ESC European Society of Cardiology

European Journal of Cardiovascular Nursing (2022) **21**, 36–45
doi:10.1093/eurjcn/zvab001

ORIGINAL ARTICLE

Motivational interviewing in a nurse-led outpatient clinic to support lifestyle behaviour change after admission to a stroke unit: a randomized controlled trial

Dorien Brouwer-Goossensen [1]*, Maaike Scheele[1], Lenneke van Genugten[1], Hester F. Lingsma[1], Diederik W.J. Dippel[1], Peter J. Koudstaal[1], and Heleen M. den Hertog[2]

[1]Department of Neurology, Erasmus MC, University Medical Center Rotterdam, PO Box 2040, 3000 CA Rotterdam, The Netherlands; and [2]Department of Neurology, Isala Hospital, Zwolle, The Netherlands

Received 31 March 2020; revised 23 September 2020; editorial decision 15 December 2020; accepted 12 January 2021; online publish-ahead-of-print 6 April 2021

Aims Modification of health behaviour is an important part of stroke risk management. However, the majority of people with cardiovascular disease fail to sustain lifestyle modification in the long term. We aimed to evaluate the effectiveness of motivational interviewing to encourage lifestyle behaviour changes after transient ischaemic attack (TIA) or minor ischaemic stroke.

Methods and results We performed a randomized controlled open-label phase II trial with blinded endpoint assessment. The intervention consisted of three 15-minute visits in 3 months by a motivational interviewing trained nurse practitioner. Patients in the control group received standard consultation after 1 and 3 months by a nurse practitioner. Primary outcome was lifestyle behaviour change, defined as smoking cessation and/or increased physical activity (30 min/day) and/or healthy diet improvement (5 points at the Food Frequency Questionnaire) at 6 months. We adjusted for age and sex with multivariable logistic regression. Between January 2014 and February 2016, we included 136 patients (of whom 68 were assigned to the intervention group). Twenty-five of 55 patients in the intervention group (45%) and 27 of 61 patients in the control group (44%) had changed their lifestyle at 6 months. We found no effect of motivational interviewing on lifestyle behaviour change after 6 months (aOR 0.99; 95% confidence interval: 0.44–2.26).

Conclusion Our results do not support the effectiveness of motivational interviewing in supporting lifestyle behaviour change after TIA or ischaemic stroke. However, the overall lifestyle behaviour change was high and might be explained by the role of specialized nurses in both groups.

Keywords Stroke • Health-behaviour change • Intervention • Motivational interviewing • RCT

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* Corresponding author. Tel: +1 010 70340130, Email: d.goossensen@erasmusmc.nl
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Practice implications

- The strong support in the control group, the timing and duration of the intervention, and cognitive problems may partially explain the lack of effect of motivational interviewing in this study. Therefore, the role of motivational interviewing in supporting lifestyle behaviour after transient ischaemic attack (TIA) or ischaemic stroke might be still possible.
- As the timing and duration of the intervention, and cognitive problems may partially explain the lack of effect of motivational interviewing, these factors should be taken into account by developing interventions to support patients in behaviour change after TIA or ischaemic stroke.
- As the number of patients that changed their lifestyle was high in both treatment arms, there is possibly a key role for nurses in supporting patients in health behaviour change.

Introduction

Stroke is the third cause of death and the first cause of disability in developed countries.[1] The incidence of stroke rises with increasing age and is expected to increase further the next years. Transient ischaemic attacks (TIA's) can be seen as a warning sign and require urgent evaluation to prevent a stroke.[2] Stroke patients often suffer considerable residual disability.[3] Even when patients do not experience any physical functional disability, patients who have experienced TIA and minor stroke often experience residual functional impairment, particularly with regard to post-event fatigue and psychological issues, which may lead to more significant disability.[4,5] After a ischaemic stroke or TIA patients have an increased risk of recurrent stroke and cardiovascular events.[6] In addition to adequate treatment of risk factors like hypertension and hypercholesterolaemia, many guidelines recommend lifestyle behaviour change, such as regular physical exercise (more than 30 min of moderate or intense activity a day), healthy diet, stop smoking, and no excessive use of alcohol to reduce this risk.[7–9] In patients with coronary artery disease, the benefits of lifestyle management on vascular risk factors as well as the risk of vascular death and myocardial infarction have been demonstrated. However, the majority of people with cardiovascular disease fail to sustain lifestyle modification in the long term.[10] Therefore, a lifestyle intervention supporting patients in changing health behaviour could be an effective way to reduce stroke recurrence. Since admission for acute stroke is brief, it is particularly important to address the secondary prevention of stroke, including lifestyle behaviour during the post-acute rehabilitation phase of care.[11]

