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Original Article

Combining action research theory with focus-solving short-term psychotherapy for psychological stress, adjustment, and rehabilitation in patients with postoperative acute myocardial infarction following percutaneous coronary intervention

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Abstract: Objective: To evaluate the impact of combining action research theory with focus-solving short-term psychotherapy on the psychological stress, adjustment, and rehabilitation of patients with acute myocardial infarction (AMI) following percutaneous coronary intervention (PCI). Methods: Between January 2022 and January 2023, a prospective study was conducted involving 300 AMI patients at Union Hospital, Tongji Medical College, Huazhong University of Science and Technology. Participants were divided into a control group and a study group, with 150 patients in each. The control group received standard treatment and rehabilitation guidance, while the study group also received interventions based on action research theory and focus-solving short-term psychotherapy. Outcomes measured included scores from the Hamilton Anxiety Scale (HAMA), Hamilton Depression Scale (HAMD), Mental Health Inventory (MHI), National Institutes of Health Stroke Scale (NIHSS), Fugl-Meyer Assessment (FMA), Essential Skills for Caregivers Assessment (ESCA), and patient satisfaction. Prognostic factors were also analyzed. Results: Post-intervention, the study group demonstrated significantly lower scores in HAMA and HAMD and reported less psychological pain, alongside higher scores in psychological well-being, compared to the control group (all $P < 0.05$). Additionally, the study group showed improved neurological function (NIHSS scores) and motor skills (FMA scores) as well as enhanced self-care abilities (higher ESCA scores) (all $P < 0.05$). Patient satisfaction was also notably higher in the study group ($P < 0.05$). Key prognostic factors included history of diabetes, Killip classification, and door-to-balloon (DTB) time. Conclusion: The integration of action research theory with focus-solving short-term psychotherapy significantly alleviated anxiety and depression in AMI patients post-PCI, enhanced their psychological adjustment, and facilitated the recovery of neurological and motor functions. This approach also improved self-care capabilities. Effective management of underlying conditions, vigilant monitoring of Killip classification, and minimization of DTB time are critical to reducing major adverse cardiac events and improving patient outcomes.

Keywords: Action research theory, focus-solving short-term psychotherapy, acute myocardial infarction, percutaneous coronary intervention

Introduction

Percutaneous coronary intervention (PCI) is the preferred treatment for acute myocardial infarction (AMI), effectively alleviating ischemic symptoms [1]. However, the success of PCI not only depends on the procedural outcome but also on postoperative rehabilitation, which is critical for long-term recovery [2]. Traditional rehabilitation strategies often fall short due to individual variability, underscoring the need for more effective postoperative interventions. The action research method, which focuses on solving practical problems through collabor-

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ative measures with patients, aims to enhance intervention outcomes by addressing the limitations of traditional models [3, 4]. Additionally, the psychological impact of PCI, particularly the role of stress in postoperative recovery, cannot be overlooked. Focus-solving short-term psychotherapy, a problem-oriented approach designed to assist patients in overcoming developmental challenges, has been sparsely applied in conjunction with action research post-AMI [5]. This study investigates the effects of this combined approach on psychological distress and rehabilitation outcomes in AMI patients following PCI. Furthermore, the study analyzes clinical data to identify risk factors for poor prognosis, providing a foundation for early diagnosis and the development of effective prevention and treatment strategies.

Materials and methods

Patients

From January 2022 to January 2023, a total of 300 patients with AMI were enrolled in a prospective study at Union Hospital, Tongji Medical College, Huazhong University of Science and Technology. Participants were randomly assigned to either a control group or a study group, with 150 patients in each. This study received approval from the hospital's Ethics Committee, and all participants signed informed consent forms.

Inclusion criteria

(1) Diagnosis of AMI conforming to established criteria [6]. (2) Eligibility for PCI with no contraindications. (3) Ability to communicate and understand effectively.

Exclusion criteria

(1) Presence of mental illness or cognitive dysfunction. (2) Chronic obstructive pulmonary disease or other significant physical diseases. (3) Hearing or visual impairments that hinder effective communication. (4) Severe organic lesions. (5) Conditions that impair motor functions or substantial resistance to rehabilitation training. (6) Discontinuation or dropout from the study or follow-up.

