Resource use of healthcare services 1 year after stroke: a secondary analysis of a cluster-randomised controlled trial of a client-centred activities of daily living intervention

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ABSTRACT

Objective The objective of the study was to compare the total use of healthcare services in the course of the first year after a stroke between participants who, after the acute care, had received occupational therapy as a client-centred activities of daily living (ADL) intervention (CADL) and participants who had received usual ADL intervention (UADL).

Design A secondary analysis of a multicentre cluster-randomised controlled trial (RCT).

Setting Primary and secondary care in Sweden.

Participants Participants were included if they: (1) had received CADL or UADL in the RCT, either as inpatients in geriatric rehabilitation units or in their own homes, and (2) data could be retrieved about their use of healthcare services provided by the county council from computerised registers.

Interventions CADL or UADL.

Outcome measures Inpatient and outpatient healthcare in the course of the first year after stroke.

Results Participants from 7 of the 16 units included in the RCT met the criteria. Participants in the CADL group (n=26) who received geriatric inpatient rehabilitation had a shorter length of hospital stay (p=0.03) than participants in the UADL group (n=46), and the CADL group with home rehabilitation (n=13) had fewer outpatient contacts (p=0.01) compared with the UADL group (n=25). Multiple regression analyses showed that in four of the models, a higher age was associated with a lower use of healthcare services. The use of healthcare services was also associated (some of the models) with dependence in ADL, stroke severity and type of rehabilitation received, CADL or UADL.

Conclusions The provision of client-centred occupational therapy after stroke did not appear to increase the use of healthcare services during the first year after stroke.rrrr

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Strengths and limitations of this study

► A major strength is the use of computerised data on the use of healthcare services as recall bias is eliminated.

► Comparisons were adjusted for other variables than the intervention received that might influence the resource use of healthcare services.

► Analyses were performed separately for the two groups of clients—those included at the geriatric rehabilitation ward and those included at units that provided home rehabilitation—as there might be different patterns depending on how the rehabilitation is organised.

► A limitation is that the groups were quite small, and the ability to identify differences that are small but of clinical relevance was limited.

responsibility as well as enablement[1] and imply that the client is actively involved in defining needs, goals, outcomes and setting priorities.[2] Client-centred rehabilitation has been suggested to improve outcomes and satisfaction with care for persons with stroke[3 4] and is often referred to as a measure of high-quality care.[5 6] However, persons with chronic conditions in Sweden receive significantly less client-centred care than comparable countries,[7] and concerns have been raised that the provision of client-centred care and rehabilitation is resource-consuming and time-consuming.[8 9]

In Sweden, the rehabilitation after stroke is organised in chains of care. Following the acute treatment, patients are referred to rehabilitation provided at a specialised level and organised as inpatient rehabilitation and/or outpatient rehabilitation. Further rehabilitation can also be organised by the primary care and provided in the patient's home by

INTRODUCTION

Client-centred care and rehabilitation involve key concepts such as individual autonomy and choice, partnership, therapist and client

specially trained stroke teams, henceforth referred to as home rehabilitation, or as general rehabilitation provided as outpatient care at the primary care clinic. Healthcare services should, according to the Health and Medical Service Act,[10] be offered based on each individual's needs, and a patient can be referred to one or more of these types of rehabilitation. In addition to individuals' needs, the type of rehabilitation offered is partly dependent on age, as geriatric rehabilitation is offered to people aged 65 years and above and medical rehabilitation to people of working age.

The organisation with levels of care embeds multiple transitions between different care providers and professionals. Care transition interventions with client-centred approaches targeting the transition between hospital and primary care have been shown to reduce rehospitalisations and length of stay (LOS) for multiple patient diagnostic groups.[11–14] However, these studies only consider a specific episode of care or care transition and not the total use of healthcare services. As a shortened LOS and reduced rehospitalisations could potentially increase the use of, for instance, primary care, it is important to capture the total use of healthcare services. The present study was conducted in the context of a multicentre cluster-randomised controlled trial (RCT) of occupational therapy after the acute care in a stroke unit. Occupational therapy, provided as client-centred activities of daily living (ADL) intervention (CADL), was compared with usual ADL intervention (UADL). The aim of the CADL intervention was to decrease dependence on assistance in daily activities and restriction in participation in everyday life. The CADL intervention has previously been described in detail,[15] and no differences were found in patient outcomes between CADL and UADL[15 16] except a difference in caregiver burden in favour of the CADL.[17]

The purpose of the present study was to explore the association between the use of healthcare services in the course of the first year after stroke and type of occupational therapy interventions (CADL or UADL) while adjusting for sociodemographic and clinical characteristics.

