Original Article

Effects of nursing intervention therapy on patients with coronary heart disease

Efeitos da intervenção terapêutica de enfermagem em pacientes com doença cardíaca coronária

Efectos de la intervención terapéutica de enfermería en pacientes con enfermedad arterial coronaria

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Descriptores
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Abstract

Objective: We aimed to assess the effects of nursing intervention therapy based on chronic disease trajectory model on anxiety and quality of life (QOL) of patients with coronary heart disease (CHD).

Methods: A total of 118 CHD patients admitted from February 2019 to February 2021 were randomly assigned into control and observation groups (n=59). Control group was given routine nursing intervention, while observation group was given intervention based on chronic disease trajectory model. Clinical symptom, self-rating anxiety scale (SAS), QOL and self-efficacy scores were compared. Incidence rates of complications were compared. Multivariate linear regression analysis was performed for the mediating effect of self-efficacy on relationship between anxiety and QOL. A structural equation model was constructed and verified.

Results: After intervention, clinical symptom and SAS scores significantly declined in both groups, especially in observation group (P<0.05). QOL and self-efficacy scores rose significantly in both groups, particularly in observation group (P<0.05). Self-efficacy score was negatively correlated with SAS score and positively correlated with QOL score, and there was a negative correlation between SAS score and QOL score (P<0.05). The model of self-efficacy, anxiety and QOL had good fitness, and the mediating effect of self-efficacy on relationship between anxiety and QOL was 0.896. The incidence rate of complications was significantly lower in observation group than in control group (P<0.05).

Conclusion: Nursing intervention based on chronic disease trajectory model significantly relieves the anxiety, improves QOL, and increases the self-efficacy score of CHD patients. Self-efficacy is a mediator for the relationship between anxiety and QOL.

Resumo

Objetivo: Avaliar os efeitos da intervenção terapêutica de enfermagem baseada no modelo de trajetória da doença crônica na ansiedade e na qualidade de vida de pacientes com doença cardíaca coronária (DCC).

Métodos: Um total de 118 pacientes com DCC admitidos entre fevereiro de 2019 e fevereiro de 2021 foram distribuídos aleatoriamente em grupos controle e observação (n = 59). O grupo controle recebeu intervenção de enfermagem de rotina, enquanto o grupo observação recebeu intervenção com base no modelo de trajetória da doença crônica. Os sintomas clínicos, a escala de autoavaliação de ansiedade (SAS), a qualidade de vida (QV) e as pontuações de autoeficácia foram comparados. As taxas de incidência de complicações foram comparadas. A análise de regressão linear multivariada foi realizada para o efeito mediador da autoeficácia na relação entre ansiedade e QV. Um modelo de equação estrutural foi construído e validado.

Resultados: Após a intervenção, os sintomas clínicos e a pontuação da SAS diminuíram significativamente em ambos os grupos, especialmente no grupo observação (P<0,05). As pontuações de QV e autoeficácia

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aumentaram significativamente em ambos os grupos, particularmente no grupo de observação (P<0,05). A pontuação de autoeficácia correlacionou-se negativamente com a pontuação SAS e positivamente com a pontuação QV. Houve correlação negativa entre a pontuação SAS e a pontuação QV (P<0,05). O modelo de autoeficácia, ansiedade e QV apresentou boa adequação, e o efeito mediador da autoeficácia na relação entre ansiedade e QV foi de 0,896. A taxa de incidência de complicações foi significativamente menor no grupo observação do que no grupo controle (P <0,05).

Conclusão: A intervenção de enfermagem baseada no modelo de trajetória da doença crônica alivia significativamente a ansiedade, melhora a QV e aumenta a pontuação de autoeficácia de pacientes com DCC. A autoeficácia é um mediador da relação entre ansiedade e QV.

Resumen

Objetivo: Evaluar los efectos de la intervención terapéutica de enfermería con base en el modelo de trayectoria de la enfermedad crónica en la ansiedad y en la calidad de vida de pacientes con enfermedad arterial coronaria (EAC).

Métodos: Un total de 118 pacientes con EAC admitidos entre febrero de 2019 y febrero de 2021 fueron distribuidos aleatoriamente en grupos control y observación (n = 59). El grupo control recibió intervención de enfermería de rutina, mientras el grupo observación recibió intervención con base en el modelo de trayectoria de la enfermedad crónica. Se compararon los síntomas clínicos, la escala de autoevaluación de ansiedad (EAA), la calidad de vida (CV) y el puntaje de autoeficacia. Se compararon las tasas de incidencia de complicaciones. El análisis de regresión lineal multivariado se realizó para el efecto mediador de la autoeficacia en la relación entre ansiedad y CV. Se elaboró y validó un modelo de ecuación estructural.

