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Pain-Friendly Strategies: Nursing Intervention in Postoperative Myocardial Revascularization

Estrategias amigables con el dolor: intervención de enfermería en posoperatorio de revascularización miocárdica

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Data availability
All data supporting the findings of this study are available within the article. For additional details, please contact the corresponding author.

Abstract

Introduction. Pain is the main symptom in the outpatient postoperative period after myocardial revascularization, negatively impacting on physical mobility, rest, emotional well-being and patient recovery.

Objective. To determine the effect of a nursing educational intervention on pain reduction in patients undergoing myocardial revascularization during the outpatient postoperative period.

Method. A quantitative, quasi-experimental study, with pretest-posttest design. Eighty revascularized patients randomly assigned to an experimental group and a comparison group at a private institution in Cúcuta (Colombia) participated. The McGill Pain Questionnaire and the Inventory of Distress-State Anxiety (IDARE) were used to evaluate the effect of the intervention, after the participants signed the informed consent form.

Results. The nursing educational intervention significantly reduced pain and anxiety in the experimental group, both overall and in each of its dimensions ($p < 0.05$). In the comparison group, no statistically significant changes were observed ($p > 0.05$). The educational intervention with structured follow-up favored the comprehensive recovery of patients who had undergone myocardial revascularization in the home environment.

Conclusion. The nursing educational intervention was effective in reducing postoperative pain and associated symptoms in patients with myocardial revascularization.

Keywords

Postoperative pain; nursing process; health education; ambulatory care; nursing care.

Resumen

Introducción. El dolor es el síntoma predominante en el posoperatorio ambulatorio de la revascularización miocárdica, con impacto negativo en la movilidad física, el descanso, el bienestar emocional y la recuperación del paciente.

Author Contributions
Débora Milena Alvarez Yañez: conceptualization, data curation, formal analysis, funding acquisition, investigation, methodology, project administration, resources, software, supervision, validation, visualization, writing – original draft, writing – review & editing.
Gloria Carvajal Carrascal: conceptualization, data curation, formal analysis, funding acquisition, investigation, methodology, project administration, resources, software, supervision, validation, visualization, writing – original draft, writing – review & editing.

Generative AI declaration
The authors declare that no generative AI tools were used in the writing, editing, data analysis, or any other part of the preparation of this manuscript.

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Objetivo. Determinar el efecto de una intervención educativa de enfermería en la reducción del dolor en pacientes con revascularización miocárdica durante el posoperatorio ambulatorio.

Método. Estudio cuantitativo, cuasi experimental, con diseño de preprueba y posprueba. Participaron 80 pacientes revascularizados, asignados aleatoriamente a un grupo experimental y a un grupo de comparación, en una institución privada de Cúcuta (Colombia). Se utilizaron la Escala de Dolor de McGill y el Inventario de Ansiedad Estado-Rasgo (IDARE) para evaluar el efecto de la intervención, previa firma del consentimiento informado por parte de los participantes.

Resultados. La intervención educativa de enfermería redujo significativamente el dolor y la ansiedad en el grupo experimental, tanto a nivel general como en cada una de sus dimensiones ($p < 0,05$). En el grupo de comparación no se observaron cambios estadísticamente significativos ($p > 0,05$). La intervención educativa con seguimiento estructurado favoreció la recuperación integral del paciente revascularizado en el entorno domiciliario.

Conclusión. La intervención educativa de enfermería resultó eficaz para disminuir el dolor posoperatorio y los síntomas asociados en pacientes con revascularización miocárdica. Se sugiere su aplicación como estrategia de cuidado dentro del seguimiento ambulatorio de cirugía cardíaca.

Palabras clave

Dolor postoperatorio; proceso de enfermería; educación en salud; atención ambulatoria; atención de enfermería.

Introduction

In the postoperative care setting, pain management continues to represent a constant challenge for nursing professionals, especially in patients undergoing myocardial revascularization. Pain is the most prominent symptom during this recovery phase and has a significant impact on multiple dimensions of patient well-being [1-9], including sleep [10-11], physical mobility [2-10,12], emotional state [13], therapeutic adherence [14] and general well-being [1,7,15]. In this context, the family acts as a supportive resource, following nursing instructions to facilitate health coping, reduce complications, and manage care to avoid delays in recovery [5,6,16].

