

Daily Functioning and Quality of Life of Patients One Year Post Stroke: A Comparison of Two Different Follow-Up Care Programmes

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Abstract

Background: An observational study to examine whether a new follow-up care programme (ATC) specifically aimed at conservation of daily functioning, quality of life and activities realizes better outcomes in stroke patients compared to conventional (ORP) follow-up care.

Methods: A total of 93 stroke patients who followed the ATC follow-up care programme or had conventional follow-up care were interviewed at home one-year post stroke using the Barthel Index and RAND-36 questionnaires and a questionnaire about their way of life and medication use. People aged under 60, Barthel < 10 or with haemorrhage were excluded.

Results: In this study 25% (ATC) and 29% (ORP) of patients experienced more limitations in activities after one year. In the ATC group the decrease is related to ADL independence and loss of social contacts. ADL independence is correlated with a better quality of life. Health-related quality of life was identical in the two groups. It was observed in both groups that quitting or doing less activities is significantly related to a diminished quality of life. There is no significant difference between the groups in terms of medicine use or follow-up care. More patients visit day centres in the ATC group.

Conclusions: No major differences in outcome could be found between the two groups. A relationship between doing diverse activities and quality of life was found in both groups. Perhaps studying

the individual needs of stroke patient would be more effective than a standard follow-up care programme. This needs further investigation.

Keywords: Stroke; Rehabilitation; Functioning; Quality of life; Secondary prevention; Aftercare

Introduction

Each year, 19.000 men and 22.000 women in the Netherlands have strokes [1, 2]. Absolute lifetime risk of stroke is similar in men and women [3]. The average age of patients having a stroke is seventy years in men and seventy-five in women [4]. Twenty-five percent of all patients die in the first year after stroke [5].

The post-stroke period can be divided into three phases: the acute phase, the rehabilitation phase and the chronic phase. This distinction is important because treatment and patient support are different at each phase [6]. Our study concerns the chronic phase, which starts approximately six months after a stroke, where acceptance and coping with persistent disabilities plays a prominent role [6].

Strokes change patients' lives in many different ways, not only physically, but also emotionally, psychically, cognitively and socially [7]. This influences quality of life (QOL). As stroke mortality declines, more patients have to live with the consequences of stroke. Therefore, improving QOL and paying more attention to follow-up care is increasingly important [7].

After discharge from hospital, stroke patients return home or need rehabilitation in a nursing home or rehabilitation clinic. The present study is about patients who rehabilitated in a nursing home and returned home after rehabilitation. When patients finally return home a lot of things have changed. It is therefore important to also pay attention to follow-up care after discharge from a nursing home.

In Groningen, the Netherlands, we have developed a new follow-up care programme. Figure 1 provides the old follow-up care programme (ORP) and Figure 2 shows the new ATC programme (Ambulant Treatment team for CVA-

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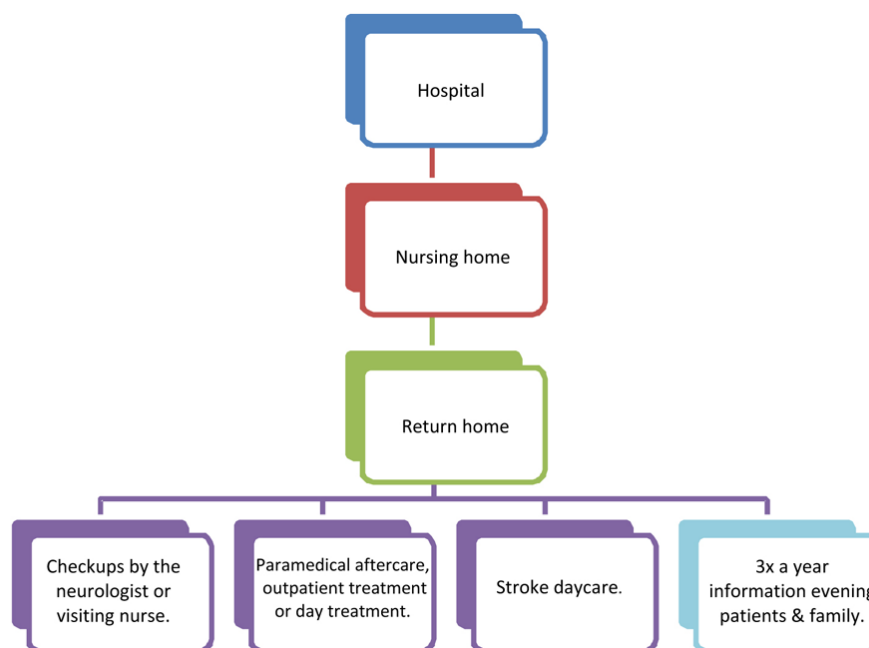


Figure 1. The conventional follow-up care (ORP).

patients). In the ATC programme there are two pathways, namely complex and non-complex. The complex pathway concerns patients who cannot be treated in general practice, patients who have invalidating cognitive or behavioural problems after stroke or those where there is no stable home environment, or where there is doubt whether the taught behaviours in rehabilitation will be applied at home. Patients in the complex pathway are guided for a year. Where there are problems, the ATC team tries to find a solution in cooperation with the patient or his/her GP. One of the professionals in the ATC team visits the patients regularly and the whole team gives advice on daily life and advice about the required follow-up care to the GPs. When necessary, the ATC team can treat certain conditions like depression, but also teach patients to go shopping, visiting or going on holidays again.