At present, only inconsistent data and data of varying quality are available on interventions to support patients in health-related behaviour change after TIA or ischaemic stroke.[12] These interventions varied from personal education, exercise or lifestyle classes, motivational counselling (not specified), telephone support, home visits, and interviews.[13] The heterogeneity in applied interventions with regards to content, intensity, behaviour focused on and duration makes comparing complex. Follow-up rates are often low and patients experience physical barriers, such as fatigue or pain, lack of knowledge and social support, and cognitive problems.[14–16]

One of the factors that plays an important role in this process is perceived self-efficacy. In our previous study,[17] we found that self-efficacy (a person's confidence to carry out behaviour necessary to reach a desired goal) was the strongest determinant of intention to stop smoking, increase physical activity, and improve healthy diet. Self-efficacy has been found to be a powerful predictor of intention to change in other cardiovascular studies.[18,19] It has a direct effect on health-related behaviour, is the strongest predictor of health-related behaviour change[20] and an important precondition for successful self-management.[21] Hence increasing self-efficacy could be a way to support health-related behaviour change in patients with TIA or ischaemic stroke.

Patient-centred care has been found to be associated with improved self-management.[22,23] There are several approaches aiming at translating patient-centred care into practice, each with their own philosophical origins (such as life world experiences or principles of humanism) and theoretical underpinnings. Motivational interviewing (MI) is one of these approaches, focusing on increasing self-efficacy and self-management.[24] Motivational interviewing is defined as a client-centred, directive method for enhancing intrinsic motivation to change by exploring and resolving ambivalence. It is designed to strengthen personal motivation for and commitment to a specific goal by eliciting and exploring the person's own reasons for change within an atmosphere of acceptance and compassion.[25] It has been developed by Miller in 1983 to support people with alcohol abuse to stop drinking.[26] Empathy, open questions, reflective listening, and emphasis on patients autonomy are the basic communication skills of motivational interviewing.[25] Motivational interviewing is easy to train and has, unlike other methods to improve self-management and self-efficacy, a measuring instrument to test the skills (Motivational Treatment Integrity score).[24,27] Motivational interviewing has been proven effective in adopting healthy lifestyle behaviour for patients with chronic diseases and in patients with cardiovascular diseases,[14–16,28] in particular, in supporting weight loss behaviours and reducing alcohol and tobacco intake.[29,30] These effects occur when conversations were short and repeated[30] and may persist at least 1 year after counselling.[31] Motivational interviewing to support patients in health behaviour change after TIA or stroke seems an attractive method as this form of support can be effective in short conversations, can be applied everywhere (including outside the hospital), and can be easily trained. Since follow-up rates are often low and many patients are already bothered by many appointments and obligations (like medication adherence) after their stroke these characteristics are very important. A recent study of 49 stroke patients, studied feasibility of motivational interviewing for low mood and showed that it is possible to train staff to deliver motivational interviewing and motivational interviewing sessions are acceptable for both patients as therapists.[32]

The effects of motivational interviewing on health behaviour change after TIA or ischaemic stroke are largely unknown. A recent

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randomized controlled trial in 386 patients with minor stroke found no effect on blood pressure or cholesterol levels, but medication adherence was significantly higher.[33] Two small studies have shown promising effects of motivational interviewing on physical activity, dietary behaviour,[34] blood pressure, and self-efficacy after stroke[35] (a person's confidence to carry out behaviour necessary to reach a desired goal). However, the intensity of the intervention and duration of the conversations has not been not well described. Studies in cardiovascular patient showed that extra care of nurses can improve physical activity, vegetable intake, and increase overweight.[36,37] Nurses could combine vascular care coordination with promoting self-management to induce healthy lifestyle.[38] Therefore, we aimed to assess whether motivational interviewing by nurses is an effective and feasible method to support lifestyle changes after a TIA or ischaemic stroke.

Methods

We conducted a randomized clinical trial with blinded outcome assessment. Patients were recruited in the first week after admission to the stroke unit or TIA outpatient clinic.

Participants

Patients were eligible for inclusion if they were 18 years or older and had a clinical diagnosis of TIA, including amaurosis fugax, or minor ischaemic stroke with a modified Rankin Scale score of 3 or less.[39] Patients were excluded if they were discharged to a nursing home, were non-Dutch speaking, or had severe aphasia. Patients were included during admission or visit to the outpatient clinic of the Erasmus University Medical Hospital in the Netherlands if they met the inclusion criteria. After inclusion, patients were randomized and baseline data were collected. The trial was approved by national and local institutional review boards (trial number 3988107812) and written informed consent was obtained from all patients. The investigation conforms with the principles outlined in the Declaration of Helsinki.

