






Intensive nurse-led follow-up in primary care to improve self-management and compliance behaviour after myocardial infarction

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Abstract

Aims and Objectives: To assess the effects of intensive follow-up by primary care nurses on cardiovascular disease self-management and compliance behaviours after myocardial infarction.

Background: Although cardiovascular disease prevention and cardiac rehabilitation take place in hospital settings, a nurse-led approach is necessary in primary care during the first few months after a myocardial infarction. Therefore, it is important to assess self-management of cardiovascular disease and levels of compliance with the prescribed diet, physical activity, and medication.

Design: The study used a multicentre, quasi-experimental, pre-post design without a control group.

Methods: Patients with acute coronary syndrome from 40 healthcare facilities were included in the study. A total of 212 patients participated in a programme including 11 interventions during the first 12–18 months after myocardial infarction. The following Nursing Outcomes Classification (NOC) outcomes were assessed at baseline and at the end of the intervention: Self-management: Cardiac Disease (1617) and Compliance Behaviour: Prescribed Diet (1622), Compliance Behaviour: Prescribed Activity (1632), and Compliance Behaviour: Prescribed Medication (1623). Marjory Gordon's functional health patterns and a self-care notebook were used in each intervention. Pre-post intervention means were compared using Student's *t*-tests for related samples. The results of the study are reported in compliance with the TREND Statement.

Results: A total of 132 patients completed the intervention. The indicators for each NOC outcome and the variations in scores before and after the intensive follow-up showed a statistically significant improvement (p -value=0.000). Compliance Behaviour: Prescribed Diet (pre=3.7; post=4.1); Compliance Behaviour: Prescribed

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Activity (pre=3.9; post=4.3); Compliance Behaviour: Prescribed Medication (pre=3.9; post=4.7).

Conclusion: Intensive, immediate follow-up after myocardial infarction improves compliance behaviours and self-management of heart disease. A combined self-care and family care approach should be encouraged to empower post-myocardial infarction patients. To facilitate patients' self-efficacy, the use of health education tools such as a cardiovascular self-care notebook can also be helpful.

Relevance to Clinical Practice: This study highlights the benefits of intensive, protocolised, comprehensive patient follow-up in primary care during the first few months after an acute myocardial infarction (AMI). Primary care nurses train patients in cardiovascular self-care.

Patient or Public Contribution: Patients were not involved in either the design or the carrying out of the study. However, at the end of the study, they participated in an evaluation process about the utility of the research study and their satisfaction with it. This process was carried out using an ad hoc survey consisting of 10 questions assessing the nursing care and follow-up inputs that were received.

KEYWORDS

aftercare, myocardial infarction, primary care nursing, self-care, self-management, treatment adherence and compliance

1 | INTRODUCTION

Individuals with coronary heart disease (CHD) are at high risk of recurrent events and mortality. Improving lifestyle-related cardiovascular risk factors (CVRFs), such as maintaining a heart-healthy diet, engaging in appropriate physical activity, and adhering to drug therapy, is associated with a significantly lower risk of recurrent events. Therefore, guidelines on secondary prevention and cardiac rehabilitation recommend lifestyle-related interventions (Kotseva et al., 2019). *Secondary Prevention and Cardiac Rehabilitation Programmes* (SP-CRPs) in hospital settings have decreased the risk of fatal and non-fatal cardiovascular events and increased health-related quality of life (Anderson et al., 2017). SP-CRPs help to provide a deeper understanding of the chronic progression of the disease. They also enable and empower patients and their families to lead a heart-healthy lifestyle (scheduled physical activity, heart-healthy diet, psycho-emotional support) and to adhere to the therapeutic plan and rigorously control risk factors (Pereira-Rodríguez et al., 2020).

Self-care behaviours and therapeutic cooperation from family members foster adherence to the therapeutic plan, which is crucial for mitigating the impact of the disease, reducing complications associated with chronic diseases, and improving quality of life (Duncan et al., 2016; Khalaf et al., 2021). Communication skills in interviews are important to enhance the self-management of heart disease, boosting patients' self-care skills and empowering them (Freier et al., 2020).

What does this paper contribute to the wider global clinical community?

- Follow-up of post-myocardial infarction patients by primary care nurses improves self-management of heart disease and compliance with prescribed diet, physical activity, and medication during the first few months after an AMI.
- The use of self-care-based health education tools increases empowerment and self-efficacy among patients with chronic cardiovascular disease and their families.

In the field of *primary care*, which is the *secondary prevention* of cardiovascular disease, individual and family care is provided, encouraging patients to take an active role in self-managing their health-disease process. The following would also be helpful: individualised counselling; family involvement in care delivery; intensive, protocolised follow-up of the number of individual and family consultations; use of motivational communication to encourage shared decision-making between patients and families; and a holistic approach to cardiovascular risk (Wood et al., 2008).

Taxonomies such as the *Nursing Outcomes Classification (NOC)* can help nurses to quantify and assess patients' conditions and reflect on potential problems to be prevented in chronic diseases. The NOC includes standardised terminology and criteria

for describing and assessing the outcomes resulting from nursing interventions.