Intervention methods

The study group underwent a comprehensive intervention combining action research theory with focus-solving short-term psychotherapy, alongside tailored rehabilitation guidance. The intervention was structured into a cyclical model comprising planning, action, observation, and reflection, tailored to the needs of AMI patients post-PCI.

Planning phase: Initiatives included motivational interviews to discuss and set specific behavior change plans with patients.

Action phase: Immediate Postoperative Rehabilitation (First 7 Days): Within 12 hours post-surgery: Absolute bed rest.

Days 1-2: Assisted exercises including sitting and standing from the bed for 15-20 minutes.

Day 3: Assisted slow indoor walking for 20-30 minutes daily.

Days 4-6: Encouragement of independent activities such as using the toilet and bathing, depending on the patient's condition.

Day 7 onwards: Assisted exercises including slow stair climbing.

Extended rehabilitation (post-discharge): First 2 weeks: Slow outdoor walks, maintaining both online and offline support.

Up to 4 weeks: Incremental increase in outdoor activities, progressing to brisk walking and jogging.

Beyond 4 weeks: Introduction of more strenuous outdoor aerobic exercises such as cycling, jogging, and Tai Ji Chuan, tailored to individual recovery rates. The target heart rate was maintained at (220 - age) × (60%-80%), for three sessions daily, each lasting no more than 30 minutes.

Focus-solving short-term psychotherapy: Initial sessions involved problem-oriented questioning by medical personnel to empower patients as experts in addressing their own challenges.

Techniques included guiding patients to set realistic treatment goals, shifting focus from unsolved issues to current treatment phases, and fostering a positive mindset through questions like "What will make you feel better"?

Encouragement and affirmation were used to enhance patient morale, for example through daily compliments on progress.

Observation and reflection: Continuous monitoring of the patients' functional rehabilitation, with detailed recording of training sessions and identification of any issues.

Reflection on any deviations from expected outcomes was required, with timely feedback provided to address any patient errors or deficiencies.

This methodological framework was designed to optimize psychological and physical recovery post-PCI, ensuring a holistic approach to patient care.

Patients in the control group received standard postoperative care and rehabilitation guidance. Vital signs were meticulously monitored following the operation. The early rehabilitation regimen was identical to that of the study group, involving specific, scheduled exercises. Regular one-on-one psychological counseling sessions were conducted to monitor and assess emotional changes. Based on the identified causes of negative emotions, targeted psychological interventions were administered. Patient inquiries were addressed promptly, and positive reinforcement was consistently provided to support recovery and well-being.

Outcome measures

Psychological stress: Psychological stress was measured using the Hamilton Anxiety Scale (HAMA) and Hamilton Depression Scale (HAMD), both of which utilize a 5-point Likert scoring system. Higher scores on these scales indicate greater psychological distress [7, 8].

Psychological adjustment: The Mental Health Questionnaire (MHI) was employed to evaluate both positive and negative psychological adjustments before and after the intervention. The questionnaire measures psychological pain (scores range from 24 to 142) and psychological well-being (scores range from 14 to 84), with higher scores indicating greater psychological pain and well-being, respectively [9].

Neurological function: Neurological function was assessed with the National Institutes of Health Stroke Scale (NIHSS) before and after the intervention. This scale includes 11 items, scored according to the severity of symptoms, with a maximum possible score of 42. A higher score indicates more severe neurological impairment [10].

Motor function: Motor function was evaluated using the Fugl-Meyer Assessment (FMA), which consists of 25 items with a total possible score of 100. A score below 50 indicates severe motor dysfunction [11].

Self-care ability: Self-care ability was measured using the Self-care Ability Scale (ESCA) before and after the intervention. This scale includes 43 items across four dimensions: health knowledge, self-concept, self-responsibility, and self-care skills, scored on a 5-point scale from 0 to 4. Higher scores indicate better self-care ability [12].

Satisfaction measurement: Three months post-intervention, patient satisfaction with medical care was assessed using the Medical Care Satisfaction Table, which categorizes responses into three levels: very satisfied, generally satisfied, and dissatisfied [13].