Previous studies have shown that interventions such as nursing education can improve adherence to treatment and symptom control, representing an accessible and low-cost strategy to support pain management [2,3,7,11,17]. In addition, complementary interventions such as massage, postural changes, music therapy, and relaxation techniques have shown efficacy when integrated with pharmacological treatment, helping to improve rest, emotional state, and overall patient experience [7,9,18,19].

However, it remains unclear whether a structured nursing educational intervention, designed in a structured manner, can generate a significant effect on the reduction of postoperative pain during the outpatient phase, compared to usual care. This question becomes relevant given the need for sustainable interventions that strengthen the role of nursing in pain management. The present study is justified by its potential to generate direct clinical benefits by promoting more effective, humanized, patient-centered care aligned with current models of care. It also offers a possible theoretical contribution to the field by building on Lenz's Theory of Unpleasant Symptoms.

The aim of this study was to determine the effect of a nursing educational intervention to reduce postoperative pain in revascularized patients during the outpatient phase, compared to the usual intervention.

Method

This was a quantitative, quasi-experimental study, with pre- and post-test measurement, conducted in a high complexity private institution in Cúcuta, Colombia. Participants met the following criteria: having undergone myocardial revascularization surgery during the second half of 2020 and the first half of 2021 and being aged 18 years of older. We excluded individuals with a diagnosis of mental and/or physical disorder that could affect their cognitive condition, as well as patients with postoperative complications that required hospitalization. A probabilistic simple random sampling method was used, applying single-blind masking. With a confidence level of 95%, a statistical power of 80%, a precision of 5 points on the McGill Pain Scale, and a variance of 60, the sample size adjusted for an expected loss of 25%, assigned 40 participants to each group (experimental and comparison).

Nursing educational intervention

Figure 1 presents Pain-Friendly Strategies: a nursing intervention for postoperative myocardial revascularization, designed to address pain in patients undergoing this surgery. It was based on Lenz's Theory of Unpleasant Symptoms and Whittemore and Grey's integrative review [20]. A quasi-experimental study was structured with two parallel groups: experimental group, which received the structured educational intervention, and comparison group, which received only the usual care performed on the third day of the outpatient postoperative period following discharge from the hospital for myocardial revascularization, including vital sign monitoring, wound revision, medical adjustment of medication by the nursing team.

The groups were assigned by simple randomization with sealed envelopes, which were managed by an external researcher. The educational intervention was designed with content supported by scientific evidence [21-27]. As a primary outcome, the intervention sought to reduce pain intensity and perception using the McGill Pain Questionnaire. Secondary outcomes included decreased anxiety (measured with the IDARE), improved sleep, adherence to home physical activity, and strengthened emotional coping and postoperative symptom control.

The intervention was structured in two phases, implemented at different times, each session lasting 30 minutes, administered in a single dose to avoid overloading the patients in the outpatient postoperative period, supported by studies that support the effectiveness of educational interventions [2,3,7,11,17]. In the experimental group, the educational intervention was applied following a structured manual and checklists, which made it possible to monitor adherence to the protocol and ensure consistency between sessions. This procedure showed 95% fidelity in the content and duration of the intervention. The intervention was applied by a single nurse expert in cardiovascular surgery and health education, trained in the protocol, and was performed in an outpatient clinic of the cardiovascular surgery unit that guaranteed privacy and comfort for the educational process. Although the intervention maintained its standardized structure and content, slight adaptations were made to the language and methodology according to the educational level of each patient. Schedules were also adjusted according to availability, without modifying the objectives or the quality of the study.

