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Original Article

Meticulous psychological nursing can effectively relieve negative emotions in patients with acute angina pectoris and reduce inflammation

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Abstract: Objective: This study aimed to explore the effects of meticulous psychological nursing on the negative emotions and inflammation in patients with acute angina pectoris (AAP). Methods: We randomly assigned 205 patients with AAP who were admitted to our hospital from June 2018 to September 2019 to receive meticulous psychological nursing (112 cases, the research group, RG) or conventional nursing (93 cases, the conventional group, CG). We measured related clinical indicators and tested the expression levels of inflammatory cytokines before and after nursing. The Self-Rating Depression Scale (SDS) and Self-Rating Anxiety Scale (SAS) were used to assess the psychological state of patients before and after nursing; the Numerical Rating Scale (NRS) was used to assess pain intensity; the Seattle Angina Questionnaire (SAQ) was used to assess the health status of patients before and after nursing; the Chinese questionnaire of quality of life in patients with cardiovascular diseases (CQQC) was used to assess the quality of life of patients before and after nursing; and a self-made "satisfaction questionnaire" by our hospital was used to assess patient satisfaction with nursing. The nursing compliance of patients was also evaluated. Results: After nursing, compared to the CG, the RG had markedly lower angina frequency, markedly shorter hospitalization duration, markedly lower SDS, SAS, and NRS scores, markedly lower expression levels of inflammatory cytokines [interleukin-6 (IL-6), tumor necrosis factor alpha (TNF-α), and soluble intercellular adhesion molecule 1 (sICAM-1)], and markedly higher SAQ and CQQC scores. The nursing compliance rate and nursing satisfaction rate were markedly higher in the RG than in the CG. Conclusion: Meticulous psychological nursing can improve the vital signs of patients with AAP, relieve pain intensity, reduce inflammation, improve the patient's psychological state, enhance the patient's treatment compliance, and improve the patient's quality of life.

Keywords: Meticulous psychological nursing, acute angina pectoris, negative emotions, inflammation

Introduction

Acute angina pectoris (AAP) is a common clinical symptom of coronary heart disease, which is induced by temporary myocardial ischemia and hypoxia caused by insufficient coronary blood supply [1, 2], manifesting as acute symptoms such as precordial pain and chest tightness [3]. AAP is mostly paroxysmal and oppressive, often triggered by physical labor or excited emotions, posing negative impacts on the daily health and quality of life of patients [4]. A previous study revealed that AAP generally induces negative emotions such as depression, anxiety, and fear, which may seriously compromise the treatment efficacy [5]. Therefore, psychological nursing interventions are crucial for improving the treatment efficacy in patients with AAP.

A deeper understanding of heart disease and health knowledge can effectively reduce the mortality and morbidity in patients. Due to incomplete patient knowledge, or a lack of correct information from medical staff, cardiac patients often have misconceptions, which may lead to longer hospital stays and slower recovery [6]. Meticulous psychological nursing is patient-centered and customized to the individual needs of patients; it introduces disease knowledge and improves psychological communication, comfort, and patient inspiration to eliminate negative emotions and improve prog-

nosis [7, 8]. A study suggests that nursing intervention including self-care education and rehabilitation planning can improve the physical and psychological health of patients with angina pectoris (AP) [9]. Another study indicates that psychological interventions can ease the negative emotions of patients, improve patients' confidence in treatment, speed up physical rehabilitation, and enhance patients' quality of life [10]. One study that conducted psychotherapy on patients with coronary heart disease, noted markedly relieved anxiety and depression and better treatment responses [11].

This study explored the impact of meticulous psychological nursing on the negative emotions, inflammation, and quality of life of patients with AAP.

Materials and methods

Basic information

We randomly assigned 205 patients with AAP who were admitted to Tonglu TCM Hospital from June 2018 to September 2019 to receive meticulous psychological nursing (112 cases, the research group, RG) or conventional nursing (93 cases, the conventional group, CG). Inclusion criteria: Patients diagnosed with AAP [12]; patients with complete basic clinical data. This study was approved by the ethics committee of our hospital. All patients and their families signed the written informed consent. Exclusion criteria: Patients with cognitive dysfunction, body dysfunction, variant angina, heart diseases such as myocardial infarction, heart failure, and severe heart arrhythmia; patients with mental illness or a family history of mental illness; patients who withdrew from the experiment halfway; patients that not cooperate with this study; and patients who were lost to follow-up.