Adverse prognosis: The incidence of major adverse cardiovascular events (MACE) within 30 days post-operation was monitored. MACE included recurrent angina, recurrent myocardial infarction, heart failure, and death.

Research method

Patients were categorized into either a good prognosis group or a poor prognosis group based on the presence of adverse outcomes (Killip classification ≥ III) at hospital discharge. Data collected included age, sex, medical history, body mass index, number of lesions, Killip classification, infarction site, smoking history, heart rate (HR) on admission, systolic blood pressure (SBP), diastolic blood pressure (DBP), left ventricular ejection fraction (LVEF), Gensini score, door-to-balloon time (DTB), and total ischemic time (TIT), all retrieved from the hospital's electronic medical record system.

Statistical methods

Data analysis was conducted using SPSS 22.0 software. Quantitative data were expressed as mean ± standard deviation (SD), and differences between groups were evaluated using t-tests. Categorical data were presented as counts and percentages (n, %) and analyzed

Table 1. Comparison of the general data in the two groups

Group	Sex (n, %)		Age (years old)	Infarction location (n, %)		BMI (kg/m^2)
	Male	Female		Superior myocardial infarction	Inferior myocardial infarction	
Control group (n=150)	65	85	53.17±8.54	71	79	21.59±4.67
Study group (n=150)	73	77	53.31±8.32	65	85	21.73±4.52
t/χ^2	0.859		0.144	0.484		0.264
P	0.354		0.886	0.487		0.792

Note: BMI, Body Mass Index.

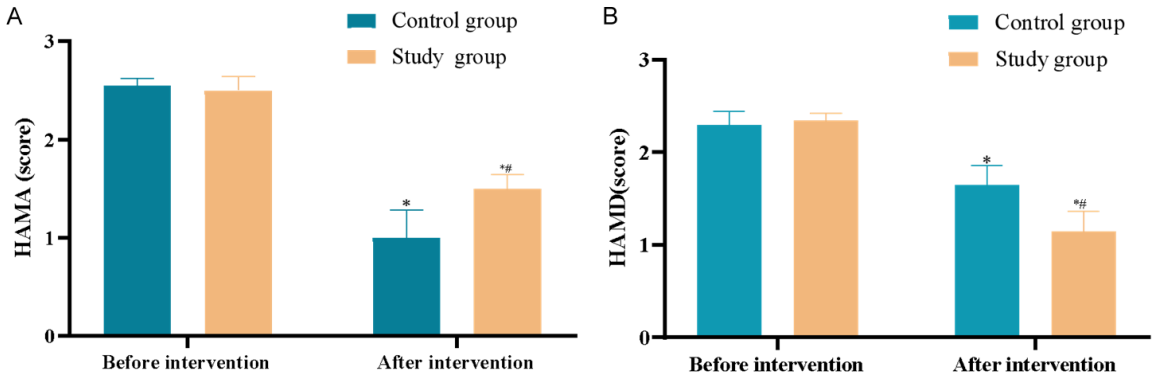

Figure 1. HAMA and HAMD scores before and after intervention in the two groups. Note: A. HAMA; B. HAMD. Compared with the same group before intervention, $^{*}P < 0.05$. Compared with the control group after intervention, $^{\#}P < 0.05$. HAMA, Hamilton Anxiety Scale; HAMD, Hamilton Depression Scale.

with the chi-square test. Variables showing significant differences were included as independent variables in a multivariate logistic regression analysis. All analyses were performed with a 95% confidence interval, and a *p*-value < 0.05 was considered statistically significant.

Results

Comparison of general data

Statistical analyses revealed no significant differences in basic demographic and clinical data between the two groups (all P > 0.05, **Table 1**).

Comparison of HAMA and HAMD scores

Initially, there were no significant differences in the HAMA and HAMD scores between the two groups (both P > 0.05). Post-intervention, both groups showed reductions in HAMA and HAMD scores compared to baseline. However, the reductions were more pronounced in the study group than in the control group, with statistical significance (P < 0.05) (**Figure 1**).