METHODS
Design
This study is a secondary analysis of healthcare use in the context of a multicentre cluster-RCT in which an intervention group received CADL and a control group received UADL.[15 16] Sixteen rehabilitation units in Stockholm, Uppsala and Gävleborg County Councils in Sweden were asked to participate. The rehabilitation units were randomly assigned to provide CADL or UADL stratified as (1) geriatric inpatient rehabilitation (geriatric rehabilitation wards) or (2) home rehabilitation (specially trained stroke teams providing rehabilitation in patients' homes).

Participants in the multicentre cluster-randomised trial
Eligible participants for inclusion in the RCT were people who were: (1) treated for acute stroke in a stroke unit ≤3 months after stroke onset, (2) dependent in at least two ADL domains according to Katz Extended ADL Index,[18] (3) not diagnosed with dementia, (4) able to understand and follow instructions and (5) referred for rehabilitation to 1 of the 16 participating units. A total of 280 participants were included in the original RCT.

Interventions
The occupational therapists (OTs) who conducted the CADL intervention had participated in a 5-day workshop.[19] The CADL presented a structure involving nine components[15] for how to discover and resolve problems faced in daily activities after stroke. Two general strategies were combined and used by the OTs across the nine components (ie, during the whole intervention process) in order to enable change: (1) using the client's lived experience as a point of departure and (2) enabling significant experience to be gained from doing valued daily activities. To facilitate a successful performance of the selected activities, the client, in collaboration with the OT, identified specific strategies to resolve upcoming difficulties with performance. The participant, together with the OT, reflected on the specific strategies used during the CADL intervention in order to facilitate transfer of use of these strategies to future activities in new daily situations.

The UADL interventions varied according to the routines and praxis of the participating rehabilitation units. The participants in both groups received other rehabilitation services, for example, physiotherapy and speech therapy, as needed.

Participants in the secondary analysis of the present study
The inclusion criterion for the present study was that all data about the participant's use of healthcare services provided by the county council were available in a computerised register.

Outcomes
Use of healthcare services
All data regarding the participants' use of healthcare services during the first 12 months after stroke were collected from Stockholm County Council's computerised database. The LOS at inpatient care as well as number of contacts with outpatient care was identified.

Inpatient care was categorised into LOS at the stroke units, at rehabilitation wards and recurrent inpatient stays.

The outpatient contacts included contacts at a specialised care level and primary care level. The specialised outpatient care contacts were categorised based on type of department (neurology department/other departments), health profession (physician/nurse) and type of contact (visit/telephone). The specialised outpatient rehabilitation contacts were categorised into visits to a specific rehabilitation professional (OT, physiotherapist,

speech and language therapist, medical social worker or psychologist) or day-visits at day-hospital rehabilitation.

The contacts with rehabilitation in primary care were categorised into general rehabilitation or stroke team rehabilitation. The CADL/UADL interventions were provided by these stroke teams primarily in the participants' homes, but occasionally also in outpatient clinics. Remaining primary care visits were categorised based on health profession (physician/nurse/assistant nurse) and type of contact.

Clinical characteristics

Data on participants' sociodemographic and clinical characteristics were collected at baseline by specially trained data collectors who were blinded to the participants' group belonging. Characteristics before stroke regarding dependence on assistance in ADL and capacity in ADL in six activities categorised as 'personal ADL' and four items categorised as 'instrumental ADL' were collected with the Katz Extended ADL Index.[18] The Katz Extended ADL Index is presented as a score between 0 and 10 where 10 indicates independence in personal ADL and instrumental ADL.

The Barthel Index[20] was used to assess capacity in ADL at baseline. The score ranges from 0 to 100, and a higher score indicates a higher level of capacity. The Barthel Index score was used to categorise the severity of the participants' stroke into mild, moderate or severe.[21] More details about the data collection are provided in Guidetti et al.[16]

Sample size

In the cluster -randomised trial, power calculations were performed,[15] and sample size was decided based on the primary outcome, the Stroke Impact Scale[22] domain participation. No power calculation was performed for the outcome use of health services.

Blinding

The data collectors were blinded to which type of interventions that was delivered by which site. Further, during the data analysis of the present study, the first and the last authors and the statistician were blinded to the participants' group belonging.

Patient involvement

The design, the intervention and the choice of outcome measures were based on our previous studies on the lived experiences of recapturing self-care after stroke.[23 24] However, no patients were directly involved in the development of research questions, outcome measures, design of this study, recruitment to or conduct of the study. Findings from the study will be not be reported directly to the study participants, but we will submit a report of the findings and conclusions for the patient organisations' newsletters.

