Consultation training of nurses for cardiovascular prevention - A randomized study of 2 years duration.

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Running head
Consultation training of nurses

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Abstract

The aim of this study was to increase patients' adherence to the treatment of hypertension through the consultation training of nurses. Thirty-three nurses were included in the study. In the intervention group (IG), 19 nurses took part in a three-day residential training course on the Stages of Change model, Motivational Interviewing and guidelines for cardiovascular prevention, and recruited 153 patients. Sixteen nurses in the control group (CG) recruited 59 patients. A decrease in systolic and diastolic blood pressure and total cholesterol was noticed in both groups over the two years. Heart rate ($p=0.027$), body mass index ($p=0.019$), weight ($p=0.0001$), waist ($p=0.041$), LDL-cholesterol ($p=0.0001$), the waist hip ratio ($p=0.024$), and perceived stress ($p=0.001$) decreased to any great extent only in the IG. After two years, 52.6% of the patients in the IG ($p=0.13$) reached the target of $\leq$ 140/90 mmHg in blood pressure compared with 39.2% in the CG. For self-reported physical activity there was a significant ($p=0.021$) difference between the groups. The beneficial effects of the consultation training on patients' weight-parameters, physical activity, perceived stress and the proportion of patients who achieved blood pressure control emphasise consultation training and the use of behavioural models in motivating patients to adhere to treatment.

Keywords

Education, hypertension, nursing, models theoretical, patient compliance, referral and consultation

Introduction

The goal of improving the opportunities for hypertensive patients to manage their own treatment is an important issue when it comes to minimising the negative health effects of high blood pressure (BP). In many trials, interest hitherto has focused on BP control and not on lifestyle related to the control of cardiovascular risk factors. However, knowledge on how to tailor the treatment so that the individual patient attains sustainable cardioprotective lifestyle behaviour changes is limited. Nurse-managed follow-up visits have turned out to have a positive effect [1, 2]. A recent Cochrane-review [3] concludes that an organised system with a stepped care approach to antihypertensive drug treatment appears to improve the control of high BP. Bosworth *et al.* [4] suggest multifactorial tailored behavioural education for improved BP control. Lifestyle changes or non-pharmacological treatment (smoking cessation, reducing alcohol intake, weight reduction, diet, physical activity and stress management) and pharmacological treatment have been found, on the basis of extensive research, to be important in reducing the risk of cardiovascular complications [5, 6]. The growing knowledge of behavioural models for changing lifestyle and increasing adherence is unfortunately seldom taken into account [7, 8].

The aim of our study was to increase patients' adherence to the treatment of hypertension by the consultation training of nurses involved in hypertension care using the "Stages of Change" (SOC) model and "Motivational Interviewing" (MI), with a specific research question about the positive effects that could be observed on the patients' BP, smoking, blood lipids, physical activity, alcohol consumption and weight as a result of nurses' communication after their consultation training.

Subjects and methods

Nurses were recruited from a register of all the nurses who were members of the Swedish Hypertension Society and from a register of all nurse-led hypertension clinics at health centres in Sweden (Figure 1). They were requested to participate and then randomly allocated to intervention (IG) or control group (CG). The intervention consisted of a multifactorial tailored education [4] for nurses that was residential and lasted for three days during the winter of 2003 and 2004, on three separate occasions. The nurses were educated in patient centeredness [9], the SOC model [10], MI [9] and applying guidelines for cardiovascular prevention [5], lifestyle factors and pharmacological treatment [3]. To get practice after the lessons, the nurses were video-recorded when counselling simulated patients. The recordings were reviewed in small groups with supervision of the research team (ED, AB, KK). To help the nurses establish a structure for the consultation, they were given a booklet specially developed for this study [11]. Moreover, another booklet was written for patients' self-management of cardiovascular risk factors and the stages involved in behavioural change with a final summing up of the patient's individual risk profile [12]. The results of the consultation training on nurses communication with patients has been previously reported [13, 14].