Nursing methods [13, 14]

Patients in the CG were given conventional nursing. Nursing staff implemented various treatment measures following the doctor's instructions and closely monitored the patient's conditions. Any abnormalities were reported to the attending physician immediately. Patients were frequently asked about their reactions to the treatment. If patients felt uncomfortable, caregivers took targeted measures immediately. We advised patients to stay on a healthy diet consisting of digestible foods with low-salt, low-fat, and high-vitamins to help keep smooth bowel movements and instructed them to relieve AP symptoms.

Patients in the RG were given meticulous psychological nursing. (1) Illness perceptions: The nursing staff collected the basic information of patients and evaluated their conditions. Through active and frequent communication with patients, nursing staff had a good understanding of the physical condition of patients. Based on the patient's perception of the disease, nurses introduced disease-related knowledge in a customized way and detailed the causes of APP, clinical treatment regimens, first-aid measures, and prognosis to improve the patient's understanding of APP. Besides, nurses guided patients to change their unhealthy lifestyle behaviors and cooperate with nursing staff. (2) Psychological counseling: Following the understanding of the basic condition of patients, nursing staff assessed the psychological state of each patient and designed customized psychological intervention plans. When patients presented with negative emotions like anxiety, depression, and fear, caregivers conducted patient psychological counseling on a one-to-one basis to increase the sense of security of patients, relieve uneasy emotions, and reduce myocardial oxygen consumption. Nurses also advised patients' family members to comfort and encourage them to enhance their confidence in treatment. (3) Treatment compliance: Nursing staff patiently explained the importance, key elements, and significance of medication to patients. Caregivers analyzed the reasons for poor medication compliance in patients and then strengthened communication with patients to enhance their treatment and medication compliance. (4) Social support: Nursing staff actively communicated with the patient's family members to understand the patient's financial situation. If the patient was from a poor family, caregivers actively sought medical insurance and other help for the patient to promote the patient's confidence in returning to society.

Outcome measures

(1) Clinical indicators: The ST-segment pressure, frequency of acute attacks, duration of

attacks, and hospitalization time of all patients were all recorded.

(2) Negative emotions: The anxiety and depression of all patients before and after nursing intervention were assessed by the Self-Rating Anxiety Scale (SAS) and the Self-Rating Depression Scale (SDS) [15]. In the SAS, a higher score suggests a higher degree of anxiety: a score of 50-70 points out of 100 indicates mild anxiety, a score of 71-90 points indicates moderate anxiety, and a score higher than 90 indicates severe anxiety. In the SDS, a higher score suggests a higher degree of depression: a score of 50-70 points out of 100 indicates mild depression, a score of 71-90 points indicates moderate depression, and a score higher than 90 indicates severe depression.

(3) Pain intensity: The 10-point Numerical Rating Scale (NRS) [16] was used to assess the pain intensity, with 0 points indicating no pain, scores below 3 points indicating mild pain, 4-6 points indicating moderate pain, 7-10 points indicating severe pain.

(4) Inflammatory cytokines: Five mL of venous blood was collected from each patient before and after nursing, followed by centrifugation (1500×g) at 4°C for 10 minutes, and then the samples were stored at -70°C. The enzyme-linked immunosorbent assay (ELISA) [17] was conducted to measure the expression levels of interleukin-6 (IL-6), tumor necrosis factor alpha (TNF-α), and soluble intercellular adhesion molecule 1 (sICAM-1), The human IL-6 ELISA kit was from Multisciences (Lianke) Biotech Co., Ltd., Hangzhou, China (item number: 70-EK106/2). The human TNF-α ELISA kit was purchased from Bai'ao Laibo Technology Co., Ltd., Beijing, China (item number: ZN2460-QWJ). The sICAM-1 ELISA kit was from (Jianglai Biotechnology Co., Ltd., Shanghai, China, item number: 1531355240). All detection procedures followed the kit instructions.

(5) Treatment compliance [18]: Patients showed complete compliance if they actively cooperated with the nursing staff to finish relevant tests and followed the medication guidance, ate a healthy diet, and followed the emotional management suggested by doctors. Patients showed moderate compliance if they cooperated well with the treatment, medication, nursing, and dietary management. Patients showed non-compliance if they did not cooperate well with the treatment or nursing under the guidance of nursing staff. Total compliance rate = (numbers of cases with complete compliance + moderate compliance)/total number of cases × 100%.

(6) Health status: The Seattle Angina Questionnaire (SAQ) [19] was used to assess the health status of patients. It consisted of 19 items that measured 5 dimensions of coronary artery disease, including angina frequency, treatment satisfaction, physical limitation, disease perception, and angina stability. In this 100-point scale, a higher score indicates better body functions.