Statistical methods

All analyses were performed separately for the groups of participants included in the different strata. In order to assess the comparability of the groups (CADL and UADL), with regard to sociodemographic and clinical characteristics, the X^2 test was used for categorical data, and the Mann-Whitney U test was used for continuous data. The Mann-Whitney U test was further used for comparisons of the use of healthcare services between the groups.

Multiple linear regression analyses were used in order to explore the association between the type of occupational therapy ADL intervention received (CADL or UADL) and (1) *initial LOS*, including the initial episode of care, that is, acute stroke unit and inpatient rehabilitation, (2) *total LOS*, including all inpatient care 0–12 months, (3) *outpatient rehabilitation*, including all contacts with outpatient rehabilitation services 0–12 months and (4) *total outpatient*, including all contacts with outpatient healthcare services 0–12 months.

Covariates, known to be associated with the use of healthcare services,[25–27] included in all analyses were: age, sex, independence/dependence in ADL before stroke according to the Katz Extended ADL Index (independent in P-ADL and I-ADL/dependent in P-ADL or I-ADL/dependent in P-ADL and I-ADL), stroke severity at baseline (mild/moderate) and capacity in ADL (Barthel Index score) at baseline. Age was centred on the mean age in the regression models, where age is included in interaction terms (age×stroke severity and age× group) due to issues of multicollinearity.

Significance level was specified at 0.05, and all analyses were performed using Statistica V.13.

RESULTS

Only the participants cared for in at the seven rehabilitation units in Stockholm County Council fulfilled this criterion, and 111 participants were included in the secondary analysis. One had an incorrect identification number, and data on healthcare use could not be retrieved. Out of the remaining 110 persons, 72 were included on geriatric rehabilitation wards, and 38 participants were included in units that provided home rehabilitation. Among those included in geriatric rehabilitation units, 26 received the CADL intervention (the geriatric CADL group), and 46 received UADL (the geriatric UADL group). Among those included in home rehabilitation, 13 received the CADL intervention (the home CADL group), and 25 received UADL (the home UADL group).

Sociodemographic and clinical characteristics

As shown in table 1, the geriatric CADL group was older than the geriatric UADL group (median 77.5 vs 68, p<0.001) and had a lower Barthel Index score at baseline (median 52.5 vs 65, p=0.05). The home CADL group was to a larger extent dependent in ADL before stroke compared with the home UADL group (dependent in personal ADL and instrumental ADL, n=3 vs 0/dependent in personal ADL or instrumental ADL, n=3 vs 7/independent, n=7 vs 18, p=0.04) (table 2).

Table 1 Sociodemographic and clinical characteristics before stroke and at baseline for the geriatric rehabilitation groups

	Geriatric CADL group, n=26	Geriatric UADL group, n=46	P values
Age (years) median/mean (min–max)	77.5/77.5 (66–89)	68/67.4 (39–89)	<0.001
Sex: male/female (n)	16/10	28/18	0.95
Civil status: living together/living alone (n)	14/12	28/18	0.56
Education: 9 years or less/more than 9 years (n)	10/16	19/27	0.81
Before stroke			
Katz Extended Index of ADL median (IQR)	10 (8–10)	10 (9–10)	0.46
Dependence in ADL*: dependent in P-ADL and I-ADL/dependent in P-ADL or I-ADL/independent	5/4/17	2/12/32	0.10
At inclusion in study			
Stroke severity mild/moderate/severe	15/10/1	35/11/0	0.15
Barthel Index median (IQR)	52.5 (45–65)	65 (50–90)	0.05

*Based on Katz Extended Index of ADL.
ADL, activities of daily living; CADL, client-centred activities of daily living; UADL, usual ADL.

Use of healthcare services

The geriatric CADL group had a shorter LOS at the geriatric rehabilitation unit compared with the geriatric UADL group (median 22.5 days vs 31 days, p=0.02) and also a shorter total initial LOS including both the acute stroke unit and the geriatric rehabilitation wards (median 26.5 days vs 36 days, p=0.03) (table 3). In primary care, the geriatric CADL group had more contacts with a physician compared with the geriatric UADL group (median 9.5 contacts vs 7 contacts, p=0.02).

The home CADL group had fewer visits to the general outpatient rehabilitation in primary care compared with the home UADL group (median 0 vs 2, p=0.04) and, moreover, fewer rehabilitation contacts in primary care when all contacts, including also the contacts with the stroke team, were summed up (median 42 vs 53, p=0.03) (table 4). When all contacts with outpatient care, including both specialised and primary care, were totalled, the home CADL group had fewer contacts compared with the home UADL group (median 74 vs 103, p=0.01).