The patient inclusion criteria were hypertensive patients consulting nurses at health centres, men and women aged <75 years, systolic blood pressure (SBP) ≥ 160 mmHg and/or diastolic blood pressure (DBP) ≥ 90 mmHg, body mass index (BMI) ≥ 25 kg/m^2, serum cholesterol ≥ 6.5 mmol/l and/or serum triglycerides ≥ 2.3 mmol/l and not reporting regular physical activity. Smoking or using snuff was not a criterion for exclusion. According to the multifactorial tailored education [4] several laboratory and

lifestyle variables were recorded at baseline and after two years. Patients in the CG received usual care while patients in the IG were counselled by the special educated nurses.

This multi-centre study adheres to the principles outlined in the Declaration of Helsinki and was approved by the Local Ethics Committee at the Faculty of Medicine, University of Gothenburg, Sweden (Ö363-00).

Statistical methods

A statistical power calculation was made based on earlier studies to estimate the power (including mean and distribution for BMI, DBP and lipids) [15]. Fifty patients in the CG were needed to give 90 % power at a 5 % significance level. The SPSS statistical software (SPSS for Windows, version 17.0, SPSS Inc., Chicago, IL) was used for all analyses. For categorical variables comparisons between the IG and CG were performed using the chi-squared test and comparisons within each group between baseline and follow-up were performed using the McNemar test. Variables at ordinal level were analysed using the Mann-Whitney test (for comparisons between the groups) and the Wilcoxon's signed rank test (for comparisons within groups between baseline and follow-up). Continuous variables were checked regarding assumptions underlying parametric and nonparametric statistics and were described and analysed accordingly. The alpha level of significance was set at 0.05 (two-tailed).

Results

The nurses in IG and CG were similar (48 years of age [range 38-59] vs 51 years [range 40-60], working since registration 20 years [range 4-36] vs 25 years [range 10-36] and

working at nurse-led clinic for hypertension 4 years [range 1-16] vs 5 years [range 0-14]). In all, 153 patients were recruited consecutively in the IG and 60 patients in the CG (Figure 2). The intention was to have >150 patients in the CG too, but the nurses had difficulties in recruiting patients and after four years the inclusion period was stopped. Due to the statistical analyses only patients who had complete data, collected from all three measurements at baseline, after one and after two years, were included in the final analyses which resulted in 137 and 51 patients in the IG and CG respectively. Reasons for loss at follow-up are given in Figure 2.

At baseline there was a significant difference in SBP between the groups (IG: 159.1 mmHg [SD 16.57] vs CG: 167.0 mmHg [SD 17.59], p <0.01), but no other differences. A decrease could be seen in SBP for both groups from baseline to one year and furthermore to two years. The same finding applied to DBP during the first year and the decrease remained for the second year (Table 1). Total cholesterol decreased from baseline to two years too, but heart rate, BMI, weight, waist, LDL cholesterol and WHR decreased only in the IG. The differences between the groups were significant for heart rate (p=0.031) and HDL cholesterol (p=0.002) at the two-year follow-up (data not shown). At two years, 52.6% of the patients in the IG (p=0.13) reached the target of ≤ 140/90 mmHg in BP compared with 39.2% in the CG (Table 2). The number of patients who reached the target level for total cholesterol and LDL cholesterol increased in both groups but to a greater extent in the IG.

In the IG, there was a decrease in waist circumference (p=0.041) and BMI (p=0.019) after two years. Looking separately at men and women in the IG, they decreased in weight (men from 99.5 kg [SD 15.7] to 98.1 kg year two [SD 15.2], p=0.009, and

women from 84.9 kg [SD 13.1] to 83.6 kg year two [SD 13.1], p=0.016), and in BMI (men from 31.2 [SD 4.2] to 30.8 year two [SD 4.3], p=0.010, and women from 31.7 [SD 4.6] to 31.2 year two [SD 4.6], p=0.019).

Regarding self-reported physical activity, there was an increase (p=0.004) in the IG, resulting at the two-year follow-up in a significant (p=0.021) difference between the groups (data not shown). The patients also reported a lower level (p=0.001) of perceived stress in the IG at the two-year follow-up. The total consumption of alcohol was lower in the IG, but there were still seven patients who consumed above the gender-specific risk consumption levels (5.1%) while there were three in the CG (5.9%) after two years.