The ATC programme was designed because there were indications that when patients are finally at home they face other problems than with rehabilitation and that a lot of stroke patients were not seeking help for many of the problems they experienced at home. With ATC guidance these problems are made clear earlier and it is easier to give advice. Major difference between the two programmes is the frequency of follow up and contacts between patients and a professional in which support and treatment can be given.

The purpose of this study is to determine whether the ATC follow-up care programme realizes a better outcome compared to the ORP follow-up care. This was done by comparing the wellbeing of patients who were treated by the ATC team one year post stroke to patients who had followed the ORP. Wellbeing includes physical functioning, QOL,

secondary prevention and changes in life habits.

Patients and Methods

Study design

The study includes all the ischemic stroke patients admitted to the Heymanscentrum nursing home in Groningen, between July 2005 and July 2006 (the ORP group) and between November 2006 and November 2007 (the ATC group). A total of 190 (93 ORP and 97 ATC) patients were included. The exclusion criteria for patients were: a) being under 60, to create a more homogenous group, because younger patients have different social life and the impact of diminished functioning is possibly much greater than in older patients; b) haemorrhagic stroke, because these patients have a worse prognosis [8] and different risk profile [9]; and c) patients with a Barthel score under 10. The MEC (medical ethical committees) of the Martini Hospital approved this study (17 January 2008). Informed consent was obtained from all patients.

After informed consent, clinical details - including stroke severity, co-morbidity, risk factors before stroke, use of medication and demographic information - were obtained from medical records. Stroke severity was determined by the National Institute of Health Stroke Scale examination at hospital admittance.

One year post stroke all patients were visited at home by a medical practitioner. Patients were interviewed in person by a trained medical practitioner and standardized question-

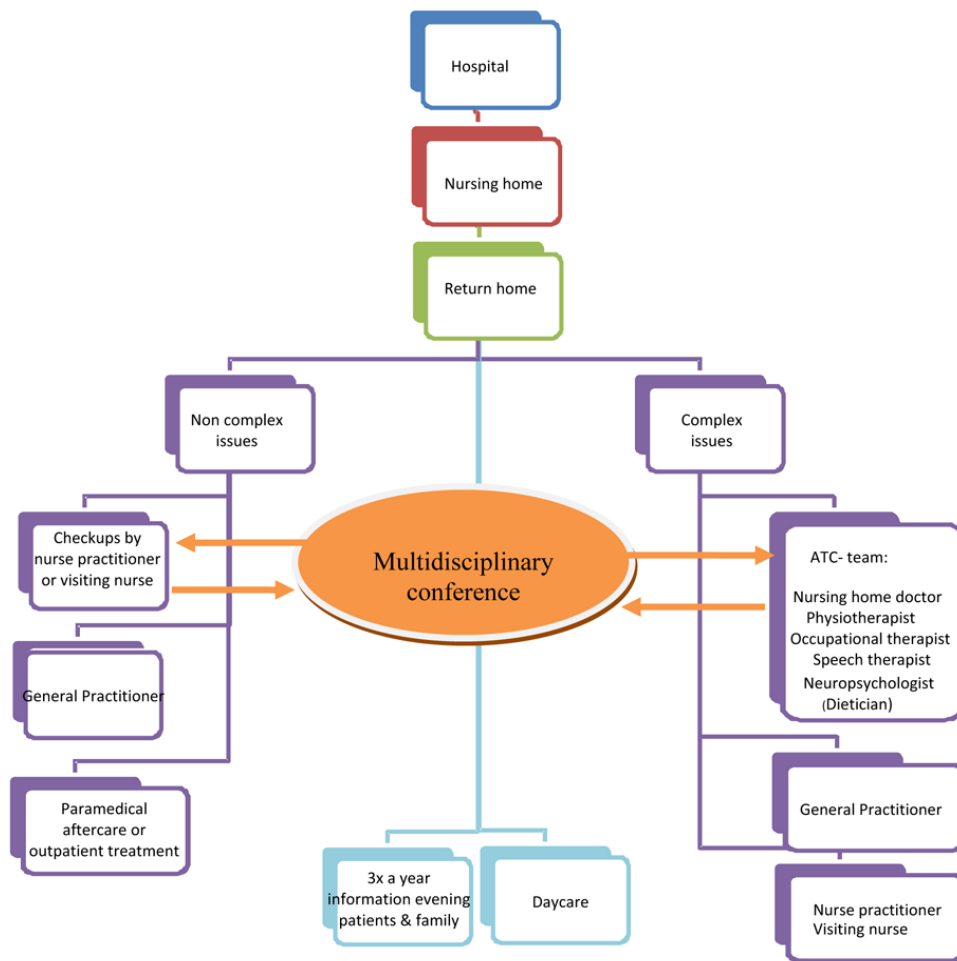


Figure 2. Follow-up care according to the ATC programme.

naires were administered.