Comparison of psychological pain and happiness scores

Before the intervention, scores for psychological pain and happiness did not significantly differ between the groups (both P > 0.05). Following the intervention, both groups experienced decreases in psychological pain scores and increases in happiness scores compared to their baseline measurements (both P < 0.05). The study group reported lower psychological pain and higher happiness scores than the control group post-intervention (both P < 0.05) (**Figure 2**).

Comparison of NIHSS

There were no significant differences in National Institutes of Health Stroke Scale (NIHSS) scores between the groups before the intervention (P > 0.05). After the intervention, NIHSS scores decreased in both groups, but the decrease was more significant in the study group compared to the control group (P < 0.05) (refer to **Figure 3**).

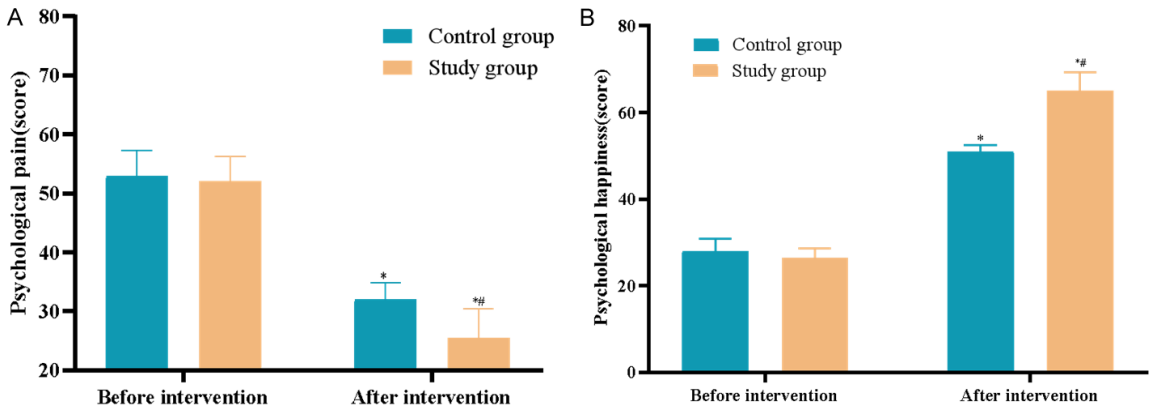

Figure 2. Psychological pain and happiness before and after intervention in the two groups. Note: A. Psychological pain; B. Psychological happiness. Compared with the same group before intervention, $^{*}P < 0.05$. Compared with the control group after intervention, $^{\#}P < 0.05$.

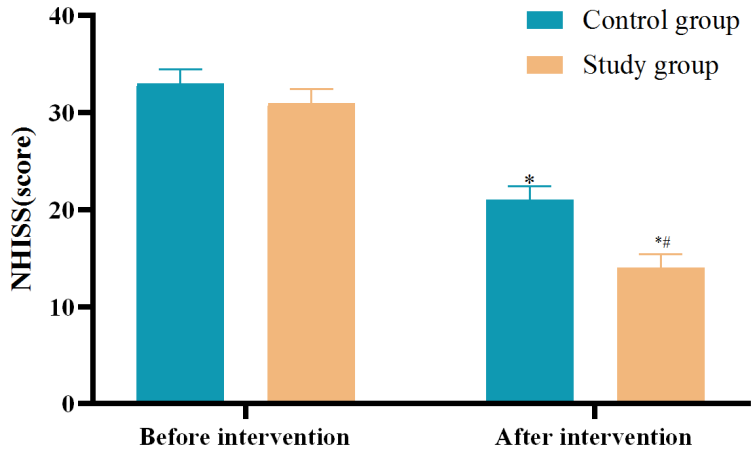

Figure 3. NHISS score before and after intervention in the two groups. Note: Compared with the same group before intervention, $^{*}P < 0.05$. Compared with the control group after intervention, $^{\#}P < 0.05$. NHISS, National Institute of Health stroke scale.