In the geriatric groups, the multiple regression models showed that a higher age and being female were associated with a shorter initial LOS, whereas a more severe stroke (ie, a moderate stroke) was associated with a longer initial LOS (table 5A). In addition, there was a significant interaction between age and stroke severity, meaning that the association between initial LOS and age was different in the stroke severity groups. The association between initial LOS and age was stronger for participants with moderate stroke compared with milder stroke. The difference between participants with mild and moderate stroke was dependent on age, that is, the difference was greater for younger participants compared with older.

With regard to inpatient hospital care, that is, the total LOS during the first year after stroke (table 5B), a more severe stroke was associated with a longer LOS, whereas

Table 2 Sociodemographic and clinical characteristics before stroke and at baseline for the home rehabilitation groups

	Home CADL group, n=13	Home UADL group, n=25	P values
Age (years) median/mean/ (min–max)	77/75 (60–84)	70/71 (52–86)	0.2
Sex: male/female (n)	7/6	15/10	0.71
Civil status: living together/living alone (n)	6/7	14/11	0.56
Education: 9 years or less/more than 9 years (n)	5/8	12/13	0.57
Before stroke			
Katz Extended Index of ADL median (IQR)	10 (7–10)	10 (9–10)	0.26
Dependence in ADL*: dependent in P-ADL and I-ADL/ dependent in P-ADL or I-ADL/independent	3/3/7	0/7/18	0.04
At inclusion in study			
Stroke severity mild/moderate/severe	11/2/0	24/1/0	0.47
Barthel Index median (IQR)	85 (60–90)	85 (75–95)	0.53

Based on Katz Extended Index of ADL.
ADL, activities of daily living; CADL, client-centred activities of daily living; UADL, usual ADL.

Table 3 Use of healthcare services the first year after stroke for the geriatric CADL group and the geriatric UADL group

	Geriatric CADL group, n=26					Geriatric UADL group, n=46					
	n*	Mean	Median	Sum	Min–max	n*	Mean	Median	Sum	Min–max	P values
Emergency unit (visits)	25	1.8	1.5	48	0–5	45	2.2	2.0	100	0–12	0.71
INPATIENT CARE (days)											
Initial hospitalisation (days)											
Acute stroke unit	26	5.8	6.0	152	0–10	46	9.1	5.0	421	0–60	0.65
Inpatient rehabilitation	26	26.6	22.5	691	12–64	46	33.9	31.0	1560	10–71	0.02
Initial stay (ie, acute stroke unit and inpatient rehabilitation)	26	32.4	26.5	843	17–73	46	43.1	36.0	1981	13–114	0.03
Recurrent hospitalisation											
Inpatient care	8	4.7	0	122	0–59	23	7.5	0.5	344	0–70	0.53
Inpatient rehabilitation	3	2.6	0	68	0–32	7	3.4	0	155	0–49	0.80
Inpatient care, total	26	39.7	29.5	1033	17–123	46	53.9	40.0	2480	13–156	0.02
OUTPATIENT CARE (contacts)											
Specialised outpatient care											
Physician, visit											
Neurology department	17	0.7	1.0	18	0–2	9	0.3	0	12	0–2	0.003
Other departments	22	2.3	1.5	59	0–7	39	4.6	2.0	214	0–49	0.19
Physician, telephone											
Neurology department	2	0.1	0	2	0–1	2	0.1	0	4	0–3	0.83
Other departments	2	0.1	0	3	0–2	3	0.1	0	5	0–3	0.94
Nurse, visit											
Neurology department	8	0.4	0	11	0–3	1	0.02	0	1	0–1	0.04
Other departments	14	1.0	1.0	25	0–8	15	1.5	0	69	0–14	0.35
Nurse, telephone											
Neurology department	1	0.04	0	1	0–1	2	0.04	0	2	0–1	0.98
Other departments	1	0.04	0	1	0–1	1	0.06	0	3	0–3	0.91
Other	6	0.6	0	15	0–6	14	0.9	0	43	0–7	0.55
Specialised outpatient rehabilitation											
Rehabilitation professionals (visit)	0					13	18.3	0	842	0–187	
Day-hospital rehabilitation (day visit)	0					8	3.2	0	146	0–28	
Primary care											
Rehabilitation											
General rehabilitation, visit	12	3.8	0	100	0–31	19	7.6	0	350	0–70	0.99
General rehabilitation, home visit	7	0.8	0	22	0–12	12	0.8	0	35	0–9	0.97
General rehabilitation, telephone	2	0.08	0	2	0–1	7	0.3	0	12	0–3	0.57
General rehabilitation, group visit	8	3.5	0	91	0–19	12	4.7	0	216	0–67	0.75
Stroke team, visits	1	0.8	0	21	0–21	10	3.6	0	164	0–61	0.22
Stroke team, home visit	23	21.2	15.5	550	0–87	34	22.5	16.0	1036	0–89	0.82
Stroke team, telephone	1	0.2	0	4	0–4	12	0.4	0	17	0–10	0.75
Stroke team, group	1	0.04	0	1	0–1	4	3.3	0	151	0–90	0.72
Rehabilitation, total	23	30.4	22.5	791	0–98	37	43.1	26.5	1981	0–185	0.62

