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RESEARCH ARTICLE

Nurse-led counseling for coronary artery disease patients: A 1-year follow-up study

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Abstract

Nurse-led counseling and systematic follow-up have been shown to reduce cardiovascular risk factor levels. The study aims were to investigate if cardiovascular risk factor levels could be reduced in patients with coronary artery disease with a nurse-led intervention and to report patients' evaluations of nurse-led counseling. The study design was a real-life longitudinal follow-up counseling intervention. Data were collected from November 2017 to May 2020. The nurse-led intervention and patients' follow-up time was 1 year. Of the 78 patients recruited, 74 completed the study. The most significant findings were in the levels of total cholesterol, low-density lipoprotein cholesterol, and triglycerides at every follow-up visit compared to their baseline levels and that waist circumference decreased during the 1-year follow-up. Patients assessed the quality of nurse-led counseling to be very good, though it decreased slightly during follow-up. The results suggest the integrated care path and specialized and primary care for coronary artery disease patients need further development. More research is needed on how to strengthen patients' self-management and what kind of counseling would best promote it.

KEYWORDS
coronary artery disease, counseling, follow-up studies, nursing, risk factors

Key points

- It is essential for people with coronary artery disease to have support and counseling to survive the period after acute disease to take responsibility for self-management.
- The health care organizations need to leverage the expertise of nurses and invest in developing nurse-led counseling.
- It would be beneficial for people with coronary artery disease to develop seamless care path and collaboration with specialized health care and primary health care.

1 | INTRODUCTION

Globally, cardiovascular diseases are the most common non-communicable diseases and cause of death. Cardiovascular diseases, including coronary heart disease and strokes, were responsible for an estimated 17.8 million deaths in 2017 (Kaptoge et al., 2019). Most cardiovascular diseases, however, are preventable by intervening in behavioral risk factors, such as tobacco use, unhealthy diet and obesity, physical inactivity, and harmful use of alcohol. Patients with high cardiovascular risk factors such as hypertension, diabetes, or hyperlipidemia need early detection, guidance, and support in self-management. (Brown et al., 2020; World Health Organization, 2017). Moreover, the effect of stress, depression, and type D personality need to considered (Masafi et al., 2018). Nurse-led counseling (NLC) can focus on patient-driven self-management and support. In this study, we use the term "counseling" for all guidance, education, and information and the term "self-management" for self-efficacy and adherence.

2 | BACKGROUND

Self-management and empowerment of chronic disease have been recognized to support people in living and coping with their disease in everyday life. The risk factors for people with coronary artery disease (CAD), such as tobacco use, obesity, and physical inactivity as well as non-adherence to medication, should be specially monitored in counseling. The effect of the disease on everyday lives and how to control the disease should be explored with every patient (Sigurdardottir et al., 2017). Traditionally, patients have received counseling for their disease and support for self-management from nurses and physicians during hospitalization and discharge (Hall et al., 2017; Hodgins et al., 2020; Katz et al., 2017; Noureddine et al., 2020). In recent years, CAD treatment and examination methods have developed and hospital stays have shortened (Khaled et al., 2020; Szummer et al., 2018; Taxiarchi et al., 2020). In the acute phase of disease, however, patients are unable to receive and reflect on all given counseling. They feel the discharge process to be challenging (Hodgins et al., 2020), because they struggle to understand their new context of living with CAD (Fålun et al., 2016). Therefore, patient counseling in the acute phase should focus on coping in everyday life and with alarming symptoms. Noureddine et al. (2020) found that over one third were not sure of their symptoms after discharge. The counseling needs to come at the right time, while its focus should be shifted to the post-hospital phase.

Adequate counseling support is important for people with CAD because they have to make lifestyle changes by adopting healthy behavior and mitigating the risk factors in their health (Brown et al., 2020). It is important for patients that they feel they have a safe atmosphere and have the opportunity to express concerns and ask questions (Kähkönen et al., 2017). Patients' motivation for treatment has been shown to be an important factor for self-management in a healthy lifestyle (Kähkönen et al., 2015). Self-management calls for people with CAD to take responsibility and perform daily activities directed at specific goals, thoughts, emotions, decisions, and behavior.

NLC has been found to be effective in decreasing systolic and diastolic blood pressure (SBP and DBP, respectively) as well as body mass index (BMI) in patients with hypertension who have undergone coronary angioplasty (Jafari et al., 2020; Saffi et al., 2014). NLC has also been shown to improve patients' level of knowledge, attitudes, and beliefs in response to acute coronary syndrome symptoms (Singh et al., 2016). In Vibulchai et al. (2016), patients who were involved in a self-management program were more active in social activities, household tasks, their occupation, and exercise than the control group. People with CAD need support to reduce depressive (Huang et al., 2017) and anxiety symptoms and to improve their quality of life (Chang et al., 2020).

Alternative interventions for improving patients' self-management are needed (Halldorsdottir et al., 2020), such as nurse-led phone interventions, which have been found to affect CAD patients' self-management to achieve goals related to the risk factors (Zhou et al., 2018). Halldorsdottir et al. (2020) observed that phone counseling has a positive impact on physical activity, diet, weight, and reducing risk factors such as lack of exercise and obesity. It has also been shown to be a promising approach for reducing patients' anxiety (Furuya et al., 2015). Molan et al. (2019) found that a website with visual education and animation increased patients' understanding of their heart conditions and examinations. Mobile-based self-management interventions have been shown to improve adherence to medication (Ni et al., 2018; Sua et al., 2020), lower blood pressure (Halldorsdottir et al., 2020; Sua et al., 2020), and decrease triglyceride (TG) levels (Halldorsdottir et al., 2020) among patients with CAD.

