Received: 10 December 2021 | Accepted: 13 June 2022

DOI: 10.1111/scs.13101

Scandinavian Journal of Caring Sciences

EMPIRICAL STUDIES

Effects of a lifestyle counselling intervention on adherence to lifestyle changes 7 years after stroke – A quasi-experimental study

Anne Oikarinen PhD, University Lecturer in Nursing Science[1] | **Janne Engblom DSc, Lecturer in Statistics**[2] | **Leila Paukkonen MSc, Doctoral Candidate**[1,3] | **Maria Kääriäinen PhD, Professor of Nursing Science**[1,3] | **Pirjo Kaakinen PhD, University Lecturer in Nursing Science**[1] | **Outi Kähkönen PhD, Postdoctoral Researcher**[1]

[1]Research Unit of Nursing Science and Health Management, Faculty of Medicine, University of Oulu, Oulu, Finland

[2]Quantitative Methods in Management, Turku School of Economics University of Turku, Turku, Finland

[3]Northern Ostrobothnia Hospital District, Oulu, Finland

Correspondence
Anne Oikarinen, Research Unit of Nursing Science and Health Management, Faculty of Medicine, University of Oulu, Oulu FI-90014, Finland.
Email: anne.oikarinen@oulu.fi

Funding information
This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Abstract

Background: Adherence to medication and healthy lifestyle is crucial for preventing secondary strokes and other vascular events. However, there is not enough evidence on the long-term effects of hospital-initiated lifestyle counselling.

Aim: To determine the effects of The Risk Factor Targeted Lifestyle Counselling Intervention, which is implemented during acute hospitalisation, on adherence to lifestyle changes 7 years after stroke or TIA.

Methods: Quasi-experimental design with 7-year follow-up period. Baseline data ($n = 150$) were gathered from a neurology unit in Finland between 2010 and 2011. Patients received either the studied intervention ($n = 75$) or the prevailing form of counselling at the time ($n = 75$). Data concerning lifestyle and clinical values were measured at the baseline time point, while adherence to lifestyle changes was assessed 7 years later (2017–2018). Analysis of covariance and multivariate ordinal logistic regression were used to describe the mean differences between the intervention and control groups.

Results: Several between-group differences were detected, namely, members of the intervention group reported consuming less alcohol and having lost more weight during hospitalisation relative to the control group. No between-group differences in the prevalence of smokers were found, but the intervention group reported a greater number of daily cigarettes than the control group. Adherence to medication, importance of adherence to a healthy lifestyle, support from family and friends, and support from nurses were all significantly higher in the intervention group than in the control group.

Conclusions: The results suggest that the lifestyle counselling intervention was effective in decreasing alcohol use and weight, as well as increasing factors that are known to support adherence to a healthy lifestyle.

This is an open access article under the terms of the Creative Commons Attribution License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.
© 2022 The Authors. *Scandinavian Journal of Caring Sciences* published by John Wiley & Sons Ltd on behalf of Nordic College of Caring Science.

Relevance to clinical practice: The results indicate that the adherence process already begins during acute phase counselling. To ensure long-lasting lifestyle changes, counselling should be started at the hospital, after which it can be provided by friends and family members.

KEYWORDS

adherence, counselling, healthy lifestyle, intervention, stroke, transient ischemic attack

INTRODUCTION

Stroke is a worldwide challenge for public health and a major cause of severe disability in the adult population [1, 2]. In 2017, there were 1.1 million incidents of stroke in the European Union and a total of 9.5 million stroke survivors. Furthermore, it has been estimated that 7.1 million disability-adjusted life years have been lost because of stroke [3]. The incidence rate of stroke is expected to remain high because of the aging population [1, 3]. For example, it has been estimated that the number of people living with stroke in the European Union will increase by 27% between the years 2017 and 2047; this increase is mainly attributed to an aging population and improved survival rates [3]. Due to the high risk for new vascular events, the period immediately following a stroke incident is a crucial time for initiating secondary prevention [4, 5]. Earlier studies suggest that up to 80%–90% of secondary strokes could be prevented by determining the known risk factors of each patient [6, 7]. The main modifiable risk factors are related to lifestyle, namely, unhealthy diet, psychological stress, being overweight, smoking, excessive use of alcohol, and certain clinical conditions, e.g., hypertension, diabetes, hyperlipidaemia, and atrial fibrillation [2, 8]. Therefore, adherence to both medication [8, 9] and a healthy lifestyle [3, 7] plays a significant role in the secondary prevention of stroke and other vascular diseases.

Non-adherence to secondary prevention practices after a stroke continues to be one of the key challenges in stroke care management [3, 7, 10]. For instance, it is recognised that stroke patients do not generally adhere to both medication and a healthy lifestyle over the long term [8, 11]. In this context, adherence means that a stroke or TIA patient adopts an active, intentional, and responsible process of self-care during which they maintain their overall health in close co-operation with health-care professionals [12–14]. Although good adherence is challenging, some factors, such as support from family and friends [15–18], support from health-care personnel [13, 15, 17], and versatile knowledge about the illness [18], have been associated with better adherence among patients with chronic illnesses in earlier studies. Furthermore, motivation and individual resources have been proven to influence the extent to which a patient feels responsible about adherence to care [18, 19].