(7) Quality of life: The Chinese questionnaire of quality of life in patients with cardiovascular diseases (CQQC) [20] was used to assess the quality of life of patients. It is comprised of 24 items that measure 6 dimensions of quality of life of patients. Patients performed self-scoring according to their own situations.

(8) Nursing satisfaction [21]: The self-made nursing satisfaction questionnaire by our hospital was used to assess the satisfaction level of patients. It is a 100-point questionnaire, with a higher score suggesting a higher nursing satisfaction level.

Statistical analysis

Statistical analysis was performed with SPSS 20.0 (Boao Yijie (Beijing) Technology Co., Ltd., Beijing, China), and data was illustrated with GraphPad Prism 7. The count data was represented by [n (%)] and compared between the two groups using the chi-square test. The measurement data was represented by the mean ± standard deviation ($\bar{x} \pm sd$) and compared between the two groups using the t-test. The paired t-test was used for the comparison between before and after nursing within the group. The difference was statistically significant when $P < 0.05$.

Results

Basic information

No significant differences were noted between the two groups in sex, average age, BIM, place of residence, ethnicity, educational degree,

Table 1. Basic information of patients in the two groups [n (%)] (mean ± SD)

Factors	RG (n = 112)	CG (n = 93)	t/χ^2	P
Sex			0.109	0.741
Male	64 (57.14)	51 (54.84)		
Female	48 (42.86)	42 (45.16)		
Average age (year)	51.24 ± 3.48	50.94 ± 3.51	0.612	0.541
BMI (kg/m^2)	23.24 ± 3.71	22.81 ± 3.42	0.856	0.393
Place of residence			1.568	0.211
Urban area	54 (48.21)	53 (56.99)		
Rural area	58 (51.79)	40 (43.10)		
Ethnicity			1.303	0.253
Han nationality	61 (54.46)	58 (62.37)		
Minority nationality	51 (45.54)	35 (37.63)		
Educational degree			3.257	0.071
≥ high school	55 (49.11)	34 (36.56)		
< high school	57 (50.89)	59 (63.44)		
Smoking			0.449	0.503
Yes	69 (61.61)	53 (56.99)		
No	43 (38.39)	40 (43.01)		
Drinking			1.401	0.237
Yes	72 (64.29)	67 (72.04)		
No	40 (35.71)	26 (27.96)		
Diabetes history			0.052	0.819
Yes	68 (60.71)	55 (59.14)		
No	44 (39.29)	38 (40.86)		
Hypertension history			0.031	0.859
Yes	64 (57.14)	52 (55.91)		
No	48 (42.86)	41 (44.09)		
Job history			0.146	0.703
Yes	62 (55.36)	49 (52.69)		
No	50 (44.64)	44 (47.31)		

Table 2. Related clinical indicators in the two groups after nursing (mean ± SD)

Groups	n	Indicators			
		ST-segment pressure	Frequency of acute attacks (attacks/week)	Duration of attacks (min)	Hospitalization time (d)
RG	112	0.19 ± 0.05	2.24 ± 1.43	3.61 ± 1.14	32.43 ± 5.37
CG	93	0.29 ± 0.09	4.73 ± 1.46	7.52 ± 1.94	46.53 ± 5.65
t	-	10.040	12.290	17.930	18.280
P	-	< 0.001	< 0.001	< 0.001	< 0.001

smoking, drinking, diabetes, hypertension, and job history (P > 0.05). More details are shown in **Table 1.**

Related clinical indicators in the two groups after nursing

The ST-segment pressure, frequency of acute attacks, duration of attacks, and the hospitalization time were markedly lower in patients from the RG than in patients from the CG (all P < 0.05). More details are shown in **Table 2.**

Scores of negative emotions in the two groups before and after nursing

The comparison of the SAS and SDS scores between the two groups before nursing show-