Self-management of medication for people with CAD is essential. Ni et al. (2018) found the main reason for non-managing in medication to be patients' lack of knowledge related to medication. Therefore, the importance of medication should be part of the discussion in every counseling. Counseling on medicine, a pillbox reminder, and the simplification of dosages together with a nurse-led intervention increased the self-management of medication (Al-Ganmi et al., 2016; Laukkanen, 2015). Al-Ganmi et al. (2020) observed that more than one-third of cardiac patients had medium or low cardiac medication self-management and suggested that it could be because of poor counseling. Promoting self-management of medication together with systematic counseling and the management of risk factors can improve the long-term prognosis of CAD and reduce mortality (Du et al., 2016).

The research on nurse-led CAD interventions is sparse, and more study is needed on reducing risk factors for people with CAD in nurse-led interventions. More research on patients' experiences and how they assess NLC is also needed.

2.1 | Study aim

The study aims were to investigate if cardiovascular risk factor levels could be reduced in patients with CAD with a nurse-led intervention and to report patients' evaluations of NLC.

TABLE 1 Treatment balance in a patient with coronary artery disease

	Poor balance	Moderate balance	Goals achieved
Follow-up in primary care	4x/year	2–3x/year	1x/year
Treatment balance	• HbA1c > 8.0% • LDL-c > 3.0 mmoL/L • BP > 160/95	• HbA1c > 7.0% • LDL-c > 2.5–3.0 mmoL/L • BP > 140/160	• HbA1c < 7.0/7.5% OR fasting < 6.0% • LDL-c < 2.5 mmoL/L • BP < 135/85
Risk factors	• Symptoms • Smoking • Overweight or gain in weight • Lack of exercise	• Medication problems • Smoking • Overweight or gain in weight • Lack of exercise	• Predictable curative medication is in use • Non-smoking • Weight under control • Adequate exercise

Abbreviations: BP, systolic blood pressure; HbA1c, glycated hemoglobin; LDL-c = low-density lipoprotein cholesterol; TG = triglycerides.

3 | METHODS

3.1 | Design

A real-life longitudinal follow-up study design was used. People with CAD received individual NLC when being discharged from the hospital, one telephone contact approximately 2 to 4 weeks from discharge, and one to four individual counseling sessions with the nurse-led practice at the primary care unit according to patients' risk factors (Table 1). The follow-up time for one patient was approximately 1 year (Figure 1).

3.2 | Intervention

Before the study, nurses in the follow-up organizations received tailored training and information on cardiac artery disease and the counseling process. They also had an opportunity to visit and orient patients to the care process and counseling in the cardiac unit of the hospital.

The first counseling session was conducted by a nurse from the cardiac unit when patients were discharged (Figure 1). At this point, the focus of counseling was on how to cope in everyday life after a heart event, highlighting the importance of regular use of the prescribed medication. Patients were advised how to identify alarming symptoms and what to do and where to contact in case of acute symptoms. They also received contact information for the cardiac unit if they had something further to ask.

During the 1-year intervention period, nurses made one phone call to patients lasting approximately 60 to 90 min. The phone counseling session was held 2 to 4 weeks after discharge. A cardiac nurse from the hospital called the myocardial infarction patients, and a primary care nurse called the other coronary heart diagnosis patients (Figure 1). These counseling sessions were focused on the issues and questions raised by patients. At this point, patients usually had many questions about, for example, their hospitalization, what has happened to them, what the diagnosis means, what it means for their everyday lives, and what activities they can perform safely. During the phone call, a time for the next counseling session at primary care was also agreed on.

The next follow-up with NLC was conducted in primary care one to four times during the year (Figure 1). The frequency of the intervention at the primary care nurse practice was evaluated according to patient risk factors (Table 1). On the basis of this study design, the thresholds for risk factors were only indicative, and initiatives for interventions were based more on patients' individual needs.

The items discussed in the NLC with people with CAD consisted of different elements of life, all of which were shown to be important for self-management purposes. The patient was to choose the items they for which they felt they needed counseling. The amount and timing of follow-up visits were agreed on and the next appointment was arranged. The items discussed in the intervention counseling with people with CAD consisted of at least the diagnosed disease, blood pressure, cholesterol, medication (highlighting its importance, motivating), nutrition (heart health—promoting diet), diabetes and blood sugar, exercise (encouragement to start), and follow-up visits. If needed, it was possible to discuss mood, sleep, and rest (importance); working life, coping in everyday life, family and friends (family/friends/lonely, need for support); sex life; hobbies (encouragement, counseling); economic situation (sometimes patients' financial issues are acute and need to be resolved before he/she can receive any other information); oral health (emphasizing its importance); smoking and snuff; alcohol; intoxicants; and weight control (motivating and support). All primary care nurses were registered nurses or advanced practice nurses, and they could consult a physician if necessary.

3.3 | Sample and data collection

The data were collected from November 2017 to May 2020 in Central Finland. Patients with CAD were recruited in one acute care hospital in a cardiac unit. Before the recruitment process, the researcher visited the unit and informed the staff nurses about the study recruitment protocol. Furthermore, two cardiac nurses from the cardiac unit were included in the study team. A convenience sample was used, and patients were recruited by the nurse from the cardiac unit. Inclusion criteria were over the age of 18 diagnosis by catheterization and treatment of acute coronary syndrome in the cardiac unit. Exclusion criteria were patients' reduced ability to answer the questionnaires, such as dementia, and bypass surgery patients. Data were collected
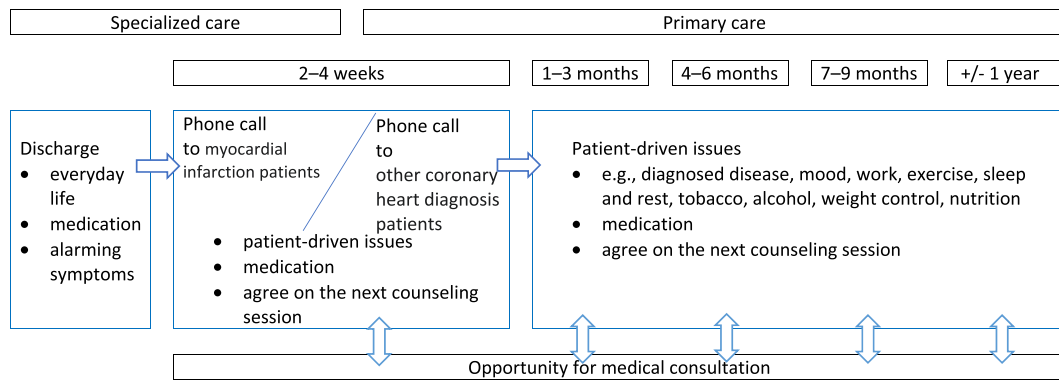
FIGURE 1 The process of nurse-led counseling with a patient with coronary artery disease

directly from web-based questionnaires and the electronic hospital medical record system.