However, stroke patient counselling is challenging in the hectic clinical environment and with hospital stays becoming shorter and shorter. In an ideal scenario, stroke patient lifestyle counselling is interactive and patient-centered, as well as carefully planned and implemented with sufficient resources. The counselling should provide versatile information on the secondary prevention of stroke in a way that will affect a patient's lifestyle behaviour over the long term [13]. The provision of counselling has also been associated with improvements in overall quality of life [20, 21], decreased post-stroke depression [22], better motivation for self-care [13, 21], and increased stroke knowledge [23, 24]. Earlier studies also suggest that certain elements of the counselling provided during the acute hospitalisation phase, such as interactions [13, 21], and the resources of health-care personnel, are connected to later adherence to a healthier lifestyle [13]. The health-care professionals who counsel stroke patients about self-management strategies need to have versatile competences [25]. Earlier research has investigated how nurse-led lifestyle counselling interventions affect adherence to lifestyle changes [5, 26–30]. However, only a few effective and long-term follow-up studies of adherence can be identified from the literature [31, 32]. Therefore, this is a topic that clearly warrants further attention [5]. The present study aimed to determine how the Risk Factor Targeted Lifestyle Counselling Intervention (RFTLC), which is implemented during acute hospitalisation, influences adherence to a healthy lifestyle 7 years after stroke or TIA. It was hypothesized that: (1) the intervention and control groups will differ in lifestyle-related outcomes; and (2) the intervention and control groups will differ in adherence-related outcomes.

METHODS

Study design

This research employed a quasi-experimental, nonequivalent control group pretest-posttest design with a 7-year

follow-up period [33]. A total of 150 patients participated the study. Patients ($n = 75$) in the control group received the prevailing type of counselling at the time of the research, whereas patients in the intervention group ($n = 75$) received the RFTLC-intervention at the hospital before discharge. Patients who were treated before the intervention constituted the control group, and they received counselling with the prevailing counselling practice. Baseline data concerning lifestyle were collected at the hospital, and adherence to a healthy lifestyle was then evaluated 7 years after discharge ($n = 84$). The Transparent Reporting of Evaluations with Nonrandomized Designs checklist (TREND) guided the research and reporting process [34].

Participants and data collection

The study data were collected from a Finnish acute neurological care unit (2010–2011). The follow-up data were gathered 7 years after the intervention using postal questionnaires (2017–2018). The flowchart of the patients and study design are shown in Figure 1. Patients at the acute neurological care unit were eligible to participate in the study if they had a diagnosis of stroke or TIA, were expected to be discharged home straight from the hospital, were aged between 18 and 65, and were able to communicate and fill in the questionnaires themselves in Finnish. Additionally, the patients were required to give informed consent if they were to participate in the study. Patients with aphasia or confusion were excluded from the study.

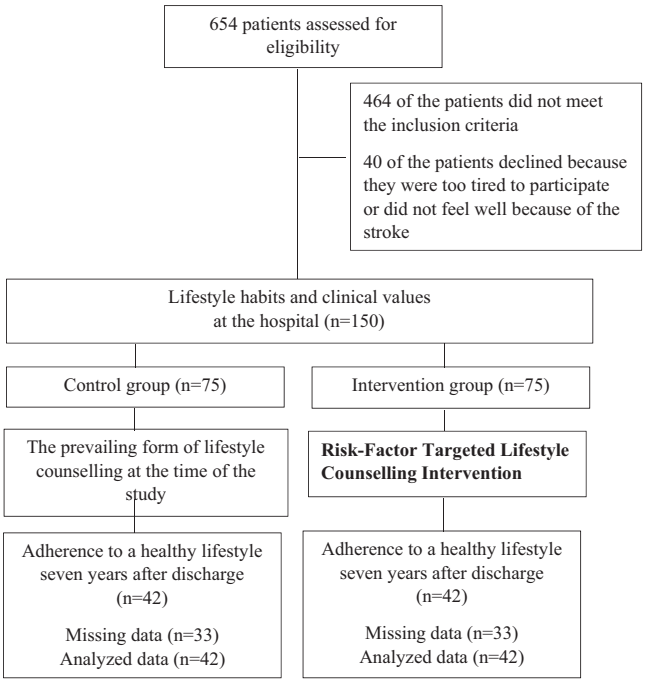

FIGURE 1 A representation of the study flow

Of the 654 patients who were admitted to the neurological care unit, 190 were eligible to participate in the study. Of these patients, 40 declined to participate. The estimation of adequate sample size ($n = 150$) was originally based on what was reported in previous studies. However, a post-hoc power analysis was also conducted. A sample of 150 patients, including follow-up responses, was found to be adequate for detecting clinically moderate differences through ANOVA at the 5% significance level and with at least 80% statistical power. Hence, the sample used in the present study was large enough to perceive statistically significant differences concerning most of the studied outcomes.