1.1 | Background

The EUROASPIRE V study reports that the vast majority of patients with coronary heart disease have unhealthy habits in relation to diet, smoking, and a sedentary lifestyle, which negatively affect the management of the main CVRFs (Kotseva et al., 2019). However, patients with chronic cardiovascular disease have difficulty maintaining adherence and adherence levels fall considerably 6 months after discharge from hospital (Polsook et al., 2016; Zakeri et al., 2020). The reasons for this include inadequate information, lack of support from family and health professionals (who fail to take patients' needs into consideration), poor perceived self-efficacy, beliefs, and low levels of patient understanding and motivation to learn about CHD prevention and management (Polsook et al., 2016; Zakeri et al., 2020).

A number of studies and clinical guidelines highlight the effectiveness of nurse-led SP-CRPs compared with the conventional approach. The reason for their effectiveness is that they focus on achieving healthier lifestyle changes and improved control of certain CVRFs in patients with established CHD and high-risk individuals (Minneboo et al., 2017; Snaterse et al., 2016). It is crucial that SP-CRPs are implemented as soon as possible after hospital discharge as they improve quality of life and reduce mortality and readmission rates (Türen & Enç, 2020). This involves a series of actions that promote adherence to medication, diet, and a follow-up plan (Zakeri et al., 2020).

After acute coronary syndrome, adherence to behavioural advice on diet, exercise, prescribed medication, and smoking cessation is associated with a substantially lower risk of recurrent cardiovascular events (Chow et al., 2010). It has also been reported that the initiation, duration, and intensity of the intervention are correlated with a better prognosis and self-management of the disease by patients. Therefore, it is advisable to carry out intensive follow-up during the first year after hospital discharge (Khalaf et al., 2021; Moreno-Palanco et al., 2011; Orozco-Beltran et al., 2013), maintaining and reinforcing a good therapeutic relationship using new technologies (e.g. telephone, internet, videoconferencing). Several studies have demonstrated the effectiveness of primary care nurses in this type of intensive, protocolised follow-up of post-myocardial infarction patients due to their organisational set-up and training (Snaterse et al., 2016).

The ability to develop care plans based on nursing theories and models is a prerequisite for nursing practice. One of the models most suited to primary care nursing is Dorothea Orem's theory of self-care. She considers self-care as a learned behaviour aiming to maintain health, recover from illness, and/or cope with the consequences of illness (Solano Villarrubia et al., 2015). Educational nursing interventions for patients that promote cardiovascular self-care agency outside the hospital setting are ideal to improve CHD (Mohammadpour et al., 2015; Tok Yildiz & Kaşıkçı, 2020). Moyra Allen's model and the University

of Calgary model advocate families as therapeutic partners who can contribute to improving health and alleviating medical conditions (Thomas, 2018). Consequently, community nurses should consider the structure, development, and roles of the families of post-myocardial infarction patients (Duncan et al., 2016; Hydzik et al., 2021). In addition, Marjory Gordon's functional health patterns help nurses to harmonise and systematise nursing care for patients with CHD (Mohammadpour et al., 2015; Tok Yildiz & Kaşıkçı, 2020).

Taxonomies such as the NOC can help nurses to quantify and assess patients' conditions and reflect on potential problems to be prevented in chronic diseases (Moorhead et al., 2018). The NOC includes standardised terminology and criteria for describing and assessing the outcomes resulting from nursing interventions. The NOC outcomes relating to self-management of heart disease and adherence behaviours (diet, physical activity and prescribed medication) can be used as indicators to measure secondary cardiovascular prevention outcomes in primary care. Although they are a useful tool for improving communication between nurses and patients, their use in daily clinical practice should be further encouraged to improve the assessment of patients' self-care.

The primary care model in Spain is based on healthcare facilities with a basic multidisciplinary team (family doctors, paediatricians and nurses) and, in some cases, additional support from physiotherapists and midwives. To optimise SP-CRPs, in addition to the hospital model, new models such as those involving primary care are proposed to facilitate accessibility, rational allocation of healthcare resources, and prompt initiation of SP-CRPs after the coronary event (Buckingham et al., 2016). Coordination between hospital SP-CRP units and healthcare facilities to care for low- and medium-risk patients is currently underway (Arrarte et al., 2020; Campuzano & de Tiedra, 2020). Primary care professionals should take a comprehensive, multidisciplinary approach to CHD, with early, intensive follow-up immediately after hospital discharge.

To support cardiovascular self-care, including self-management and compliance behaviours, the availability of tools to facilitate follow-up in primary care nurses' practices is crucial. The Madrid Society of Family and Community Nursing, or SEMAP (Sociedad Madrileña de Enfermería Familiar y Comunitaria), along with six Spanish nursing scientific societies, has published the *Cuaderno del paciente en autocuidados cardiosaludables* (Patient's Heart-Healthy Self-Care Notebook) (Lizcano Álvarez et al., 2012). A pilot test was carried out with 10 patients to verify its understandability and suitability as a health education tool. The aim of the notebook was to assist in the self-management of CVRFs through self-monitoring, increase patients' knowledge, make the follow-up plan easier, and enhance communication between professionals in primary care and hospital settings. An added value of this document was that no such tool was available to support cardiovascular self-care at the time of the study.

The study hypothesised that intensive, protocolised follow-up with support from an educational tool such as the heart-healthy self-care notebook would improve cardiovascular disease self-management and compliance behaviours in patients who have had a myocardial infarction.

1.2 | Aims

The study objective was to assess cardiovascular disease self-management and compliance behaviours to prescribed treatment among patients with acute coronary syndrome after intensive follow-up by primary care nurses.