In the study protocol, the objective was to follow up on the risk factors in every NLC session. The follow-up measures include blood tests on total cholesterol (TC) as well as measurements of low-density lipoprotein cholesterol (LDL-c), high-density lipoprotein cholesterol (HDL-c), TG, glycated hemoglobin (HbA1c), SBP/DBP, weight, BMI, and waist circumference. The Fageström test (scale 0–10) was used to determine patients' tobacco status and nicotine dependence. Interpretations of nicotine dependence from the test are as follows: 0–2 points = low dependence, 2–6 points = moderate dependence, and 7–10 points = strong dependence (Heatherton et al., 1991). The Kasari Frequency Intensity Time (FIT) Index (scale 0–100) with three questions on the frequency, efficiency, and duration of exercise was used to classify each patient's physical activity level. Briefly, interpretations of the FIT index are as follows: 0–12 = low activity, 13–36 = some activity, 37–63 = good activity, and ≥64 = excellent activity (Karjalainen et al., 2018).

The study included the CAD Patient Guidance Questionnaire, a six-item measure designed to evaluate patients' perceptions of NLC. Patients were asked to evaluate NLC on a scale of 0–10 (0 = totally disagree, 10 = totally agree). The items were as follows:

1. I received enough information about the subject.
2. I received instructions and advice that I can use to maintain my heart health.
3. The professionals listened to me.
4. I was asked about my views and opinions by the professionals.
5. I received help in setting goals to promote my heart health.
6. I received support and examples to make choices that promote my health.

3.4 | Ethical considerations

Specialized care and primary care organizations provided permission for data collection before the research began. The Committee of Research Ethics of Central Finland Health Care District provided a positive statement (Decision date: 28.6.2017, 6/2017). Participation in the study and answering the questionnaire were voluntary and anonymous (TENK, 2019). Participants were orally informed of the study, they received an information letter, and they gave written consent to participate in the study. The General Data Protection Regulation was followed during all stages of the study (European Commission, 2016).

3.5 | Analysis

Descriptive statistics (frequency, percent, mean) were computed for all demographic variables. Mean and frequency were calculated for all variables at the baseline and for four follow-up visits. The variables of four follow-up visits were compared to the study baseline data. Differences between follow-up visits were assessed using t tests, and the mean of paired differences and 95% significance level was used. Data analysis was performed using SPSS Statistics (version 27.0, IBM Corporation, Armonk, NY).

4 | RESULTS

4.1 | Characteristics of participants

A total of 78 patients were recruited for the study, and all of them were accepted in the baseline measures. Four patients suspended or dropped out of the study because of moving to another location. In total, 52 patients were in contact with a nurse after 1 year, and 35 patients were in contact with either a physician or both a nurse and a physician. The mean age was 61.7, and the age range was 34 to 82 years. The most representative group of patients were between 60 and 69 years (38.5%). There were more males (70.5%) than females (Table 2).

4.2 | Risk factors of coronary artery disease

At the baseline, both SBP and DBP were at the treatment balance level (134/80 mmHg) and did not show any significant changes during

TABLE 2 Participants' characteristic and measurements of at baseline

	n	%	Mean	Std. deviation	Minimum	Maximum
Age	78		61.7	9.80	34	82
<40	3	3.8				
40–49	7	9.0				
50–59	19	24.4				
60–69	30	38.5				
>70	19	24.4				
Gender	78					
Female	23	29.5				
Male	55	70.5				
SBP (mmHg)	74		134	14.71	100	181
DBP (mmHg)	74		80	8.67	50	102
BMI (kg/m^2)	74		28.4	4.69	21	43
<25	16	20.5				
25–29	32	41.0				
30–35	17	21.8				
>35	9	11.5				
Waist circumference (cm)	76		104.9	13.12	62	140
Female	22	29.5	101.2	12.51	76	131
Male	54	70.5	106.4	13.17	62	140
Tobacco status	78					
Yes	17	21.8				
Nicotine depencdnece	17		2.4	2.21	0	7
No	61	78.2				
FIT	75		41.1	19.87	0	80
TC (mmol/L)	75		4.65	1.19	2.3	8.2
LDL-c (mmol/L)	75		3.10	1.09	0.8	6.4
HDL-c (mmol/L)	74		1.41	1.33	0.2	12
TG (mmol/L)	74		1.50	0.86	0.4	4.7
HbA1c (mmol/L)	37		46.00	18.64	26	114
Total assessment of counseling	73		9.17	1.19	0	10
I received enough information about the subject.	73		9.23	1.06	5	10
I received instructions and advice that I can use to maintain my heart health.	73		9.15	1.61	1	10
The professionals listened to me.	73		9.48	0.94	5	10
I was asked my views and opinions by the professionals.	72		8.96	1.51	0	10
I received help in setting goals to promote my heart health.	72		9.24	1.46	0	10
I received support and examples to make choices that promote my health.	72		8.93	1.77	0	10

Abbreviations: BMI, body mass index; DBP, diastolic blood pressure; FIT, physical activity (Index of Kasari); HbA1c, glycated hemoglobin; HDL-c, high-density lipoprotein cholesterol; LDL-c, low-density lipoprotein cholesterol; SBP, systolic blood pressure; TC, total cholesterol; TG, triglycerides.

the follow-up. Only at the first follow-up was DBP indicated to significantly decrease ($p < 0.032$; see Table 2, Table 3). The mean of BMI was 28.4 kg/m^2, which indicated overweight. Normal weight (BMI < 25 kg/m^2) was found among 20.5% of patients, while 41.0% were overweight (BMI 25–29 kg/m^2), and a third of the patients were obese or (BMI 30–35 kg/m^2) or severely obese (BMI > 35 kg/m^2; Table 2).