Continued

Table 3	Continued									
	Geriatric CADL group, n=26					Geriatric UADL group, n=46				
	n*	Mean	Median	Sum	Min–max	n*	Mean	Median	Sum	Min–max	P values
Physician										
Visit	23	12.8	6.0	333	0–50	42	7.7	4.0	355	0–32	0.16
Home visit	12	2.0	0	51	0–10	12	1.2	0	56	0–16	0.15
Stroke team	0					0					
Telephone	18	2.5	2.0	65	0–15	25	1.6	1.0	76	0–13	0.17
Physician, total	25	17.3	9.5	449	0–58	43	10.6	7.0	487	0–34	0.03
Nurse										
Visit	13	3.0	0.5	79	0–24	22	3.5	0	162	0–85	0.76
Home visit	12	9.0	0	233	0–38	17	6.9	0	316	0–41	0.49
Stroke team	0					0					
Telephone	3	0.3	0	8	0–4	4	0.1	0	5	0–2	0.81
Group	0					0					
Nurse, total	17	12.3	4	320	0–48	32	10.5	3.0	483	0–116	0.62
Assistant nurse										
Visit	2	0.08	0	2	0–1	4	0.3	0	12	0–7	0.93
Home visit	4	4.1	0	107	0–103	12	4.9	0	226	0–134	0.40
Group	0					1	0.1	0	4	0–4	
Assistant nurse, total	4	4.2	0	109	0–104	16	5.3	0	242	0–134	0.14
Outpatient care, total	26	69.4	65.5	1804	1–185	46	98.6	74.0	4534	2–316	0.34

*Number of people who have used the service.
CADL, client-centred activities of daily living; UADL, usual ADL.

dependence in both personal ADL and instrumental ADL before the stroke was associated with a shorter LOS. For outpatient rehabilitation and total outpatient contacts, higher age was associated with fewer contacts (table 5C,D).

In the home groups, the multiple regression model showed no associations between the independent variable or covariates and initial LOS or total LOS. With regard to outpatient rehabilitation (table 6A), higher age and a better capacity in ADL according to Barthel Index at baseline were related to fewer contacts, whereas belonging to the UADL group was associated with a higher number of contacts.

Moreover, an interaction between age and group belonging was also significantly associated with the number of outpatient rehabilitation contacts, meaning that the association with age differed between the CADL and UADL groups. In the UADL group, there was a very weak association between higher age and higher number of contacts, whereas there was an association between higher age and fewer contacts in the CADL group.

For total outpatient care, including both specialised and primary care, belonging to the UADL group was associated with a higher number of contacts, whereas better capacity in ADL at baseline and dependence in personal ADL or instrumental ADL before the stroke was related to fewer contacts (table 6B).

DISCUSSION

Implementation of client-centred care and rehabilitation is supported by stakeholders in Sweden[28] and internationally[5] as a way of addressing challenges in the healthcare system including an ageing population and rising costs. It is consequently important to evaluate the impact of client-centred care on the use of healthcare services. This study is, to our knowledge, the first in which the total use of healthcare services has been compared, and the findings suggest that receiving a client-centred occupational therapy intervention does not appear to increase the total use of healthcare services during the first year after a stroke. In fact, there were some areas of health service utilisation, inpatient care, where there was a significant reduction in utilisation without a cost shift into the community postdischarge from the health service.