Measures at 12 months

The Barthel Index (BI) was used to assess disability in our patients. The BI measures the level of independence in ADL and yields a score ranging from 0 (functionally dependent) to 20 - 21 (functionally independent). Patients are given three points for eating independently in this questionnaire, rather than two points. The sensitivity and reliability of the BI are high for stroke patients [10-12].

To measure health-related quality of life (HRQOL) we used the RAND-36. The RAND-36 consists of 36 questions and comprises 8 health-scales (physical function (FF), role limitations - physical (Rlf), social functioning (SF), role limitations - emotional (Rle), bodily pain (BP), general health (GH), vitality (Vit) and mental health (MH)). The health scales range from 0 (poor HRQOL) to 100 (good HRQOL). This is based on the summated ratings method. The RAND-36 is a reliable and valid measure for determining HRQOL in stroke patients [13-15]. The HRQOL in this study was compared to the HRQOL of the Dutch elderly population [15].

In addition, patients were asked about changes in habits and daily occupations because of stroke, such as smoking, alcohol consumption, housekeeping, physical exercise, hobbies, reading, visiting family and friends, membership of clubs or associations and going on holiday. We also asked about their use of medication, if they had contact with their GPs, neurologists, nurse practitioners or assistants, and their reason for this contact. They were also asked about rehabilitation: whether they had any and how many times they had physiotherapy, speech therapy, occupational therapy, home help, day-centre care and admittance to hospital.

Statistical analysis

SPSS 15 for Windows was used for statistical analysis. Statistical significance was set at $P < 0.05$ (2-sided). For comparisons between groups we used the non-parametric tests: Mann-Whitney, Kruskal-Wallis and Analysis of variance (ANOVA) using the Rank Transform method. The Rank Transform method consists of replacing the observations by their ranks in the combined sample and performing one of the standard analysis of variance procedures on these ranks

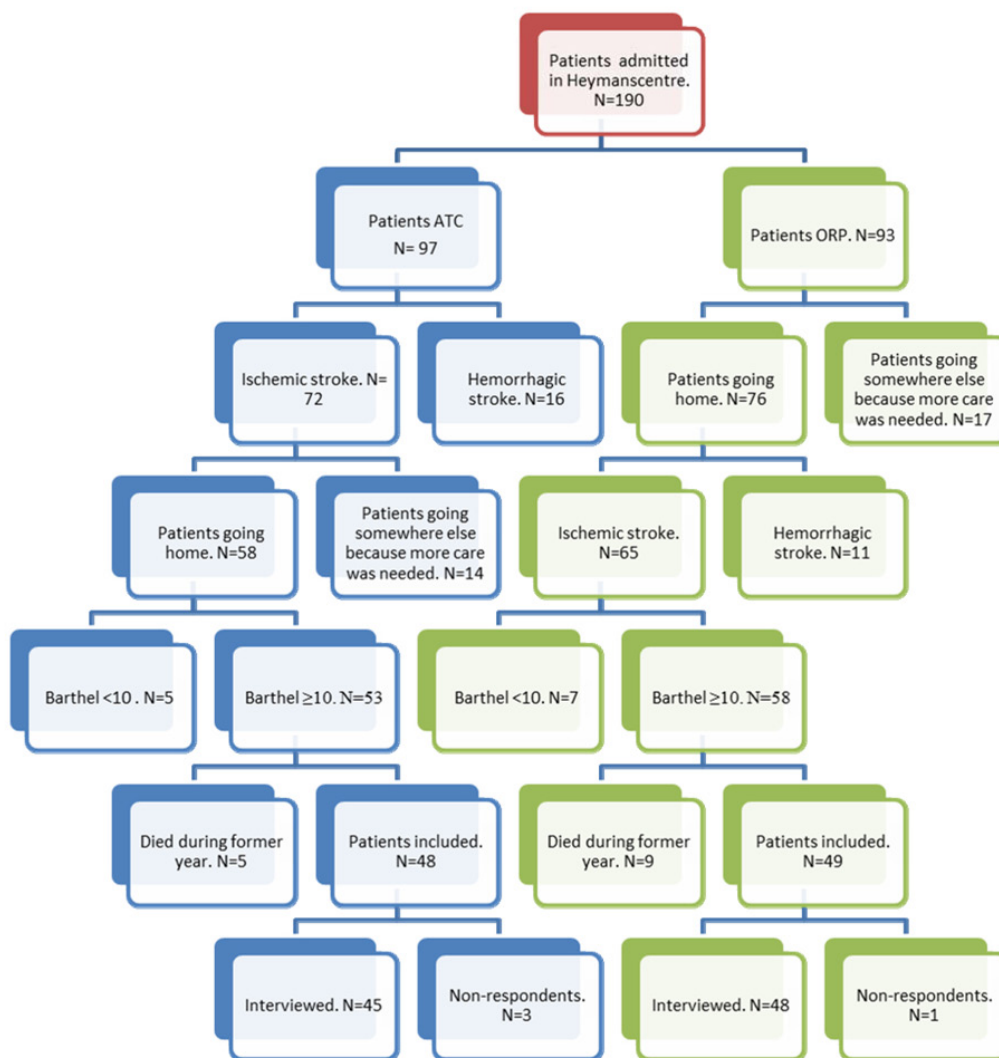


Figure 3. Patient selection flow chart.