Waist circumference, on average, was 101.2 cm for females and 106.4 cm for males (Table 2). Comparing both female and male waist circumferences, the mean value decreased in every follow-up and was

TABLE 3 Comparing the means of four follow-up sessions to the baseline with the risk factors (SBP, DBP, BMI, waist circumference, nicotine dependence, FIT, TC, LDL-c, HDL-c, TG and HbA1c) and the CAD patient guidance questionnaire

	1. Follow-up					2. Follow-up					3. Follow-up					4. Follow-up				
	n	Mean of baseline	Mean	Mean of paired differences	Sig.	n	Mean of baseline	Mean	Mean of paired differences	Sig.	n	Mean of baseline	Mean	Mean of paired differences	Sig.	n	Mean of baseline	Mean	Mean of paired differences	Sig.
SBP (mmHg)	43	135	134	1.81	0.557	32	133	138	−5.03	0.119	19	128	137	−8.42	0.058	28	133	137	−3.29	0.362
DBP (mmHg)	43	81	77	3.54	0.032*	32	78	81	−2.53	0.208	19	80	82	−2.63	0.401	28	80	80	0.00	1.000
BMI (kg/m²)	40	28.7	28.5	0.18	0.313	31	28.8	28.8	0.06	0.778	18	27.7	27.8	−0.11	0.767	24	29.2	28.9	0.33	0.246
Waist circumference (cm)	30	106.4	102.5	3.98	0.001**	23	106.5	104.5	2.02	0.039*	12	99.0	96.8	2.29	0.122	16	107.1	103.3	3.75	0.017*
Nicotine dependence	2	2.5	2.0	0.50	0.500	2	4.5	3.0	1.50	0.205	-					-				
FIT	35	40.7	48.1	−7.34	0.026*	29	42.3	47.0	−4.72	0.207	18	45.1	47.4	−2.39	0.694	23	37.8	46.9	−9.09	0.110
TC (mmol/L)	42	4.85	3.52	1.33	0.000***	41	4.82	3.73	1.08	0.000***	31	4.82	3.87	0.95	0.000***	38	4.90	3.68	1.21	0.000***
LDL-c (mmol/L)	42	3.24	1.99	1.25	0.000***	41	3.22	2.13	1.09	0.002**	31	3.16	2.23	0.93	0.000***	39	3.29	2.14	1.14	0.000***
HDL-c (mmol/L)	42	1.54	1.29	0.25	0.357	41	1.52	1.29	0.23	0.390	30	1.30	1.34	−0.04	0.304	39	1.61	1.34	0.27	0.345
TG (mmol/L)	42	1.63	1.29	0.34	0.004**	40	1.56	1.32	0.24	0.010*	30	1.64	1.23	0.41	0.003**	39	1.53	1.33	0.20	0.126
HbA1c (mmol/l)	13	54.15	48.23	5.92	0.117	15	52.80	44.93	7.87	0.104	11	49.27	44.55	7.73	0.389	13	49.46	43.00	6.46	0.225
CAD Patient Guidance Questionnaire:																				
I received enough information about the subject.	25	9.16	9.20	−0.04	0.840	17	9.29	8.94	0.35	0.455	11	8.64	9.36	−0.73	0.195	10	8.70	8.90	−0.20	0.735
I received instructions and advice that I can use to maintain my heart health.	25	9.32	9.28	0.04	0.832	17	9.41	9.24	0.18	0.484	11	9.36	9.55	−1.18	0.140	10	8.90	9.00	−0.10	0.798
The professionals listened to me.	25	9.60	9.48	0.12	0.503	16	9.75	9.25	0.50	0.088	11	9.55	9.55	0.00	1.000	10	9.70	8.90	0.80	0.022*
I was asked my views and opinions by the professionals.	25	9.04	9.12	−0.08	0.731	16	9.25	9.25	0.00	1.000	9	8.89	9.33	−0.44	0.104	9	8.89	8.78	0.11	0.729
I received help setting goals to promote my heart health.	24	9.50	9.17	0.33	0.043*	17	9.41	9.12	0.29	0.056	10	9.30	9.30	0.00	1.000	10	9.20	8.80	0.40	0.037*
I received support and examples to make choices that promote my health.	24	9.21	9.33	−0.13	0.417	17	9.24	9.35	−0.12	0.608	10	8.20	9.50	−1.30	0.128	10	8.90	8.70	0.20	0.591
Total assessments of counseling	25	9.31	9.27	0.04	0.750	17	9.40	9.21	0.20	0.341	11	8.86	9.47	−0.61	0.103	10	9.07	8.87	0.20	0.507

Note: Significance: *, p < 0.05; **, p < 0.005; ***, p < 0.001.
Abbreviations: BMI, body mass index; DBP, diastolic blood pressure; df, degree if freedom; FIT, physical activity (Index of Kasari); HbA1c, glycated hemoglobin; HDL-c, high-density lipoprotein cholesterol; LDL-c, low-density lipoprotein cholesterol; SBP, systolic blood pressure; Sig, siginfigancy; t, t test; TC, total cholesterol; TG, triglycerides.

statistically significant at the first ($p < 0.001$), second ($p < 0.039$), and fourth ($p < 0.017$) follow-up (Table 3).

