Factors contributing to health care utilization and health care costs in the long term after stroke. Secondary results from the Life After Stroke (LAST) study, a pragmatic randomized controlled trial

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SUBJECT AREAS

KEYWORDS

stroke, economics, cost, health care utilisation, quality of life

Abstract

Background The result from the Life After Stroke (LAST) study showed that an 18-month follow up program as part of the primary health care, did not improve maintenance of motor function for stroke survivors. In this study we evaluated whether the follow-up program could lead to a reduction in the use of health care compared to standard care. Furthermore, we analyse to what extent differences in health care costs for stroke patients could be explained by individual need factors (such as physical disability, cognitive impairment, age, gender and marital status), and we tested whether a generic health related quality of life (HRQoL) is able to predict the utilisation of health care services for patients post-stroke as well as more disease specific indexes.

Methods The Last study was a multicentre, pragmatic, single-blinded, randomized controlled trial. Adults (age ≥ 18 years) with first-ever or recurrent stroke, community dwelling, with modified Rankin Scale < 5 . The study included 380 persons recruited 10 to 16 weeks post-stroke, randomly assigned to individualized coaching for 18 months (n=186) or standard care (n=194). Individual need was measured by the Motor assessment scale (MAS), Barthel Index, Hospital Anxiety and Depression Scale (HADS), modified Rankin Scale (mRS) and Gait speed. HRQoL was measured by EQ-5D-5L. Health care costs were estimated for each person based on individual information of health care use. Multivariate regression analysis was used to analyse cost differences between the groups and the relationship between individual costs and determinants of health care utilisation.

Results There were higher total costs in the intervention group. MAS, Gait speed, HADS and mRS were significant identifiers of costs post-stroke, as was EQ-5D-5L. **Conclusion** Long term, regular individualized coaching did not reduce health care costs compared to standard care. We found that MAS, Gait speed, HADS and mRS were significant predictors for future health care use. The generic EQ-5D-5L performed equally well as the more detailed battery of outcome measures, suggesting that HRQoL measures may be a simple and efficient way of identifying patients in need of health care after stroke and targeting groups for interventions. Clinical Trial Registration: <https://www.clinicaltrials.gov> NCT01467206.

Full Text

Due to technical limitations, full-text HTML conversion of this manuscript could not be completed.

However, the manuscript can be downloaded and accessed as a PDF.

Tables

Table 1. Baseline demographic and clinical characteristics.

	Intervention group (n=186)	Control group (n=194)
Predisposing variables		
Age (years), y, mean (SD)	71.7 (11.9)	72.3 (11.3)
Age ≥ 80 - n (%)	44 (23.7)	53 (27.3)
Gender Female - n (%)	82 (44.1)	67 (34.5)
Enabling variables		
Living alone - n (%)	56 (30.1)	51 (26.3)
Need variables		
MAS, mean (SD)*	41.8 (6.9)	41.7 (7.4)
Gait speed mean (SD)*	1.29 (0.55)	1.36 (0.60)
MMSE, mean (SD)*	27.9 (2.32)	28.0 (2.30)
HADS, mean (SD)*	6.6 (5.3)	7.2 (6.1)
Barthel, mean (SD)*	96.3 (7.4)	96.1 (9.2)
mRS, mean (SD)	1.45 (1.08)	1.44 (1.10)
EQ-5D-5L, mean (SD)*	0.83 (0.16)	0.83 (0.17)
Costs		
Grand total, mean (SD)	23 126 (30 780)	20 412 (32 114)
Grand total ex intervention, mean (SD)	21 646 (32 114)	
Hospital, mean (SD)	9 453 (16 936)	9 201 (13 199)
<i>Out-patients', mean (SD)</i>	2 325 (3 430)	1 796 (1 829)
<i>In-patients' day, mean (SD)</i>	203 (609)	214 (866)
<i>In-patients', mean (SD)</i>	6 925 (15 413)	7 191 (12 814)
Primary care, mean (SD)	9 551 (20 748)	8 491 (23 792)
<i>Home care, mean (SD)</i>	6 117 (15 101)	6 054 (18 222)
<i>Nursing home, mean (SD)</i>	3 434 (12 270)	2 437 (10 970)
Physiotherapists, mean (SD)	3 169 (3 366)	1 667 (3 412)
Physiotherapists ex intervention, mean (SD)	1 689 (3 166)	
GP's, mean (SD)	953 (847)	1 053 (947)

*Results from the pooled data. SD-Standard Deviation. MAS- Motor Assessment Scale; MMSE-Mini-Mental State Examination; HADS - Hospital Anxiety and Depression Scale (HADS A and D); mRS-modified Rankin Scale; modified Rankin Scale (mRS); Health Related Quality of Life (EQ-5D-5L).