Intervention

Patients were randomly allocated to motivational interviewing or standard counselling. For this purpose, an independent trial assistant had concealed computer-generated allocation sequences in consecutively numbered, opaque, and sealed envelopes. When a patient was included and given a (consecutive) trial number, the corresponding numbered envelope was opened, by which the patient was assigned to intervention or control group.

All patients received routine general lifestyle advice including regular physical exercise (more than 30 min of moderate or intense activity every day), healthy diet, and advice to stop smoking as part of standard care at baseline by a neurologist. Patients in the intervention group received counselling by an experienced nurse practitioner at ~4 weeks, 8 weeks, and 3 months after inclusion. During these sessions of 15 min, lifestyle behaviour, motivation, and opportunities for change were discussed. A previous review reported that 64% of the studies showed an effect when using motivational interviewing in brief encounters of 15 min.[30] Patients were asked what behaviour they would change if they changed their lifestyle and how they would approach this change. Previous attempts were discussed in which successes were highlighted. Open questions and complex reflections were used to enlarge ambivalence between intentions and action. When patients were in action phase questions were asked about method and planning of the change and when patients actually changed their behaviour maintenance was discussed. Advice was only given with patients consent and emphasis was placed on the positive effects of change without reducing patients autonomy. The nurse practitioner delivering the intervention had completed 2 days basic and 6 days expert training in motivational interviewing. During the study, the nurse practitioner was coached by a motivational interviewing-certified trainer, mean Motivational Treatment Integrity score was 4.6 (out of five, the higher the score, the better the motivational interviewing skills).[27] Patients in the control group received consultation by another experienced, but not motivational interviewing trained nurse practitioner, who was part of the routine care after ~4 weeks and 3 months after admission. During these sessions of 15 min, lifestyle behaviour and general lifestyle advice were discussed. All consultations were given at the same outpatient clinic, in the same room. Data were collected by a separate investigator in a different room than the consultation room, but the same room for patients in intervention or control group.

Procedures

At baseline, we recorded clinical features of the TIA or ischaemic stroke, demographic data, quantification of stroke severity according to the National Institutes of Health stroke scale (NIHSS, a 15-item scale with scores that range from 0 to 42 and higher values indicating greater severity),[40] vascular history and risk factors (including use of alcohol), body mass index, waist circumference and use of medication. Cholesterol levels, glucose levels, and blood pressure were measured at baseline and 6 months thereafter. After inclusion, patients were asked to complete questionnaires. The patients completed these questionnaires after their visit to the outpatient clinic or during their admission at the stroke unit.

Follow-up visits were scheduled at 3 and 6 months after inclusion. The following questionnaires were completed during these visits:

- Actual smoking status was assessed with questions on current smoking status, how many years a patient had smoked, and average number of cigarettes smoked per day.
- Physical activity, measured with the International Physical Activity Questionnaire short (IPAQ-S) questionnaire. Patients were asked to report activities performed for at least 10 min during the last 7 days, and time spent in physical activity performed across leisure time, work, domestic activities, and transport at each of 3 intensities: walking, moderate, and vigorous.[41] We used reported minutes of moderate and vigorous physical activity to calculate a total physical activity score of minutes a day. Cronbach's alpha was 0.79.
- Dietary behaviour, evaluated with the short Food Frequency Questionnaire (FFF). This 14-item scale is used to assess the intake of saturated fatty acids, unsaturated fatty acids, and fruits and vegetables over the week before the visit. An overall cardiovascular dietary score was calculated, ranging from -17 to +19, the higher the score, the more favourable the dietary pattern.[42] Cronbach's alpha was 0.71.
- Intention to change was assessed by means of a single item per behaviour.[41] Patients were asked on a scale of 1 to 5, the likelihood that they would:
  - get 30 min of moderate to heavy daily physical activity in the next 3 months.
  - Decrease intake of unhealthy fats/reduce their total energy intake in the next 3 months?
  - Stop smoking within the next 3 months.
  - Higher scores indicate higher intention to change.
- Self-efficacy, measured with the self-efficacy scale, a 7-item scale with scores that range from 1 to 5. Higher values indicate more confidence to carry out the behaviour necessary to reach the desired goal.[19]

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Questions are formulated as: I think I am able to quit smoking/choose healthy food/care for enough physical activity. Cronbach's alpha was 0.84.