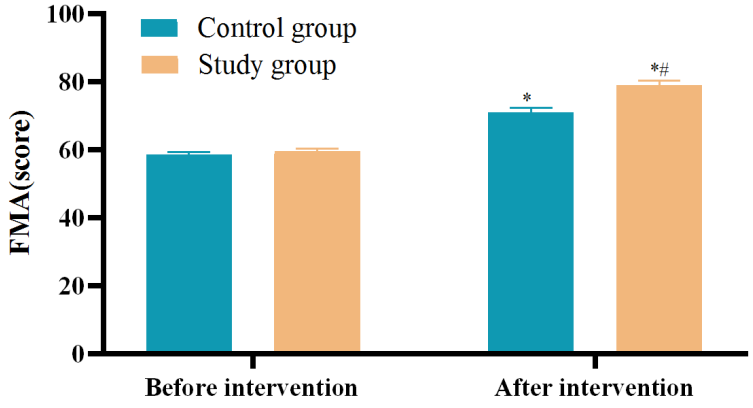

Figure 4. FMA score before and after intervention in the two groups. Note: Compared with the same group before intervention, $^{*}P < 0.05$. Compared with the control group after intervention, $^{\#}P < 0.05$. FMA, Function Assessment Scale.

Comparison of FMA scores

No significant differences were observed in FMA scores between the two groups prior to the intervention (P > 0.05). Post-intervention, both groups showed improvements in FMA scores, with the study group achieving significantly higher scores than the control group (P < 0.05) (refer to **Figure 4**).

Comparison of ESCA scores

Before the intervention, there were no significant differences in the scores for health knowledge, self-concept, self-responsibility, and self-care skills between the groups (all P > 0.05). After the intervention, all these parameters improved in both groups, with the study group showing significantly higher improvements across all ESCA scores compared to the control group (all P < 0.05) (**Figure 5**).

Comparison of satisfaction

The study group reported higher satisfaction scores compared to the control group post-intervention (P < 0.05) (**Figure 6**).