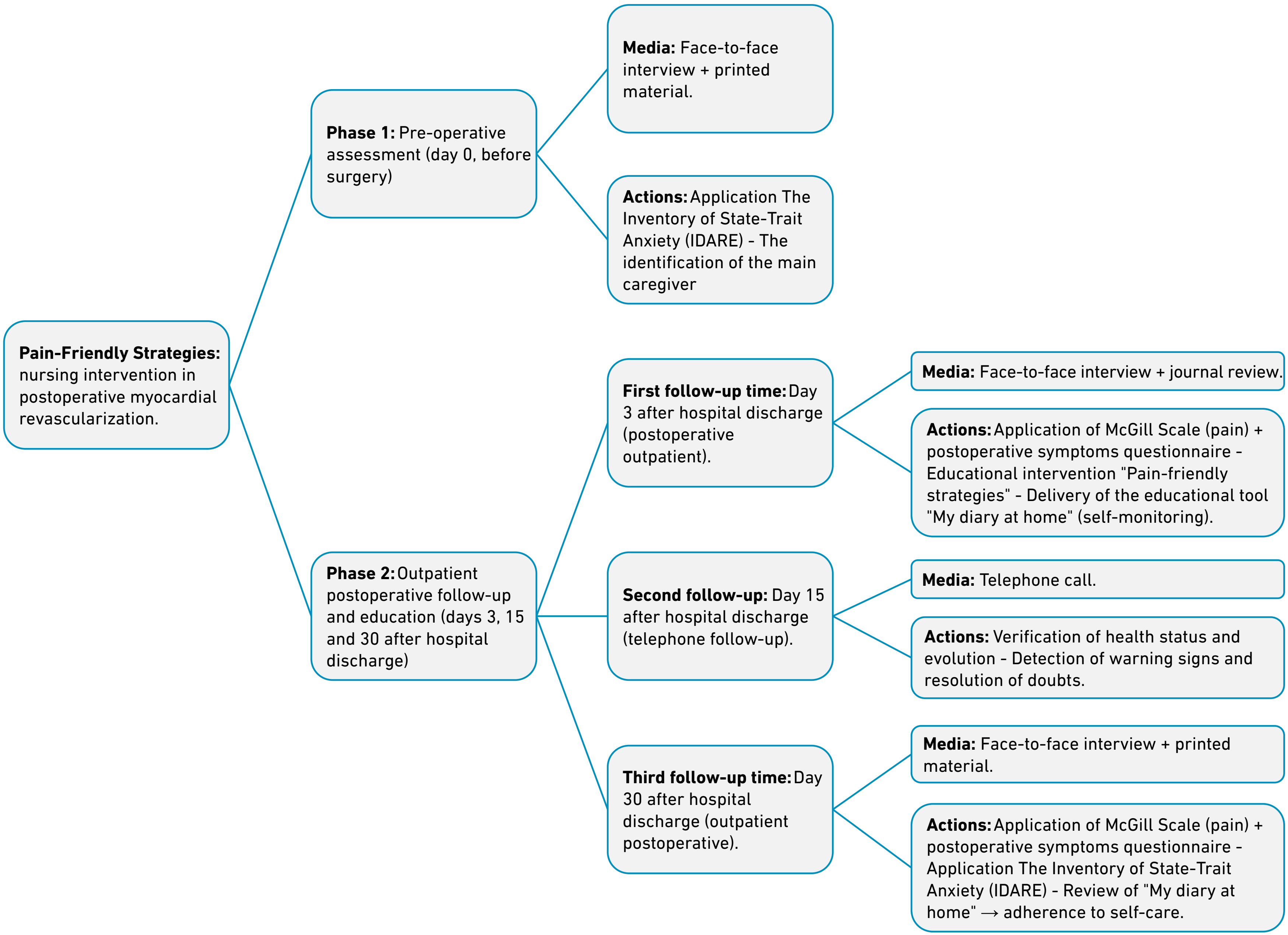

Figure 1. Pain-Friendly Strategies: nursing intervention in postoperative myocardial revascularization

Note. Source: Authors' own elaboration.

Phase 1: Pre-operative assessment (day 0, before surgery)

In this phase, a face-to-face interview was conducted with the patient and primary caregiver. Physiological, psychological and situational factors associated with the pain experience were identified. The Inventory of State-Trait Anxiety (IDARE) was applied to assess the patient's preoperative anxiety levels. In the experimental group, a structured educational session, "Getting to know the surgical procedure" was provided, supported by a visual tool, designed to facilitate the patient's comprehensive understanding of the surgical process, covering the preoperative, intraoperative and postoperative stages [21-22]. This allowed the patient to acquire clear and structured information, thereby reducing anxiety and promoting better adaptation to the procedure. The identification of the main caregiver, who would assume an active role in the home recovery process, was formalized. It should be clarified that the evaluation instruments (McGill and IDARE) were applied only to the patient, so the participation of the caregiver did not influence the reported results, thus avoiding measurement bias. In contrast, the comparison group received the usual care of the cardiac surgery program.