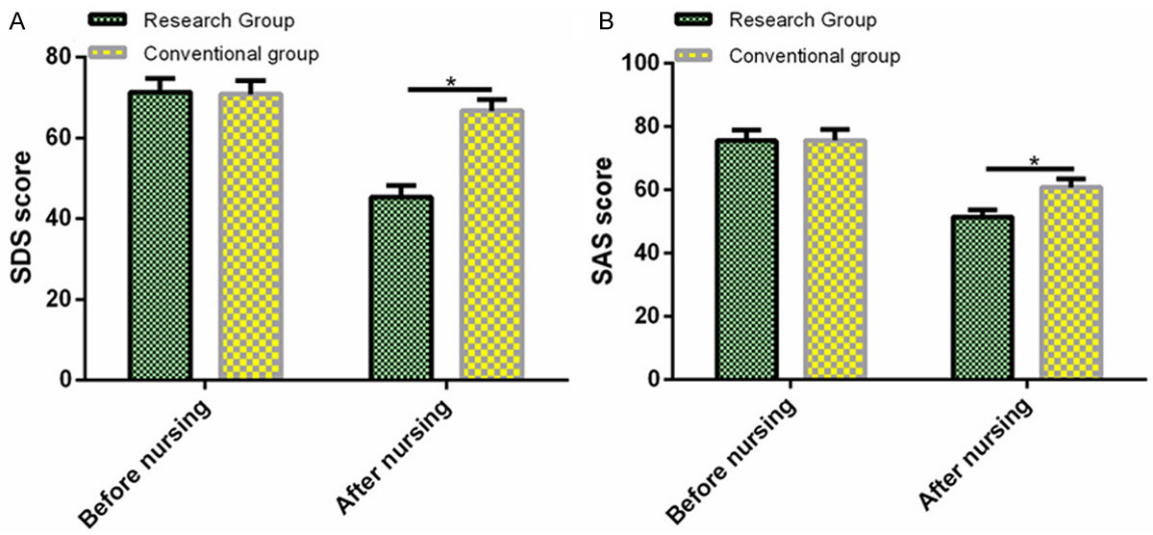

Figure 1. Scores of negative emotions in the two groups before and after nursing. A. Before nursing, the SDS scores in the RG were not different from that in the CG; after nursing, the SDS scores were markedly lower in the RG than in the CG. B. Before nursing, the SAS scores in the RG were not different from that in the CG; after nursing, the SAS scores were markedly lower in the RG than in the CG. Note: "*" indicates $P < 0.05$ for the comparison between the two groups.

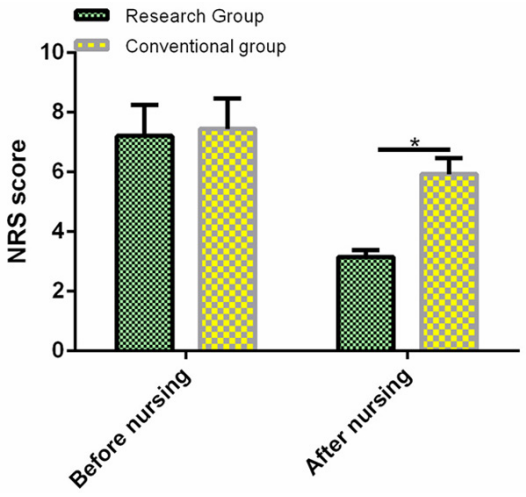

Figure 2. NRS scores in the two groups before and after nursing. Before nursing, the two groups were not markedly different in the NRS scores. After nursing, the NRS scores were markedly lower in the RG than in the CG. Note: "*" indicates $P < 0.05$ for the comparison between the two groups.

ed no marked differences ($P > 0.05$). In both groups, the SAS and SDS scores after nursing were markedly lower than those before nursing, with remarkably lower SAS and SDS scores in the RG than in the CG ($P < 0.05$). More details are shown in **Figure 1.**

NRS scores in the two groups before and after nursing

The comparison of the NRS scores between the two groups before nursing showed no marked differences ($P > 0.05$). In both groups, the NRS scores after nursing were markedly lower than those before nursing, with remarkably lower NRS scores in the RG than in the CG ($P < 0.05$). More details are shown in **Figure 2.**

Expression of inflammatory cytokines in the two groups before and after nursing

The comparison of the expression levels of IL-6, TNF-α, and sICAM-1 between the two groups before nursing showed no marked differences ($P > 0.05$). In both groups, the expression levels of IL-6, TNF-α, and sICAM-1 after nursing were markedly lower than those before nursing, with remarkably lower IL-6, TNF-α, and sICAM-1 levels in the RG than in the CG ($P < 0.05$). More details are shown in **Table 3.**

Nursing compliance in the two groups after nursing

The total nursing compliance rate after nursing was markedly higher in RG than in CG

Table 3. Expression of inflammatory cytokines in the two groups before and after nursing (mean ± SD)