Outcome measures

Primary outcome measure was lifestyle behaviour change after 6 months, defined as smoking cessation and/or increase of physical activity of 30 min a day and/or increasing score of 5 points on the Food Frequency Questionnaire. These outcome measures were based on the food and exercise recommendations in the Netherlands.

Secondary outcome measures included change in self-efficacy and intention to change lifestyle behaviour, change in weight, waist circumference, blood pressure, cholesterol, and blood glucose after 6 months and feasibility of motivational interviewing on the nurse-led outpatient clinic.

A sample of 136 patients was expected to have a power of 80% to detect a difference in lifestyle behaviour change (quitting smoking and/or a 30-min increase in exercise and/or a 5-point increase in Food Frequency Questionnaire) between the intervention group and control group of 25% after 6 months assuming a significance level of $\alpha = 0.05$ and a change in lifestyle behaviour of 30% in the control group.

Statistical analysis

Statistical analyses were performed with STATA 12.1 statistical package (Statacorp, College Station, TX, USA). Analyses were done by intention-to-treat principles. Differences in characteristics were analysed with Chi^2 tests (proportions), tests and in case of unequally distributed data with Mann–Whitney *U* tests. Differences in primary and secondary outcomes between control and intervention group were compared with Chi^2 tests and further analysed by multivariable logistic or linear regression in which we adjusted for age, sex, baseline self-efficacy, baseline smoking status, and history of TIA (because of unbalanced trial arms). Differences between primary outcomes in subgroups were analysed with Chi^2 tests. These subgroups contained patients with high self-efficacy scores (22 or higher based on median self-efficacy of 22) or low (<22) self-efficacy scores and patients who received all three counselling sessions and patients who had one or two sessions (per protocol analysis). The data that support the findings of this study are available from the corresponding author upon request.

Results

One hundred and thirty-six patients were enrolled between January 2014 and February 2016 of whom 68 were assigned to the intervention group. Follow-up was completed in 92 patients (*Figure 1*). Two patients died, 4 patients had a recurrent severe ischaemic stroke, and 21 patients refused follow-up, did not filled in the questionnaire during their appointment, or did not respond on telephone calls or appointment invitations. The other six patients were excluded because of dementia, discharge to a nursing home or rehabilitation centre, or being diagnosed as a stroke mimic.

Baseline characteristics were mainly well balanced (*Table 1*), except for history of TIA which was more common in the patients allocated to motivational interviewing, and smoking that occurred more often in the control group.

In the total study population, mean age was 63 years [standard deviation (SD) 14], 85 (63%) patients were male and 43 (32%) had TIA. Patients had a moderately healthy lifestyle; median physical activity time was 71 min a day (IQ 26–150). The body mass index was 28 kg/m^2 (SD 5.01), meaning mild overweight and patients had a normal diet (median diet score was 1, interquartile range -1 to 3) at baseline.

Sixteen patients (12%) used more alcohol than advised (more than 2 units a day for women and three units a day for men) and 28 patients (21%) were smokers.

Twenty-five of 55 patients in the intervention group (45%) and 27 of 61 patients in the control group (44%) had changed their lifestyle at 6 months. We found no evidence for benefit of motivational interviewing on lifestyle behaviour change after 6 months [*Table 2*, aOR 0.99; 95% confidence interval (CI) 0–2.26]. In the per protocol analysis, the effect of motivational interviewing was very much the same (*Table 3*, aOR 0.97; 95% CI 0.37–2.52 and data in Supplementary material online). Also, there were no positive effects of motivational interviewing on reduction of waist, cholesterol levels, and blood pressure (*Table 4*). Overall, self-efficacy and self-efficacy for quitting smoking were improved in the intervention group, but this was not significant (aBeta 0.19; 95% CI 0.07–0.46). Patients in the intervention group with low baseline self-efficacy scores stopped smoking more often than patients in the control group (*Table 5*). There were no differences in physical activity and dietary behaviour between patients with high or low self-efficacy scores. More patients in the motivational interviewing group (50%) than in the control group (33%) quit smoking (*P* 0.39) at 3-month follow-up (data in Supplementary material online). This trend did not sustain after 6 months.

Discussion

Our results do not support the effectiveness of motivational interviewing in supporting lifestyle behaviour change after TIA or minor ischaemic stroke. The overall lifestyle behaviour change in this study was high and might be explained by the role of specialized nurses in both groups.