[16]. Fisher’s exact test was used for categorical variables.

To describe the number of patients who changed their habits due to stroke, their responses were categorized into ‘more’, ‘less’, ‘as much as before’ or ‘quit’.

Despite the relatively large number of statistical tests applied, we decided not to correct for ‘multiple testing’ (for instance by means of the Bonferroni method). Instead, the P-values are simply presented as an indication of the strength of the evidence.

Results

Baseline characteristics

A total of 190 patients were found to have had an ischemic stroke. Eventually, ninety-three interviews (ATC N = 45, ORP N = 48) were conducted (Fig. 3).

Detailed baseline characteristics of the study population are provided in Table 1. There are no significant differences in the characteristics of the two groups.

Level of dependence according to Barthel Index

When patients were admitted in the nursing home, 24% of the ATC group and 15% of the ORP group were severely till totally dependent (BI: 0 till 10). One year after discharge 3 patients of the ATC and 1 patient of the ORP were severely or totally dependent. Most patients were not dependent at all (BI > 19) (ATC: 56%, ORP: 58%) or only slightly dependent (BI 15 till 20) (ATC: 38%, ORP: 35%).

Almost 38% of the ATC group and 40% of the ORP group scored the same at discharge and one year after discharge. Thirty-eight percent (ATC) and 31% (ORP) had better scores after one year. Twenty-five percent (ATC) and 29% (ORP) had worse scores. Progress in ADL independen-

Table 1. Baseline Characteristics of the Study Population

Variables	ATC (%)	ORP (%)	P*
Patients included	45	48	
Gender			
Men	22 (49)	17 (35)	
Women	23(51)	31 (65)	
Age, average (range)	78 (61 - 92)	77 (60 - 89)	
Living situation			
Living alone	21 (47)	30 (62.5)	
Living with a partner	24 (53)	18 (37.5)	
Brain hemisphere			0.351
Left side	19 (42)	27 (56)	
Right side	22 (49)	21 (44)	
Unknown	4 (9)	-	
NIHSS, average (range)	5 (0 - 23)	5 (0 - 22)	0.522
Risk factors present before stroke			
No risk factors	7 (16)	3 (6)	0.189
Hypertension	24 (53)	17 (43)	0.082
Hypercholesterolemia	9 (20)	7 (14)	0.489
Diabetes	5 (11)	8 (20)	0.440
Cardiac embolus	11 (24)	12 (22)	0.951
Smoking	10 (22)	-	
History			
No history	7 (16)	3 (6)	0.189
Ischemic heart disease	13 (29)	7 (15)	0.093
Stroke/TIA	12 (27)	14 (29)	0.788
Atrial fibrillation	7 (16)	12 (25)	0.259
Heart failure	2 (4)	4 (8)	0.678
COPD	4 (11)	9 (19)	0.303
Depression	4 (9)	2 (4)	0.425

* Fisher's exact test.

cy after one year did not differ significantly between the two groups ($P = 0.457$).

Being more dependent was related to diminishing daily occupations. This was significant in housekeeping, physical activity and hobbies in both groups. An experienced decline in QOL is not related to being more dependent (Table 2).

There is no significant difference between follow-up care and BI (Table 2). Only ATC group patients with district nursing service experienced worse BI than patients without district nursing service.

The Rank Transform ANOVA was used to investigate whether there were any interaction effects between the ATC and ORP groups and gender, changes in habits, daily occupations, use of medication, the frequency of contact with GPs, neurologists or rehabilitation with respect to the BI scores. There were no significant interaction effects (Table 2).

Health-related quality of life (RAND-36)

Table 3 presents the comparison between the HRQOL of

Table 2. Functioning (BI), One Year After Discharge According to Demographic Factors, Change in Activities and Follow-Up Care