Table 2: Regression results* of individual cost coefficient measured as proportion increase in cost with one unit increase, with 95% CI, n=380

	Total costs	Primary care	Hospital care	GP
Intervention	0.31† (0.05 – 0.64)	-0.12 (-0.85 – 4.55)	-0.61 (-0.89 – 0.12)	-0.22 (-0.42 – 0.0)
Need variables				
MAS	-0.04† (-0.07 – -0.01)	-0.43† (-0.66 – -0.21)	-0.03 (-0.15 – 0.10)	0.01 (-0.03 – 0.0)
Gait speed	-0.41† (-0.63 – -0.18)	-1.87† (-3.69 – -0.04)	-1.53† (-2.57 – -0.50)	-0.29† (-0.57 – -0.0)
MMSE	-0.04 (-0.09 – 0.01)	0.17 (-0.22 – 0.55)	0.04 (-0.18 – 0.27)	-0.04 (-0.10 – 0.0)
HADS	0.03† (0.00 – 0.05)	0.12 (-0.06 – 0.29)	-0.01 (-0.11 – 0.09)	0.04† (0.01 – 0.0)
Barthel	-0.003 (-0.02 – 0.02)	0.08 (-0.10 – 0.25)	0.03 (-0.07 – 0.13)	0.01 (-0.02 – 0.0)
mRS	0.27† (0.12 – 0.43)	1.57† (0.29 – 2.86)	0.71 (-0.03 – 1.46)	0.23† (0.02 – 0.4)
Predisposing variables				
Age 60-69	0.14 (-0.22 – 0.66)	-0.11 (-0.96 – 17.90)	-0.39 (-0.90 – 2.61)	0.17 (-0.28 – 0.9)
Age 70-79	0.15 (-0.19 – 0.65)	9.28 (-0.42 – 181)	-0.44 (-0.90 – 1.97)	0.50 (-0.05 – 1.3)
Age 80-89	0.40 (-0.05 – 1.08)	1 790† (74.8 – 42 255)	-0.79 (-0.97 – 0.33)	0.45 (-0.12 – 1.4)
Age 90+	0.40 (-0.32 – 1.86)	1 334† (3.28 – 416 044)	-0.97 (-1.00 – -0.12)	-0.22 (-0.69 – 0.9)
Gender	-0.02 (-0.24 – 0.26)	0.68 (-0.78 – 11.82)	0.48 (-0.54 – 3.83)	0.03 (-0.25 – 0.4)
Enabling variables				
Living alone	0.35† (0.03 – 0.77)	14.28† (0.75 – 132.5)	-0.24 (-0.78 – 1.69)	-0.15 (-0.40 – 0.1)
Other variables				
Asker	0.66† (0.19 – 1.32)	1.24 (-0.85 – 91.98)	6.96† (0.67 – 37.04)	0.22 (-0.21 – 0.8)
Bærum	0.71† (0.31 – 1.25)	0.81 (-0.80 – 15.15)	8.04† (1.54 – 31.28)	0.29 (-0.09 – 0.8)
Constant	13.70† (11.40 – 16.01)	-1.34 (-19.88 – 17.20)	6.68 (-4.12 – 17.49)	8.48 (5.54 – 11.4)
Adj. R-square	36.7	37.6	7.8	7.8

*Results from the pooled regression †P<0.05

Table 3: Regression results* of individual cost coefficient measured as proportion increase in cost with one unit increase, with 95% CI, n=380

	Total costs	Primary care	Hospital care	GP
Intervention	0.35† (0.06 – 0.71)	-0.09 (-0.86 – 5.10)	-0.56 (-0.85 – 0.26)	-0.21 (-0.41 – 0.00)
Need variables				
EQ-5D-5L	-3.50† (-4.26 – -2.75)	-18.59† (-24.68 – -12.57)	-4.51† (-7.83 – -1.20)	-2.15 (-3.05 – -1.25)
Predisposing variables				
Age 60-69	0.42 (-0.05 – 1.12)	1.48 (-0.90 – 61.93)	-0.11 (-0.85 – 4.34)	0.29 (-0.21 – 1.00)
Age 70-79	0.47† (0.01 – 1.14)	34.64† (0.76 – 719.8)	-0.08 (-0.83 – 3.86)	0.63† (0.04 – 1.50)
Age 80-89	1.23 (0.48 – 2.36)	30 654† (1162 – 808 187)	-0.52 (-0.92 – 1.96)	0.71† (0.05 – 1.70)
Age 90+	0.92 (-0.11 – 3.15)	4582.7† (9.21 – 2 058 054)	-0.96 (-1.00 – 0.25)	-0.14 (-0.65 – 1.10)
Gender	0.06 (-0.19 – 0.38)	1.56 (-0.69 – 20.24)	0.84 (-0.45 – 5.22)	0.11 (-0.19 – 0.50)
Enabling variables				
Living alone	0.35† (0.01 – 0.80)	15.76† (0.67 – 167.5)	-0.15 (-0.76 – 2.06)	-0.17 (-0.41 – 0.10)
Other variables				
Asker	0.50† (0.07 – 1.12)	-0.29 (-0.95 – 9.97)	7.35† (0.53 – 37.16)	0.27 (-0.16 – 0.90)
Bærum	0.60† (0.23 – 1.09)	-0.27 (-0.91 – 5.08)	8.06† (1.82 – 28.16)	0.33 (-0.03 – 0.80)
Constant	13.39† (12.66 – 14.12)	7.41† (1.58 – 13.24)	11.74† (8.52 – 14.96)	10.09† (9.22 – 10.96)
Adj. R-square ¹	28.2	29.8	5.2	7.1

*Results from the pooled regression †P<0.05

Figures

Figure 1a

Figure 1b

Figure 1c

Figure 1

Patients sorted due to individual cost. Figure 1a) Increasing total cost per patient measured in Euro, average=21741€; Figure 1b) Increasing primary cost per patient measured in Euro, average=9010€; Figure 1c) Increasing hospital cost per patient measured in Euro, average=9324€

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