At baseline, 21.1% of the patients in the IG did not use any antihypertensive medication and, after two years, 13.9% still did not (Table 3). The number of patients on lipid-lowering medication increased in the IG from 11.0 to 27.5% and in the CG from 9.9 to 21.6%. The differences between the groups were non-significant.

Discussion

While following patient variables over two years after nurses' consultation training SBP, DBP and total cholesterol decreased in both the IG and CG. Heart rate, BMI, weight, waist, LDL-cholesterol and WHR decreased to a greater extent only in the IG. Furthermore, more patients in the IG reached target BP and reported lower level of perceived stress. Significant differences between the groups were found for increased physical activity, heart rate and HDL cholesterol.

There are some confounding factors that have to be taken into account. The nurses' understanding and skills when it came to practising the behavioural models may be decisive in interventions that work in two stages. First, the nurses should change their behaviour to be more patient-centred during their own counselling with patients [16] and, second, the patients should participate in the MI conversation and reflect upon their lifestyle, which sometimes does not simply involve only a single behaviour but can involve several different behaviours [17]. However, these are the requirements in clinical practice. Furthermore the nurses in the study groups were interested to improve hypertension care, a reason for participating in the study, which could have an effect on patients' outcome. Only patients, whose data was available at all three measurements, were finally included due to the planned statistical analyses. We do not know if the excluded patients were different from the included, which should be considered in interpreting the results. Another limitation is the duration of several years for inclusion of patients. Some nurses succeeded in finding several patients quite quickly while others managed only to find a couple of patients. Explanation for this, given by the nurses, was that they had very different amount of time scheduled for their hypertensive patients.

The greater decreases in BMI, weight, waist and WHR for the patients in the IG at the two-year follow-up demonstrate the positive effect of the nurses' use of MI. This kind of research showing the applicability of MI was requested by Duran [18]. The most pronounced changes occurred between baseline and one year and then remained to the two-year follow-up. Applying a Bonferroni correction for multiple comparisons would mean that one of these effects (waist and weight) disappears. In the CG was the same pattern seen with less pronounced changes from baseline to the one-year follow-up.

In using MI, the nurse must form an alliance with the patient and encourage the patient to explore his/her ambivalence and express self-generated reasons for change. In doing this, the patients' autonomy is central. Depending on the stage of changing behaviour according to the SOC model [19] the patient has reached, the intervention must be matched to that stage. If a patient is not interested in or considering change, the pre-contemplation stage, and is treated as if it was simply a matter of just deciding how to make the change, the predictable outcome is resistance [20]. As the patients in the IG succeeded in reducing their body weight variables, we can assume that the use of MI and the SOC model was successful, although there were significant differences between the groups only for heart rate, HDL cholesterol and physical activity.

The decrease in the weight variables is probably one of the reasons for more patients, though not significantly, reaching the target BP level of ≤ 140/90 mmHg in the IG (52.6%) than in the CG (39.2%) [21]. This assumption is strengthened by the fact that fewer patients in the IG, 44.5%, increased the amount of antihypertensive medication, compared with 49% in the CG. The increase in physical activity in the IG is also expected to lower BP [22] and could be viewed as a result of the nurses' training in MI [23], as well as the use of the multifactorial tailored behavioural counselling [4]. The same reasoning applies to the patients' lower perceived level of stress in the IG. Similar results were also found in the EUROACTION study, where nurses were engaged in a cardiovascular disease prevention programme showing significant effects on body weight with 16% (IG) vs 7% (CG) and risk factor levels of BP, waist circumference and intake of fruit and vegetables in high-risk patients in general practice after one year [24]. The nurses' continuous follow-up of the patients in our study can also contribute to the results. The IG nurses' increased awareness of the importance of reaching target

values may be the reason for the increase in lipid-lowering medication of 16.8% compared with 11.8% in the CG. Even though it is the general practitioner (GP) who prescribes the drugs, it is often the nurse who draws the GP's attention to a specific problem. A study from an outpatient clinic in Denmark found that, when nurses were entitled to initiate and titrate antihypertensive medication, 95% of the patients reached target BP [1].

A new lifestyle requires constant attention, which might result in relapses in former behaviour or maintaining the new lifestyle [25]. Prochaska *et al.* [26] suggest that at least five years is the time period when people undergoing a behavioural change could need support in order not to have relapses. A further follow-up of this study would therefore be of interest.