Variables	ATC group			ORP group			
	N	Median (range)	P*	N	Median (range)	P*	P#
Gender ²							
Male	22	20 (8 - 21)	0.467	17	19 (2 - 21)	0.018	0.434
Female	23	20.5 (7 - 21)		31	21 (17 - 21)		
Social situation ²							
Living alone	21	20 (8 - 21)	0.820	18	20 (2 - 21)	0.834	0.619
Living with partner	24	20.5 (7 - 21)		30	20 (16 - 21)		
Stroke location ²							
Left side	19	21 (8 - 21)	0.075	27	20 (11 - 21)	0.282	0.300
Right side	22	19 (7 - 21)		21	20 (2 - 21)		
Housekeeping ¹							
More			0.000			0.014	0.619
As much as before	16	21 (18 - 21)		15	21 (17 - 21)		
Less	19	19 (16 - 21)		26	20 (13 - 21)		
Quit	10	17.5 (7 - 21)		7	17 (2 - 20)		
Physical activity ¹							
More			0.012			0.014	0.407
As much as before	16	21 (18 - 21)		17	21 (13 - 21)		
Less	25	19 (15 - 21)		26	19 (11 - 21)		
Quit	4	8 (7 - 21)		5	17 (2 - 20)		
Hobbies ¹							
More	1		0.014			0.043	0.051
As much as before	21	21 (16 - 21)		21	21 (13 - 21)		
Less	18	20 (8 - 21)		16	19.5 (16 - 21)		
Quit	5	17 (7 - 19)		11	20 (2 - 20)		
Visiting ¹							
More			0.000			0.214	0.551
As much as before	20	21 (18 - 21)		31	20 (13 - 21)		
Less	19	20 (16 - 21)		16	20 (11 - 21)		
Quit	6	11.5 (7 - 19)		1	2		
Experienced quality of life ²							
The same	22	21 (8 - 21)	0.079	21	19 (13 - 21)	0.367	0.331
Diminished	22	19 (7 - 21)		27	20 (2 - 21)		
GP contact ²							
No	3	21 (19 - 21)	0.364			0.864	
Yes	42	20 (7 - 21)					
> 10 times				26	20 (2 - 21)		
< 10 times			22	20 (11 - 21)			
Neurologist contact ²							
No	11	20 (17 - 21)	0.972	5	19 (13 - 21)	0.719	
Yes	26	20.5 (8 - 21)		43	20 (2 - 21)		
Physiotherapy ²							
No	13	21 (15 - 21)	0.070	34	20 (2 - 21)	0.136	0.264
Yes	32	19 (7 - 21)		14	18.5 (11 - 21)		
Speech therapy ²							
No	31	19 (7 - 21)	0.216	32	20 (2 - 21)	0.320	0.698
Yes	14	21 (8 - 21)		16	20 (16 - 21)		
Occupational ² therapy							
No	28	21 (7 - 21)	0.105	34	20 (13 - 21)	0.127	0.160
Yes	17	19 (8 - 21)		14	19 (2 - 21)		
District nursing services ^{2/3}							
No	29	21 (8 - 21)	0.000	24	20 (2 - 21)	0.470	
Yes				19	20 (11 - 21)		
More	15	18 (7 - 21)					
Less			5	21 (18 - 21)			
Local Authority home help ²							
No	19	19 (7 - 21)	0.766	18	20 (16 - 21)	0.374	0.780
Yes	25	20 (8 - 21)		30	20 (2 - 21)		
Day center ²							
No	33	21 (7 - 21)	0.103	43	20 (2 - 21)	0.222	0.425
Yes	12	19 (8 - 21)		5	20 (17 - 21)		
Hospital admittance ²							
No	38	20 (7 - 21)	0.780	38	20 (13 - 21)	0.496	0.316
Yes	7	19 (17 - 21)		10	19.5 (2 - 21)		

* Kruskal-Wallis1 and Mann-Whitney2 test, # Interaction rank transform ANOVA.

Table 3. Rand-36 Comparison in the Two Study Groups

Rand-36	ATC	ORP	P*
	Median (range)	Median (range)	
Physical functioning	45 (0 - 95)	55 (0 - 95)	0.301
Social functioning	87.5 (25 - 100)	100 (0 - 100)	0.836
Role limitations - physical	50 (0 - 100)	25 (0 - 100)	0.012
Role limitations - emotional	100 (33.3 - 100)	100 (0 - 100)	0.552
Mental Health	82 (12 - 100)	76 (24 - 100)	0.086
Vitality	65 (0 - 100)	65 (20 - 100)	0.727
Bodily Pain	100 (34.7 - 100)	100 (10.2 - 100)	0.673
General Health	65 (15 - 100)	50 (5 - 100)	0.042

*Mann-Whitney test.

the ATC and the ORP groups. HRQOL is nearly identical in these two groups, except for two health scales. The ATC group has significantly better HRQOL for the 'role limitations - physical' and 'general health' health scales.

Two aspects of the RAND-36 were related to level of dependence in personal activities of daily living (BI). There is a high correlation with the 'physical functioning' health scale (ATC: $R = 0.850$; ORP: $R = 0.593$) and a moderate correlation with 'role-limitations physical' health scale ($R = 0.329$) in the ATC group.

Tables 4 and 5 present the relationship between HRQOL and change in activities. Patients who stopped or reduced activities such as housekeeping, physical exercise, hobbies or visiting presented significantly worse HRQOL.

We also investigated whether there was an interaction effect between the groups and the change in activities in the RAND-36 (Table 6). There is only one significant interaction effect between housekeeping and the ATC and ORP groups for the RAND-36 ($P = 0.046$).

Daily occupations

Quitting or doing less of certain activities such as housekeeping, physical activity, hobbies and visiting is significantly related to physical functioning and HRQOL for both groups. The percentages of patients who had to stop or diminish activities are presented in Table 7.

