ESD services between January 2005 and December 2006 are presented in Table I and the distribution of age, gender and proportion of patients in lone households is shown in Fig. 1. Dependency in P-ADL, measured by the Katz Index, was recorded in 222 of the 225 patients and it improved significantly between the start and end of ESD ($p < 0.001$) (Table II).

Background populations

A total of 590 stroke cases, approximately 70% of expected cases, were registered in Riks-Stroke (19) between June 1997 and September 1998. The mean age (standard deviation (SD))

was 74.7 (11.3) years, 47.5% were females, 44.4% were living alone, 375 (63.6%) had a first-ever stroke, mean LOS (SD) was 16.5 (19.2) days. A total of 514 cases (87%) were still alive 3 months after stroke (Table I).

A total of 1707 stroke cases, 100% of expected cases, were registered in Riks-Stroke (19) between January 2005 and December 2006. The mean age (SD) was 75.7 (12.3) years, 50.8% were females, 53.1% were living alone, 1320 (77.7%) had a first-ever stroke, mean LOS (SD) was 17.3 (26.8) days. A total of 1353 cases (79.2%) were still alive 3 months after stroke (Table I).

The mean logLOS for the Riks-Stroke patients still alive 3 months after stroke was lower in 2005–06 (mean 2.14 (SD 1.23)), than in 1997–98 (mean 2.32 (SD 0.97)) ($p = 0.40$, 95% confidence interval (95% CI) $-0.35, -0.004$).

Comparisons between the ESD patient populations and their corresponding background populations consisting of the Riks-Stroke patients still alive 3 months after stroke

The patients admitted to the ESD services did not differ from the Riks-Stroke populations according to gender or age, but fewer patients admitted to the ESD services lived alone in

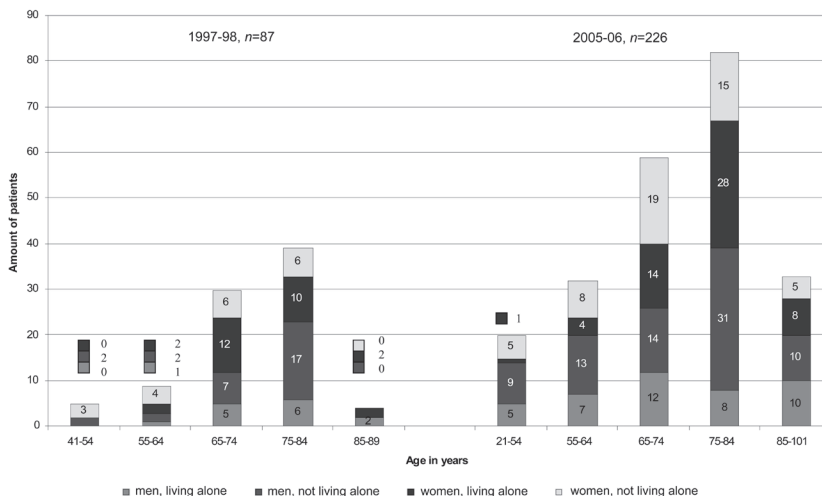


Fig. 2. Distribution of age, gender and proportion of patients in lone households, among the patients admitted to the early supported discharge (ESD) services after stroke in 1997–98 ($n = 87$) and 2005–06 ($n = 226$). The wide columns represent the actual number of patients in each category. Where it was not possible to show all the values inside the wide columns, the narrow columns above the corresponding wide columns show the values corresponding to the thinnest slices.

Table III. Patients' need of care and satisfaction with different dimensions of quality of care, measured 6 months after stroke among subjects admitted to the early supported discharge (ESD) services in 1997–98 (n = 84)

	Manifested need, n (%)	Satisfied, n (%)	Neutral, n (%)	Dissatisfied, n (%)	Uncertain, n (%)
Art of care					
Sympathy from staff		66 (79)	13 (15)	5 (6)	
Kind treatment		77 (92)			
Good information		56 (67)	13 (15)	15 (18)	
Training specifically tailored to the condition		60 (69)	9 (10)	14 (17)	
Technical aids	77 (92)	74 (96)	2 (3)	1 (1)	
Workplace adaptation	0 (0)				
Home adaptation	41 (49)	30 (93)	1 (3)	2 (5)	
Public transport	37 (44)	35 (95)	1 (3)	1 (3)	
Accessibility/convenience					
Easy to get in touch with staff		66 (79)	11 (13)	5 (6)	2 (2)
Finances					
Cost of care		52 (62)	12 (14)	20 (24)	
Availability					
Contact with all expertise needed		63 (75)	7 (8)	11 (13)	3 (4)
Continuity					
Meeting same staff during training at home		62 (74)	6 (7)	13 (15)	3 (4)
Efficacy/outcomes of care					
Satisfaction with the care received		69 (82)	4 (5)	10 (12)	1 (1)
Participation in discharge planning		49 (58)	5 (6)	29 (35)	1 (1)
Participation in planning training programme					
overall after stroke		35 (42)	11 (13)	34 (40)	4 (5)
Satisfaction with the amount of rehabilitation after stroke		40 (48)	10 (12)	32 (38)	2 (2)

2005–06 ($p = 0.002$) (Table I). There was no difference in mean logLOS between the ESD patients (mean 2.68 (SD 0.67)) and the background population (mean 2.32 (SD 0.97)) in 1997–98 ($p = 0.85$; 95% CI -0.02 , $+0.74$) or between the ESD patients, (mean 2.18 (SD 0.73)) and the background population (mean 2.14 (SD 1.23) in 2005–06 ($p = 1.0$; 95% CI -0.2 , $+0.28$).