2 | METHODS

2.1 | Design

The study used a multicentre, quasi-experimental, pre-post design without a control group. The results of the study are reported in compliance with the Transparent Reporting of Evaluations with Non-randomised Designs (TREND) statement (Des Jarlais et al., 2004) (see Appendix S1).

2.2 | Setting and participants

The study was carried out from March 2017 to January 2019 in the nurses' offices of 40 primary care facilities in the city of Madrid, Spain.

The inclusion criteria were people who were

- aged between 40 and 70 years old who had been diagnosed according to the International Classification of Primary Care (ICPC): K74 (Ischaemic heart disease with angina); K75 (Acute myocardial infarction); K76 (Ischaemic heart disease without angina) (WONKA International Classification Committee, 1998).
- able to commit to attending nursing consultations during the study period and to sign the informed consent form.

The exclusion criteria were people who were

- cognitively impaired;
- unable to read or write in Spanish;
- immobilised/unable to travel to the health facility;
- suffering from a serious illness with a life expectancy of less than 1 year.

2.3 | Participants and recruitment

Nurses were recruited on a voluntary basis. An invitation to participate was emailed to 320 primary care nurses. The Clinical Care Group (CCG) consisted of a total of 59 nurses.

A non-probability purposive sampling method was used by selecting patients who: visited the nurses' offices at the primary care facilities; met the inclusion criteria; agreed to participate. Each nurse was required to select at least three patients for follow-up. The study was completed by 53 nurses with a mean of 3.7 patients

(1–9). The recruitment period lasted for 5 months (from February 2017 to June 2017).

To measure an unknown prevalence from a finite population ($N=3000$), we used the proportion that maximises the variance of the sample proportion estimator (50%) and a 95% confidence level for a 5% level of accuracy. The necessary sample size was estimated to be 384 patients, reducing to 341 after correcting for a finite population. In the end, the study began with a sample of 212 patients (Figure 1).

2.4 | Measurements

2.4.1 | General information questionnaire

To harmonise the intervention and the use of the heart-healthy self-care notebook as far as possible, the nurses were trained to standardise data recording and intervention procedures using the Data Collection Manual (*Manual de Recogida de Datos*). The manual protocolised the steps to be followed in each nursing consultation, which were recorded on an ad-hoc computer platform and in the patient's clinical record.

2.4.2 | Variables

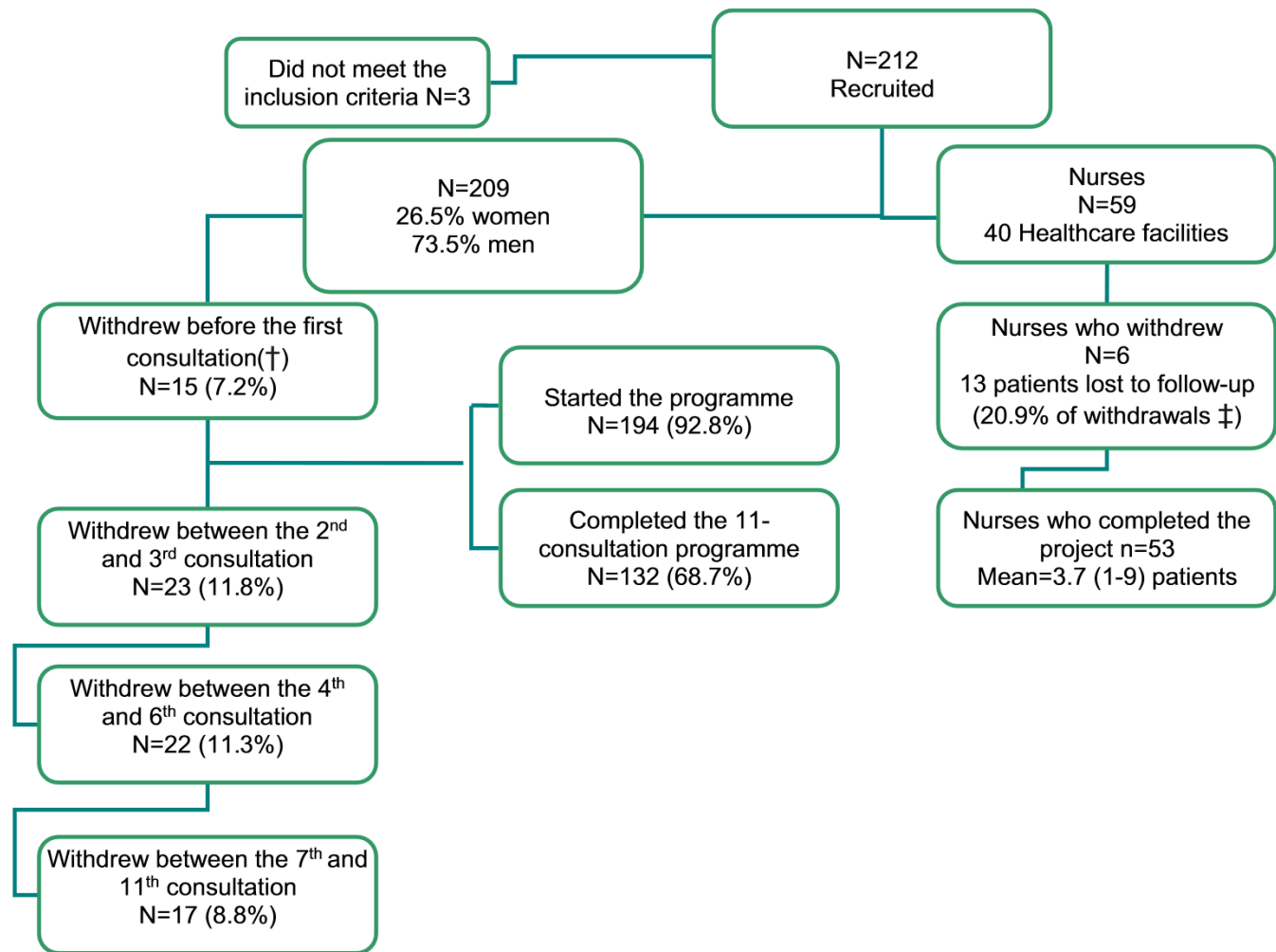
The following data were recorded: sociodemographic variables (age, sex, education level), clinical variables (blood pressure, diabetes, dyslipidaemia, obesity, tobacco use, previous heart disease according to the ICPC) and examination variables (mean blood pressure, BMI, abdominal circumference).