Instruments and measures of the study

At the baseline time point, the Lifestyle Questionnaire was used to measure the patients' lifestyle habits, clinical values, and sociodemographic factors [35, 36]. The questionnaire is a self-administered questionnaire including both multiple-choice and dichotomous questions concerning the background and respondents' weight control (3 items), smoking habits (5 items), nutritional habits (16 items), physical activity (11 items), stress management (2 items), alcohol consumption (4 items), and adherence to medication (4 items). Further, clinical outcomes; BMI, systolic and diastolic blood pressure, and glucose (fingertip), were measured by the researcher during the baseline data gathering process. These outcomes during the follow-up period were reported by the patients themselves. A combined self-administered questionnaire, Adherence to Healthy Lifestyle Questionnaire was used to assess the patients' adherence to a healthy lifestyle 7 years after discharge from the hospital. The questionnaire is based on two instruments, the first of which is the Adherence of People with Chronic Disease instrument. This instrument is widely used and has shown high validity (construct and criterion validity) and reliability (internal consistency), with Cronbach's α-values ranging from 0.69–0.91 [12, 37]. The combined Adherence to Healthy Lifestyle Questionnaire also included the Lifestyle instrument (same as in baseline), which has been widely used in previous studies to examine cardiovascular risk factors through population-based health surveys in Finland [35, 36]. The Adherence to Healthy Lifestyle Questionnaire used in this study included items, which respondents scored using a five-point Likert scale (1-strong agreement, 5-strong disagreement), as well as multiple dichotomous questions about adherence to lifestyle change (8 items) and the factors related to adherence such as motivation (4 items), perceived meaning of lifestyle change (5 items), support received from family and friends (4 items), and

support received from doctors (2 items) and nurses (3 items) at the hospital.

Outcome measures

Lifestyle-related outcomes

Body mass index (BMI, weight + height), systolic and diastolic blood pressure, waist circumference, blood glucose (fingertip), physical activity, weight management, diet, stress management, alcohol consumption, and smoking.

Adherence-related outcomes

Adherence to medication, adherence to a healthy lifestyle, motivation to change lifestyle behaviour, importance of lifestyle changes, support from family and friends, support from doctors, and support from nursing personnel.

Intervention

The RFTLC-intervention consisted of 2 days of education for stroke nurses. During this time, the nurses were educated about lifestyle-related stroke risk factors and ways of discussing individual risk factors in everyday practice. Nurses were educated after control groups' baseline data was collected. The current Finnish National Institute for Health and Welfare guidelines for a healthy lifestyle were used as a knowledge base when planning the education days. Furthermore, nurses ($n = 6$) were individually guided – including a pre-formulated structured conversation – on how to counsel patients before discharge from the hospital. The counselling sessions had the following contents:

- Phase I: Motivating the patient to grasp the importance of adherence to both medication and a healthy lifestyle in secondary prevention, including data that these factors can influence the risk of a new stroke by 80%–90%. The goals for the counselling session were identified and assessed together with the patients.
- Phase II: Recognising possible risk factors (alcohol consumption, smoking, weight management, healthy diet, stress management, and physical activity) together with the patients. Certain questions were pre-formulated to support nurses in the counselling situation.
- Phase III: If the patient needed support in some aspect of their healthy lifestyle, for instance, in quitting smoking, they were shown that adequate resources exist (e.g., contact with a tobacco-free nurse or a discussion about nicotine replacement therapy with a doctor).
- Phase IV: All of the patients received a follow-up booklet about stroke risk factors and their treatment.

Control group patients received the prevailing form of counselling at the time of the research. In practice, this means that these patients received counselling that was not standardised and which could include varying content because the stroke unit had disorganised routines and counselling heavily depended on an individual professional's competence in counselling. The RFTLC intervention has previously been described in detail [38, 39].

Data analysis

The data analysis was conducted with Statistical Analysis Software, version 9.2 (SAS Inc.). Repeated measures analysis of covariance (ANCOVA) was used to test whether changes in the mean values for the two groups were significant. Estimates of ANCOVA and the corresponding 95% confidence intervals are presented in the text. Lifestyle variables, which were not grouped with other variables, were individually analysed with a repeated measures multivariate ordinal logistic regression. This analysis yielded odds ratios (ORs) and 95% confidence intervals (CIs). Covariates (age, intervention, and control groups and gender) were also used in the analyses. If a certain patient had more than 25% data missing, this patient was excluded from the analyses. Missing values were not replaced but coded as blanks. Scores ranged from 1 to 100 for each sum variable. The threshold for statistical significance was set at $p < 0.05$.

RESULTS

Baseline sociodemographic characteristics, clinical values, and lifestyle habits

At baseline, members of the two groups differed in terms of gender and education level (Table 1), as well as in terms of systolic blood pressure (Table 2).