The findings in the present study showed that delivery of client-centred occupational therapy ADL interventions did not appear to increase the LOS in hospital or the number of rehabilitation or other healthcare contacts with outpatient care during the first year after stroke. Rather, results from multiple regression analyses suggest that clients who did not receive client-centred occupational therapy in their homes had a higher number of outpatient rehabilitation contacts and higher total number of outpatient contacts compared with clients who received CADL as home rehabilitation. Although, no

Table 4 Use of healthcare services the first year after stroke for the home CADL group and the home UADL group

	Home CADL group, n=13					Home UADL group, n=25					P values
	n*	Mean	Median	Sum	Min–max	n*	Mean	Median	Sum	Min–max	
Emergency unit (visits)	13	2.1	2.0	27	1–5	24	2	2.0	50	0–5	0.70
INPATIENT CARE (days)											
Initial hospitalisation											
Acute stroke unit	13	7.7	6.0	100	2–15	25	9.4	9.0	235	0–26	0.54
Inpatient rehabilitation	12	16.0	20.0	208	0–26	16	15.4	13.0	385	0–50	0.51
Initial stay (ie, stroke unit and inpatient rehabilitation)	13	23.7	27.0	308	4–35	25	24.8	26.0	620	2–55	0.95
Recurrent hospitalisation											
Inpatient care	4	1.8	0	23	0–17	9	4.8	0	120	0–79	0.72
Inpatient rehabilitation	0					2	0.7	0	17	0–10	0.70
Inpatient care, total	13	25.5	28.0	331	4–45	25	30.3	29.0	757	2–134	0.70
OUTPATIENT CARE (contacts)											
Specialised outpatient care											
Physician, visit											
Neurology department	5	0.4	0	5	0–1	5	0.3	0	7	0–2	0.45
Other departments	10	2.3	2.0	30	0–10	21	5.6	2.0	139	0–48	0.52
Physician, telephone											
Neurology department	2	0.2	0	2	0–1	1	0.4	0	1	0–1	0.58
Other departments	3	0.2	0	3	0–1	9	0.6	0	16	0–4	0.41
Nurse, visit											
Neurology department	1	0.1	0	1	0–1	1	0.6	0	15	0–15	0.88
Other departments	5	0.4	0	5	0–1	11	1.2	0	31	0–9	0.47
Nurse, telephone											
Neurology department	0					1	1.2	0	29	0–29	
Other departments	1	0.1	0	1	0–1	6	0.4	0	10	0–3	0.40
Other	3	1.6	0	21	0–8	9	0.9	0	23	0–6	0.81
Specialised outpatient rehabilitation											
Rehabilitation professional (visit)	0					8	26.0	7.0	649	0–126	
Day-hospital rehabilitation (day visit)	0					0					
Primary care											
Rehabilitation											
General rehabilitation, visits to clinic	6	1.8	0	24	0–13	18	8.0	2.0	200	0–41	0.04
General rehabilitation, home visits	3	0.6	0	8	0–5	7	2.0	0	50	0–20	0.68

Continued

Table 4 Continued

	Home CADL group, n=13					Home UADL group, n=25					P values
	n*	Mean	Median	Sum	Min–max	n*	Mean	Median	Sum	Min–max	
General rehabilitation, telephone	3	0.3	0	4	0–2	10	0.9	0	22	0–3	0.27
General rehabilitation, group visit	2	2.1	0	28	0–20	14	10.0	1.0	249	0–102	0.05
Stroke team, visits to clinic	5	3.7	0	48	0–23	1	0.1	0	1	0–1	0.08
Stroke team, home visits	13	23.6	13.0	307	5–62	25	36.9	30.0	922	5–97	0.09
Stroke team, telephone	5	2.6	0	34	0–16	0					
Stroke team, group visit	1	0.5	0	6	0–6	8	0.8	0	20	0–4	0.28
Rehabilitation, total	13	35.3	42.0	459	7–63	25	58.6	53.0	1464	13–129	0.03
Physician											
Visit to clinic	13	10.9	7.0	142	1–26	22	5.7	4.0	142	0–23	0.07
Home visit	4	1.1	0	14	0–7	6	1.4	0	34	0–9	0.86
Stroke team	0					1	0.1	0	1	0–1	
Telephone	10	2.9	2.0	38	0–10	14	1.5	1.0	37	0–5	0.13
Physician, total	13	14.9	10.0	194	2–31	24	8.6	7.0	214	0–24	0.06
Nurse											
Visit to clinic	9	3.4	3.0	44	0–12	12	1.2	0	30	0–7	0.06
Home visits	8	11.6	1.0	151	0–112	10	28.6	0	716	0–447	0.67
Stroke team	3	0.4	0	5	0–2						
Telephone	4	0.4	0	5	0–2	2	0.1	0	2	0–1	0.25
Stroke team telephone	1	0.1	0	1	0						
Group	0					2	0.1	0	3	0–2	
Nurse, total	13	15.8	6.0	206	1–115	18	30.0	3.0	751	0–447	0.19
Assistant nurse											
Visit to clinic	0	0	0	0	0	2	0.1	0	3	0–2	0.7
Home visit	4	3.3	0	43	0–23	4	5.3	0	132	0–103	0.49
Group visit	0					0					
Assistant nurse, total	4	3.3	0	43	0–23	6	5.4	0	135	0–103	0.68
Outpatient care, total	13	74.6	74.0	970	11–208	25	139.4	103.0	3484	18–668	0.01

Number of people who have received the service.