Only three published studies focused on the effects of motivational interviewing on health behaviour after TIA or ischaemic stroke. Two of these studies were small and showed promising effects on physical activity, dietary behaviour, blood pressure, and self-efficacy.[34,35] In line with our results, a recent randomized controlled trial in 386 stroke patients found no effect on blood pressure or cholesterol levels, but medication adherence was significantly higher in the intervention group.[33] Usual care after discharge by a general practitioner or at a designated stroke clinic was supplemented with four face to face or telephone motivational interviewing sessions in 9 months. A recent review of motivational interviewing on lifestyle modification in patients with cardiovascular diseases showed that motivational interviewing was more effective than usual care on changing smoking habits and physical activity.[43] Motivational interviewing did not differ from usual care in changing dietary behaviour.[43]

Although no overall effect of motivational interviewing on lifestyle behaviour change could be found in this study, there might be an effect on smoking behaviour. After 3 months, 50% of the patients in the intervention group stopped smoking compared to 33% in the control group (data in Supplementary material online). This trend did not sustain after 6 months. Earlier studies showed that motivational interviewing was particularly effective when conversations were short and repeated.[30] The conversations in this study were short but possibly

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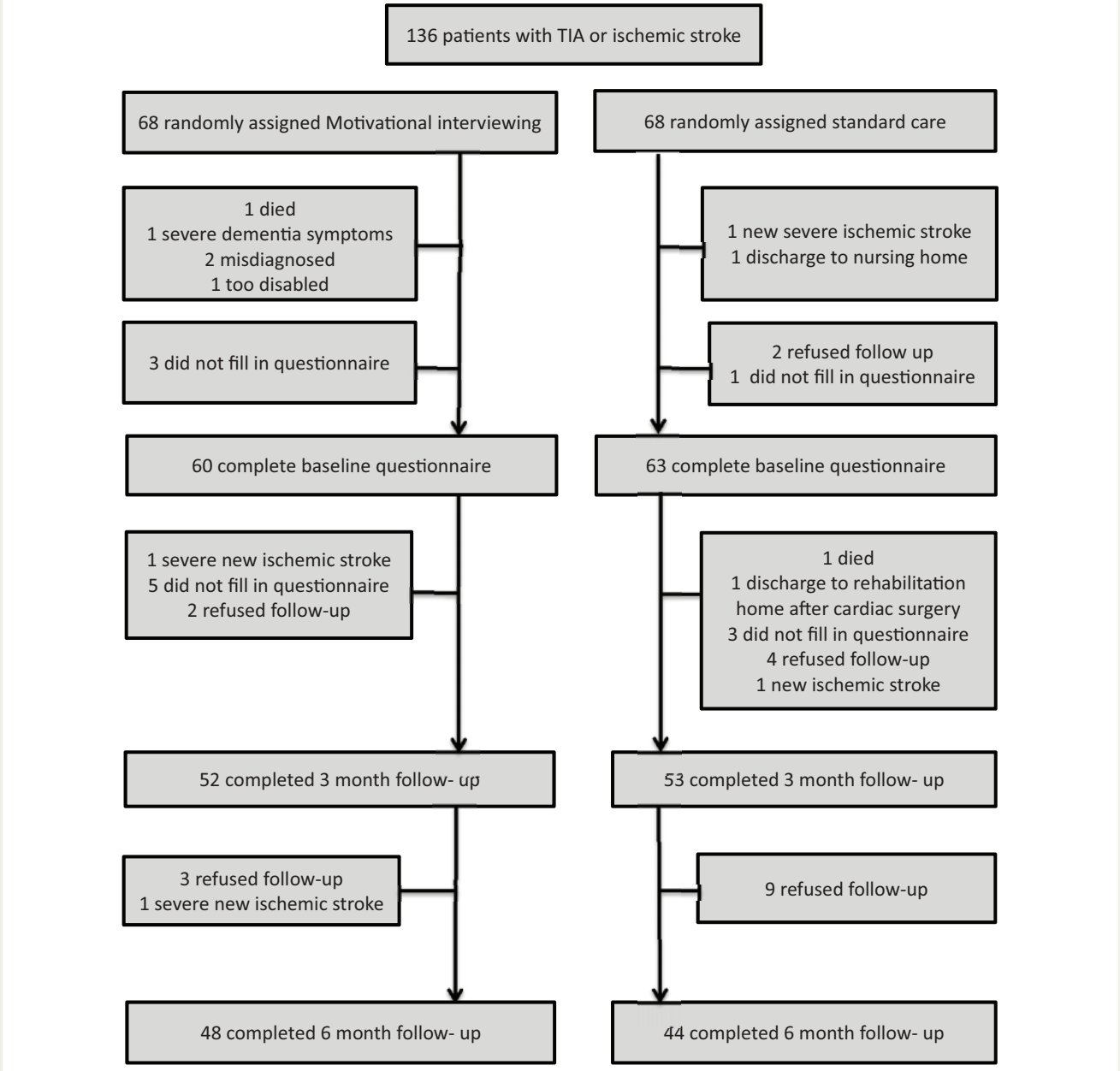

Figure 1 Flowchart of inclusion and follow-up of patients

not repeated often enough with as possible consequence the effect of the intervention on smoking behaviour did not sustain.