Difference between lifestyle-related outcomes

The results of the data analysis show that hypothesis one was only partially supported (Table 3). For example, members of the intervention group consumed significantly less alcohol than members of the control group (MD: 6.92; $p = 0.022$). There was also a significant between-group difference in weight change during the 7-year follow-up period (OR: 0.69; $p = 0.028$), as members of the intervention

TABLE 1 Sociodemographic characteristics at the time of hospitalisation, organised by group and group differences *n* (%)

Variable	Intervention group (*n* = 75)	Control group (*n* = 75)	Total *n (%)*	*p*
Diagnosis	*n* (%)	*n* (%)	*n* (%)	
TIA	29 (19.3)	32 (21.3)	61 (40.7)	
Stroke	46 (30.7)	43 (28.7)	89 (59.3)	0.480
Age	Mean 56.7 (8.4)	Mean 56.4 (8.3)	Mean 56.5 (SD 8.3)	0.793
First stroke or TIA	63(42)	66(44)	129 (86)	0.248
Gender				
Male	48 (64)	35 (46.6)	83 (55.3)	0.002
Female	27 (36)	40 (53.3)	67 (44.7)	
Marital status				
Single	8 (5.3)	5 (3.3)	13 (8.7)	0.406
Courtship	4 (2.7)	5 (3.3)	9 (6)	
Married/cohabitation/domestic partnership	56 (37.3)	52 (34.7)	108 (72)	
Widowed	1 (0.7)	1 (0.7)	2 (1.3)	
Divorced	6 (4)	12 (8)	18 (12)	
Education				
Basic education (primary and lower secondary)	31 (20.7)	33 (22)	64 (43)	<0.001
Upper secondary education (general or vocational)	22 (14.7)	15 (10)	37 (24.8)	
Upper vocational degree	18 (12)	15 (10)	36 (24.2)	
Polytechnic	0	3 (2)	3 (2)	
Academic degree	4 (2.7)	8 (5.3)	12 (8)	
Working status				
Working	40 (26.7)	29 (19.3)	69 (53.1)	0.167
Retired	18 (12.)	29 (19.3)	47 (36.2)	
Unemployed or laid off	7 (4.6)	7 (4.6)	14 (10.8)	
Other	10 (6.7)	10 (6.7)	20 (13.3)	

Note: n (%) presented. A Chi-square test was used to detect differences between groups for categorical variables, while a *t*-test was used to detect differences in continuous variables (age).

group estimated greater weight loss than members of the control group.

No significant between-group difference in the prevalence of smoking was noted. However, smokers in the intervention group had increased their daily number of cigarettes during the follow-up period (OR: 2.02; $p = 0.034$) relative to control group smokers.

Differences between adherence-related outcomes

Hypothesis two was partially supported by the data (Table 4), i.e., members of the intervention group estimated their adherence to medication significantly higher (MD: 14.26; $p = 0.012$) than members of the control group (Table 4). Furthermore, members of the intervention group understood the importance of adherence to a healthy lifestyle better than members of the control group (MD: 5.20; $p = 0.047$). When compared to statements by the control group, the intervention group reported receiving more support from family and friends (MD: 12.56; $p = 0.001$) as well as nursing personnel (MD: 16.84; $p = 0.003$) during the 7-year follow-up period.

DISCUSSION

The study suggests that the Risk-Factor Targeted Lifestyle Counselling Intervention, which is implemented during

TABLE 2 Differences in the lifestyle habits and clinical values between groups (intervention and control) at baseline (years 2010–2011)

Lifestyle variable	MD (CI 95%) or OR (95% CI)	*p*
BMI[a]	−0.03 (−2.09, 2.03)	1.000
Waist circumference[a]	0.24 (5.45, 5.94)	1.000
Systolic blood pressure[a]	10.17 (2.25, 18.09)	0.004
Diastolic blood pressure[a]	1.75 (−2.55, 6.07)	1.000
Glucose (fingertip)[a]	−0.04 (−0.53, 0.44)	1.000
Physical activity[a]	−3.40 (−14.49,7.68)	1.000
Diet[a]	−1.37 (−10.64, 7.89)	1.000
Alcohol[a]	8.07 (−0.28, 16.43)	0.064
Smoking currently[b]	0.98 (−0.89, 0.85)	1.000
Number of smoked cigarettes per day[b]	2.14 (0.56, 8.13)	0.687
Stress management[b]	0.87 (0.37, 2.00)	1.000
Weight – one's own image[b]	1.13 (0.50, 2.55)	1.000

Note: Covariates: age, intervention and control groups, and gender.

Abbreviations: BMI, body mass index; CI, confidence interval.

[a]MD, mean difference, analysis of covariance.

[b]OR, multivariate ordinal logistic regression.

TABLE 3 Differences in lifestyle-related outcomes between groups (intervention and control) at the 7-year follow-up measurement

Lifestyle variable	MD (95% CI)	*p*
BMI[a]	−0.25 (−1.78/1.27)	0.742
Waist circumference[a]	−0.21 (−4.36/3.93)	0.919
Systolic blood pressure[a]	0.61 (−4.23/5.47)	0.802
Diastolic blood pressure[a]	−0.43 (−2.92/2.06)	0.734
Glucose (fingertip)[a]	−0.09 (−0.40/0.22)	0.565
Physical activity[a]	−1.51 (−8.98/5.95)	0.690
Diet[a]	2.83 (−3.18/8.84)	0.355
Alcohol[a]	6.92 (0.99/12.86)	0.022
Smoking currently[b]	0.79 (0.54/1.17)	0.253
Number of smoked cigarettes per day[b]	2.02 (1.05/3.89)	0.034
Stress management[b]	1.12 (0.81/1.56)	0.477
Weight – one's own image[b]	0.98 (0.70/1.36)	0.916
Weight change during the 7 years[b]	0.69 (0.50/0.96)	0.028

Note: Covariates: age, intervention and control groups, and gender.