CADL, client-centred activities of daily living; UADL, usual ADL.

such differences between the geriatric groups were found. Comparisons with previous studies are difficult, since interventions described as client-centred or person-centred care vary considerably.[29] Fears of client-centred care being a time-consuming enterprise have been put forward.[9 30] In the present study, the mean number of contacts with the OTs during the intervention period was 21.9 in the CADL group compared with 15.7 in the UADL group,[15] but we do not have data on the length of each contact. The higher number of contacts might reflect that the development of a partnership/relation between the health professionals and the client, a key component in a client-centred approach, might be more time-consuming than the usual care. On the other hand, healthcare services that take their departures from the prioritised needs, build on the person's own ability to handle challenges of everyday life and have a problem-solving approach could be expected to reduce healthcare use in the longer term. In line with this, some studies suggest that a person-centred[12] or integrated care[13 31] might contribute to a shorter

Table 5A Final regression model for the association between the geriatric rehabilitation group's initial LOS (log-transformed), that is, the initial episode of care including the acute stroke unit and inpatient

	B*	95% CI	P values
Intercept	3.42	3.22 to 3.62	<0.001
Age†	−0.01	−0.02 to 0.000006	0.05
Groups			
UADL versus CADL	0.15	−0.07 to 0.37	0.18
Stroke severity‡			
Moderate versus mild	0.55	0.3 to 0.79	<0.001
Sex			
Female versus male	−0.26	−0.46 to 0.05	0.01
Age×stroke severity§	−0.03	−0.06 to 0.002	0.03

R²=0.28.
*Regression coefficient.
†Patients with mild stroke severity.
‡B at mean age.
§Patients with moderate severity, B=−0.03+(−0.01)=−0.04.
CADL, client-centred activities of daily living; LOS, length of stay; UADL, usual ADL.

LOS or lower hospitalisation rate. However, these studies include only the specific healthcare service that has been client-centred or person-centred and not the total use

Table 5B Final regression model for the association between the geriatric rehabilitation group's total LOS (log-transformed), including all inpatient care 0–12 months, and the independent variable and covariates

	B*	95% CI	P values
Intercept	3.57	3.33 to 3.81	<0.001
Groups			
UADL versus CADL	0.14	−0.13 to 0.42	0.31
Independence before stroke (Katz Extended Index of ADL) before stroke			
Dependent in personal ADL or instrumental ADL versus independent in personal ADL and instrumental ADL	−0.11	−0.4 to 0.18	0.44
Dependent in personal ADL and instrumental ADL versus independent in personal ADL and instrumental ADL	−0.43	−0.88 to 0.004	0.047
Stroke severity†			
Moderate versus mild	0.47	0.2 to 0.74	<0.001
Age‡	−0.01	−0.2 to 0.13	0.13
Age×stroke severity§	−0.02	−0.17 to 12	0.17

R²=0.22.
*Regression coefficient.
†Patients with mild stroke severity.
‡B at mean age.
§Patients with moderate severity, B=−0.02+(−0.01)=−0.03.
ADL, activities of daily living; CADL, client-centred activities of daily living; LOS, length of stay; UADL, usual ADL.

Table 5C Final regression model for the association between the geriatric rehabilitation group's outpatient rehabilitation (square root transformed), including all contacts with outpatient rehabilitation services 0–12 months, and the independent variable and covariates

	B*	95% CI	P values
Intercept	12.51	6.64 to 18.37	<0.001
Age	−0.09	−0.17 to 0.009	0.029

R²=0.07.
*Regression coefficient.

of healthcare services, and none of these focused on people with stroke. As a shortened LOS could potentially increase the use of, for example, primary care, it is imperative, and it is in line with this study to capture the total use of healthcare services for a more extended time after the intervention.