In this study, the number of patients that changed their lifestyle was high in both treatment groups. In our previous study with a similar study population, only 37% of the patients changed their lifestyle[44] in contrast to 44% in the control group of this study. This might be explained by care of nurses in both arms of this study. Since both nurses were very experienced in counselling stroke patients after TIA or stroke the difference in approach was possibly too small. In cardiovascular patients, it has been proven that nurse-managed interventions can improve lifestyles, even when the nurses did not use a specific counselling method.[37] Since patient-centred care can promote self-management and can be applied practically in different ways, the small difference between the groups could also be explained by the fact that the nurse in the control group did not use motivational interviewing skills, but possibly did use other skills that were also patient-centred.[22,23] Earlier studies found a strong relation between successful outcomes of problem drinkers and the degree to which their counsellors displayed the skill of accurate empathy. Empathy is thereforeseen as the basis of successful treatment with motivational interviewing.[45] As nurses can be expected to be empathetic, their empathy may, therefore, also contribute to the lifestyle behaviour change of the patients in both groups in this study.

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Table 1 Baseline characteristics (*N* = 136)

	Control (*n* = 68)	Intervention (*n* = 68)	*P*-value
Sex (male), *n* (%)	46 (68)	39 (57)	0.43
Age (years), mean (SD)	62 (14)	64 (13)	0.84
Event characteristics			
Event type (TIA), *n* (%)	22 (32)	21 (31)	0.96
Stroke aetiology (TOAST),[a] *n* (%)			
Large vessel disease	10 (14)	15 (22)	0.20
Cardiac embolism	4 (6)	6 (9)	0.16
Small vessel disease	15 (22)	7 (10)	0.09
Other	6 (9)	2 (3)	0.17
Undetermined	33 (49)	38 (56)	0.85
NIHSS score,[b] median (IQ)	0 (0–2)	0 (0–1)	0.93
Vascular history, *n* (%)			
TIA	5 (7)	13 (20)	0.09
Ischaemic stroke	11 (16)	10 (15)	0.90
Ischaemic heart disease	16 (24)	18 (27)	0.89
Atrial fibrillation	4 (6)	3 (4)	0.77
Peripheral arterial disease	3 (4)	5 (7)	0.43
No vascular history	37 (54)	35 (51)	0.98
Lifestyle			
Smoking, *n* (%)	18 (26)	10 (15)	0.09
Alcohol abuse, *n* (%)	6 (9)	10 (15)	0.29
Physical exercise[c] (min/day), median (IQ)	69 (24–150)	71 (29–174)	0.66
Physical exercise >30 min a day, *n* (%)	43 (68)	44 (73)	0.43
Overall dietscore,[d] median (IQ) from -17 to +19	1 -1 (to 2)	1.0 (-2 to 3)	0.63
Overweight (BMI > 25), *n* (%)	43 (65)	46 (74)	0.27
BMI (kg/m^2), mean (SD)	27 (5.2)	28 (4.8)	0.70
Vascular risk factors			
Hypertension, *n* (%)	44 (65)	48 (72)	0.53
Systolic blood pressure (mmHg), mean (SD)	137 (18)	135 (19)	0.79
Diastolic blood pressure (mmHg), mean (SD)	79 (10)	76 (12)	0.06
Statin use, *n* (%)	59 (87)	62 (91)	0.16
LDL level (mmol/L), mean (SD)	2.9 (1.1)	3.4 (1.2)	0.06
Blood glucose level (mmol/L), mean (SD)	6.2 (2.6)	5.9 (1.4)	0.28
Diabetes mellitus, *n* (%)	15 (22)	20 (29)	0.69
Coping			
Self-efficacy[e] non-smokers total, median (IQ) from 0 to 24	22 (18–23)	20 (16.5–23)	0.46
Self-efficacy smokers total, median (IQ) from 0 to 28	22.5 (17.5–25)	22 (16–26)	0.93
Intention to change			
Intention to change physical activity, median (IQ) from 0 to 4	3 (2–4)	3.5 (2–4)	0.51
Intention to change dietary behaviour, median (IQ) from 0 to 4	3 (2–4)	3 (2–4)	0.88
Intention to quit smoking, median (IQ) from 0 to 4	2 (1–4)	2 (0–4)	0.66