Groups	n	IL-6 (pg/ml)		TNF-α (pg/ml)		sICAM-1 (ng/ml)	
		Before nursing	After nursing	Before nursing	After nursing	Before nursing	After nursing
RG	112	43.79 ± 4.32	31.48 ± 3.04	48.78 ± 4.79	36.79 ± 3.27	832.54 ± 12.24	635.18 ± 10.36
CG	93	43.26 ± 4.35	39.68 ± 3.12	49.32 ± 4.82	42.25 ± 3.83	833.24 ± 12.43	703.14 ± 11.43
t	-	0.872	19.000	0.801	11.010	0.408	44.610
P	-	0.384	< 0.001	0.424	< 0.001	0.684	< 0.001

Table 4. Nursing compliance in the two groups after nursing [n (%)]

Groups	n	Complete compliance	Moderate compliance	Non-compliance	Total compliance rate
RG	112	86 (76.79)	22 (19.64)	4 (3.57)	108 (96.43)
CG	93	32 (34.41)	43 (46.24)	18 (19.35)	75 (80.65)
χ^2	-	-	-	-	13.211
P	-	-	-	-	0.001

Table 5. SAQ scores in the two groups before and after nursing (mean ± SD)

Groups	n	Disease perception		Treatment satisfaction		Angina frequency	
		Before nursing	After nursing	Before nursing	After nursing	Before nursing	After nursing
RG	112	57.43 ± 4.35	91.68 ± 6.34	61.32 ± 5.38	89.68 ± 5.53	64.89 ± 5.26	87.59 ± 6.31
CG	93	57.24 ± 4.38	78.42 ± 6.27	61.53 ± 5.43	74.35 ± 6.51	64.74 ± 6.48	72.58 ± 5.23
t	-	0.310	14.980	0.277	18.230	0.183	18.300
P	-	0.756	< 0.001	0.782	< 0.001	0.855	< 0.001

Groups	n	Angina stability		Physical limitation	
		Before nursing	After nursing	Before nursing	After nursing
RG	112	47.37 ± 3.35	95.68 ± 6.75	60.78 ± 4.38	89.86 ± 6.34
CG	93	48.13 ± 3.57	76.94 ± 6.29	60.35 ± 4.24	70.79 ± 6.32
t	-	1.570	20.410	0.710	21.470
P	-	0.118	< 0.001	0.479	< 0.001

(96.43% vs. 80.65%, P < 0.05). More details are shown in **Table 4.**

SAQ scores in the two groups before and after nursing

The two groups were not markedly different in the SAQ scores before nursing (P > 0.05). In both groups, the SAQ scores after nursing were markedly higher than those before nursing (P < 0.05). Scores in the 5 dimensions (angina frequency, treatment satisfaction, physical limitation, disease perception, and angina stability) were markedly higher in the RG than in the CG (P < 0.05). More details are shown in **Table 5.**

CQQC scores in the two groups before and after nursing

Patients from the two groups were not remarkably different in the CQQC scores before nursing (P > 0.05). After nursing, the CQQC scores markedly increased in both groups (P < 0.05), with remarkably higher CQQC scores in the RG than in the CG (P < 0.05). More details are shown in **Table 6.**

Nursing satisfaction in the two groups after nursing

The nursing satisfaction rate after nursing was markedly higher in the RG than in the CG (94.64% vs. 76.34%, P < 0.05). More details are shown in **Table 7.**

Discussion

AAP is a common disease, it can be induced by changing lifestyles and dietary habits, as well as increased stress from life and work [22, 23]. Due to the rapid onset and obvious pain, AAP patients often have negative emotions, which aggravates the clinical symptoms

Table 6. CQQC scores in the two groups before and after nursing (mean ± SD)

Groups	n	Physical health		Illness		Medical care	
		Before nursing	After nursing	Before nursing	After nursing	Before nursing	After nursing
RG	112	6.42 ± 1.34	16.79 ± 3.35	11.32 ± 2.13	17.34 ± 3.54	3.18 ± 1.32	5.38 ± 1.23
CG	93	6.28 ± 1.31	11.89 ± 2.23	11.69 ± 2.34	12.32 ± 3.35	3.14 ± 1.29	4.14 ± 1.15
t	-	0.752	12.060	1.184	10.360	0.218	7.400
P	-	0.453	< 0.001	0.238	< 0.001	0.827	< 0.001
Groups	n	Daily life		Social psychology		Working status	
		Before nursing	After nursing	Before nursing	After nursing	Before nursing	After nursing
RG	112	5.28 ± 1.34	9.96 ± 3.35	13.47 ± 3.65	20.68 ± 4.04	2.25 ± 1.34	6.23 ± 2.54
CG	93	5.37 ± 1.36	6.34 ± 2.56	13.78 ± 3.34	14.79 ± 3.76	2.38 ± 1.38	3.89 ± 2.34
t	-	0.476	8.551	0.629	10.720	0.682	6.804
P	-	0.635	< 0.001	0.530	< 0.001	0.496	< 0.001