The outcome variables were the indicator scores for the following NOC outcomes: Self-management: Cardiac Disease (1617); Compliance Behaviour: Prescribed Diet (1622); Compliance Behaviour: Prescribed Activity (1632); and Compliance Behaviour: Prescribed Medication (1623). Each indicator was assessed on a Likert scale ranging from 1 to 5: 1 (never demonstrated); 2 (rarely demonstrated); 3 (sometimes demonstrated); 4 (frequently demonstrated) and 5 (always demonstrated).

The Clinical Investigators Group (CIG), made up of eight primary care nurses with expertise in cardiovascular care, selected the indicators for each NOC outcome based on the following criteria: relevance to the primary care setting, estimated patient care time, concept clarity, and concept understandability (Table 1).

2.5 | Intervention and data collection procedures

The organisational structure (see Appendix S2) was nodal, consisting of three levels. The first level, the Technical Research Group (TRG), comprised the two principal investigators and two coordinators responsible for monitoring four nodes. The second level, the Clinical



†. They dropped out of the study after signing the informed consent form at consultation 0 and did not attend the first consultation.

‡. Percentage of the 62 patients who dropped out once the programme had started.

FIGURE 1 Flow chart showing the study population and recruited nurses.

Research Group (CRG), comprised eight nurses, each responsible for another node made up of 7–8 nurses from the CCG.

Patients were recruited at nursing or medical consultations and given an appointment for the recruitment or 'zero' consultation. The study was explained to them and those interested signed the informed consent form. They were then issued with the heart-healthy self-care notebook and the NANDA-I nursing diagnosis Readiness for Enhanced Health Management (00162) (Herdman & Kamitsuru, 2017) was recorded in their clinical history, as they had expressed a desire to improve the management of their illness over the forthcoming 12 months.

Eleven interventions were implemented during nursing consultations over a period of 12–18 months. Each consultation lasted approximately 30–60 min and was held every 15 to 45 days. Each intervention included protocolised actions (Figure 2).

In the last intervention, the final post-intervention assessment of all outcome indicators was carried out. To minimise any bias caused by feeling observed and evaluated, which could influence the final assessment, the nurse could not see the assessment, or scores assigned to the indicators in the previous consultations.

The use of the self-care notebook in nursing consultations consisted of several steps. At the beginning of each consultation, the patient's compliance with notebook use was assessed based on instructions given by the nurse. During each consultation, a section of the notebook corresponding to a particular functional pattern was explained to the patient. At the end of each consultation, the patient was instructed on the tasks to complete at home, for example, readings and self-recording of measurements (blood pressure, weight, blood glucose, etc.).

TABLE 1 Outcome indicators selected for each Nursing Outcomes Classification (NOC).

<i>NOC (1623): Compliance behaviour: prescribed medication</i>	
Keeps a list of all medications with dose and frequency	
Obtains required medication	
Knows and informs health professional of all medication being taken (name, dosage, frequency, and how it is being taken)	
Takes all medication at intervals prescribed (assessed using the Morinsky-Green test)	
Knows and monitors medication therapeutic effects (why and for what purpose it is being taken)	
Knows and monitors medication side effects	
<i>NOC (1622): Compliance behaviour: prescribed diet</i>	
Participates in setting achievable dietary goals with health professional	
Plans and prepares heart-healthy meals consistent with activity and tastes	
Uses nutritional information on labels to guide selections	
Knows what food to eat when eating out	
Close relatives are aware of the agreed diet	
<i>NOC (1632) Compliance behaviour: prescribed activity</i>	
Identifies expected benefits of physical activity	
Identifies barriers to implement prescribed physical activity	
Sets achievable short-term activity goals with health professional	
Participates in prescribed physical activity (3–5 days per week, 30–45 minutes per day, or 150 minutes per week with intensity specific to each patient)	
Knows and monitors target heart rate set by health professional	
Seeks external reinforcement for performance of health behaviours	
Identifies and reports symptoms experienced during activity to health professional	
<i>NOC (1617): Self-management: cardiac disease</i>	
Dimension 1	Uses effective weight control strategies Self-monitors CVRF parameters (blood pressure, weight, blood glucose, etc.) Follows recommended heart-healthy diet
Dimension 2	Monitors symptom onset, severity, and frequency, and knows symptom relief strategy Knows and accepts medical diagnosis Keeps appointments with health professional Has received pneumococcal conjugate vaccine (PCV13, PREvenar®)
Dimension 3	Practises self-control to maintain smoking cessation Avoids alcohol consumption or consumes less than 20 grams per day (men) or 10 grams per day (women), preferably red wine Adjusts daily routine to a heart-healthy lifestyle Seeks information about cardiovascular health and participates in cardiovascular health decisions
Dimension 4	Has received annual influenza vaccine Has received pneumococcal polysaccharide vaccine (PPSV23)
Dimension 5	Uses stress management strategies Knows the most relevant analytical parameters (lipid, glycaemic, and renal profiles) and their normal levels and is able to interpret them Reduces weight by more than 5% per year (patients with a BMI > 25)
Dimension 6	Limits sodium intake to less than 5 grams per day Limiting fat and cholesterol intake