Phase 2: Outpatient postoperative follow-up and education (days 3, 15 and 30 after hospital discharge)

This phase included three follow-up moments:

First follow-up time: Day 3 after hospital discharge (postoperative outpatient)

A face-to-face session was held, in which the McGill Pain Questionnaire was applied to measure the level of pain. In addition, a symptom questionnaire designed by the research team was used to collect information on the presence and intensity of postoperative symptoms, such as nausea, vomiting, dizziness, sleep disturbances, muscle tension, cough, diarrhea, constipation and fatigue. Each symptom was evaluated using a Likert-type scale from 1 to 5, in which 1 indicated the absence of the symptom and 5 represented the highest perceived intensity. The questionnaire also included an open item to record other symptoms not initially contemplated, which made it possible to broaden the clinical characterization during follow-up. In the experimental group, the educational intervention "Pain-friendly strategies" was delivered to the patient and caregiver [21-27]. The details are provided in Appendix: Pain-Friendly Strategies, a nursing intervention in postoperative myocardial revascularization that addressed the following topics:

1. Correct use of the chest vest, addressing the appropriate moments for its use, adjustment, care and benefits to reduce pain and facilitate mobility.
2. Cardiovascular training at home through short, moderate-intensity walks, with active breaks and recommendations on hydration and pre-exercise nutrition.
3. Postural and respiratory hygiene, which incorporated proper use of the vest, controlled breathing exercises, and warm-up and stretching techniques.
4. Strengthening of the emotional state, with strategies such as listening to music, sharing with the family, maintaining a positive attitude and avoiding isolation.
5. Guidelines to improve nighttime rest, avoiding daytime sleep and promoting a structured routine with emphasis on sleeping in the supine position.
6. Correct use of respiratory incentive to prevent pulmonary complications, with indications on technique, frequency and cleanliness.

7. Recognition of alarm signs that require immediate medical attention, such as fever, wound discharge, edema, dyspnea, persistent chest pain or palpitations.

This session was conducted in an interactive manner, resolving doubts, strengthening the patient's understanding and promoting empowerment for self-care at home. Printed educational material was handed out as visual reinforcement.

Patients in the experimental group were provided with the educational tool "My Diary at Home", aimed at promoting self-care management and daily monitoring of activities during the outpatient postoperative period. This tool includes structured items covering essential dimensions of self-care, such as pain management, mobility, breathing, emotional well-being and rest. Each day, patients record their compliance by marking "Yes" or "No" for specific behaviors, such as taking medications on time, wearing a chest vest properly, resting in the supine position, correcting posture, practicing breathing exercises for pain, engaging in recreational activities, and staying calm.

At the end of the day, patients summed their score and consulted a self-assessment scale with motivational feedback, which reinforced adherence to recommendations through reflection, self-observation, and recognition of personal effort. These scores were analyzed as indicators of self-care adherence, and their relationship to reported clinical outcomes, primarily pain reduction and decreased anxiety, was explored. In contrast, the comparison group did not receive this tool or additional educational interventions beyond the usual care of the cardiac surgery program. Both groups received pharmacological pain management according to institutional clinical guidelines, ensuring equity in the standard of care.

Second follow-up: Day 15 after hospital discharge (telephone follow-up)

A follow-up telephone call was made to both the intervention group and the comparison group, in order to monitor the general evolution of the postoperative process and recovery at home. During the call, aspects related to the current state of health, the presence of alarm signs and specific doubts of the participants were explored.

Third follow-up time: Day 30 after hospital discharge (outpatient postoperative)

A face-to-face evaluation was performed to assess the evolution of postoperative pain, again applying the McGill Pain Questionnaire. Data were also collected on other symptoms such as nausea, vomiting, dizziness, sleep disorders, muscle tension, presence of cough, diarrhea, constipation and fatigue. Additionally, the State-Trait Anxiety Inventory (IDARE) was applied to measure anxiety levels in this stage of recovery. At this meeting, the patients in the experimental group were given the educational tool "My diary at home", in order to analyze compliance with the recommended activities and assess their adherence to the educational process and home follow-up.