Abbreviations: BMI, body mass index; CI, confidence interval.

[a]MD, mean difference, analysis of covariance.

[b]OR, Multivariate ordinal logistic regression.

TABLE 4 Differences in adherence-related variables between the groups (intervention and control) at the 7-year follow-up measurement

	MD (CI 95%)	*p*
Adherence to medication	14.26 (3.10/25.39)	0.012
Adherence to a healthy lifestyle	1.20 (−6.03/8.44)	0.742
Motivation for adherence to a healthy lifestyle	5.63 (−0.22/11.49)	0.059
Importance of adherence to a healthy lifestyle	5.20 (0.05/10.34)	0.047
Support from family and friends	12.56 (4.77/20.36)	0.001
Support from doctors	3.67 (−2.38/9.73)	0.233
Support from nurses	16.84 (5.81/27.86)	0.003

Note: Repeated measures analysis of covariance.

Covariates: age, intervention and control groups, and gender.

Abbreviations: CI, confidence interval; MD, mean difference.

the acute hospitalisation of TIA and stroke patients, is only partially effective. There was evidence that the investigated intervention may improve some primary outcomes up to 7 years after discharge, i.e. decreased alcohol consumption and healthy weight loss. The results of the study suggest that lifestyle counselling right after acute stroke events is more effective than non-structured counselling, and should be offered to all patients, particularly these patients who suffered a mild stroke and were discharged straight from the hospital. However, it is not possible to state that these differences were solely due to the intervention because of the long follow-up period and the limitations related to study design.

It was interesting to observe that the intervention, which was implemented during acute hospitalisation,

possibly improves secondary outcomes such as adherence to medication, understanding the importance of adherence to lifestyle changes, support from family and friends as well as nursing personnel. These results are important because similar factors have been proven to improve adherence in previous research that included an extensive study period [14, 42, 43].

The results also provide evidence that counselling during acute hospitalisation may improve some lifestyle-related outcomes 7 years after discharge, e.g., decreased alcohol consumption and weight loss. Similar results were also identified in studies, which reported self-management counselling interventions to be effective at controlling certain risk factors [44]. Furthermore, it is notable that individualised counselling regarding stroke, recurrence risk, medication adherence, healthy lifestyle, and risk factor control has been proven to reduce the risk of stroke recurrence [45].

The tested intervention, which involved structured lifestyle counselling by stroke nurses, provided significantly more perceived support from nurses (a result that was also observed over the long term) than the control, non-structured counselling. The importance of support from nurses has been proven to be meaningful in several studies investigating adherence to treatment among patients with long-term illnesses [14, 46]. It has also been reported that interventions in which nurses have a primary role are effective at improving medical and behavioural risk factors, along with the knowledge that risk factors are a part of the secondary prevention of stroke [47, 48]. The presented results strongly support the claim that nurses play a vital role in stroke care, which has been suggested in previous studies [25]. Doctors were part of the intervention planning group; however, in the future, lifestyle counselling interventions should be more tailored to a multidisciplinary team of stroke professionals [25]. This type of approach would promote both support from doctors as well as long-term adherence to treatment.

Friends and family members were not included in the studied intervention. Therefore, it is interesting that there was a significant between-group difference in support from family and friends. The presented results indicate that the adherence process already begins during acute phase counselling and – for this reason – stroke patients who receive the structured counselling will understand that they need to involve family members and friends in their care process. The involvement of family members and friends has already previously been established as a pivotal part of stroke care [16]. Hence, future counselling interventions need to both be implemented at an early stage and involve family members; these decisions can largely improve the results of the recovery process.

Many studies that have investigated how lifestyle counselling influences adherence to treatment and/or lifestyle changes conclude that counselling is seldom continuous [31, 32]. This highlights the importance of ensuring that stroke patients receive continuous lifestyle counselling. Furthermore, it would be beneficial to provide patients with practical advice during the recovery process. As such, it could be useful to examine adherence to treatment across different phases of the care path and develop counselling in a way that the right information is provided at the right time, maybe through digital forms.

Limitations

The study provides new knowledge about long-term adherence to lifestyle changes among stroke patients. However, it has some limitations. The participating stroke and TIA patients were not randomly allocated to study groups, which is the most significant limitation [33]. This means that the presented results are not fully reliable because there might be several variables affecting the outcomes of the study, which cannot be controlled. However, covariates were used in the analysis to minimise these effects. Even if the counselling session was structured and planned in as much detail as possible, the success of the intervention was nevertheless still strongly based on nurse–patient interaction; this is a potential source of bias since every counselling conversation was dependent on the nurse's and patient's circumstances. However, an interactive relationship can also be seen as positive aspect, since this is part of an ideal counselling situation.

The data were collected using self-reported questionnaires, which incur a widely recognised risk of biases. However, the study instruments have been proven to be valid in several studies. It should be noted that some of the patients did not return the questionnaires, which means that a higher response rate could have changed the results. Each participant did receive one reminder to complete the questionnaire. The fact that the TREND Statement checklist was used when reporting the results increased the validity of the research [34].

It is impossible to fully compare the presented results to what has been reported in other studies since no long-term follow-up studies of the effects of lifestyle counselling interventions on adherence to lifestyle changes were identified from the literature. The extensive follow-up period and employed study design mean that the observed effects cannot be solely attributed to the RFTLC intervention.