2.6 | Statistical analyses

To ascertain whether or not there was any variation between the pre- and post-scores of the follow-up intervention, means were compared using Student's *t*-tests for related samples. To verify the reliability of the NOC outcome scales, Cronbach's alpha model for

internal consistency was used, with ≥ 0.7 taken as an optimal value. To check the one-dimensionality of the scales, an exploratory factor analysis was performed on each outcome.

Given the adequate sample size in each group ($n > 30$), the normality of the main variables can be assumed by applying the central limit theorem. The statistical significance threshold was set at 5%

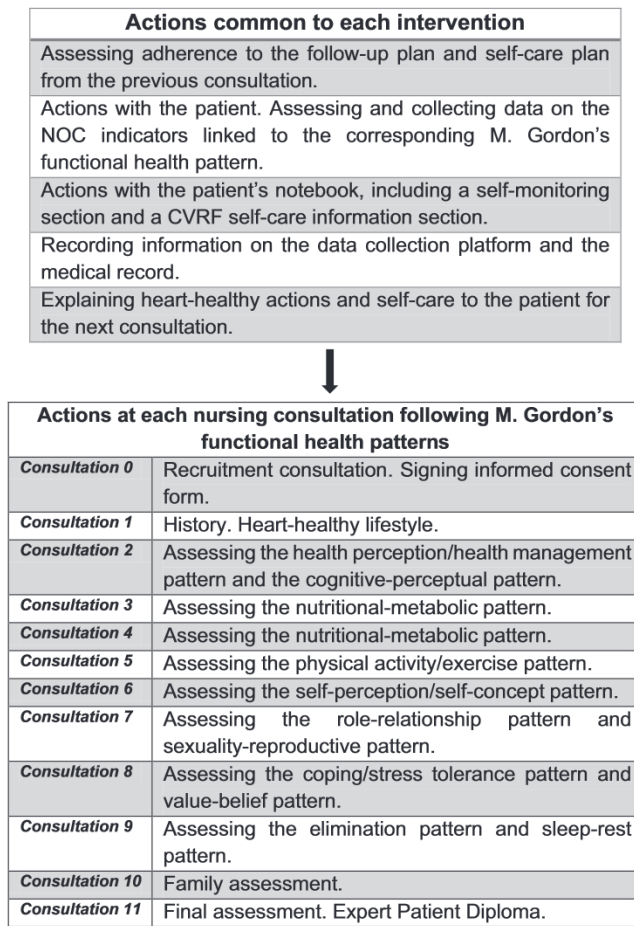


FIGURE 2 Structure of the follow-up protocol used at the interventions.

($\alpha=0.05$). Data processing and analysis were performed using the SPSSv25 statistical package.

2.7 | Ethical considerations

The study was approved by the Clinical Research Ethics Committee for the Ramón y Cajal Hospital (code 139/16) and followed the ethical principles set out in the Declaration of Helsinki ('World Medical Association Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects', 2013).

The data were handled anonymously and confidentially in compliance with Spanish law (Spanish Organic Law 15/1999 of 13 December on Personal Data Protection, and Spanish Law 14/2007 of 3 July on Biomedical Research). Participants signed an informed consent form after reading the project information sheet.

3 | RESULTS

A total of 212 eligible patients were recruited, 3 of whom were excluded for failing to meet the inclusion criteria. The study began with a

total of 209 patients. By the end of the study, each nurse had monitored a mean of 3.7 patients (range: 1–9). The intervention was completed by 132 patients (Figure 1). Table 2 shows their clinical characteristics.

The reliability of each outcome was measured using Cronbach's α : Compliance Behaviour: Prescribed Diet (0.822); Compliance Behaviour: Prescribed Activity (0.859); Compliance Behaviour: Prescribed Medication (0.683); Self-Management: Cardiac Disease (0.760).

The exploratory factor analysis verified the one-dimensionality of the three compliance behaviour outcomes. The outcome Self-Management: Cardiac Disease displayed six dimensions (Table 1).

To analyse the pre-post intervention scores, a Student's *t*-test for related samples was used with each NOC outcome (taking the mean ratings of the indicators for each NOC outcome as the overall measure). The indicators for each NOC outcome and the variations in scores before and after the intensive follow-up are presented below.

3.1 | Compliance behaviour: Prescribed diet (1622)

- Participates in setting achievable dietary goals with a health professional.
- Plans and prepares heart-healthy meals consistent with activity and tastes.
- Uses nutritional information on labels to guide selections.
- Knows what food to eat when eating out.
- Close relatives are aware of the agreed diet.