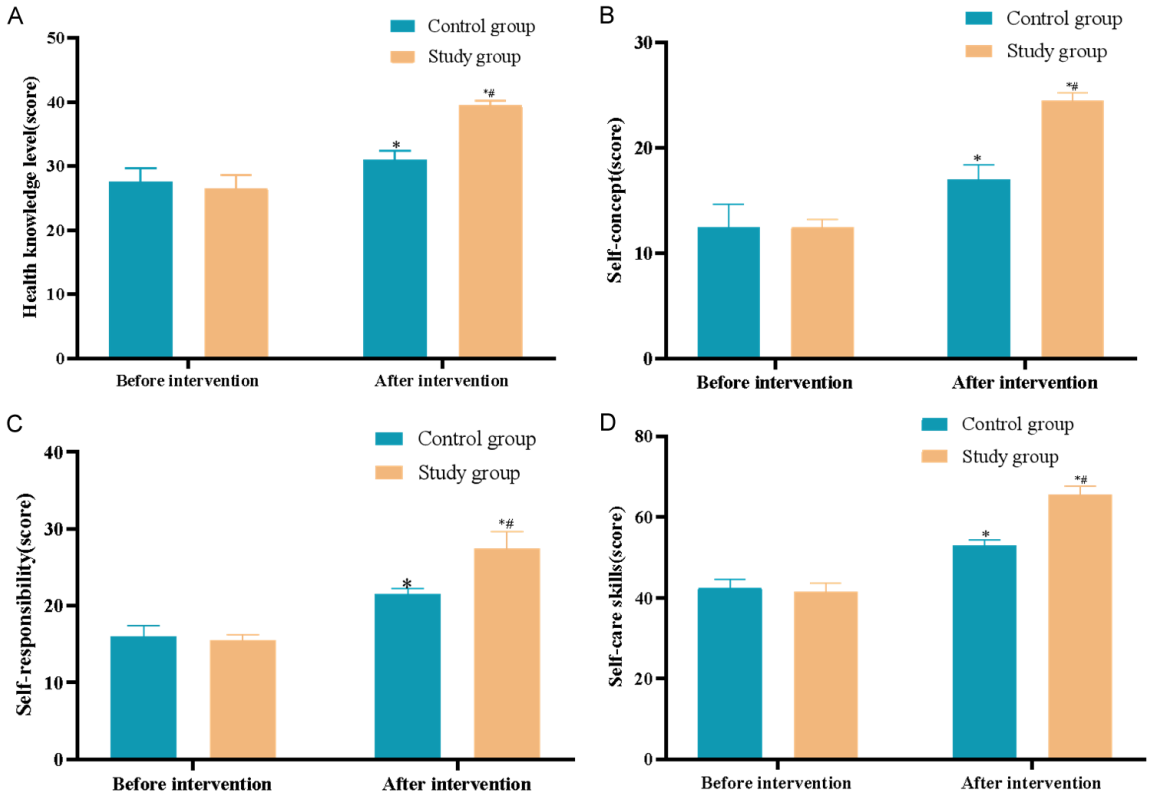

Figure 5. Health knowledge level, self-concept, self-responsibility and self-care skills scores before and after intervention in the two groups. Note: A. Health knowledge level; B. Self-concept; C. Self-responsibility; D. Self-care skills. Compared with the same group before intervention, $^{*}P < 0.05$. Compared with the control group after intervention, $^{\#}P < 0.05$.

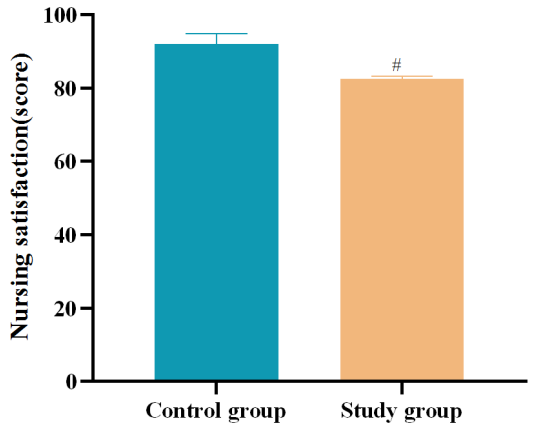

Figure 6. Satisfaction score before and after intervention in the two groups. Note: Compared with the Control group after intervention, $^{\#}P < 0.05$.

Comparison of prognostic situation

The incidence of major MACE was significantly lower in the study group than in the control group (P < 0.05), as detailed in **Table 2**.

Univariate analysis

Statistical analysis between the poor prognosis and good prognosis groups revealed significant differences in age, history of diabetes, myocardial colic, lesion index, Killip classification, smoking history, drinking history, heart rate at admission, SBP, DBP, Gensini score, DTB, and TTT (all P < 0.05), as outlined in **Table 3**.

Multivariate analysis

Using poor prognosis as the dependent variable, significant variables identified in **Table 2** were included in a logistic regression model. The analysis indicated that history of diabetes, Killip classification, and DTB were independent risk factors influencing the prognosis of patients with acute myocardial infarction undergoing PCI (all P < 0.05), as presented in **Table 4**.

Discussion

While PCI technology significantly extends the lifespan of patients with AMI, it can also induce

Table 2. Comparison of prognosis between the two groups

Group	Recurrent angina pectoris	Recurrent myocardial infarction	Heart failure	Death	Total
Control group (n=150)	3 (2.00)	5 (3.33)	4 (2.67)	0 (0.00)	12 (8.00)
Study group (n=150)	1 (0.67)	2 (1.33)	1 (0.67)	0 (0.00)	4 (2.67)
χ^2					4.166
P					0.041

Table 3. Univariate analysis of prognosis of patients' postoperative acute myocardial infarction PCI