Medication

The use of medication is important in secondary prevention. One year post stroke, 51% (ATC) and 36% (ORP) used the same medication as at discharge from hospital.

One year post stroke, 60% of the ATC group used aspirin. On discharge from hospital, this percentage was 69%. Thirty-six percent used aspirin and dipyridamole in combination. Thirty-one percent of the ATC patients used acenocoumarol. Two percent used no blood-thinning medication at all.

In the ORP group, 8% used no blood-thinning medication at all. Sixty-nine percent used aspirin. Nineteen percent used aspirin and dipyridamole in combination. Twenty-one percent used acenocoumarol.

Another important group of drugs are the cholesterol-lowering medications. Use of simvastatin decreased over one year. No cholesterol-lowering medication was used in 33% of the ATC and 29% of the ORP group.

In both groups, 80% of patients use antihypertensive medication after stroke. The most frequently used medication is a thiazide diuretic (42% ATC and 38% of the ORP group). Forty-four percent of the patients said their blood pressure was never measured in the year preceding the interview.

There are no significant differences in medication use between the two rehabilitation groups.

Follow-up care

Patients were asked how often they visited their GPs. Seven percent ($N = 3$) of the ATC group and no-one from the ORP group said they had no contact with their GP. Many patients would like their GP to visit them more often.

Seventy-one percent of the patients from the two groups received physiotherapy. In both groups 30% had occupational therapy and 30% had speech therapy.

In the ATC group 33% had district nursing service, as

Table 4. ATC Group; Relationship Between HRQOL and Change in Activities

Variables	FF	P	SF	P	RLF	P	RLe	P	MH	P	Vit	P	BP	P	GH	P
House-Keeping ¹																
As much	77.5	<0.001	75	0.244	75	0.071	100	0.421	78	0.704	75	0.593	100	0.102	70	0.939
Less	45		100		50		100		84		65		89.8		65	
Quit	10		75		25		100		84		60		94.9		65	
Physical activity ¹																
As much	72.5	<0.001	100	0.120	87.5	0.006	100	0.808	84	0.615	67.5	0.037	100	0.014	75	0.075
Less	35		81.3		37.5		100		82		67.5		89.8		65	
Quit	2.5		62.5		25		100		62		32.5		100		32.5	
Hobbies ¹																
As much	70	0.003	100	0.005	75	0.069	100	0.258	80	0.312	70	0.072	100	0.724	70	0.006
Less	45		75		50		100		86		60		94.9		55	
Quit	20		62.5		25		100		76		50		100		40	
Visiting ¹																
As much	70	<0.001	100	0.220	75	0.011	100	0.782	84	0.890	70	0.245	100	0.864	70	0.168
Less	45		75		50		100		80		65		100		65	
Quit	7.5		75		0		100		80		60		100		45	
Day center ²																
Yes	40	0.246	75	0.436	50	0.568	100	0.601	84	0.643	60	0.558	100	0.877	60	0.558
No	55		100		50		100		80		70		100		70	

Results of the Kruskal-Wallis¹ or Mann-Whitney² test. FF: median physical functioning, SF: median social functioning, RLF: median role limitations - physical, RLe: median role limitations - emotional, MH: median mental health, Vit: median vitality, BP: median bodily pain, GH: median general health.

Table 5. ORP Group; Relationship Between HRQOL and Change in Activities

Variables	FF	P	SF	P	RLF	P	RLe	P	MH	P	Vit	P	BP	P	GH	P
House-Keeping ¹																
As much	60	0.001	87.5	0.557	25	0.660	100	0.798	84	0.300	70	0.164	100	0.742	65	0.106
Less	60		100		25		100		76		60		88.8		45	
Quit	20		75		25		100		72		55		77.6		40	
Physical activity ¹																
As much	70	0.045	100	0.009	50	0.008	100	0.153	80	0.104	70	0.179	100	0.352	65	0.208
Less	52.5		75		25		100		72		60		88.8		42.5	
Quit	25		75		25		100		72		65		100		50	
Hobbies ¹																
As much	60	0.124	100	0.155	75	0.006	100	0.904	80	0.035	70	0.324	100	0.944	65	0.274
Less	60		87.5		50		100		76		65		100		50	
Quit	35		75		25		100		72		45		100		40	
Visiting ¹																
As much	55	0.066	100	< 0.001	25	< 0.001	100	0.707	76	0.559	70	0.045	79.6	0.355	65	0.222
Less	42.5		62.5		0		100		74		60		100		45	
Quit	0		12.5		0		100		72		25		100		20	
Day center ²																
Yes	50	0.648	62.5	0.019	0	0.036	100	0.529	64	0.099	45	0.599	77.6	0.658	35	0.279
No	55		100		25		100		76		65		100		50	

Results of the Kruskal-Wallis¹ or Mann-Whitney² test. FF: median physical functioning, SF: median social functioning, RLF: median role limitations - physical, RLe: median role limitations - emotional, MH: median mental health, Vit: median vitality, BP: median bodily pain, GH: median general health.