Relevance to clinical practice

It is challenging for stroke patients to adhere to lifestyle changes over long time periods. However, the results of the

present study suggest that the adherence process already begins during acute phase lifestyle counselling, which is provided immediately after stroke or TIA has been diagnosed. The likelihood of sustained lifestyle changes could be increased by starting counselling at an early stage of recovery and involving family members and friends, who are a significant part of the patient's long-term care, in the process. However, it still seems as if counselling is too brief, so practitioners and decision-makers should develop ways through which counselling can be more continuous throughout the care process.

CONCLUSION

The study suggests that the Risk-Factor Targeted Lifestyle Counselling Intervention for stroke and TIA patients, which is implemented during acute hospitalisation, may improve some lifestyle-related outcomes 7 years after discharge, e.g., decreased alcohol consumption and healthy weight loss. Furthermore, the presented results indicate that the tested intervention also improves certain important adherence-related outcomes, such as adherence to medication, understanding the importance of a healthy lifestyle, and support from family, friends, and the nursing staff. Therefore, it can be assumed that the provision of lifestyle counselling prior to discharge from acute care is an important part of ensuring that stroke and TIA patients will adhere to lifestyle changes over the long-term. However, the continuity of lifestyle counselling, as well as new channels for providing relevant information, should be further investigated since the tested intervention was not effective in sustaining healthy lifestyle behaviour.

AUTHOR CONTRIBUTIONS

Made substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data: AO, JE. Involved in drafting the manuscript or revising it critically for important intellectual content: AO, JE, OK, PK, LK, MK. Agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved: AO, JE, OK, LP, PK, MK. Given final approval of the version to be published: AO, JE, OK LP, PK, MK.

ACKNOWLEDGEMENTS

The authors would like to thank all the patients who participated in the study, as well as the nursing staff and managers, for their assistance. We would like to give our warmest thanks to professor Helvi Kyngäs for his continuous support.

ETHICAL APPROVAL

Ethical approval (ETMK:83180/2009) for the study was obtained from the Research Ethics Committee of the local hospital district. The research was conducted in accordance with The Code of Ethics of the World Medical Association [40]. Patients were carefully informed about the study at the hospital, and they gave written informed consent for voluntary participation [33]. Moreover, it is important from an ethical perspective that both groups of patients received some form of lifestyle counselling prior to discharge from the hospital. Patients were identified from the surveys via ID numbers. The study also complied with the European Union's General Data Protection Regulation (GDPR 2016). As per the relevant legislation, the collected data will be stored for 10 years on a password-protected computer [41].

CONFLICT OF INTEREST

None.

ORCID

Anne Oikarinen https://orcid.org/0000-0002-3509-8912
Leila Paukkonen https://orcid.org/0000-0001-8762-311X

REFERENCES

1. WHO. World Health Organisation. Cardiovascular diseases (CVDs). Geneva, SZ: World Health Organisation; 2015. [Cited 2021 Dec 8] Available from: http://www.who.int/mediacentre/factsheets/fs317/en/
2. Virani S, Alonso A, Aparicio H, Benjamin E, Bittencourt M, Callaway C, et al. American Heart Association Council on epidemiology and prevention statistics Committee and stroke statistics subcommittee. Circulation. 2021;143(8):e254–743. https://doi.org/10.1161/CIR.0000000000000950
3. Wafa H, Wolfe C, Emmet E, Roth G, Johnson C, Wang Y, et al. Burden of stroke in Europe. Thirty-year projections of incidence, prevalence, deaths, and disability-adjusted life years. Stroke. 2020;51(8):2418–27. https://doi.org/10.1161/STROKEAHA.120.029606
4. Sacco R, Kasner S, Broderick J, Caplan L, Connors J, Culebras A, et al. An updated definition of stroke for the 21st century: a statement for healthcare professionals from the American Heart Association/American Stroke Association. Stroke. 2013;44(7):2064–89.
5. Heron N, Kee F, Cardwell C, Tully MA, Donnelly M, Cupples ME. Secondary prevention lifestyle interventions initiated within 90 days after TIA or 'minor' stroke: a systematic review and meta-analysis of rehabilitation programmes. Br J Gen Pract. 2017;67(654):e57–66. https://doi.org/10.3399/bjgp16X688369
6. O'Donnell D, Xavier D, Lui L, Zhang H, Chin SL, Rao-Melacini P, et al. Risk factors for ischaemic and intracerebral haemorrhagic stroke in 22 countries (the INTERSTROKE study): a case-control study. Lancet. 2010;376:112–23.