The results show that the mean score rose significantly, by 0.45 points, suggesting that adherence to the prescribed diet throughout the pre-post follow-up improved by 0.45 points (Table 3).

3.2 | Compliance behaviour: prescribed activity (1632)

- Identifies expected benefits of physical activity.
- Identifies barriers to implement prescribed physical activity.
- Sets achievable short-term activity goals with a health professional.
- Participates in prescribed physical activity (3–5 days per week, 30–45 min per day, or 150 min per week with intensity specific to each patient).
- Knows and monitors the target heart rate set by a health professional.
- Seeks external reinforcement for the performance of health behaviours.
- Identifies and reports symptoms experienced during activity to a health professional.

Similarly, the results show that the mean score rose significantly, by 0.33 points, suggesting that adherence to the prescribed physical activity throughout the pre-post follow-up improved by 0.33 points (Table 4).

TABLE 2 Baseline demographic and clinical characteristics.

		Valid N	Percentage	Mean	Standard deviation	Median
Sex	Male	97	73.5	81.66	10.92	83.00
	Female	35	26.5	78.66	11.05	78.00
High blood pressure	No	55	41.7	81.84	10.53	83.00
	Yes	77	58.3	80.17	11.33	82.00
Tobacco use	Current smoker	14	10.6	71.14	10.47	70.50
	Ex-smoker	58	43.9	80.53	10.87	82.00
	Never smoked	60	45.5	83.45	10.03	84.50
ICPC	K74 ^a	47	35.6	80.70	11.68	83.00
	K75 ^b	82	62.1	80.85	10.78	81.50
	K76 ^c	3	2.3	83.67	7.57	87.00
Dyslipidaemia	No	46	34.8	81.46	10.76	82.50
	Yes	86	65.2	80.55	11.16	82.50
Diabetes	No	100	75.8	81.13	10.84	83.00
	Yes	32	24.2	80.03	11.60	82.00
BMI						
Normal 18.5–24.9	Normal	23	17.4	77.83	14.21	80.00
Overweight 25–29.9	Overweight	68	51.5	82.26	10.60	84.50
Obese I 30–34.9	Obese I	27	20.5	81.85	8.61	82.00
Obese II 35–39.9	Obese II	14	10.6	77.14	10.22	74.50
Abdominal circumference		177	100	101.13	11.61	100
Mean blood pressure in the right arm		191	100	103.95	10.81	104.2
Mean blood pressure in the left arm		191	100	101.35	13.34	103.8

Abbreviations: BMI, body mass index; ICPC, International Classification of Primary Care.

^aK74, Ischaemic heart disease with angina.

^bK75, Acute myocardial infarction.

^cK76, Ischaemic heart disease without angina.

TABLE 3 Compliance behaviour: prescribed diet.

Paired samples test								
Paired differences								
	Mean	Std. deviation	Std. error mean	95% Confidence interval of the difference		t	df	Sig. (2-tailed)
				Lower	Superior			
Pre–Post	0.44697	0.83576	0.07274	0.30306	0.59087	6.144	131	0.000
Paired samples statistics								
	Mean	N	Std. deviation	Std. error mean				
Pre	3.7008	132	0.67919	0.05912				
Post	4.1477	132	0.76228	0.06635				

3.3 | Compliance behaviour: prescribed medication (1623)

- Keeps a list of all medication with dose and frequency.
- Obtains required medication.

- Knows and informs the health professional of all medication being taken (name, dosage, frequency, and how it is being taken).
- Takes all medication at intervals prescribed (assessed using the Morinsky-Green test).

- Knows and monitors medication therapeutic effects (why and for what purpose it is being taken).
- Knows and monitors medication side effects.

The results show that the mean score rose significantly, by 0.76 points, suggesting that adherence to the prescribed medication throughout the pre-post follow-up improved by 0.76 points (Table 5).

3.4 | Self-management: cardiac disease (1617)

The results for the indicators (Table 1) show a variable increase in all dimensions of this outcome, with mean scores ranging from 0.25 to 0.9 points for Self-management: Cardiac Disease. This further confirms the positive impact of the nurse-led follow-up intervention on post-myocardial infarction patients (Table 6).

Table 7 presents a summary of the overall differential results throughout the pre-post follow-up of all outcomes.

4 | DISCUSSION

SP-CRPs are known to reduce mortality, decrease cardiovascular complications, and improve patient quality of life, yet these programmes are underused (Kotseva et al., 2019). The implementation of SP-CRP protocols in primary care is rare, continuity of care between hospital and primary care settings is critical to improve adherence (Arrarte et al., 2020). Primary care provides chronic cardiovascular patients with long-term therapeutic relationships between themselves, their healthcare professionals, and their families, and continuous follow-up, mutual trust, a better understanding of the disease, and improved adherence (Wang et al., 2018).

For this reason, it is important that intensive, comprehensive follow-up is carried out during the first months after the event to improve CVRFs and morbidity and mortality rates. As in previous studies, it has been observed that better results are obtained in this period, enabling patients to improve some of their CVRFs (Huang

et al., 2017; Jafari et al., 2020; Nurmeksela et al., 2021; Ruiz-Bustillo et al., 2019), their self-efficacy (Polsook et al., 2016), and their levels of empowerment (Lei et al., 2018). Kim et al. confirmed that it is essential to periodically monitor the direct effect of self-care compliance on changes to left ventricular ejection fraction in outpatients after AMI. They concluded that counselling and education could improve disease awareness and self-efficacy among patients with low self-management compliance (Kim et al., 2021).