At the baseline, 78.2% of patients were non-smokers and 21.8% were smokers with moderate nicotine dependency (mean 2.41; Table 2). During the follow-up, tobacco status was the least monitored variable. The FIT index was, at the beginning, at a mean of 41.1, which was already on a good activity level (Table 2). During the follow-up, the activity level continued to grow, and at the end, the mean of the FIT index with all patients was 46.9. Comparing pairs, only at the first follow-up was the FIT value statistically significant ($p < 0.026$; Table 3).

Changes in other risk factors (TC, LDL-c, HDL-c, TG, and HbA1c) during the four follow-up visits compared to the baseline are shown in Table 3. The most significant findings were in TC, which decreased from a baseline of 4.65 mmol to 3.68 mmol at the fourth follow-up and showed statistically significant values at every follow-up (-$p < 0.000$) when comparing the means. LDL-c decreased significantly at every follow-up from a baseline of 3.10 mmol to a final value of 2.13 mmol ($p < 0.000$). Accordingly, t tests showed a statistically significant decrease of LDL-c at each follow-up. TG value decreased during the follow-up from 1.5 mmol to 1.31 mmol. The results showed statistical significance only at the first three follow-ups ($p < 0.004$, $p < 0.010$, $p < 0.000$). HDL-c and HbA1c both decreased but not in a statistically significant way (Table 3).

4.3 | Patients' assessments of counseling

Participants assessed the counseling to be at a very good level on all subscales at every follow-up point. Patients assessed the counseling using the CAD Patient Guidance Questionnaire on a scale of 0–10. The means were between 8.87 and 9.47 for total assessments of the subscales. Patients reported they received enough information on the subject during the follow-up, while the mean was 9.23, at the end decreasing only slightly to 8.90. They evaluated the instructions and advice they received for coping with heart health at a good level (9.15, 9.28, 9.24, 9.55, 9.00). A minor but significant drop was in patients' assessments of how professionals listened to them at the baseline (9.48) to final follow-up (8.90) ($p < 0.022$). There was no significant change in items relating to patients' experience of how their views and opinions were asked about, and how they were supported in making healthy choices. However, there was a significant drop in how patients assessed how they got help with setting goals to promote their heart health, from 9.24 to 8.02 ($p < 0.037$; Table 3).

5 | DISCUSSION

The aim of this study was to investigate if cardiovascular risk factor levels could be reduced in patients with CAD with a nurse-led intervention and to report patients' evaluations of NLC. Nurse-led intervention was multifaceted, including phone counseling, and was conducted in collaboration with specialized care and primary care. In this study, only NLC visits were reported. Nurses always had the opportunity to consult a physician about patients' results, medication, or any other issue if necessary.

The most significant findings in risk factors were in TC, LDL-c, and TG levels at every follow-up session compared to the baseline levels, while HbA1c showed no significant changes. Another notable finding in risk factors was the decrease in waist circumference during the 1-year follow-up, and the FIT index remained at a good level. There were no significant changes in SBP/DBP and BMI levels. According to the follow-up, no changes were observed with tobacco habits. Patients assessed the quality of NLC to be at a very good level, though it decreased slightly during follow-up, especially in how professionals listened and how patients received help in setting goals.

The most significant results were with blood values. TC, LDL-c, and TG all decreased significantly during the follow-up. Medication has been found to lower cholesterol and reduce risk of cardiovascular events (Gencer et al., 2020). In the NLC, these aspects were considered by motivating patients to self-manage with a cholesterol-lowering diet and better adherence to taking medication. Recent studies have reported several reasons why patients failed in the self-management of their medication regimen. These include intentional and unintentional reasons, suspicion of generic drugs, and a lack of information regarding the seriousness of disease after percutaneous coronary intervention (Ni et al., 2018; Pettersen et al., 2018). Previously, patients have reported that the medication information they received from physicians and nurses is uninformative and inadequate (Pettersen et al., 2018). In this study, the content of the counseling information on medication for patients was not investigated. Świeczkowski et al. (2016) found several reasons for lack of self-management: a lack of education on antiplatelet treatment, various comorbidities, depression, unmarried status, and the financial limitations of the patient. Accordingly, nurse-led interventions have been able to change patients' illness perception, and after follow-up they have been more aware that the disease is chronic and could worsen suddenly (Sigurdardottir et al., 2017). Patient counseling and the engagement of professionals (a physician, pharmacist, or nurse) are critical aspects for improving self-management of CAD treatment, and follow-up is conducted in person or by phone. Multifaceted interventions including face-to-face, phone, and automated monitoring and encouragement appear to be the most effective (Al-Ganmi et al., 2016; Levy et al., 2018). In NLC, nurses can focus on patients' individual needs, which are often different from patient to patient: one may need more information, another support and encouragement. Sometimes a patient's financial worries are the first issue to be discussed before focusing on other counseling.

In this study, waist circumference measures at baseline for both females and males were over current guidelines (90 cm for female and 100 cm for male). This result represents a significant health risk for both genders. During the follow-up, the waist circumference indicated significant improvement. Sevinc and Argon (2018) noted that increased self-management regarding exercise and diet was related to weight loss among people with CAD while also decreasing their waist circumference values significantly. Chiang et al. (2018) found that a

nurse-led intervention improved patients' self-management of physical activity for people with CAD. In this study, patients' exercise habits were at a relatively good level and continued to improve during the follow-up. It is essential in NLC to encourage and motivate people with CAD to start exercising and not remain sedentary. Exercise has many positive effects on patients' rehabilitation, such as on blood pressure and body weight control.

In the results, both SBP and DBP were at acceptable levels during the follow-up. BMI remained at the same level during the follow-up, though it indicated obesity level at the baseline and did not decrease during the year of counseling. Other studies have indicated that intensive counseling has been able to decrease blood pressure in hypertensive patients and lower BMI as well (Huang et al., 2017; Jafari et al., 2020). It is important for people with CAD to receive support in their self-management of a healthy lifestyle (Jiang et al., 2020), including helping them make heart-healthy choices in their diet to control their weight. Even small changes can improve health in the long run.