[a]Classification of subtype of acute ischaemic stroke developed for the Trial of Org 10172 in Acute Stroke Treatment (TOAST).
[b]Quantification of stroke severity according to the National Institutes of Health stroke scale (NIHSS), a 15-item scale with scores that range from 0 to 42 and higher values indicating greater severity.
[c]Measured with the International Physical Activity Questionnaire short (IPAQ-S) questionnaire.
[d]Evaluated with the short Food Frequency Questionnaire (FFF), ranging from -17 to +19, the higher the score, the more favourable the dietary pattern. An overall cardiovascular dietary score was calculated.
[e]Self-efficacy, measured with the self-efficacy scale, a 9-item scale with scores that range from 1 to 5. Higher values indicate more confidence to carry out the behaviour necessary to reach the desired goal.

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Table 2 Behaviour change after 6-month follow-up

	Control, *n* (%)	Intervention, *n* (%)	*P*-value	aOR[a] (95% CI)
Overall behaviour change[b] (*n* = 92)	27 (44)	25 (45)	0.95	0.99 (0.44–2.26)
Quit smoking (*n* = 24)	4 (22)	2 (20)	0.62	1.77 (0.22–14.02)
More physical activity (*n* = 85)	20 (43)	19 (40)	0.76	0.71 (0.29–1.76)
Healthy diet (*n* = 61)	6 (13)	5 (11)	0.87	0.70 (0.16–3.03)

[a]Adjusted for age ,sex, history of TIA, baseline self-efficacy, and smoking status at baseline.
[b]Defined as smoking cessation and/or increase of physical activity of 30 min a day and/or increasing score of 5 points on the Food Frequency Questionnaire.

Table 3 Per protocol analysis for behaviour change after 6-month follow-up

	Control, *n* (%)	Intervention, *n* (%)	*P*-value	aOR
Overall behaviour change (*n* = 95)	26 (43)	15 (43)	0.96	0.97 (0.37–2.52)
Quit smoking (*n* = 24)	4 (22)	2 (33)	0.58	1.70 (0.18–16.30)
More physical activity (*n* = 77)	19 (41)	10 (32)	0.41	0.61 (0.22–1.72)
Healthy diet (*n* = 78)	6 (13)	4 (13)	0.71	0.72 (0.15–3.43)

[a]Adjusted for age ,sex, history of TIA, baseline self-efficacy, and smoking status at baseline.

Table 4 Change in secondary outcomes after 6-month follow-up

	Control	Intervention	*P*-value	aBeta (95% CI)
Waist circumference, mean (SD) (*n* = 75)	2.42 (5.7)	1.41 (8.2)	0.53	-0.84 (-4.51 to 2.83)
Weight loss, mean (SD) (*n* = 42)	-4.8 (2.5)	-4.18 (5.2)	0.67	-1.23 (-4.93 to 2.47)
Systolic blood pressure, mean (SD) (*n* = 92)	-8.8 (18)	-6.2 (17)	0.45	-2.07 (-7.66 to 3.53)
Diastolic blood pressure, mean (SD) (*n* = 92)	-5.0 (11)	-3.5 (11)	0.51	-1.71 (-5.27 to 1.85)
Total cholesterol, mean (SD) (*n* = 89)	-0.80 (1.2)	-0.58 (1.2)	0.39	0.41 (0.03 to 0.80)
Glucose, mean (SD) (*n* = 79)	-0.05 (3.0)	0.49 (1.6)	0.32	0.70 (-0.03 to 1.43)
Intention to change physical activity, median (IQ) (*n* = 88)	0.0 (0 to 1)	0 (0 to 1)	0.82	-0.19 (-0.84 to 0.44)
Intention to follow healthy diet, median (IQ) (*n* = 82)	0 (-1 to 1)	0 (0 to 1)	0.58	0.17 (-0.76 to 1.19)
Intention to quit smoking, median (IQ) (*n* = 6)	-1 (-1 to 0)	0 (-2 to 0)	1.00	0.43 (-1.91 to 2.79)
Self-efficacy overall, median (IQ) (*n* = 95)	3.7 (3 to 4)	3.7 (3 to 4)	0.09	0.19 (-0.07 to 0.46)
Self-efficacy smokers, median (IQ) (*n* = 14)	19 (17 to 23)	25.5 (19 to 28)	0.06	1.01 (-13.2 to 15.2)
Self-efficacy non-smokers, median (IQ) (*n* = 81)	22 (19 to 24)	22 (21 to 23)	0.64	-0.58 (-2.33 to 1.15)

[a]Adjusted for age, sex, history of TIA, baseline self-efficacy, and smoking status at baseline.