Pain was assessed using the McGill Pain Questionnaire, developed by Melzack, which explores dimensions such as location, quality, and intensity of pain, with test-retest reliability ranging from 66% to 80% at 4 weeks and from 50% to 100% at 3-7 days [28]. Anxiety was measured with the Inventory of State-Trait Anxiety (IDARE), designed by Spielberger and Díaz Guerrero, composed of two different scales to measure anxiety as a stable trait and as a transitory state. This instrument presents high psychometric properties, with a Cronbach's α internal consistency coefficient between 0.89 and 0.91 [29,30]. To guarantee objectivity, both scales were applied by blind external evaluators, without direct intervention by the researcher.

Statistical analysis included the presentation of simple frequencies and graphs, as well as the calculation of descriptive measures for quantitative variables. The Mann-Whitney U test was used to analyze the experimental and comparison groups, and the Wilcoxon test was used to evaluate intra-group changes in pain and anxiety. The significance level was set at 0.05. The analysis was performed with SPSS software, version 25 for Windows.

Data collection was performed between the second half of 2020 and the first half of 2021, guaranteeing the confidentiality, privacy, and voluntariness of the participants through informed consent. Endorsement was obtained from the author of the scale and the Institutional Ethics Committee, and the Research and ETCA Subcommittee of the Faculty of Nursing and Rehabilitation of the Universidad de la Sabana according to Act 015 of August 18, 2020, it was classified as minimal risk according to Resolution 008430 of 1993, in accordance with international ethical principles such as the Nuremberg Code, and the Declaration of Helsinki, and the guidelines of the Council for International Organizations of Medical Sciences (CIOMS) [31,32].

Results

Patients undergoing myocardial revascularization face various challenges during recovery. The following is a description of the results obtained according to the study group, measurement time of and the variables evaluated.

Sociodemographic characteristics

Table 1 shows the characterization of the participants, showing a male predominance in both groups, especially in the experimental group (87.5%). The average ages were similar (62.8 and 64.7 years). The marital status and schooling levels were diverse, with no significant differences between the groups.

Table 1. Sociodemographic characterization of the participants.

Variable	**Category**	**Group**	
		Experimental (N = 40)	**Comparison (N = 40)**
Age	Rank	37 – 80	41 – 80
	Average (S.D.)	±9,2 (62.8)	±9.1 (64,7)
Sex	Female	12,50% (5)	30,00% (12)
	Male	87,50% (35)	70,00 (28)
Marital status	Married	55,00% (22)	55,00% (22)
	Separated	5,00% (2)	7,50% (3)
	Single	2,50% (1)	10,00 (4)
	Common-law	30,00% (12)	17,50% (7)
	Widowed	7,50% (3)	10,00% (4)
Schooling	None	0,00% (0)	2,50% (1)
	Postgraduate	5,00% (2)	0,00% (0)
	Elementary	42,50% (17)	50,00% (20)
	High School	32,50% (13)	35,00% (14)
	University	20,00% (8)	12,50% (5)

Note. Source: Study data.

Postoperative symptoms

In the first measurement (day 3 after hospital discharge, postoperative outpatient), the most frequent symptoms in the experimental group were: sleep disorders (77.5%), muscle stiffness (72.5%), cough (47.5%), constipation (35%) and fatigue (30%). On the second measurement (day 30 after discharge from hospital post-operative outpatient), these symptoms decreased markedly, especially muscle stiffness (27.5%) and sleep disturbances (32.5%). Conversely, in the comparison group, an increase in muscle tension was observed, reaching 70% in the second measurement.

Pain assessment

Pain assessment using the McGill Pain Questionnaire is presented in Tables 2 and 3. In the first measurement (day 3 after hospital discharge, postoperative outpatient), only the emotional dimension showed a statistically significant difference between groups (p = 0.026), being higher in the comparison group (3.2 ± 2.3) versus the experimental group (2.0 ± 1.8).

Table 2. McGill pain scale results between groups.