No improvements were shown in smoking habits and nicotine dependency. Despite the importance of discussing this topic in counseling, it was the least monitored risk factor. Huang et al. (2017) reached a similar conclusion for smoking but found improvements in other risk factors. Though patients are often aware of risk factors like tobacco use, they are ambivalent about making decision for healthy choices. Here nurses can be a primary support and encourage patients through counseling (Dobber et al., 2019). The motivational interview is a method that professionals use to help patients recognize the need for change and consider ways to implement it. It emphasizes patients' own values and goals, the meaning of change, and their resources. From nurses this approach requires reflective listening and interaction, increasing the probability of success in self-management (Current Guidelines, 2020). Motivational interviews have been shown to be a beneficial method for altering smoking habits (Dobber et al., 2019; Lee et al., 2016).

Patients assessed the quality of the NLC to be at a very high level, though the patients' view of the quality showed a minor decline in every subarea during the follow-up. The decrease was significant in assessments of how the professional listened and helped in setting goals to promote heart health. This finding shows how important it is to listen to patients and discuss those issues they are interested in and consider important. Fålun et al. (2016) have described how patients commonly struggle to understand the context of living with CAD, manage symptoms, and understand the precipitating causes of CAD. Even though patients are motivated to change their lifestyle and contemplated taking their life in new directions and adopting a change of life perspective, they often want to maintain their present lifestyle and live as normally as possible (Fålun et al., 2016). Healthcare professionals have assessed updated theoretical and clinical knowledge and advanced communication skills as essential for patient counseling (Svavarsdóttir et al., 2016). They stressed the importance of being able to establish interpersonal relationships with patients, grasping their learning needs, facilitating an effective dialogue, and providing individualized patient-driven lifestyle counseling.

5.1 | Limitations

This study had some limitations. It was a real-life intervention and all the measurements were conducted by nurses in the actual reception situation. Nurses received precise instructions for the measurements, but these instructions were not always strictly followed, and there was information missing in the follow-up. Furthermore, we did not take into consideration patients' comorbidities. This aspect also influenced the nurses' reception, when patients could have multiple follow-ups simultaneously, such as for CAD and diabetes or asthma. Even though the content of lifestyle counseling is similar for many long-term diseases, the emphasis is these can be on different issues. The specificity of the long-term disease needs to be considered in counseling. Self-reported assessments of physical activity can be cautiously critical. Some research has shown that people overestimate exercise performance in self-assessment compared to objective measurements (Jakicic et al., 1998; Paul et al., 2018). Patients' compliance with follow-up visits may also influence the results. The design was a longitudinal study, and a control group would have given more information about the strength of the intervention. This study used only a convenience sample in one acute care hospital in Finland, so the results should be viewed in this context. The significant results of the study are in line with international research literature.

6 | CONCLUSION

According to the study results, NLC is a suitable intervention to help patients with CAD in self-management. We did not observe changes in all risk factors, but we found significant improvements in cholesterol and triglyceride levels. Although the patients were overweight and failed to lose weight, we also found improvements in patients' waist circumference and physical activities. It is essential for people with CAD to have support and counseling to survive the period after acute disease. These are needed to reduce fears and to encourage even small lifestyle changes and taking responsibility for self-management.

The results of this study are promising and suggest that the health care organizations need to leverage the expertise of nurses and invest in developing NLC. The care path for people with CAD and seamless collaboration with specialized health care and primary health care should be developed. More research, however, is still needed to determine the practice that best motivates people with CAD in self-management. To better tailor counseling according to patients' requirements, it is essential to learn more about patients' own views of their needs and expectations.

AUTHOR CONTRIBUTIONS

Study design: Anu Nurmeksela, Vuokko Pihlainen. Data collection: Anu Nurmeksela. Data analysis: Anu Nurmeksela. Manuscript writing:

Anu Nurmeksela, Vuokko Pihlainen, Tarja Kettunen, Jari Laukkanen, Jaana Peltokoski.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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REFERENCES

Al-Ganmi, A. H., Perry, L., Gholizadeh, L., & Alotaibi, A. M. (2016). Cardiovascular medication adherence among patients with cardiac disease: A systematic review. *Journal of Advanced Nursing*, 72(12), 3001–3014.

Al-Ganmi, A. H. A., Alotaibi, A., Gholizadeh, L., & Perry, L. (2020). Medication adherence and predictive factors in patients with cardiovascular disease: A cross-sectional study. *Nursing and Health Sciences*, 22(2), 454–463.

Brown, J. C., Gerhardt, T. E., & Kwon, E. (2020). *Risk factors for coronary artery disease*. StatPearls. https://www.statpearls.com/ArticleLibrary/viewarticle/28614

Chang, Z., Guo, A. Q., Zhou, A. X., Sun, T. W., Ma, L. L., Gardiner, F. W., & Wang, L. X. (2020). Nurse-led psychological intervention reduces anxiety symptoms and improves quality of life following percutaneous coronary intervention for stable coronary artery disease. *Australian Journal of Rural Health*, 28(2), 124–1310.

Chiang, C. Y., Choi, K. C., Ho, K. M., & Yu, S. F. (2018). Effectiveness of nurse-led patient-centered care behavioral risk modification on secondary prevention of coronary heart disease: A systematic review. *International Journal of Nursing Studies*, 84(April), 28–39.

Current Guidelines. (2020). *Motivational Interviewing*. Duodecim. https://www.kaypahoito.fi/nix02109

Dobber, J., Latour, C., Snaterse, M., van Meijel, B., Ter Riet, G., Scholte op Reimer, W., & Peters, R. (2019). Developing nurses' skills in motivational interviewing to promote a healthy lifestyle in patients with coronary artery disease. *European Journal of Cardiovascular Nursing*, 18(1), 28–37.