Factors		Poor prognosis group (n=16)	Good prognosis group (n=284)	t/χ^2	*P*
Sex (n, %)	Male	7 (43.75)	131 (46.13)	0.034	0.853
	Female	9 (56.25)	153 (53.87)		
Age (years old)		59.78±4.76	62.96±4.51	2.736	0.007
History of diabetes (n, %)	Yes	12 (75.00)	98 (34.51)	10.695	0.001
	No	4 (25.00)	186 (65.49)		
History of hypertension (n, %)	Yes	9 (56.25)	129 (45.42)	0.715	0.398
	No	7 (43.75)	155 (54.58)		
History of angina pectoris (n, %)	Yes	10 (62.50)	75 (26.41)	9.717	0.002
	No	6 (37.50)	209 (73.59)		
BMI (kg/m^2)		21.98±4.31	21.06±3.68	0.964	0.336
Lesion index (n, %)	Single branch lesion	2 (12.50)	124 (43.66)	6.038	0.014
	Non-single branch lesion	14 (87.50)	160 (56.34)		
Killip classification (n, %)	II	5 (31.25)	169 (59.51)	4.241	0.039
	III	11 (68.75)	125 (44.01)		
Infarction location (n, %)	Superior myocardial infarction	7 (43.75)	129 (45.42)	0.017	0.896
	Inferior myocardial infarction	9 (56.25)	155 (54.58)		
History of smoking (n, %)	Yes	13 (81.25)	102 (35.92)	13.167	< 0.001
	No	3 (18.75)	182 (64.08)		
History of drinking (n, %)	Yes	8 (50.00)	71 (25.00)	4.880	0.027
	No	8 (50.00)	213 (75.00)		
HR on admission (beats/min)		89.16±9.34	81.33±8.69	3.493	0.001
SBP (mmHg)		127.29±6.52	114.95±5.32	8.915	< 0.001
DBP (mmHg)		82.33±4.58	76.63±4.64	4.784	< 0.001
LVEF (%)		46.16±4.59	55.31±4.36	8.145	< 0.001
Gensini score (score)		68.59±8.46	42.33±7.52	13.501	< 0.001
DTB (h)		7.16±1.21	5.46±1.28	5.183	< 0.001
TIT (h)		7.54±1.33	5.89±1.36	4.727	< 0.001

Note: BMI, Body Mass Index; HR, heart rate; SBP, systolic blood pressure; DBP, diastolic blood pressure; LVEF, left ventricular ejection fraction; DTB, door-to-balloon time; TIT, total ischemic time; PCI, percutaneous coronary intervention.

considerable psychological and physical stress. This stress may provoke negative emotions, impair self-cognition, and disrupt self-adaptation, all of which can hinder postoperative rehabilitation [14, 15]. The transformation of the medical model has heightened awareness within the academic community about the critical importance of postoperative interventions in the rehabilitation of AMI patients. Various intervention models have been explored by researchers globally to enhance outcomes after AMI [16, 17].

In this study, action research theory was applied to the postoperative care of AMI patients and combined with focus-solving short-term

Table 4. Multivariate analysis of prognosis of patients' postoperative acute myocardial infarction PCI

Factors	*β*	*SE*	*Wald X²*	*P*	*OR*	The *95% CI* of *OR*	
						Lower Limit	Upper Limit
Age	1.978	1.402	1.992	0.158	7.231	0.464	112.822
History of diabetes	2.881	1.377	4.381	0.036	17.84	1.201	264.984
History of angina pectoris	0.101	1.679	0.004	0.952	1.106	0.041	29.74
Lesion index	0.084	1.277	0.004	0.947	1.088	0.089	13.304
Killip classification	0.345	0.140	6.033	0.014	1.412	1.072	1.859
History of smoking	1.575	1.485	1.124	0.289	4.830	0.263	88.776
History of drinking	0.591	1.468	0.162	0.687	1.806	0.102	32.098
HR on admission	0.066	0.086	0.579	0.447	1.068	0.902	1.265
SBP	0.054	0.068	0.629	0.428	1.055	0.924	1.205
DBP	0.030	0.105	0.083	0.774	1.031	0.84	1.265
LVEF	0.055	0.132	0.171	0.679	1.056	0.816	1.367
Gensini score	0.123	0.066	3.477	0.062	1.131	0.994	1.288
DTB	0.777	0.348	4.99	0.025	2.176	1.100	4.304
TIT	0.432	0.467	0.854	0.355	1.540	0.616	3.848
Constant	-2.197	0.333	43.45	0.000	0.110	-	-

Note: HR, heart rate; SBP, systolic blood pressure; DBP, diastolic blood pressure; LVEF, left ventricular ejection fraction; DTB, door-to-balloon time; TIT, total ischemic time; PCI, percutaneous coronary intervention.