Comparisons between the 2 ESD study populations 1997–98 and 2005–06

At the start of ESD, there were no differences in age ($p = 0.6$), gender ($p = 0.8$), proportion living alone ($p = 0.9$) (Table I) or Katz Index distribution ($p = 0.36$) in 1997–98 and 2005–06 (Table II). Mean logLOS was shorter in 2005–06 (mean 2.18 (SD 0.73)) than in 1997–98 (mean 2.68 (SD 0.67)) ($p = 0.008$, 95% CI $+0.08$, $+0.91$).

The mean duration of the ESD input in 2005–06 was shorter in days ($p < 0.001$), in hours ($p = 0.004$), and in number of sessions ($p < 0.001$) than in 1997–98; the mean duration of therapy in hours was smaller in 2005–06 for both physiotherapy ($p = 0.016$) and occupational therapy ($p = 0.007$) and the proportion of patients receiving physiotherapy was higher in 2005–06 ($p = 0.01$), while the proportion of patients receiving occupational therapy was the same as in 1997–98 ($p = 0.716$) (Table IV).

DISCUSSION

This study shows some aspects of the feasibility and effectiveness of ESD services for an urban stroke population at the stroke unit at Malmö University Hospital in 1997–98 and 2005–06.

Table IV. Comparison of the amount and duration of the input of rehabilitation at home after early supported discharge (ESD) after stroke, delivered per patient, in 1997–98 and 2005–06

	ESD June 1997–Sept 1998, n = 87	ESD Jan 2005–Dec 2006, n = 226	p-value
<i>Input by the ESD team</i>			
<i>per patient *</i>			
Duration in days			
mean (SD)	43 (28)	30 (23)	<0.001
median (min–max)	38 (4–150)	25 (1–137)	
Number of visits			
mean (SD)	15 (13)	11 (9)	<0.001
median (min–max)	11 (2–49)	8 (1–61)	
Duration in hours, in all			
mean (SD)	22.5 (18)	17 (14)	0.004
median (min–max)	16 (2.5–71.5)	13 (1–95)	
Duration in hours, occupational therapy			
mean (SD)	12 (10)	9 (7)	0.007
median (min–max)	9 (0–47)	7 (0–44)	
Duration in hours, physiotherapy			
mean (SD)	11 (12)	8 (8)	0.016
median (min–max)	7 (0–45)	5 (0–57)	
<i>Patients treated, amount</i>			
<i>(%) † by:</i>			
Occupational therapist	84 (97)	218 (97)	n.s.
Physiotherapist	64 (74)	199 (89)	0.01

**t*-test for independent samples.

† χ^2 test.

SD: standard deviation; n.s.: not significant.

The selection of patients in our centre was based, as in the randomized studies (4), on need (persisting disability mainly in P-ADL), practicability (suitable housing, safety and acceptance of early discharge) and stability of medical condition. Langhorne et al. (4) found the mean proportion of patients eligible for the ESD services to be 41% (range 13–68%). In 2005–06 in Malmö, the proportion of patients admitted to ESD amounted to 16.7% (226/1353) of the patients after acute stroke alive at 3 months, 13.2% (226/1707) of all acute stroke cases at the hospital and 25.3% (226/894) of all the patients discharged directly to their own homes from the stroke unit. We believe that with appropriate resource allocation more patients could be admitted to the ESD services in our centre, as discussed below. The organization of ESD in the randomized studies summarized by Langhorne et al. (4) differs from place to place between them and is difficult to compare. In this discussion, we have therefore chosen to focus mainly on the studies from Stockholm, Sweden (15), Norway, (20), Australia (21) and Canada (22). The inpatient care system and ESD services described in those studies seemed to have most similarity with Malmö, the ones from Stockholm (15) and Norway (20) being closest to the Malmö setting.

The mean age of the Malmö populations was 72 years for the patients with ESD, rather similar to the findings in Stockholm, 70.8 years (15); Norway, 74 years (20); Australia, 72 years (21) and Canada, 70.3 (22). The mean age in Malmö did not differ from the background populations. The range was 41–89 years in 1997–98, and 21–101 years in 2005–06, indicating that high age *per se* was no impediment to participation in ESD. The gender distribution in Malmö among patients admitted to ESD did not differ from that of the background population and was similar to the gender distribution in the randomized studies (15, 20). The proportion living alone in the ESD population in our survey in 2005–06 was significantly lower than in the background population. This indicates, on the one hand, that even if the fact of living alone is not intrinsically an obstacle for admission to ESD services, in some cases it probably is an actual impediment.