7. Boehme A, Esenwa C, Elkind M. Stroke risk factors, genetics, and prevention. Circ Res. 2017;120(3):472–95. https://doi.org/10.1161/CIRCRESAHA.116.308398
8. Kotseva K, Wood D, De Bacquer D, De Backer G, Rydén L, Jennings C, et al. EUROASPIRE IV: a European Society of Cardiology survey on the lifestyle, risk factor and therapeutic management of coronary patients from 24 European countries. Eur J Prev Cardiol. 2019;23(6):636–48. https://doi.org/10.1177/2047487315569401
9. Rothwell PM, Algra A, Amarenco P. Medical treatment in acute and long-term secondary prevention after transient ischaemic attack and ischaemic stroke. Lancet. 2011;377:1681–92. https://doi.org/10.1016/S0140-6736(11)60516-3
10. Lawrence M, Pringle J, Kerr S, Booth J, Govan L, Roberts NJ. Multimodal secondary prevention behavioral interventions for TIA and stroke: a systematic review and meta-analysis. PLoS One. 2015;10:e0120902.
11. Glader EL, Sjölander M, Eriksson M, Lundberg M. Persistent use of secondary preventive drugs declines rapidly during the first 2 years after stroke. Stroke. 2010;41:397–401.
12. Kyngäs HA, Skaar-Chandler CA, Duffy ME. The development of instrumental to measure the compliance of adolescents with a chronic disease. J Adv Nurs. 2000;32:1499–506.
13. Oikarinen A, Engblom J, Kääriäinen M, Kyngäs H. A study of the relationship between the quality of lifestyle counselling and later adherence to the lifestyle changes based on patients with stroke and TIA. Clin Rehabil. 2018;32(4):557–67.
14. Kähkönen O, Saaranen T, Kankkunen P, Lamidi ML, Kyngäs H, Miettinen H. Predictors of adherence to treatment by patients with coronary heart disease after a percutaneous coronary intervention. J Clin Nurs. 2018;27(5–6):989–1003. https://doi.org/10.1111/jocn.14153
15. Kyngäs H. Motivation as a crucial predictor of good compliance in adolescents with rheumatoid arthritis. Int J Nurs Pract. 2002;8(6):336–41.
16. Lawrence M, Pringle J, Kerr S, Booth J. Stroke survivors' and family members' perspectives of multimodal lifestyle interventions for secondary prevention of stroke and transient ischemic attack: a qualitative review and meta-aggregation. Disability Rehabil. 2016;38(1):11–21. https://doi.org/10.3109/09638288.2015.1031831
17. Magrin ME, D'Addario M, Greco A, Miglioretti M, Sarini M, Scrignaro M. Social support and adherence to treatment in hypertensive patients: a meta-analysis. Ann Behav Med. 2015;49(3):307–18. https://doi.org/10.1007/s12160-014-9663-2
18. Kähkönen O, Kankkunen P, Saaranen T, Miettinen H, Kyngäs H, Lamidi ML. Motivation is a crucial factor for adherence to a healthy lifestyle among people with coronary heart disease after percutaneous coronary intervention. J Adv Nurs. 2015;71(10):2364–73. https://doi.org/10.1111/jan.12708
19. Kangasniemi M, Hirjaba M, Kohonen K, Vellone E, Moilanen T, Pietilä AM. The cardiac patients' perceptions of their responsibilities in adherence to care: a qualitative interview study. J Clin Nurs. 2017;26:2583–92. https://doi.org/10.1111/jocn.136422583
20. Holzemer E, Thanavaro J, Malmstrom T, Cruz-Flores S. Modifying risk factors after TIA and Stroke: the impact of intensive education. J Nurs Pract. 2011;7(5):372–7. https://doi.org/10.1016/j.nurpra.2011.01.017
21. Kaakinen P, Ervasti H, Kääriäinen M. Quality of counseling in knee and joint arthroscopy patient in day surgery. Int J Orthop Trauma Nurs. 2017;24:12–20.
22. Huang C, Hsu M, Hsu S, Cheng P, Lin S, Chuang C. Mediating roles of social support on post stroke depression and quality of life in patients with ischemic stroke. J Clin Nurs. 2010;19(19–20):2752–62.
23. Slark J, Sharma P. Risk awareness in secondary stroke prevention: a review of the literature. J R Soc Med. 2014;3:204800401351473. https://doi.org/10.1177/2048004013514737
24. Watkins CL, Wathan JV, Leathley MJ, Auton MF, Deans CF, Dickinson HA. The 12-month effects of early motivational interviewing after acute stroke: a randomized controlled trial. Stroke. 2011;42(7):1956–61.
25. Jarva E, Mikkonen K, Tuomikoski AM, Kääriäinen M, Meriläinen M, Karsikas E, et al. Healthcare professionals' competence in stroke care pathways: a mixed-methods systematic review. J Clin Nurs. 2021;30(9–10):1206–35. https://doi.org/10.1111/jocn.15612
26. Haynes R, Yao X, Degani A, Kripalani S, Garg A, McDonald H. Interventions for enhancing medication adherence. Cochrane Database Syst Rev. 2008;(2):CD000011. https://doi.org/10.1002/14651858.CD000011.pub3/pdf
27. Shankari G, Ng S, Goh S, Woon F, Doshi K, Wong P, et al. Modifiable factors associated with non-adherence to secondary ischaemic stroke prevention strategies. J Stroke Cerebrovasc Dis. 2020;29(12):105395.
28. Bridgwood B, Lager KE, Mistri AK, Khunti K, Wilson AD, Modi P. Interventions for improving modifiable risk factor control in the secondary prevention of stroke. Cochrane Database Syst Rev. 2014;(5):CD009103. https://doi.org/10.1002/14651858.CD009103.pub2
29. Jin K, Khonsari S, Gallagher R, Gallangher P, Clark AM, Freedman B, et al. Telehealth interventions for the secondary prevention of coronary heart disease: a systematic review and meta-analysis. Eur J Cardiovasc Nurs. 2019;18(4):260–71.
30. Towfighi A, Cheng E, Hill V, Barry F, Lee M, Valle N, et al. Results of a pilot trial of a lifestyle intervention for stroke survivors: healthy eating and lifestyle after stroke. J Stroke Cerebrovasc Dis. 2020;29(12):105323.
31. McManus JA, Craig A, McAlpine C, Langhorne P, Ellis G. Does behaviour modification affect post-stroke risk factor control? Three-year follow-up of a randomized controlled trial. Clin Rehabil. 2009;23(2):99–105.
32. Ögren J, Irewall AL, Söderström L, Mooe T. Long-term, telephone-based follow-up after stroke and TIA improves risk factors: 36-month results from the randomized controlled NAILED stroke risk factor trial. BMC Neurol. 2018;18(1):153. https://doi.org/10.1186/s12883-018-1158-5
33. Polit DF, Beck CT. Nursing research generating and assessing evidence for nursing practice. 10th ed. Philadelphia, PA: Wolters Kluwer Health; 2017.
34. Des Jarlais DC, Lyles C, Crepaz N. Improving the reporting quality of nonrandomized evaluations of behavioral and public health interventions: the TREND statement. Am J Public Health. 2004;94:361–6.
35. Peltonen M, Harald K, Männisto S, Saarikoski L, Peltomäki P, Lund L, et al. National FINRISKI 2007 survey - implementing the study and the study results. Helsinki: National Public