Table 7. Nursing satisfaction in the two groups after nursing [n (%)]

Factors	RG (n = 112)	CG (n = 93)	χ^2	P
Great satisfaction	72 (64.29)	30 (32.36)	-	-
Moderate satisfaction	34 (30.36)	41 (44.09)	-	-
Dissatisfaction	6 (5.36)	22 (23.66)	-	-
Satisfaction rate	106 (94.64)	71 (76.34)	14.431	0.001

and unhealthy feelings, impairing the subsequent treatment and rehabilitation [24-26]. Therefore, it is of great significance to give patients scientific nursing interventions to control the condition and improve the psychological state.

In this study, we conducted meticulous psychological nursing to improve the related clinical indicators, negative emotions, inflammatory cytokines, angina condition, and quality of life of patients with AAP, and then noted marked improvements in the disease condition after nursing. We recorded the attacks of AP and the hospitalization time of all patients and found that the ST-segment pressure, the frequency of acute attacks, the duration of attacks, and the hospitalization time after nursing were notably lower in the RG than in the CG, indicating that meticulous psychological nursing can effectively reduce the frequency of angina attacks, enhance the treatment efficacy, and hence decrease the hospitalization time. A previous study [27] suggests that most AP patients suffer from depression and spend a tremendous amount of money on treatment and care. So, novel intervention models are needed to improve the treatment efficacy in patients. The study by Zhang [28] gave tumor patients undergoing surgeries comprehensive physiological and psychological nursing and found that nursing intervention can effectively reduce the pain intensity and anxiety of patients and facilitate postoperative recovery. In this study, the SDS and SAS scores were markedly lower in the RG than in the CG after nursing, indicating that meticulous psychological nursing can ease bad emotions, strengthen the patient's confidence in treatment, and improve the patient's psychological state through targeted communication with patients. The NRS scores were also lower in the RG than in the CG, indicating that effective counseling of negative emotions can not only improve the patient's psychological state but also reduce the patient's pain intensity and promote disease recovery.

A previous study suggests that inflammation plays a vital role in the pathogenesis and prognosis of AP, for example, CRP and IL-6 are accurate predictors of severe coronary events in patients with AP [29]. The study by Huang and his colleagues [30] gave high-quality nursing intervention to patients with uremia and found that effective nursing can relieve metabolic disorders, inhibit systemic inflammatory factors and oxidative stress, and enhance the quality of life of patients. Here the expression levels of IL-6, TNF-α, and sICAM-1 were markedly lower in the RG than in the CG, indicating that meticulous psychological nursing can effectively reduce the inflammation in patients and promote disease rehabilitation. Studies [31,

32] suggest that patients' treatment compliance is related to disease morbidity and mortality, with better treatment efficacy in patients with higher treatment compliance. In this study, the nursing compliance was markedly higher in the RG than in the CG, indicating that effective communications with patients can enhance the disease perception of patients, help patients maintain healthy habits, and improve the treatment and nursing compliance. It was revealed in a former study [33] that effective rehabilitation interventions for patients with acute myocardial infarction can increase the SAQ scores and enhance the quality of life of patients. In this study, the SAQ scores were markedly higher in the RG than in the CG, suggesting that meticulous psychological nursing can promote the recovery of patients' cardiac function and reduce the severity of AP. Besides, the CQQC scores were markedly higher in the RG than in the CG, indicating that meticulous psychological nursing can accelerate the recovery from the disease and thus improve the quality of life of patients. Here the level of patient satisfaction with nursing was higher in the RG than in the CG, which suggests that meticulous psychological nursing is more pleasing among patients. Such results provide a strong reference for subsequent clinical applications of meticulous psychological nursing.

This study confirmed the benefits of meticulous psychological nursing for patients with AAP, but there are some limitations. For example, the sample size was relatively small and we did not explore risk factors for poor prognosis of APP. We will address such problems in the future to perfect this study.

In summary, meticulous psychological nursing can improve the vital signs of patients with AAP, relieve pain intensity, reduce inflammation, improve the patient's psychological state, enhance the patient's treatment compliance, and improve the patient's quality of life.

Disclosure of conflict of interest:

None.

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