Resultados: Después de la intervención, los síntomas clínicos y el puntuaje de la EAA disminuyeron de forma considerable en ambos grupos, especialmente en el grupo observación (P<0,05). Los puntajes de CV y de autoeficacia aumentaron considerablemente en ambos grupos, particularmente en el grupo de observación (P<0,05). El puntaje de autoeficacia se correlacionó negativamente con el puntaje EAA y positivamente con el puntaje CV. Hubo una correlación negativa entre el puntaje EAA y el puntaje CV (P<0,05). El modelo de autoeficacia, ansiedad y CV presentó una buena adecuación y el efecto mediador de la autoeficacia en la relación entre ansiedad y CV fue de 0,896. La tasa de incidencia de complicaciones fue considerablemente inferior en el grupo observación que en el grupo control (P <0,05).

Conclusión: La intervención de enfermería con base en el modelo de trayectoria de la enfermedad crónica alivia de forma considerable la ansiedad, mejora la CV y aumenta el puntaje de autoeficacia de pacientes con EAC. La autoeficacia es un mediador de la relación entre ansiedad y CV.

Introduction

As a common disease in the elderly, coronary heart disease (CHD) is a cardiovascular disease due to changes in coronary artery function, endangering human health.[1] Anxiety, depression and mental stress are leading factors resulting in the occurrence of CHD and also psychological predictors of the decline in the quality of life (QOL) of such patients.[2] The long course of CHD easily leads to unhealthy psychological mood of patients, thereby affecting their QOL.[3] In China, 50% of CHD patients have different degrees of anxiety or depression. The relief of negative emotions and improvement of QOL of CHD patients have become crucial problems urgently to be addressed by clinical medical staffs in their work.[4] It was reported in a study that psychological nursing interventions like interpersonal therapy, relaxation therapy and cognitive behavioral therapy are able to effectively relieve the anxiety and depression and improve the prognosis and QOL of CHD patients.[5] The chronic disease trajectory model, first proposed in 1991, plays a vital role in the nursing of patients with glioma, leukemia and lung cancer, which significantly alleviates the negative emotions and clinical symptoms and improves the prognosis of patients.[6] In this model, chronic diseases are considered to have multi-dimensional and evolvable trajectory and process, and nursing intervention based on this model changes with the stage of chronic disease trajectory.[7] In the past few years, some scholars have applied nursing intervention based on this model to the nursing of CHD patients, and discovered that the nursing effect is satisfactory. However, there are few related studies. In this study, therefore, the effects of nursing intervention based on chronic disease trajectory model on the anxiety and QOL of CHD patients were investigated, providing a reference for the effective nursing of CHD patients.

Methods

In this prospective study, 118 CHD patients treated in our hospital from February 2019 to February 2021 were enrolled and assigned into control and observation groups (n=59) using a random number table. In control group, there were 34 males and 25 females aged 61-80 years old, with a mean of (70.64±8.12) years old, and routine nursing intervention was adopted. In observation group, there were 31 males and 28 females aged 62-80 years old, with an average of (71.35±7.96) years old, and nurs-

ing intervention based on chronic disease trajectory model was given. The general data of patients exhibited no significant differences between the two groups (P>0.05). All patients were treated with percutaneous coronary intervention (PCI). This study was approved by the Medical Ethics Committee of our hospital (approval No. 2019012232).

The inclusion criteria were set as follows: 1) patients meeting the diagnostic criteria for CHD formulated by the World Health Organization/ International Society of Cardiology,[8] 2) those aged >60 years old, 3) those with clear consciousness, 4) those treated with PCI, and 5) those who and whose families were informed of this study.

The exclusion criteria involved 1) patients complicated by severe brain, liver or kidney diseases, 2) those with mental illness or severe Alzheimer's, or deaf-mute or blind patients, 3) those with hemiplegia or long-term bedridden patients, 4) those with heart enlargement or acute myocardial infarction, or 5) those with poor compliance.

Conventional nursing measures were carried out in control group in the perioperative period, including preoperative publicity, direction of medication usage, postoperative guidance for functional exercise, prevention of infection and complications, and routine telephone and outpatient follow-up after discharge.