Health Institute, Department of Health Promotion and Chronic Disease Prevention; 2008 Publication B34. [in Finnish].
36. Ylimäki E-L, Kanste O, Heikkinen H, Bloigu R, Kyngäs H. The effects of a counselling intervention on lifestyle change in people at risk of cardiovascular disease. Eur J Cardiovasc Nurs. 2015;14(2):153–61.
37. Kääriäinen M, Paukama M, Kyngäs H. Adherence with health regimens of patients on warfarin therapy. J Clin Nurs. 2013;22:89–96.
38. Oikarinen A. 2016. Effects of risk factor targeted lifestyle counselling intervention on quality of lifestyle counselling and on adherence to lifestyle change in stroke patients. Doctoral dissertation. Acta Universitatis Ouluensis. D 1357, University of Oulu, Finland.
39. Oikarinen A, Engblom J, Kääriäinen M, Kyngäs H. The effects of risk factor-targeted lifestyle counselling intervention on working-age stroke patients' adherence to lifestyle change. Scand J Caring Sci. 2017;31(3):555–68.
40. World Medical Association. Declaration of Helsinki - ethical principles for medical research involving human subjects. JAMA. 2013;310:2191–4.
41. Personal Data Act 523/1999. Ministry of Justice. Finland. [Cited 2021 Jan 31]. Available from: http://www.finlex.fi/en/laki/kaannokset/1999/19990523
42. Ireland G, Gould ML, Dassinger D, Koper A, LeBlanc K. Nurse case management to improve risk reduction outcomes in a stroke prevention clinic. Can J Neurosci Nurs. 2010;32(4):7–13.
43. Ahmadi M, Laumeier I, Steinicke M, Ferse C, Endres M, Grau A, et al. A support programme for secondary prevention in patients with transient ischaemic attack and minor stroke (INSPiRE-TMS): an open-label, randomised controlled trial. Lancet Neurol. 2020;19:49–60.
44. Sakakibara BM, Kim AJ, Eng JJ. A systematic review and meta-analysis on self-management for improving risk factor control in stroke patients. Int J Behav Med. 2017;24(1):42–53.
45. Shani SD, Varma RP, Sarma PS, Sylaja PN, Kutty VR. Life style and behavioural factors are associated with stroke recurrence among survivors of first episode of stroke: a case control study. J Stroke Cerebrovasc Dis. 2021;30(4):105606.
46. Wilkinson M, Whitehead L, Crowe M. Nurses perspectives on long-term condition self-management: a qualitative study. J Clin Nurs. 2016;25(1–2):240–6.
47. Parappilly BP, Field TS, Mortenson WB, Sakakibara BM, Eng JJ. Effectiveness of interventions involving nurses in secondary stroke prevention: a systematic review and meta-analysis. Eur J Cardiovasc Nurs. 2018;17(8):728–36.
48. Irewall AL, Ögren J, Bergström L, Laurell K, Söderström L, Mooe T. Nurse-led, telephone-based, secondary preventive follow-up after stroke or transient ischemic attack improves blood pressure and LDL cholesterol: results from the first 12 months of the randomized, controlled NAILED stroke risk factor trial. PLoS One. 2015;10:e0139997.

How to cite this article: Oikarinen A, Engblom J, Paukkonen L, Kääriäinen M, Kaakinen P, Kähkönen O. Effects of a lifestyle counselling intervention on adherence to lifestyle changes 7 years after stroke – A quasi-experimental study. Scand J Caring Sci. 2022;00:1–10. https://doi.org/10.1111/scs.13101