psychotherapy to provide psychological interventions. The findings indicate that short-term psychotherapy, supported by action research, enhances patients' neurological and motor functions and fosters robust self-care capabilities. The integration of critical thinking into scientific research and clinical practice through the action research method facilitates the development of a structured, scientific intervention system. This system aims to mitigate the limitations and arbitrary nature of traditional interventions [18, 19]. The action research intervention model employed in this study incorporates phases of planning, action, observation, and reflection, operating in a cyclical, spiral mode to continuously improve patients' self-management abilities [20]. In the planning stage, by assembling a scientific team, a tailored and scientifically rigorous intervention plan was developed based on the actual conditions of patients, ensuring the plan's scientific validity [21]. In the action stage, process was divided into two phases: in-hospital and post-discharge. This structure not only involved caregivers actively but also shifted the approach from passive to active participation, enhancing patient engagement in their recovery process [22]. Continuous recording and reflection during these activities allowed for the incorporation of feedback from caregivers and patients, which was used to refine the intervention strategies and promote the adoption of beneficial behaviors, thereby optimizing clinical rehabilitation outcomes [23]. The study demonstrated significant improvements in psychological outcomes within the study group, with lower HAMA and HAMD scores and reduced psychological pain compared to the control group. Additionally, psychological well-being scores were higher, indicating that focus-solving short-term psychotherapy effectively ameliorates the psychological distress associated with AMI surgery. This psychotherapy approach includes stages of describing the problem, goal construction, exploration of exceptions, and feedback provision [24]. Guided by researchers, patients articulated their issues and concerns, enabling targeted interventions to mitigate negative emotions and promote psychological well-being [25]. Tailoring goals to individual patient differences enhances the perceived attainability of these goals, fostering positive behaviors and attitudes [26]. The intervention also highlights patients' positive traits such as resilience and optimism, providing encouragement and affirmations to reinforce these characteristics during follow-up sessions. Ultimately, the study group expressed higher satisfaction levels, suggesting that the integration of action research-supported short-term psychotherapy not only

improves the quality of interventions but also strengthens the physician-patient relationship.

The multivariate analysis identified diabetes, Killip classification, and DTB as independent risk factors influencing the prognosis of patients with acute myocardial infarction undergoing PCI. Diabetes exacerbates coronary artery disease by enhancing platelet activity and promoting the release of inflammatory factors post-PCI, leading to coagulation and fibrinolysis disorders and a heightened risk of stent thrombosis. Hyperglycemia can also damage endothelial cells, increasing the likelihood of coronary atherosclerotic plaque rupture and thromboembolism. It is crucial, therefore, to rigorously manage glucose and lipid metabolism in patients with AMI complicated by diabetes to mitigate the adverse effects of blood sugar instability on prognosis.

Moreover, a higher Killip classification indicates more severe heart failure. Patients with Killip classification III experience significant impairment in cardiac pump function and reduced tissue repair capability, which may not be fully reversible even with successful PCI alleviating myocardial ischemia. This underscores the necessity for heightened clinical vigilance and targeted pharmacological management in patients with high Killip classifications to control heart failure progression and reduce the risk of MACE postoperatively.

Additionally, prolonged coronary artery occlusion significantly worsens patient outcomes, with occlusions lasting over six hours causing extensive myocardial necrosis and complicating surgical intervention. Shortening the DTB time is critical, as timely reperfusion significantly enhances myocardial salvage opportunities and improves long-term prognosis.

However, a limitation of this study is its relatively small sample size. Future research will aim to expand the number of cases to further validate and refine these findings.

In conclusion, the combined application of action research theory and focus-solving short-term psychotherapy in AMI postoperative care has shown promising results. Patients exhibited significant improvements in psychological well-being, evidenced by increased scores in well-being assessments and reduced HAMA and HAMD scores, as well as lower scores in psychological pain measures. Additionally, this intervention approach led to decreased NIHSS scores and increased scores in the FMA across all dimensions, indicating enhanced neurological and motor functions.

Furthermore, the history of diabetes, Killip classification, and DTB were identified as critical risk factors affecting the prognosis of patients undergoing PCI. These findings underscore the necessity of diligent management of underlying conditions, careful monitoring of Killip classifications, and the importance of minimizing DTB to reduce the incidence of MACE and improve patient outcomes.

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Disclosure of conflict of interest

None.

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