Conclusion

The extensive three-day consultation training for nurses resulted in effects on patients' weight-parameters, physical activity, perceived stress and the number of patients who achieved BP-control during two years of follow-up. These findings emphasise the importance of consultation training for nurses and the use of behavioural models in motivating patients to make lifestyle changes in order to control their BP. Further and larger studies are needed to verify our results, preferably from other countries too.

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Table 1. Overview of BP, heart rate, BMI, weight, waist, WHR and blood lipids at baseline and significance level within groups after two years.

Intervention group n=137 (mean; SD 95% CI)			**Control group n=51 (mean; SD 95% CI)**	
	Baseline	2 yrs	Baseline	2 yrs
Systolic BP (mmHg)	159.1(16.6;156.3-161.9)	142.9(15.1;140.3-145.4)***	167.0(17.6;162.1-172.0)	145.6(10.0;141.6-149.6)***
Diastolic BP (mmHg)	93.0(9.5;91.4-94.6)	83.6(9.3;82.0-85.1)***	90.2(11.3;86.9-93.3)	83.1(16.6;80.2-85.9)***
Heart rate (beats/min)	68.8(9.6;67.2-70.4)	67.2(9.9;65.5-68.9)*	71.0(12.1;68.1-75.0)	70.3(9.1;52.5-125.7)
BMI (kg/m^2)	31.4(4.3;30.7-32.1)	30.9(4.4;30.2-31.7)***	30.9(4.1;29.8-32.1)	30.8(3.7;29.8-31.9)
Weight (kg)	93.3(15.9;90.6-95.9)	92.0(16.0;89.3-94.7)***	90.4(17.5;85.6-95.5)	90.2(16.6;85.5-94.9)
Waist men (cm)	109.8(10.6;107.4-112.3)	108.2(11.7;105.7-110.9)**	110.6(9.5;106.8-114.4)	108.4(8.3:105.0-111.9)
Waist women (cm)	101.5(10.2;98.8-104.1)	99.9(11.4;96.9-102.9)*	100.0(11.1;95.5-104.6)	101.2(10.9;96.7-105.7)
WHR	1.0(0.1;0.9-1.0)	0.9(0.1;0.9-1.0)*	1.0(0.1;0.9-1.0)	0.9(0.1;0.9-1.0)
Cholesterol (mmol/l)	6.3(1.1;6.2-6.5)	5.8(1.0;5.7-6.0)***	6.4(0.9;6.2-6.7)	5.8(0.9;5.5-6.0)***
HDL (mmol/l)	1.5(0.9;1.3-1.6)	1.3(0.4;1.3-1.4)	1.5(0.5;1.4-1.7)	1.6(0.7;1.4-1.8)
LDL (mmol/l)	4.2(1.0;4.0-4.3)	3.8(1.0;12.8-81.9)***	4.8(5.5;3.3-6.4)	3.6(0.8;16.1-62.3)
TG (mmol/l)	2.0(0.9;1.9-2.2)	2.1(1.6;0.9-5.5)	2.0(1.8;1.5-2.5)	1.7(1.2;1.4-2.1)*

BP, blood pressure, BMI, body mass index, HDL, high-density lipoprotein cholesterol, LDL, low-density lipoprotein cholesterol, TG, triglycerides, WHR, waist-hip ratio, $^{*}P<0.05$, $^{**}P<0.01$ and $^{***}P<0.001$

Table 2. Data from baseline to the 2-year follow-up for BP, blood lipids, waist, WHR and BMI.