Du, L., Dong, P., Jia, J., Li, Z., Lai, L., Yang, X., Wang, S., Yang, X., Li, Z., Shang, X., & Fan, X. (2016). Impacts of intensive follow-up on the long-term prognosis of percutaneous coronary intervention in acute coronary syndrome patients - a single center prospective randomized controlled study in a Chinese population. *European Journal of Preventive Cardiology*, 23(10), 1077–1085.

European Commission. (2016). *General data protection regulation (GDPR)*. European Commission. https://gdpr-info.eu/

Fålun, N., Fridlund, B., Schaufel, M. A., Schei, E., & Norekvål, T. M. (2016). Patients' goals, resources, and barriers to future change: A qualitative study of patient reflections at hospital discharge after myocardial infarction. *European Journal of Cardiovascular Nursing*, 15(7), 495–503.

Furuya, R. K., Arantes, E. C., Dessotte, C. A. M., Ciol, M. A., Hoffman, J. M., Schmidt, A., Dantas, R. A. S., & Rossi, L. A. (2015). A randomized controlled trial of an educational programme to improve self-care in Brazilian patients following percutaneous coronary intervention. *Journal of Advanced Nursing*, 71(4), 895–908.

Gencer, B., Marston, N. A., Im, K. A., Cannon, C. P., Sever, P., Keech, A., Braunwald, E., Giugliano, R. P., & Sabatine, M. S. (2020). Efficacy and safety of lowering LDL cholesterol in older patients: A systematic review and meta-analysis of randomised controlled trials. *The Lancet*, 396(10263), 1637–1643.

Hall, C., Murphy, M., & Scanlon, A. (2017). Cardiac rehabilitation in the acute care setting: Integrative review. *Australian Critical Care*, 30(2), 99–106.

Halldorsdottir, H., Thoroddsen, A., & Ingadottir, B. (2020). Impact of technology-based patient education on modifiable cardiovascular risk factors of people with coronary heart disease: A systematic review. *Patient Education and Counseling*, 103(10), 2018–2028.

Heatherton, T. F., Kozlowski, L. T., Frecker, R. C., & Fagerström, K. -O. (1991). The Fagerström test for nicotine dependence: A revision of the Fagerstrom tolerance questionnaire. *British Journal of Addiction*, 86(9), 1119–1127.

Hodgins, M. J., Filiatreault, S., Keeping-Burke, L., & Logan, S. M. (2020). Patterns of patient coping following hospital discharge from medical and surgical units: A pilot study. *Nursing and Health Sciences*, 22(1), 118–125.

Huang, Y. J., Parry, M., Zeng, Y., Luo, Y., Yang, J., & He, G. P. (2017). Examination of a nurse-led community-based education and coaching intervention for coronary heart disease high-risk individuals in China. *Asian Nursing Research*, 11(3), 187–193.

Jafari, F., Shahriari, M., Sabouhi, F., Khosravi-Farsani, A., & Eghbali-Babadi, M. (2020). The effect of a lifestyle management educational program on blood pressure, heart rate, and body mass index in patients with hypertension. *ARYA Atherosclerosis*, 16(1), 7–15.

Jakicic, J. M., Polley, B. A., & Wing, R. R. (1998). Accuracy of self-reported exercise and the relationship with weight loss in overweight women. *Medicine & Science in Sports & Exercise*, 30(4), 635–638.

Jiang, W., Zhang, Y., Yan, F., Liu, H., & Gao, R. (2020). Effectiveness of a nurse-led multidisciplinary self-management program for patients with coronary heart disease in communities: A randomized controlled trial. *Patient Education and Counseling*, 103(4), 854–863.

Kähkönen, O., Kankkunen, P., Miettinen, H., Lamidi, M. L., & Saaranen, T. (2017). Perceived social support following percutaneous coronary intervention is a crucial factor in patients with coronary heart disease. *Journal of Clinical Nursing*, 26(9–10), 1264–1280.

Kähkönen, O., Kankkunen, P., Saaranen, T., Miettinen, H., Kyngäs, H., & Lamidi, M. L. (2015). Motivation is a crucial factor for adherence to a healthy lifestyle among people with coronary heart disease after percutaneous coronary intervention. *Journal of Advanced Nursing*, 71(10), 2364–2373.

Kaptoge, S., Pennells, L., de Bacquer, D., Cooney, M. T., Kavousi, M., Stevens, G., Riley, L. M., Savin, S., Khan, T., Altay, S., Amouyel, P., Assmann, G., Bell, S., Ben-Shlomo, Y., Berkman, L., Beulens, J. W., Björkelund, C., Blaha, M., Blazer, D. G., ... di Angelantonio, E. (2019). World Health Organization cardiovascular disease risk charts: Revised models to estimate risk in 21 global regions. *The Lancet Global Health*, 7(10), e1332–e1345.

Karjalainen, M., Saltevo, J., Tiihonen, M., Haanpää, M., Kautiainen, H., & Mäntyselkä, P. (2018). Frequent pain in older people with and without diabetes - Finnish community based study. *BMC Geriatrics*, 18(1), 1–8.

Katz, D. A., Graber, M., Lounsbury, P., Vander Weg, M. W., Phillips, E. K., Clair, C., Horwitz, P. A., Cai, X., & Christensen, A. J. (2017). Multiple risk factor counseling to promote heart-healthy lifestyles in the chest pain observation unit: Pilot randomized controlled trial. *Academic Emergency Medicine*, 24(8), 968–982.

Khaled, S., Jaha, N., Shalaby, G., Niazi, A. K., Alhazmi, F., Alqasimi, H., Ruzaizah, R. A., Haddad, M., Alsabri, M., & Kufiah, H. (2020). Early discharge (within 24–72 h) in low-risk AMI patients treated with PCI: Feasibility and safety—Hajj study. *Egyptian Heart Journal*, 72(1), 55.

Laukkanen, J. A. (2015). Cardiac rehabilitation: Why is it an underused therapy? *European Heart Journal*, 36(24), 1500–1501.