Studies conducted in primary care settings similar to our own have also reported good results (Brotons et al., 2011; Khalaf et al., 2021; Moreno-Palanco et al., 2011), but none have been identified using this type of protocolised follow-up in 11 nursing consultations over such a short period of time. By contrast, one trial (Kennedy et al., 2014) failed to demonstrate the involvement of primary care nurses in patient self-care, despite them playing a key role in comprehensive care and adherence to the therapeutic regimen (Tharani et al., 2021).

Our study provides evidence of the importance of individualised nursing education focused on self-care for cardiovascular prevention. Like other studies and meta-analyses (Baptiste et al., 2016), this approach improves mortality rates and reduces readmissions due to cardiovascular disease. The data from our study confirm that improved self-care are associated with nurse-led follow-up, corroborating other studies such as the RESPONSE 2 trial (Minneboo et al., 2017), which assessed the effect of comprehensive primary care nursing programmes on lifestyle. Unlike other studies (Pajk et al., 2020; Wood et al., 2008), in which nurses devoted all of their clinical care time to the research study, our protocol allows them to incorporate intensive follow-up into their regular care activities. Another trial has found that nursing interventions increase knowledge and improve self-care behaviour among patients compared with traditional medical education (Oh & Hwang, 2021).

Another key aspect of our research is the proposal of a follow-up protocol to standardise care for patients and their families through the assessment of Gordon's functional health patterns. Türen et al. linked this model to improved quality of life and survival rates in patients with heart failure during the first 30 days after admission

TABLE 4 Compliance behaviour: prescribed activity

Paired samples test								
Paired differences								
		95% Confidence interval of the difference						
	Mean	Std. deviation	Std. error mean	Lower	Upper	t	df	Sig. (2-tailed)
Pre-Post	0.33117	0.73425	0.06391	0.20474	0.45759	5.182	131	0.000
Paired samples statistics								
	Mean	N	Std. deviation		Std. error mean			
Pre	3.9946	132	0.75292		0.06553			
Post	4.3258	132	0.67315		0.05859			

TABLE 5 Compliance behaviour: prescribed medication.

Paired samples test								
	Paired differences			95% Confidence interval of the difference		t	df	Sig. (2-tailed)
	Mean	Std. deviation	Std. error mean	Lower	Upper			
Pre-Post	0.71645	0.62232	0.05417	0.60930	0.82360	13.227	131	0.000

Paired samples statistics				
	Mean	N	Std. deviation	Std. error mean
Pre	3.9848	132	0.59212	0.05154
Post	4.7013	132	0.37171	0.03235

TABLE 6 Self-management: cardiac disease.

Paired samples statistics						
		Mean	N	Std. deviation	Std. error mean	p-Value, Student's t
Dimension 1	SCD1_mean_pre	3.6894	132	0.67072	0.05838	0.000
	SCD1_mean_post	4.0581	132	0.76445	0.06654	
Dimension 2	SCD2_mean_pre	3.5473	132	0.57636	0.05017	0.000
	SCD2_mean_post	4.1496	132	0.70971	0.06177	
Dimension 3	SCD3_mean_pre	3.8119	132	0.81400	0.07085	0.008
	SCD3_mean_post	3.5278	132	1.05413	0.09175	
Dimension 4	SCD4_mean_pre	3.1061	132	1.80439	0.15705	0.000
	SCD4_mean_post	3.9924	132	1.54449	0.13443	
Dimension 5	SCD5_mean_pre	3.2778	132	0.86558	0.07534	0.001
	SCD5_mean_post	3.0000	132	0.84408	0.07347	
Dimension 6	SCD6_mean_pre	4.0265	132	0.75744	0.06593	0.000
	SCD6_mean_post	4.2879	132	0.78905	0.06868	

Abbreviation: SCD, self-management: cardiac disease.

(Türen & Enç, 2020). Partner involvement in the early stages of AMI also influences lifestyle improvement (Minneboo et al., 2017). As a result, the family consultation at the end of the programme is of particular note. Nurses, patients, and families felt that this was a positive experience. At the consultation, the family receives the nurse's full attention and care, as they are viewed as a therapeutic partner in any chronic disease. In their mixed methods research with 740 families, Jeemon et al. observed that it was important for the family unit to be informed about and involved in heart-healthy lifestyles (Jeemon et al., 2017). In addition, brief educational interventions with families in primary care settings improve CVRFs (Duncan et al., 2016). This suggests that during the first months after an AMI, family relationships can become dysfunctional so a family approach is essential (Hydzik et al., 2021). Once our study was complete, the need for another family session at the second consultation in the protocol was assessed.

The use of *NOC outcomes* makes it possible to assess the management of the therapeutic regimen in individuals with chronic

conditions with adequate validity while offering new approaches to address this problem (Morilla-Herrera et al., 2011). Outcomes in heart disease self-management and compliance behaviour are crucial, which is why our study measured them and identified an improvement in outcome indicators by patients, particularly in terms of adherence to diet and physical activity. It should also be noted that, to achieve these outcome indicators, trials with different methodologies from ours (Köhler et al., 2020; Zakeri et al., 2020) stress the importance of nurse-led educational programmes, including group education.