	Intervention group n=137, n (%)		Control group n=51, n (%)	
	Baseline	2 yrs	Baseline	2 yrs
BP ≤140/90 mmHg	0	72(52.6) [a]	0	20(39.2) [a]
SBP ≤140 mmHg	8(5.9)	55(40.1)	4(7.8)	16(31.4)
DBP ≤90 mmHg	62(45.3)	96(70.1)	30(58.8)	36(70.6)
TG mmol/l <resp limit/sex [b]	65(47.8)	60(44.1)	25(49.0)	33(64.7)
Cholesterol ≤ 5.0 mmol/l	8(5.8)	33(24.1)***	1(2.0)	9(17.6)**
LDL ≤ 3.0 mmol/l	14(10.6)	31(23.7)**	4(8.2)	13(26.0)*
HDL ≥ 1.0 mmol/l	120(87.6)	122(89.7)	49(96.1)	48(94.1)
WHR ♂ ≤94 cm, ♀ ≤80 cm	13(9.6)	22(16.1)	1(2.0)	5(9.8)
Waist				
♂ ≤94 cm, ♀ ≤80 cm	4(2.9)	9(6.6)*	1(2.0)	1(2.0)
♂ 94.1-101.9 cm, ♀ 80.1-87.9 cm	17(12.4)	25(18.2)	5(9.8)	7(13.7)
♂ >102 cm, ♀ >88 cm	116(84.7)	103(75.2)	45(88.2)	43(84.3)
BMI (kg/m^2)				
≤24.9	2(1.5)	8(6.0)*	3(5.9)	2(3.9)
25-29.9	57(41.9)	59(44.0)	21(41.2)	23(45.1)
30-34.9	52(38.2)	42(31.3)	18(35.3)	18(35.3)
≥35	25(18.4)	25(18.7)	9(17.6)	8(15.7)

BP, blood pressure, SBP, systolic blood pressure, DBP, diastolic blood pressure, WHR, waist-hip ratio, BMI, body mass index, TG, triglycerides, LDL, low-density lipoprotein cholesterol, HDL, high-density lipoprotein cholesterol, [a] not applicable, [b] ♂ ≤1.8 and ♀ ≤1.6 mmol/l, $^{*}P<0.05$, $^{**}P<0.01$ and $^{***}P<0.001$

Table 3. Antihypertensive and lipid-lowering drug medication (proportion of patients).

	Intervention group n=137, n (%)		Control group n=51, n (%)	
	Baseline	2 yrs	Baseline	2 yrs
None	33(21.1)	17(13.9)	15(29.4)	5(9.8)
Antihypertensive drugs	104(78.9)	120(86.1)	36(70.6)	46(90.2)
Betablockers	66(48.2)	70(51.1)	20(39.2)	19(37.3)
Calciumantagonists	24(17.5)	37(27.0)	7(13.7)	18(35.3)
ACE inhibitors	19(13.9)	32(23.4)	11(21.6)	17(33.3)
ACE inhibitors+diuretics	2(1.5)	2(1.5)	1(2.0)	4(7.8)
Angiotensin II-antagonists	17(12.4)	20(14.6)	2(3.9)	8(15.7)
Angiotensin II-antagonists+diuretics	5(3.6)	11(8.1)	0	1(2.0)
Diuretics	36(26.3)	55(40.1)	17(33.3)	22(43.1)
Other[1]	2(1.5)	4(2.9)	0	0
Lipid-lowering drugs	15(11.0)	38(27.5)	5(9.9)	11(21.6)
Statins, n (%)	14(10.3)	35(25.4)	4(7.9)	10(19.6)
Fibrates, n (%)	1(0,7)	3(2.1)	1(2.0)	1(2.0)