In observation group, nursing based on chronic disease trajectory model was performed in addition to conventional nursing measures used in control group. Specifically, before the formal implementation of intervention, a multidisciplinary health care collaboration team dominated by nurses was set up. The team, through division and cooperation, provided patients with admission assessment and routine health guidance, pushed knowledge related to cardiac rehabilitation to them, assessed their mental state and offered psychological counseling, and resolved cardiovascular disease-related problems encountered during intervention.

Interventions were then offered to elderly CHD patients in different treatment periods based on the chronic disease trajectory model. 1) At the onset and diagnosis stage, disease-related aspects and activities of daily living were nursing emphases. The team gave publicity to the knowledge of CHD to patients, including concepts, diagnosis methods, treatment methods and prognosis, to alleviate their fears. Moreover, the team cared for patients and established friendly relationships with them to correctly guide them to vent their bad psychological emotions. 2) In the perioperative period, interventions in self-concept behaviors were implemented on the basis of key interventions at the onset and diagnosis stage. Patients were taught the knowledge of treatment plans, preoperative preparations, precautions and so on, given guidance of postoperative diets, daily life and functional exercises, and guided to form positive self-concepts and respond to diseases in an individually appropriate and correct way. Besides, the team helped patients explore relevant social support systems and contact lower-level rehabilitation hospitals, and provided them with more services and conveniences, as well as psychological counseling and timely emotional support for patients with negative emotions. 3) In the stabilization period, patients discharged were provided with health knowledge of re-examinations, healthy diets, exercises and so on, and followed up by outpatient clinic or telephone, and the intervention plan was timely adjusted according to their actual situation.

As to clinical symptoms, the symptom scoring was employed to evaluate the major clinical symptoms of patients before and after intervention, with 0-9 points for angina pectoris, 0-3 points for dyspnea, 0-3 points for palpitation, and 0-6 points for fatigue and weakness. A higher value indicated severer clinical symptoms.

The anxiety state of patients was assessed before and after intervention using the self-rating anxiety scale (SAS) covering 20 evaluation items. A 4-point scale was used, with 1 point for "no or a little of the time", 2 points for "some of the time", 3 points for "good part of the time" and 4 points for "most of the time". The scores of the 20 items were summed as the total score. The higher the score was, the severer the anxiety of patients would be.

In terms of QOL, the Quality-of-Life Questionnaire Core 30 (QLQ-C30) scale was utilized to evaluate the QOL of patients before and after intervention, which is composed of 5 dimensions (role function, emotional function, physical

function, social function, and cognitive function). QLQ-C30 domain scores were calculated as the average response across component items linearly transformed to a scale ranging between 0 and 100 points. [9] A higher score suggested better QOL of patients.

The self-efficacy of patients was evaluated before and after intervention using the general self-efficacy scale (GSES) including two dimensions of psychological activity and skill. A 4-point scale was used, with 1 point for "not at all true", 2 points for "hardly true", 3 points for "moderately true" and 4 points for "exactly true". The total score was calculated by finding the sum of all 10 items. The higher the score was, the better the self-efficacy of patients would be.

The complications of patients after intervention were recorded, including hemorrhage, urinary retention, pain and angina pectoris.

SPSS 19.0 software was employed for statistical analysis, and GraphPad Prism 5.0 software was used for plotting. The numerical data were expressed as %, with χ^2 test for comparison between the two groups. The measurement data were expressed as mean ± standard deviation and compared between the two groups through the independent *t* test. Pearson's correlation analysis was conducted for the correlations among self-efficacy, anxiety and QOL, and the mediating effect of self-efficacy on the relationship between anxiety and QOL was analyzed through stepwise regression analysis. A structural equation model was constructed using AMOS17.0 software, the goodness of fit index (GFI), adjusted GFI (AGFI), incremental fit index (IFI), root mean square error of approximation (RMSEA) and normed fit index (NFI) of the model were calculated, and the model was verified by Bootstrap method. P<0.05 indicated that difference was statistically significant.

Results

Clinical symptom scores before and after nursing intervention

The clinical symptom score of patients showed no significant difference between the two groups before intervention (p>0.05). After intervention, the scores of angina pectoris, dyspnea, palpitation, and fatigue and weakness were decreased notably in both groups compared with those before intervention, and they were lower in observation group than those in control group (p<0.05) (Table 1).