Motivational interviewing focuses on increasing self-management by building self-efficacy. In a previous study, we found that self-efficacy for health behaviour change was high in patients after TIA and ischaemic stroke and was the strongest determinant of intention to quit smoking, increase physical activity, and/or improve healthy diet.[33] However, in this study, self-efficacy was not significantly increased in the intervention group (aBeta 0.16, 95% CI -0.09 to 0.42), although it seemed to play a role in smoking cessation (*Tables 4 and 5*). At present, it is not clear whether stroke patients are capable of adopting self-management. Possible cognitive problems, physical constraints, and fear can affect this process. In this study, we did not assess cognition, but earlier studies showed that cognitive disorders are highly prevalent after stroke.[46–48]

Strengths of this study are the detailed description of the content of the intervention and that the nurse was well trained in motivational interviewing and was coached and evaluated by an experienced trainer during the entire study. Furthermore, we used a relevant control group as both groups were seen by a nurse specialist, one with and one without specific motivational interviewing training and coaching. Our study has some limitations. First, the duration of the intervention (3 months) might have been too short. Most patients are still rehabilitating during this phase and adapting to their disabilities. Hence,

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Table 5 Behaviour change after 6 months in patients with high or low self-efficacy

	Self-efficacy	Control, *n* (%)	Intervention, *n* (%)	*P*-value
Quit smoking				
n = 11	Low	0 (0)	2 (50)	0.04
n = 14	High	4 (44)	0 (20)	0.08
More physical activity				
n = 45	Low	10 (48)	7 (29)	0.20
n = 41	High	10 (48)	11 (55)	0.63
Healthy diet				
n = 44	Low	3 (15)	4 (17)	0.89
n = 41	High	3 (13)	1 (6)	0.42

lifestyle behavioural change may not be their highest priority. Furthermore, the patients experienced fear, depressive symptoms, and cognitive complaints that may have complicated the counselling. These problems were expressed during the counselling sessions and had more priority for the patients than lifestyle changes, but we did not measure cognition or depression in this study. Another limitation comes with the method of inclusion and data collection. After inclusion, patients were randomized and baseline data were collected. Patients were given time to complete the questionnaire during their stay. Unfortunately, some patients withdrew immediately after inclusion or were discharged before the questionnaires were completed. In addition, patients sometimes appeared to have too much comorbidity or the first diagnosis was incorrect. This has reduced the sample size. We also experienced a high percentage of lost to follow-up (32%). Drop out was evenly distributed over both groups. However, there were significant fewer patients with a TIA in the drop out group, and significant more smokers and patients who used more alcohol than recommended (data in Supplementary material online). This selective missing may be clinical relevant for the feasibility of using motivational interviewing, however, given the width of the confidence intervals at 6-month follow-up (*Table 2*), it is unlikely that final conclusions, thereby would be affected. High drop out and distractions in conversations affected the feasibility of using motivational interviewing in this group. The extra visit to the hospital may be a to high threshold to take for patients. Because a relatively large number of smokers and alcohol users dropped out, having conversations at home or in primary settings can possibly increase the feasibility of the intervention.

In summary, the strong support in the control group, the timing and duration of the intervention, and cognitive problems may partially explain the lack of effect of motivational interviewing in our study. Therefore, the role of motivational interviewing in supporting lifestyle behaviour after TIA or ischaemic stroke might be still possible and a role for nurses in lifestyle behaviour change in these patients could be considered.

At present, there is no strong evidence of the effectiveness of motivational interviewing on behaviour change after a TIA or ischaemic stroke, however, overall lifestyle behaviour change was high in both groups and may be explained by the role of specialized nurses in this study. Future studies should, therefore, focus on the role of nurses in behavioural change processes after stroke or TIA.

Conclusion

Our results do not support the effectiveness of motivational interviewing in supporting lifestyle behaviour change after TIA or minor ischaemic stroke. However, the overall lifestyle behaviour change was high and might be explained by the role of specialized nurses in both groups.

Supplementary material

Supplementary material is available at *European Journal of Cardiovascular Nursing*.

Funding

This study was funded by the Evidence Based Care for Nurses fund of the Erasmus University Medical Hospital.

Conflict of interest: none declared.

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