Another important, widely studied aspect in post-myocardial infarction patients is compliance with prescribed medication. Our results show an improvement in this behaviour. Despite not exploring the type of medication, other studies measuring adherence to statins, antihypertensives, etc., highlight the importance of this intervention being implemented in primary care (Kavita et al., 2020; Sotorra-Figuerola et al., 2021; Zafeiropoulos et al., 2021) and in the first year after infarction (Khalaf et al., 2021). Another clinical trial

TABLE 7 Pre/post differences for all NOC outcomes.

	Pre	Post	Pre/post	
	Mean (SD)	Mean (SD)	Difference in means (SD)	p-Value (Student's t)
CPD	3.701 (0.679)	4.148 (0.763)	0.447 (0.836)	0.000
CPA	3.995 (0.753)	4.326 (0.673)	0.332 (0.734)	0.000
CPM	3.985 (0.592)	4.703 (0.372)	0.717 (0.622)	0.000
SCD1	3.690 (0.671)	4.059 (0.765)	0.369 (0.790)	0.000
SCD2	3.548 (0.577)	4.150 (0.710)	0.603 (0.839)	0.000
SCD3	3.812 (0.815)	3.528 (1.055)	-0.285 (1.206)	0.008
SCD4	3.107 (1.805)	3.993 (1.545)	0.887 (1.531)	0.000
SCD5	3.278 (0.866)	3.000 (0.845)	-0.278 (0.943)	0.001
SCD6	4.027 (0.758)	4.288 (0.79)	0.262 (0.840)	0.000

Abbreviations: CPA, compliance behaviour: prescribed activity; CPD, compliance behaviour: prescribed diet; CPM, compliance behaviour: prescribed medication; SCD, self-management: cardiac disease (1–6 dimensions); SD, standard deviation.

in secondary prevention showed that a 12-week nursing intervention after AMI in the community setting improved self-management of the disease, adherence to medication, and physical activity. This study, unlike ours, took less of an individual approach and relied more on group and telephone management (Shen et al., 2021). That said, our findings show an improvement in the self-management of heart disease and the level of compliance with the therapeutic regimen in terms of diet, physical activity, and prescribed medication.

The use of the ad-hoc notebook was an important aspect of this study. Providing support using this type of educational material was found to help patients to monitor their CVRFs and health professionals to communicate, enhancing empowerment and self-efficacy among patients and their families. Several studies agree on the usefulness of guidelines for patient self-management and improvement of primary care nurses' skills in cardiovascular care (Kennedy et al., 2014).

Potential limitations of the results include patient attrition. We believe that the study dropout rate after an intensive follow-up of 11 consultations and more than 1 year is acceptable compared with similar studies, where the number of follow-up consultations was lower (Brotons et al., 2011; Minneboo et al., 2017; Moreno-Palanco et al., 2011). One-fifth of the patients who withdrew from the study were assigned to nurses who did not complete the study. We believe that patients and nurses alike displayed strong adherence to the study. Another limitation was the voluntary nature of nurses' participation, which could lead to patient selection bias. Neither the professionals nor the patients could be blinded. In routine clinical practice, it was not feasible for an external evaluator from outside the care unit to perform the initial and final assessments of the variables. To increase concordance and objectivity, and to improve external validity, nurses were trained in the intervention protocol and the data collection manual. The NOC indicators and items selected for the study are pending validation in terms of accuracy, significance, and utility.

In view of the above and based on their professional experience and previously published studies (Lizcano Álvarez, 2021), the authors believe that primary care nurses are a key component in a protocolised

approach to secondary cardiovascular prevention and that continuity of care must be improved alongside hospital cardiac rehabilitation units. This study could help to improve the management of post-myocardial infarction patients during the first months after an AMI.

The relevance of this study and its impact on clinical practice lies in the fact that it aims to empower chronic post-myocardial infarction patients and their families during the first few months after an AMI using a protocolised, intensive, comprehensive nursing intervention.

5 | CONCLUSIONS

Intensive, comprehensive, protocolised follow-up of AMI patients by community-based primary care nurses could improve self-management of heart disease and adherence to diet, physical activity, and prescribed medication.

To improve both patient and family empowerment and self-efficacy, this study highlights the importance of gearing cardiovascular nursing care towards patient self-care training and family engagement. The use of an educational tool, such as a self-care notebook, improves adherence and enhances the therapeutic relationship.

Further clinical trials are needed to assess improvements in health outcomes by measuring lifestyle-related CVRFs and to test the level of adherence and self-efficacy in the longer term. Finally, healthcare institutions should supply protocols and educational materials to primary care facilities to improve secondary cardiovascular prevention.

AUTHOR CONTRIBUTIONS

All authors have met the criteria for authorship as established by the Nursing Open Journal and the Wiley Editing Services and all authors are in agreement with the content of the manuscript. ALA and LCJ: conceptualization; study design; writing – original draft preparation. ATS, BCZ, AAC and MGCE: data analysis and writing – review and editing. All authors were involved in editing and approving the final version of the manuscript.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest to declare.

ETHICS STATEMENT

The study was approved by the Clinical Research Ethics Committee for the Ramón y Cajal Hospital (code 139/16) and followed the ethical principles set out in the Declaration of Helsinki. Participants signed an informed consent form after reading the project information sheet.

DATA AVAILABILITY STATEMENT

The data underlying this article will be shared on reasonable request to the corresponding author.

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