Table 1. Clinical symptom scores before and after intervention

Group	Control Group (n=59)		Observation Group (n=59)	
	Before intervention	After intervention	Before intervention	After intervention
Angina pectoris	7.15±0.76	3.31±0.35*	7.16±0.74	2.52±0.28*#
Dyspnea	2.52±0.27	1.41±0.23*	2.54±0.28	1.01±0.12*#
Palpitation	2.58±0.24	1.44±0.18*	2.56±0.26	1.02±0.13*#
Fatigue and weakness	5.14±0.56	2.66±0.30*	5.16±0.60	2.03±0.22*#

*p<0.05 vs. the same group before intervention; #p<0.05 vs. control group after intervention

Anxiety states before and after nursing intervention

The SAS score displayed no significant difference between the two groups of patients before intervention (p>0.05), while it declined significantly in both groups after intervention, and it was obviously lower in observation group than that in control group (p<0.05) (Table 2).

Table 2. SAS scores before and after nursing intervention

Group	Control Group (n=59)	Observation Group (n=59)	*t*	p-value
Before intervention	57.86±6.84	57.74±6.61	0.097	0.923
After intervention	53.25±6.42	46.48±6.34	5.763	0.000
t	3.775	9.443	-	-
P	0.000	0.000	-	-

SAS - Self-rating anxiety scale

QOL before and after nursing intervention

Before intervention, no significant differences were found in the scores of role function, emotional function, physical function, social function, and cognitive function, as well as total QOL score (P>0.05). After intervention, these scores declined significantly in both groups, more obviously in observation group (P<0.05) (Table 3).

Self-efficacy scores before and after nursing intervention

The scores of psychological activity and skill displayed no significant differences between the two groups of patients before intervention (p>0.05), whereas the self-efficacy score was elevated significantly in both groups after intervention, more significantly in observation group (p<0.05) (Table 4).

Table 3. QOL before and after nursing intervention

Group	Control Group (n=59)		Observation Group (n=59)	
	Before intervention	After intervention	Before intervention	After intervention
Role function	59.73±3.86	64.39±3.96*	59.28±3.95	73.12±4.20*#
Emotional function	58.86±3.79	65.83±4.02*	59.12±3.73	73.64±4.55*#
Physical function	59.45±3.81	65.47±3.85*	58.76±3.96	73.31±4.83*#
Social function	49.31±3.65	56.74±3.81*	48.85±3.42	62.20±3.72*#
Cognitive function	71.28±4.62	77.49±5.18*	70.86±4.73	81.73±5.42*#
Total score	58.43±3.74	64.31±4.16*	58.05±3.68	71.28±4.26*#

*p<0.05 vs. the same group before intervention; #p<0.05 vs. control group after intervention; QOL - Quality of life

Table 4. Self-efficacy scores before and after nursing intervention

Group	Psychological activity		Skill	
	Before intervention	After intervention	Before intervention	After intervention
Control Group (n=59)	52.64±4.28	59.31±4.62*	43.65±4.54	49.65±4.82*
Observation Group (n=59)	51.72±4.35	67.43±5.74*	42.82±4.37	55.25±5.02*
t	1.158	8.465	1.012	6.181
p	0.249	0.000	0.314	0.000

*p<0.05 *vs.* the same group before intervention

Multivariate linear regression analysis results of self-efficacy, anxiety state and QOL

The results of Pearson correlation analysis revealed that the scores of self-efficacy dimensions (psychological activity and skill) had negative relations to SAS score (*r*=-0.642, -0.626) and positive associations with the scores of all QOL dimensions (role function, emotional function, physical function, social function, and cognitive function) (*r*=0.486-0.658). The SAS score was negatively correlated with the scores of all QOL dimensions (*r*=-0.562, -0.631, -0.564, -0.528, -0.528, -0.609), with statistical significance (p<0.05) (Table 5).