Measurement	Dimensión	Experimental					Comparison					Value p*
		Media	D.E	Median	Minimum	Maximum	Media	D.E	Median	Minimum	Maximum	
1st Measurement. Day 3 after hospital discharge (postoperative outpatient)	Sensory	8,2	5,5	7	1	26	8,2	4,4	8	2	23	0,780
	Emotional	2,0	1,8	2	0	6	3,2	2,3	3	0	8	0,026
	Miscellaneous	1,0	1,6	0	0	7	1,0	1,9	0	0	7	0,501
	Valuative	2,5	1,0	2	1	4	2,5	1,2	3	0	4	0,857
	PRI	13,8	7,6	13	4	43	14,9	7,6	14	3	33	0,365
2nd Measurement. Day 30 after hospital discharge (postoperative outpatient)	Sensory	1,7	3,0	0	0	12	8,7	4,3	9	0	23	0,000
	Emotional	0,4	0,8	0	0	3	3,2	2,2	3	0	8	0,000
	Miscellaneous	0,4	1,1	0	0	5	1,2	1,9	0	0	6	0,027
	Valuative	1,1	0,3	1	1	2	2,7	1,0	3	1	4	0,000
	PRI	3,6	4,4	2	1	19	15,8	7,2	15	1	37	0,000

Note. Source: Study data. * Mann Whitney U test

Table 3. Intragroup McGill Pain Scale Results.

Dimensión	Experimental (Z / value p)	Comparación (Z / value p)
Sensorial Final - Initial	-5,035[a] / 0,000	-,495[b] / 0,621
Emocional Final - Initial	-4,701[a] / 0,000	-,039[a] / 0,969
Miscelánea Final - Initial	-2,032[a] / 0,042	-,400[b] / 0,689
Valuativa Final - Initial	-5,165[a] / 0,000	-1,017[b] / 0,309
PRI Final - Initial	-5,230[a] / 0,000	-,697[b] / 0,486

Note. Source: Study data; a. Based on positive ranges; b. Based on negative ranges; c. Wilcoxon signed-rank test

On the second measurement (day 30 after discharge from hospital post-operative outpatient), all pain dimensions and the total index (PRI) were significantly lower in the experimental group ($p < 0.05$), indicating a substantial reduction in pain after the nursing intervention.

Intragroup analysis (Table 3) showed that the experimental group presented a statistically significant reduction in all pain dimensions ($p < 0.05$), while no relevant changes were found in the comparison group ($p > 0.05$).

Evaluation of anxiety

The results of the State-Trait Anxiety Inventory (STAI) are detailed in Tables 4 and 5. In the first measurement (day 3 after hospital discharge, postoperative outpatient), relevant differences were observed between the groups in anxiety as a trait ($p = 0.017$), with higher scores in the comparison group. Although the difference in state anxiety did not reach statistical significance ($p = 0.056$), the trend was similar. In the second measurement (day 30 after discharge from hospital post-operative outpatient), statistically significant differences were found in both anxiety as a state ($p < 0.001$) and anxiety as a trait ($p < 0.001$), with lower scores in the experimental group.

Table 4. Results of the anxiety inventory - IDARE, between groups.

Moment	Anxiety	Experimental					Comparison					Value p*
		Media	DE	Median	Minimum	Maximum	Media	DE	Median	Minimum	Maximum	
1st Measurement. Day 3 after hospital discharge (postoperative outpatient)	State	29,1	9,8	26,5	20	55	34,4	11,7	33,5	20	61	0,056
	Feature	33,3	8,7	31,5	21	51	39,1	11,0	38,0	21	64	0,017
2nd Measurement. Day 30 after hospital discharge (postoperative outpatient)	State	26,4	10,3	23,0	20	64	36,4	14,4	32,0	20	68	0,000
	Feature	29,6	10,8	26,0	20	65	41,0	12,1	40,5	20	65	0,000

Note. Source: Study data. * Mann Whitney U test.

Table 5. Results of the anxiety inventory - IDARE, intra-groups.

Contrast statistics[c]	Experimental (Z / value p)	Comparison (Z / value p)
Anxiety (State) - Final – Anxiety (state) - Initial)	-2,202[a] / 0,028	-,782[b] / 0,434
Anxiety (Feature) -Final – Anxiety (Feature)	-2,584[a] / 0,010	-1,167[b] / 0,243

Note. Source: Study data; a. Based on positive ranges; b. Based on negative ranges; c. Wilcoxon signed-rank test.