[1] = sympatholytics with central or peripheral effect

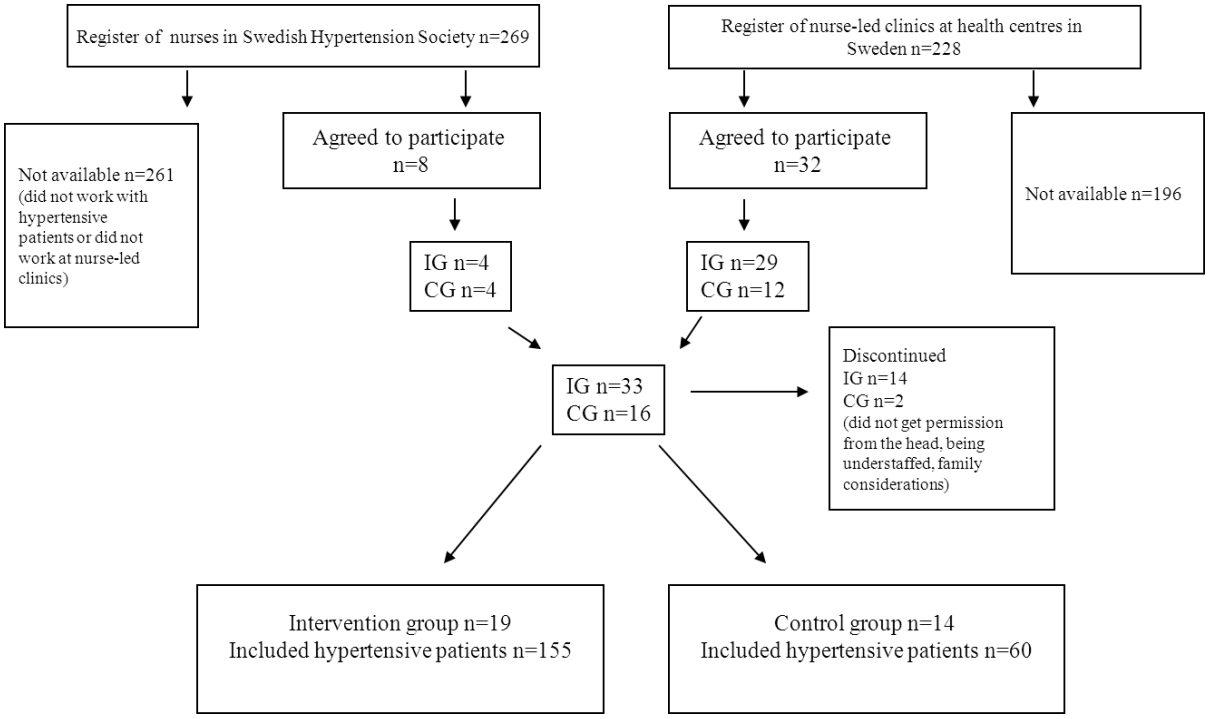

Fig 1. Flow diagram of participating nurses

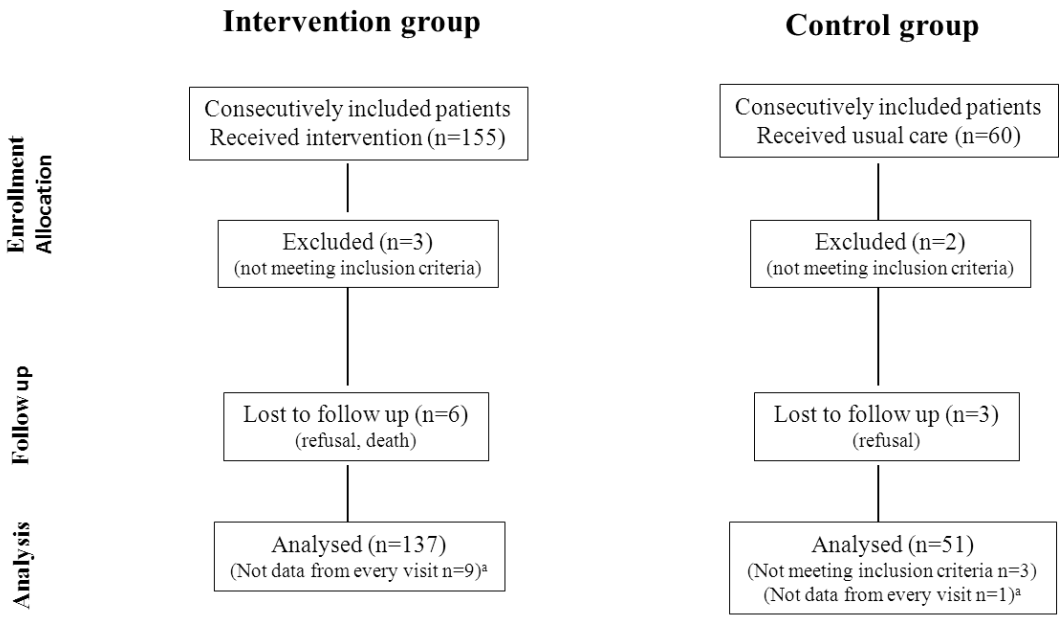

Fig 2. Flow diagram of patients. [a]Data missing due to patients not showing up or the nurses being off duty when data should be collected.