Previous studies on client-centred ADL interventions have shown that participants who received client centred ADL interventions were to a larger extent participating in goal-setting, planning for how the goals could be reached and follow-up of goals compared with those who received ADL as usual.[19] Moreover, they experienced that the intervention enabled them to feel as owners of their own rehabilitation process.[32 33] This suggests that the effect of the CADL intervention on healthcare usage might be related to a changed healthcare-seeking behaviour of an activated patient. Similar results have also been found in other settings, showing an inverse association between patient activation (knowledge, skills and confidence) and healthcare usage, that is, patients with higher levels of activation had lower healthcare usage.[33] In the present study, we can only ascertain that the OTs delivered a client-centred service. As rehabilitation after stroke should be team based[34–36] and the OT is only one among several professions in the team, it might be questioned as to what extent the care and rehabilitation as a whole was client-centred. In order to provide client-centred care and rehabilitation, embracing all the clients' needs, priorities and values, future interventions should involve the entire team in a shared approach to explore how such a team-based intervention could affect healthcare usage.

Table 5D Final regression model for the association between geriatric rehabilitation group's total outpatient (square root transformed), including all contacts with outpatient health care services 0–12 months including all inpatient care 0–12 months, and the independent variable and covariates

	B*	95% CI	P values
Intercept	16.47	10.91 to 22.05	<0.001
Age	−0.11	−0.19 to −0.03	0.005

R²=0.09.
*Regression coefficient.

Table 6A Final regression model for the association between the home rehabilitation group's outpatient rehabilitation (log-transformed), including all contacts with outpatient rehabilitation services 0–12 months, and the independent variable and covariates

	B*	95% CI	P values
Intercept	5		
Age†	−0.072	−0.11 to 0.02	0.004
Groups‡			
UADL versus CADL	0.75	0.28 to 1.22	0.003
Age×group§	0.074	0.02 to 0.12	0.006
ADL score (Barthel Index)	−0.01	−0.03 to 0.006	0.003

R^2=0.49.
*Regression coefficient.
†Patients in group CADL.
‡Beta-koff at mean age.
§Patients in group UADL, B=0.074+(−0.072)=0.002.
ADL, activities of daily living; CADL, client-centred activities of daily living; UADL, usual ADL.

In addition to the main results in the study, in four of the eight models, the findings showed associations between higher age and a lower use of healthcare services, both LOS during the initial episode of care and contacts with outpatient rehabilitation services and total outpatient healthcare contacts. Previous studies have reported similar findings from Sweden[26] and 10 European countries,[37] whereas an American and a Danish study report more similar use.[38 39] Another difference in resource use was that women appeared to receive shorter initial LOS at the stroke unit and in inpatient geriatric rehabilitation

Table 6B Final regression model for the association between the home rehabilitation group's total outpatient (log-transformed), including all contacts with outpatient health care services 0–12 months including all inpatient care 0–12 months, and the independent variable and covariates

	B*	95% CI	P values
Intercept	6.57		
ADL score (Barthel Index)	−0.03	−0.04 to 0.02	<0.001
Group			
UADL versus CADL	0.47	0.09 to 0.84	0.01
Independence before stroke (Katz Extended Index of ADL) before stroke			
Dependent in personal ADL or instrumental ADL versus independent in personal ADL and instrumental ADL	−0.62	−0.99 to 0.26	0.001
Dependent in personal ADL and instrumental ADL versus independent in personal ADL and instrumental ADL	−0.53	−1.28 to 0.22	0.16

R^2=0.56.
*Regression coefficient.
ADL, activities of daily living; CADL, client-centred activities of daily living; UADL, usual ADL.

after a stroke. These findings suggest an inequity in resource use based on age and sex and should be further investigated and followed closely.

A strength of the present study is its use of computerised data on the use of healthcare services as recall bias is eliminated. Furthermore, we conducted the analyses separately for the two groups of clients—those included at the geriatric rehabilitation ward and those included at units that provided home rehabilitation—as there might be different patterns in the use of healthcare services depending on how the rehabilitation is organised.[40 41] However, this entails that the groups were quite small, and the ability to identify differences that are small but of clinical relevance was limited. Another strength is that the comparison between CADL and UADL was adjusted for other variables that might influence the resource use of healthcare services. We presume that, based on the inclusion criterion in the study and the level of disability reported in data from the Swedish Stroke Register,[42] the findings in the present study may be valid for approximately 25%–30% of the stroke population.

We conclude that the provision of a client-centred occupational therapy ADL interventions after stroke did not appear to prolong the LOS, nor did it increase the number of contacts with outpatient healthcare services during the first year after stroke. Client-centred services may thus be implemented even though more evidence on the effect on client and family outcomes and resource use through a full powered RCT with economic evaluation is warranted.

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