In the intragroup analysis (Table 5), the experimental group showed significant reductions in both anxiety dimensions (state and trait), with p-values < 0.05. In contrast, the comparison group showed no significant changes.

In the experimental group, the percentage of participants with high anxiety as a state went from 12.5% to 7.5% after the intervention, and the low level increased from 67.5% to 80%. In the comparison group, high anxiety increased from 22.5% to 30%.

Regarding trait anxiety, the experimental group reduced the percentage of medium anxiety from 53% to 30%, with an increase in the low level (65%). In the comparison group, an increase in the high level of trait anxiety was observed, from 30% to 35%.

Discussion

The findings of the present study show that an educational nursing intervention, implemented in revascularized patients during the outpatient postoperative period, was effective in reducing pain intensity, improving pain control in the different dimensions evaluated (sensory, emotional, miscellaneous, and evaluative), reducing associated physical symptoms, and favoring better emotional stability. The need to implement nursing interventions in the outpatient setting has been widely supported in the literature, especially in revascularized patients, due to their impact on symptom control, adherence and post-surgical recovery [2,8,9,11,17,18].

The positive effects were particularly noticeable from day 3 after hospital discharge, with significant differences compared with the comparison group. In the experimental group, a decrease in alterations such as muscle stiffness, sleep disorders, cough, fatigue and constipation was observed. This improvement can be attributed to early education on the early recognition of pain, the use of non-pharmacological pain mitigation strategies, respiratory and postural hygiene techniques, and the appropriate use of tools such as the chest vest and respiratory incentive. In contrast, the comparison group reported increased muscle tension, which is consistent with studies describing how pain interferes with mobility, rest and cough efficiency, perpetuating a cycle of symptoms that intensifies discomfort and delays recovery [2,10,13].

The reduction in pain in the experimental group was significant in all the dimensions evaluated, supporting the effectiveness of non-pharmacological educational strategies as an adjunct to medical treatment. This indicates that the intervention not only alleviated the painful experience, but also favored a more adaptive coping with the surgical process, reducing the negative perception of pain and its functional impact. These results are in line with previous research reporting a progressive decrease in postoperative pain when early educational interventions are incorporated [2-4] and even suggest their potential to reduce hospital stay.

As for anxiety, a decreasing trend was identified in the intervention group. The reduction was most evident in the "state" dimension, suggesting that the educational accompaniment and support provided by the nurse generated immediate emotional relief in the early postoperative phase, following hospital discharge. The inclusion of the main caregiver, the provision of visual support material and telephone follow-up favored an environment of greater emotional security for the patient. Although the intervention was not psychological in nature, its impact on emotional state reinforces the importance of comprehensive care. This finding is particularly relevant, given that post-discharge anxiety is often associated with increased pain perception and recovery complications; therefore, its early reduction represents a meaningful clinical benefit. These results are consistent with studies that demonstrate the efficacy of educational interventions to reduce anxiety in surgical patients [8,11,19].

As documented by multiple studies [1-9], pain continues to be the symptom with the greatest impact in the outpatient postoperative period in patients undergoing myocardial revascularization, which justifies the need for educational and nonpharmacological approaches led by nurses. In turn, anxiety is a key modulating factor in the experience of pain, and its control by means of educational interventions provides a double benefit: it reduces the subjective perception of pain and facilitates adherence to therapeutic recommendations. The active participation of nurses in all phases of the postoperative process, from preoperative assessment to home follow-up, strengthens their professional autonomy, positions them as leaders in the field of cardiovascular care, and promotes more humanized care, centered on the patient and family [9,18,19]. This study reaffirms the potential of nursing to lead low-cost, effective and replicable interventions in the outpatient setting, contributing significantly to the quality of care and patient safety [1,19].

In terms of feasibility, the strategy is based on simple educational resources, checklists and a structured diary that do not require advanced technology or specialized infrastructure, which favors its implementation in health institutions and in settings with limited resources. Likewise, the intervention mainly requires time for monitoring and follow-up by nurses, which makes it a cost-effective alternative to more complex or more expensive strategies. These elements reinforce its scalability and its potential integration into cardiovascular health education programs in community and hospital settings.