Lee, W. W. M., Choi, K. C., Yum, R. W. Y., Yu, D. S. F., & Chair, S. Y. (2016). Effectiveness of motivational interviewing on lifestyle modification and health outcomes of clients at risk or diagnosed with cardiovascular diseases: A systematic review. *International Journal of Nursing Studies*, 53, 331–341.

Levy, A. E., Huang, C., Huang, A., & Michael Ho, P. (2018). Recent approaches to improve medication adherence in patients with

coronary heart disease: Progress towards a learning healthcare system. *Current Atherosclerosis Reports*, 20(1), 5.

Masafi, S., Saadat, S. H., Tehranchi, K., Olya, R., Heidari, M., Malihialzackerini, S., Jafari, M., & Rajabi, E. (2018). Effect of stress, depression and type d personality on immune system in the incidence of coronary artery disease. *Open Access Macedonian Journal of Medical Sciences*, 6(8), 1533–1544.

Molan, N., Emmanuel, S., Langley, T., & Holloway, C. J. (2019). Evaluating the effectiveness of an online cardiac rehabilitation resource (Www. Svhhearthealth.Com.Au) in Improving knowledge and confidence for patients with newly diagnosed cardiac conditions: A pre-experimental pilot study. *Heart Lung and Circulation*, 28(5), 761–770.

Ni, Z., Liu, C., Wu, B., Yang, Q., Douglas, C., & Shaw, R. J. (2018). An mHealth intervention to improve medication adherence among patients with coronary heart disease in China: Development of an intervention. *International Journal of Nursing Sciences*, 5(4), 322–330.

Noureddine, S., Dumit, N. Y., & Maatouk, H. (2020). Patients' knowledge and attitudes about myocardial infarction. *Nursing and Health Sciences*, 22(1), 49–56.

Paul, D. R., McGrath, R., Vella, C. A., Kramer, M., Baer, D. J., & Moshfegh, A. J. (2018). Understanding the nature of measurement error when estimating energy expenditure and physical activity via physical activity recall. *Journal of Physical Activity and Health*, 15(7), 543–549.

Pettersen, T. R., Fridlund, B., Bendz, B., Nordrehaug, J. E., Rotevatn, S., Schjøtt, J., & Norekvål, T. M. (2018). Challenges adhering to a medication regimen following first-time percutaneous coronary intervention: A patient perspective. *International Journal of Nursing Studies*, 88 (February), 16–24.

Saffi, M. A. L., Polanczyk, C. A., & Rabelo-Silva, E. R. (2014). Lifestyle interventions reduce cardiovascular risk in patients with coronary artery disease: A randomized clinical trial. *European Journal of Cardiovascular Nursing*, 13(5), 436–443.

Sevinc, S., & Argon, G. (2018). Application of Pender's health Promotıon model to post-Myocard infarction patients in Turkey. *International Journal of Caring Sciences*, 11(1), 409–411. www. internationaljournalofcaringsciences.org

Sigurdardottir, A. K., Sigurlásdóttir, K., Ólafsson, K., & Svavarsdóttir, M. H. (2017). Perceived consequences, changeability and personal control of coronary heart disease are associated with health-related quality of life. *Journal of Clinical Nursing*, 26(21–22), 3636–3645.

Singh, S. K. D., Ahmad, A., Rahmat, N., Thin, N., & Hmwe, T. (2016). Nurse-led intervention on knowledge, attitude and beliefs towards acute coronary syndrome. *Nursing in Critical Care*, 23(4), 186–191.

Sua, Y. S., Jiang, Y., Thompson, D. R., & Wang, W. (2020). Effectiveness of mobile phone-based self-management interventions for medication adherence and change in blood pressure in patients with coronary heart disease: A systematic review and meta-analysis. *European Journal of Cardiovascular Nursing*, 19(3), 192–200.

Svavarsdóttir, M. H., Sigurardóttir, Á. K., & Steinsbekk, A. (2016). Knowledge and skills needed for patient education for individuals with coronary heart disease: The perspective of health professionals. *European Journal of Cardiovascular Nursing*, 15(1), 55–63.

Świeczkowski, D., Mogielnicki, M., Cwalina, N., Zuk, G., Pisowodzka, I., Ciecwierz, D., Gruchala, M., & Jaguszewski, M. (2016). Medication adherence in patients after percutaneous coronary intervention due to acute myocardial infarction: From research to clinical implications. *Cardiology Journal*, 23(5), 483–490.

Szummer, K., Wallentin, L., Lindhagen, L., Alfredsson, J., Erlinge, D., Held, C., James, S., Kellerth, T., Lindahl, B., Ravn-Fischer, A., Rydberg, E., Yndigegn, T., & Jernberg, T. (2018). Relations between implementation of new treatments and improved outcomes in patients with non-ST-elevation myocardial infarction during the last 20 years: Experiences from SWEDEHEART registry 1995 to 2014. *European Heart Journal*, 39(42), 3766–3776.

Taxiarchi, P., Kontopantelis, E., Kinnaird, T., Curzen, N., & Banning, A. (2020). *Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information. January*.

TENK. (2019). TENK, the ethical principles of research with human participants and ethical review in the human sciences in Finland. Finnish National Board on Research Integrity TENK Guidelines 2019. https://www.tenk.fi/sites/tenk.fi/files/Ihmistieteiden_eettisen_ennakkoarvioinnin_ohje_2019.pdf

Vibulchai, N., Thanasilp, S., & Preechawong, S. (2016). Randomized controlled trial of a self-efficacy enhancement program for the cardiac rehabilitation of Thai patients with myocardial infarction. *Nursing and Health Sciences*, 18(2), 188–195.

World Health Organization. (2017). *Cardiovascular diseases (CVDs)*. https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)

Zhou, Y., Liao, J., Feng, F., Ji, M., Zhao, C., & Wang, X. (2018). Effects of a nurse-led phone follow-up education program based on the self-efficacy among patients with cardiovascular disease. *Journal of Cardiovascular Nursing*, 33(1), E15–E23.