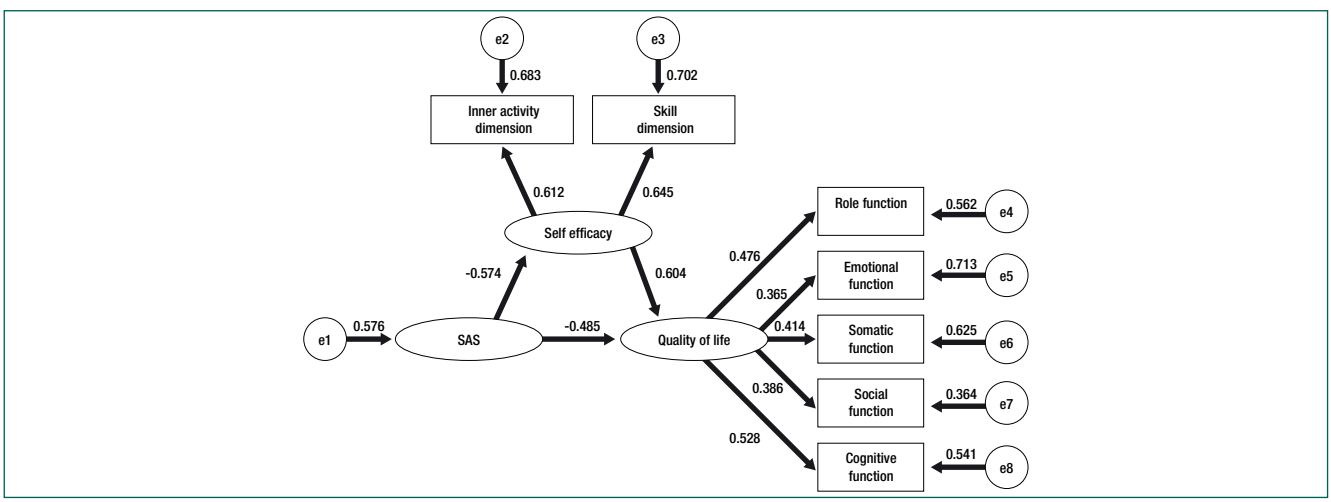
Table 5. Multivariate linear regression analysis results of self-efficacy, anxiety and QOL (*r*)

Variables	SAS score	Psychological activity	Skill
Role function	-0.562[b]	0.486[a]	0.496[a]
Emotional function	-0.631[b]	0.612[b]	0.658[b]
Physical function	-0.564[b]	0.543[b]	0.584[b]
Social function	-0.528[a]	0.566[b]	0.637[b]
Cognitive function	-0.609[b]	0.625[b]	0.573[b]
SAS score	-	-0.642[b]	-0.626[b]

[a]p<0.05, [b]p<0.01. QOL; Quality of life; SAS - self-rating anxiety scale

Establishment of mediation model

The structural equation model for self-efficacy, anxiety and QOL was constructed and subjected to mediation test. The absolute fit indices of the model were χ^2/df=3.128, GFI=0.884, AGFI=0.824, IFI=0.892, RMSEA=0.095, and NFI=0.842, indicating good fitness in data. The direct effect of SAS score on the QOL score was -0.485, and the indirect effect of self-efficacy on the QOL score was -0.347 (the product of -0.574 and 0.604), accounting for 41.71% of the total effect, suggesting that self-efficacy partially acts as a mediator in the relationship between anxiety and QOL. Next, the interval was estimated using the bias-corrected Bootstrap confidence interval estimation method, and the results showed that the mediating effect of self-efficacy on the relationship between anxiety and QOL was 0.896 (95%CI: 0.542-0.961) (Figure 1), implying that self-efficacy exerts a mediating effect on the relationship between anxiety and QOL.



CHD - Coronary heart disease; QOL - quality of life

Figure 1. Mediation model for effect of self-efficacy of CHD patients on relationship between anxiety and QOL

Incidence rate of complications

The complications observed in the two groups included hemorrhage, urinary retention, pain and angina pectoris. The total incidence rate was 6.78% (4/59) in observation group, significantly lower than that [23.73% (14/59)] in control group (P<0.05) (Table 6).

Table 6. Incidence rates of complications

Group	Control Group (n=59)	Observation Group (n=59)	χ^2	p-value
Hemorrhage	3 (5.08)	1 (1.69)	1.035	0.309
Urinary retention	4 (6.78)	1 (1.69)	1.880	0.170
Pain	5 (8.47)	1 (1.69)	2.810	0.094
Angina pectoris	2 (3.39)	1 (1.69)	0.342	0.559
Total incidence rate	14 (23.73)	4 (6.78)	6.556	0.010

Discussion

CHD, manifested as cardiac arrhythmia, dyspnea, angina pectoris, chest tightness, chest pain and other symptoms in clinic, easily leads to death if not treated timely and effectively. It is currently the second leading cause of death in China, and people dying of CHD account for 67.1% of those dying of cardiovascular diseases.[10] CHD shows an increasing incidence rate year by year as the aging process develops. Negative emotions such as anxiety and depression are risk factors for the development and progression of CHD.[11] Besides, CHD has a long course and is prone to repeated attack, bringing certain psychological burden on patients and thus affecting their compliance to treatment, treatment outcomes and QOL.[12] For these reasons, it is essential to provide CHD patients with scientific and comprehensive nursing interventions and to improve their negative emotions and QOL. Nursing intervention based on chronic disease trajectory model, a novel nursing method, has been widely used in the nursing of patients with brain trauma, breast cancer, diabetes and other diseases in foreign countries, achieving significant effects.[13] However, its application to CHD patients has been rarely studied. To verify the application effect of nursing intervention based on chronic disease trajectory model in CHD patients, in this study, such an intervention was compared with conventional nursing intervention from the effects on anxiety and QOL of CHD patients.