Limitations and recommendations

A primary limitation of this study was the absence of an evaluation of the long-term sustainability of its effects, which restricts the temporal projection of the findings. Further research is recommended to explore the long-term impact of these interventions and their formal integration into clinical guidelines as replicable, cost effective strategies in the outpatient cardiovascular setting. Additionally, the intervention was applied only by the nurse researcher, which may imply limitations in the availability of time and in the possibility of replicating the process in routine clinical practice conditions. Another limitation is the possible presence of the Hawthorne effect, given that participants in the experimental group received greater attention and structured follow-up.

Conclusions

The results of this study demonstrate that an educational nursing intervention, based on disciplinary knowledge and oriented to symptom control, can generate significant benefits for patients in the outpatient postoperative period of myocardial revascularization. The experimental group showed a significant reduction in pain and a tendency towards a reduction in anxiety, suggesting a positive impact on physical and emotional well-being, adherence to clinical recommendations and continuity of recovery activities at home, all of which contribute to a more autonomous, safe rehabilitation focused on the patient's well-being.

These findings highlight the importance of educational nursing support in the transition from hospital to home care, strengthening professional autonomy and favoring a humanized care model. The use of visual resources, structured follow-up and the inclusion of the family caregiver were determining elements for the positive results achieved.

This educational intervention reinforces the leading role of nursing in pain management and post-surgical recovery and provides evidence to advance patient-centered care models based on education, family participation and continuity of care.

It is recommended that different health care settings adapt and implement educational nursing interventions based on this model, adjusting them to their resources and population, to optimize pain and anxiety control and ensure continuity of care.

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Appendix. Pain-Friendly Strategies: nursing intervention in postoperative myocardial revascularization.	
Cardiovascular Training	Intensity: Mild to Moderate Frequency: At least 5 times a week. Duration: minimum 1 hour per day Forms of Exercise: Walking Method of Exercise: Fractional, i.e. with 5-minute rest intervals every 15 minutes, this rest should be active.
Hydration during exercise	Only with water every 15 minutes half a glass or a full glass. After exercising you can consume food according to nutrition prescription until after 60 minutes.
General recommendations	✓ Do not exercise on an empty stomach (maximum 3 hours without having eaten). ✓ Maintain proper posture (back straight and vest properly worn) between each exercise. ✓ Proper cleaning of the vest and adjust it if required. ✓ Perform breathing exercises 5 times at each rest (take in through the nose and expel through the mouth softly). ✓ If it is difficult to perform the exercise standing up, you can do it sitting down. Rest 20 seconds between each exercise. ✓ Warm-up and stretching to avoid muscle injuries.
Strengthening of the emotional state.	✓ Always keep calm and tranquil. ✓ Listen to the music of your preference several times a day, music will help you relax, calm pain and anxiety. ✓ Share leisure activities with your family, they will help you to keep your mind busy and to reincorporate, little by little, into your social life. ✓ Smile many times a day, it will help you to release the pain, you will feel happy and grateful for this new stage in your life. ✓ Talking to your family and friends about your emotions can help you get through these first days.
Rest and sleep	✓ If you have difficulty sleeping, try to keep to a schedule and do not sleep during the day. ✓ Sleeping on your back reduces pain and helps the healing process to heal faster.

Use of respiratory incentive	Reinforce the benefits of using respiratory incentive: achieve recruitment of collapsed units to reverse atelectasis and improve the effective cough mechanism to avoid secondary complications. Perform the respiratory incentive following the guidelines: - Position, be seated with head upright. - Couple the mouthpiece with the mouth and avoid generating leaks. - Perform a slow and deep inspiration until the three balls are raised and kept up for 3 to 5 seconds. - Clean the mouthpiece with dry cloth and keep the incentive in a bag to avoid dust or bacteria accumulation.
Warning signs	Consult a physician in case of temperature >38 °C, presence of secretions in surgical wound, chills, leg edema, loss of consciousness, palpitations, dyspnea, fatigue. In case of chest pain, “shortness of breath” and fatigue discontinue exercise, if symptoms persist consult a physician.

Note. Source: Authors’ own elaboration.