The whole range of disability according to the Katz Index was present in the Malmö ESD population. Langhorne et al. (4) showed that most evidence for benefit of ESD appeared to be for patients with moderate disability; at discharge from hospital the typical Barthel Index was 15/20 (mild-moderate dependency). Forty-one percent of the patients randomized to ESD in the Stockholm study (15) were independent in P-ADL. In Malmö only 26–30% of patients admitted to the ESD services were independent in P-ADL at discharge. We believe that more patients with milder strokes in our centre would probably benefit from training in extended ADL in the home setting. At the other extreme there are, in our experience, patients with major disabilities who are very suitable for ESD, in accordance with the Norwegian study (20), demonstrating by subgroup analyses that patients with moderate to severe stroke benefited most from their extended service. The Malmö ESD services were modified from Widén Holmqvist et al. (15) and Von Koch et al. (16), the main difference between the Stockholm and the Malmö setting being patient selection. The Stockholm study excluded patients who were dependent in feeding and continence, patients with Mini-

Mental State Examination scores of less than 23, and patients with clinical signs of massive perceptual deficit. In Malmö, patients with the above characteristics were admitted to the ESD services if the requirements of practicalities and patient/carer motivation and safety were met. In our experience patients with cognitive impairments are very suitable for ESD as they may benefit most from situational learning in the home setting. This is in line with recommendations to use goal-directed activities in the environmental context of real life, for interventions and assessments of executive functions (23).

LOS for the ESD populations had a broad distribution, with a range from 1 to 69 days. This shows that very short LOS is not an actual impediment to participation in ESD. Furthermore, the broad distribution of LOS reflects indirectly the wide range of disability of the patients admitted to the ESD services. There was no difference in mean logLOS between the ESD patients and the background populations. One of Langhorne et al.'s main results was a significant reduction in LOS in the ESD groups (4), it would therefore have been of interest to study whether ESD in the Malmö setting also had an impact on LOS. However, this would have required a matching between the population admitted to ESD and a comparable population within the background population, which it is not possible to achieve with the methodology used in the present study.

Between the start and the end of ESD, P-ADL measured by the Katz Index improved significantly as expected (4, 24). In our follow-up study from 1997 to 1998, further improvement was seen in the performance of a few activities of the ADL taxonomy 6 months after stroke, perhaps indicating a lasting effect of ESD. However, in the lack of randomization no conclusions can be drawn about the efficacy of ESD *per se* in the Malmö setting. Patient satisfaction questionnaires are widely used, although there is no formal agreement on items to be included (25). In our study we used the same questionnaires as in the randomized study by Widén Holmqvist et al. (15). In the Malmö setting in 1997–98 the questionnaires were completed 6 months after stroke, instead of 3 months as in the study from Stockholm. In Malmö most of the patients were satisfied with or neutral about the different dimensions of care; the exclusion from the follow-up of patients who died or were not compliant with treatment may, however, have biased these results. In 3 categories more than 33% of the patients were dissatisfied. Thirty-five percent were dissatisfied with their participation in discharge planning and 40% with their participation in planning of the training programme overall after stroke. Part of the feeling of dissatisfaction may reflect the fact that some patients did not actually remember or did not understand the initial phases of the rehabilitation process, and thus may not indicate true dissatisfaction with the method. On the other hand, ESD offers a very good opportunity to increase the patients' actual and perceived participation in planning as the rehabilitation proceeds. Our impression is that patient motivation and compliance with self-training programmes are higher in the home environment. The goals for rehabilitation are also easier to define than in the hospital setting. Thirty-eight percent were dissatisfied with the amount of rehabilitation received after stroke, perhaps reflecting the actual need for further rehabilitation, but also the fact that patients after stroke may feel abandoned after hospital discharge (26).

Although no deliberate changes were introduced in the ESD services over the years, some changes occurred. LOS decreased for the patients admitted to ESD, but it also decreased for the background populations. No conclusions can therefore be drawn about whether any changes in ESD may have affected LOS over time. The proportion of patients receiving physiotherapy increased. This may reflect a certain change in the role of the PT in stroke care over the years, the PT being increasingly involved in task-specific training well in accordance with more recently developed treatment strategies (27). The ESD duration in days, hours and number of sessions per patient decreased significantly between 1997–98 and 2005–06. These results may reflect an increased effectiveness of the ESD services and, consequently, a more effective resource use, but, as no long-term follow-up of patient outcome was carried out in 2005–06, we cannot exclude the possibility that the decrease in the amount of rehabilitation input may have had some detrimental consequences for patient outcome. We are therefore planning a new 6- and 12-month follow-up at our centre.

In conclusion, we found the use of ESD to be feasible over time in the routine setting of a large urban stroke unit, for a selected group of patients of similar age, gender and/or proportion living alone to those in randomized studies (4, 15, 20, 21, 22). The input of the ESD services per patient decreased over time, perhaps indicating an improvement in use of healthcare resources.

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