Nursing intervention based on chronic disease trajectory model aims to alleviate the clinical symptoms of CHD patients, reduce the occurrence of complications, and maintain the stability of the psychological state and improve the QOL of patients, thereby improving the treatment outcomes in patients. The improvement of clinical symptoms is a crucial index evaluating the effects of treatment and nursing intervention in patients. The clinical symptom indices for evaluating CHD patients include angina pectoris, dyspnea, palpitation, and fatigue and weakness. The higher the score is, the severer the clinical symptoms will be.[14] Zhang *et al.* reported that nursing intervention based on chronic disease trajectory model significantly improved the clinical symptoms of elderly CHD patients.[15] In this study, the improvement of clinical symptoms of patients was significantly better in observation group than that in control group. It may be because patient's compliance to treatment is improved through nursing intervention based on chronic disease trajectory model. Besides, unreasonable eating and living habits are also important factors leading to the development and progression of CHD.[16] This mode of nursing intervention helps CHD patients to develop good living habits by giving guidance in reasonable diets, daily life and exercises at the onset and diagnosis stage and in the perioperative period and stable period, thus improving their clinical symptoms and promoting their recovery. Gu *et al.* found that nursing intervention based on chronic disease trajectory model significantly reduced the SAS score and relieved the anxiety symptoms of lung cancer patients receiving targeted therapy, with the nursing effect significantly better than that of conventional nursing.[17] In this study, the anxiety of the two groups of patients was significantly alleviated after nursing intervention, and the SAS score was significantly lower in observation group than that in control group. It may be because nursing intervention based on chronic disease trajectory model rationally uses human resources through division and cooperation, discovers the psychological prob-

lems of patients in time, provides emotional support and psychological counseling, and earnestly solves the psychological burden of patients, thereby reducing their anxiety.

As an important factor in behavioral decision-making, self-efficacy is formed by information about one's own intelligence and ability obtained from different information sources, which is a vital factor promoting health behaviors of CHD patients.[18] Patients with high self-efficacy believe that they can adjust their daily life and improve their health through their own efforts, so that they can overcome the disease. However, patients with low self-efficacy tend to pay attention to their own defects and potential difficulties and imagine failure scenarios, and are more likely to have negative emotions such as tension, anxiety and depression, which is not conducive to the treatment of diseases. Zhang *et al.* showed that nursing intervention based on chronic disease trajectory model significantly increased the self-efficacy score of CHD patients, and such a score was significantly higher than that in conventional nursing intervention.[15] In this study, the self-efficacy score in observation group rose significantly and was higher than that in control group after intervention. The reason may be that such a nursing intervention helps patients correct bad living and eating habits and develop a positive attitude that they can overcome the disease, thus improving the self-efficacy of CHD patients, which is beneficial to the treatment of the disease. Chen found that the self-efficacy of CHD patients had a clear correlation with their anxiety and lifestyle.[19] In the present study, the results of stepwise regression analysis, structural equation model and Bootstrap verification revealed that self-efficacy acted as a mediator in the relationship between anxiety and QOL of CHD patients. Nursing intervention based on chronic disease trajectory model improved the self-efficacy of CHD patients to relieve their anxiety, thus improving their QOL. Self-efficacy is a protective factor able to partially offset the negative effects of anxiety. When facing the same degree of anxiety, CHD patients with high self-efficacy can respond more actively, so their QOL is less affected.

Conclusion

In conclusion, nursing intervention based on chronic disease trajectory model significantly relieves the anxiety, improves the QOL and increases the self-efficacy score of CHD patients. Self-efficacy serves as a mediator in the relationship between anxiety and QOL. Regardless, this study is limited. This is a single-center study with a small sample size, so some of the results may be biased. Further multicenter studies with larger sample sizes are ongoing in our group to validate the findings herein.

Collaborations

Bifei Yan designed the study; Jing Chen and Juanhua Tu performed and analyzed the experiments; Yan Wang drafted the paper; Jing Chen significantly revised the paper.

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