Table 6. RAND-36 Interactions Between the ATC and ORP Groups and Activities

HRQOL	Activities	P#
Physical functioning	Housekeeping	0.046
	Physical activity	0.128
	Hobbies	0.164
	Visiting	0.870
	Day centre	0.695
Social functioning	Housekeeping	0.860
	Physical activity	0.256
	Hobbies	0.430
	Visiting	0.063
	Day centre	0.141
Role limitations – physical	Housekeeping	0.701
	Physical activity	0.804
	Hobbies	0.190
	Visiting	0.142
	Day centre	0.154
Role limitations – emotional	Housekeeping	0.564
	Physical activity	0.321
	Hobbies	0.367
	Visiting	0.892
	Day centre	0.847
Mental health	Housekeeping	0.218
	Physical activity	0.312
	Hobbies	0.607
	Visiting	0.808
	Day centre	0.131
Vitality	Housekeeping	0.732
	Physical activity	0.079
	Hobbies	0.718
	Visiting	0.412
	Day centre	0.882
Bodily pain	Housekeeping	0.634
	Physical activity	0.289
	Hobbies	0.847
	Visiting	0.565
	Day centre	0.622
General health	Housekeeping	0.351
	Physical activity	0.281
	Hobbies	0.424
	Visiting	0.834
	Day centre	0.471

Interaction rank transform ANOVA.

Table 7. Change in the Frequency of Daily Occupations

Daily Occupations	ATC (%)	ORP (%)	P*
Housekeeping			
The same	35.6	31.3	0.459
Less	42.2	54.2	
Quit	22.2	14.6	
Physical exercise			
The same	35.6	35.4	1.000
Less	55.6	54.2	
Quit	8.9	10.4	
Hobbies			
More	2.2	0	0.328
The same	46.7	43.8	
Less	40.0	33.3	
Quit	11.1	22.9	
Visiting			
The same	44.4	64.6	0.041
Less	42.2	33.3	
Quit	13.3	2.1	
Holidays			
The same	62.2	45.8	0.047
Less	17.8	10.4	
Quit	20.0	43.8	

* Fisher's exact test.

did 45% of the ORP. Forty-three percent of the ATC group and 38% of the ORP group did not receive local authority home help.

In the ATC group 27% of the patients visited day centres. Only 10% of the ORP group visited day centre. Fourteen percent (ATC) and 18% (ORP) had suffered from another stroke.

Discussion

The aim of this study was to compare the wellbeing one year post stroke of patients treated by the ATC team with patients who had followed the ORP to determine if the ATC follow-up care realizes better outcomes.

The two groups were readily comparable because there were no significant differences in their NIHSS, age, stroke location and risk factors.

This study has several limitations. The study groups were relatively small because of selection criteria. To make stronger generalizations, the study group should be larger and patients from multiple nursing homes should be studied. The participants were distributed to two treatments in

the basis of time entering the study. Although the practitioners in the different programs were the same, we could not completely rule out the confounding factor time entering the rehabilitation programs. Furthermore, the study groups had a very high mean age, thus decline in functioning is possibly partially due to normal aging. Finally, patients who refused to participate in this study were not considered. These patients told us that they were doing fine and that a visit was not necessary. Theoretically, these patients could be those whose physical and psychological functioning is very bad.

One of this study's strengths is the method of data acquisition. We visited patients at home to complete the questionnaires together. A lot of information is obtained through conversation, not only through the actual talking but also by being able to demonstrate. Another strength is the fact that one researcher visited all the patients and that we used standardized questionnaires. This avoids different interpretation of the results.

Our research showed no significant difference in ADL independence after one year between the ATC group and the ORP group. Like other studies [17], there is a relationship between ADL independence and daily occupations in both groups. Paying attention to this in rehabilitation is important

[18, 19].

In the ATC group there is a relationship between ADL independence and loss of social contacts. This has also been observed in other studies [20, 21]. In the ORP group no relationship was found. We expected the opposite because more attention is paid to this aspect in the ATC programme. A possible explanation is that when more attention is paid to this problem, people experience more loss of social contacts. Life satisfaction is significantly related to social activity and ADL independence [22-24], this should therefore receive extra attention in rehabilitation.

HRQOL was studied with the RAND-36. Unfortunately, the HRQOL was only measured one year post stroke. HRQOL was nearly identical in the two groups. The ATC group only had better HRQOL in 'role limitations – physical' and 'general health' health. HRQOL and ADL independence were correlated. Worse ADL independence correlates to worse 'physical functioning' and 'role-limitations physical'. Other studies also show such a relationship [25-28]. Physical impairment has a great impact on reintegration of stroke patients in society. HRQOL is raised with improvement in physical state, and patients are more easily reintegrated into society [27].

The HRQOL in both groups was high. The studies of Kauhanen et al (2000) and Carod-Artal et al (2000) report lower HRQOL after one year. They possible studied more severely impaired stroke patients, because they included all ischemic stroke patients. In contrast, in our study the mean age was higher [25, 29]. In a study by Shyu et al (2009), older ischemic stroke patients were interviewed at home, but these patients seem to have also had lower HRQOL [28].

There was a significant difference between the ATC group and ORP group with respect to holidays and visiting. Patients in the ATC group more frequently reported that their vacation habits were unchanged. This is possibly due to the fact that going on holidays was specifically trained in the ATC rehabilitation. Patients in the ORP group were more often able to continue visiting family and friends. We have no good explanation for this, because the ATC group specifically trained visiting in rehabilitation.

A diminished QOL is significantly related to quitting or doing less of certain activities such as housekeeping, physical activity, hobbies and visiting in both groups. HRQOL could possibly increase further were patients to receive even more support than was given in the ATC rehabilitation to resume different activities. Another option would be to start community-based rehabilitation programmes. This could increase stroke patients' activity levels and give them greater satisfaction [30-33], although this was not found in the ATC group.

There is no significant difference in medication use between the two rehabilitation groups. We would have expected a stricter use of medication in the ATC group because of more intensive assistance.

Although there are no significant differences in medication use, in the ATC group more patients were using the same medicine as they had done on discharge from their nursing homes compared to the ORP group. One year post stroke more patients from the ORP group used no blood-thinning medication at all. Of the ATC group, fewer patients used aspirin, but more used aspirin and dipyridamole in combination, or acenocoumarol. When patients use aspirin, the risk of further stroke decreases by 13-22% [34]. The use of aspirin is recommended to every stroke patient and patients with atrial fibrillation should use acenocoumarol [35]. When dipyridamole or clopidogrel is added to aspirin, it will result in a relative risk reduction of 16% for vascular death, stroke or heart attack [36]. All in all, there seems to be better use of blood-thinning medication in the ATC group. Some minor aspects can be adjusted, such as adding dipyridamole to aspirin. However, this only concerns small percentage of patients.

Use of simvastatin decreased over one year. This is possibly due to negative publicity. Less cholesterol-lowering medication is used by the ATC group, though these patients get more assistance in using medicine. Almost everyone should use cholesterol-lowering medication unless life expectancy based on comorbidity is minimal. The risk of cardiovascular disease is reduced by statins, regardless of cholesterol levels. With respect to fatal and non-fatal cardiovascular disease through statin use, an absolute risk reduction of 5-6% is achieved. Treatment with statins even in elderly patients will reduce the risk of cardiovascular disease [34, 35, 37].

Eighty percent of patients from both groups used antihypertensive medication, but 44% said their blood pressure had never been measured in the year preceding the interview. It is important to check blood pressure regularly. A reduction of 5 - 6 mmHg in diastolic blood pressure or 10 mmHg in systolic pressure results in a 24% reduction in the chances of stroke recurrence [34].

Seven percent of the ATC group and 0% of the ORP group reported that they had received no post-stroke contact with their GPs. This could be explained by the fact that patients from the ATC group receive a lot of assistance from others, meaning that GPs are under the impression that contact with them is less necessary.

Turning to follow-up care, many patients (71% ATC and 71% ORP) received physiotherapy. Thirty percent of both groups received occupational therapy and 30% received speech therapy. Follow-up care is very important because early initiation of rehabilitation is related to improved functional outcome and physiotherapy based on different approaches has a greater impact on functional independence than no therapy at all [38-40]. Because patients from ATC group received more specific guidance and therapy we would expect that functioning would be much better than in the ORP group. However, in this study this was not found.

Harrington (2009) showed that low-cost 'exercise and education' intervention was successful in improving physical integration, when compared with standard care [41].

The same percentage of patients in the ATC and ORP group received district nursing service and local authority home help. Although the assistance provided for the two groups is different, there is no difference in using these two services. A lot more patients from the ATC group visited a day centre. This is probably due to the fact that patients from the ATC group receive more information about day centre care and are encouraged use it.

Fourteen percent (ATC) and 18% (ORP) suffered from another stroke. In a study by Appelros et al (2003), 9% of survivors experienced another stroke within one year [42]. This percentage is lower than our findings. The number of patients with stroke recurrence is too small to investigate whether there is a relationship between the quality of follow-up care and the occurrence of a second stroke.

Mortality differs slightly between the two groups (ATC 9.4%, ORP 16.6%), but is still relatively low. Mortality in other studies is about 30% [5, 43, 44]. Mortality is probably low because the severity of stroke was also low in terms of NIHSS score on admission to hospital. There is a relationship between higher NIHSS score and higher mortality [45, 46].

All in all, no great difference in outcome between the two groups could be found. We expected that patients with better follow-up care specifically aimed at conservation of activities would ultimately result in better dependency in ADL, HRQOL and participation. Other research confirms this idea [47, 48] but these studies used small groups and mainly explored physical activity and the resources required to reconstruct their lives. However, ATC follow-up care seems of little added value compared to conventional follow-up care. In order to increase participation and improve QOL, a different type of follow up is required. Perhaps studying the individual needs of stroke patient would be more effective than a standard follow-up care programme. This needs further investigation in stroke patients.

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