Advances in Psychological Intervention Strategies for the Return of Young and Middle-aged Acute Coronary Syndrome (ACS) Patients to Society

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Abstract This article reviews the characteristics of psychological disorders in young and middle-aged acute coronary syndrome (ACS) patients, the mechanisms and effects of various psychological intervention strategies, factors influencing return to work, and current research problems and development trends, to provide scientific evidence for psychological rehabilitation and social function recovery of young and middle-aged ACS patients.

Key words Acute coronary syndrome (ACS), Young and middle-aged ACS patients, Psychological disorders, Psychological intervention, Return to society

1 Introduction

Acute coronary syndrome (ACS) is a critical and urgent condition in cardiovascular diseases, encompassing unstable angina, ST-segment elevation myocardial infarction, and non-ST-segment elevation myocardial infarction[1]. With advancement in modern medical technology, the mortality rate of ACS patients during the acute phase has significantly decreased, yet psychological issues have become increasingly prominent[2]. Young and middle-aged ACS patients, who are key contributors to society, face significant challenges regarding their personal recovery and family stability[3]. Studies show that the prevalence of depression and anxiety among ACS patients ranges from 20% to 40% and 30% to 50%, respectively[4-5]. Young and middle-aged patients, at a crucial stage of career development, often face multiple challenges such as work pressure, financial burdens, and family responsibilities, potentially elevating the incidence of psychological disorders[6]. These symptoms not only reduce their quality of life but also increase the risk of cardiovascular events and mortality[7]. Therefore, researching effective psychological intervention strategies to promote the psychological recovery and social function restoration of young patients ACS and middle-aged is of great significance.

2 Characteristics and influencing factors of psychological disorders in young and middle-aged ACS patients

2.1 Clinical characteristics of psychological disorders The psychological issues in young and middle-aged ACS patients primarily manifest as depression, anxiety, and post-traumatic stress disorder (PTSD)[8]. Compared with older patients, younger patients are more prone to cognitive biases about their condition, such as excessive worry about relapse, heightened sensitivity to physical symptoms, and overly pessimistic outlook on the prognosis[9]. According to a study by Steptoe *et al.*[10], the depression scores of young ACS patients during hospitalization are a significant predictor of their return to work 12 - 13 months later. Depression symptoms can appear within 7 - 10 d after the onset of ACS and may persist for several months or even years[11]. These symptoms often occur with significant cognitive impairments, including difficulty concentrating, memory decline, and impaired decision-making abilities, which severely impact their work performance and social functioning[12].

2.2 Factors influencing work recovery Returning to work is a key indicator for assessing the rehabilitation outcomes of ACS patients[13]. Studies show that 58% of patients return to work within three months, and 88% do so within two years. However, 12% fail to return to work after two years, and 24% are employed but not at their pre-disease level[14]. Factors affecting the return to work of young and middle-aged ACS patients include: clinical factors: heart failure, arrhythmia, and other cardiac complications are significant predictors[15]; psychological factors: depressive symptoms are the primary psychological barrier, with hospitalization depression scores negatively correlating with the rate of returning to work[10]; social factors: job nature, educational level, and social support all impact the success rate of returning to work[16]; cognitive factors: misconceptions about the disease and excessive worry are crucial in hindering work recovery[17].

3 Theoretical basis and mechanism of psychological intervention strategies

3.1 Application of cognitive behavioral therapy Cognitive Behavioral Therapy (CBT) is currently the most evidence-supported method of psychological intervention[18]. CBT helps patients develop more adaptive coping strategies by identifying and altering their negative cognitive and behavioral patterns[19]. For ACS pa-

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tients, the core techniques of CBT include: cognitive restructuring: recognizing and challenging catastrophic thoughts about disease prognosis; behavioral activation: gradually increasing enjoyable and functional activities; stress management: learning relaxation techniques and coping skills; problem-solving: enhancing the ability to handle real-life problems[20]. A randomized controlled trial conducted by Zhang *et al.* [21] in young and middle-aged coronary heart disease patients showed that those who received 8 weeks of CBT intervention experienced significant improvements in depressive and anxiety symptoms, as well as a marked improvement in quality of life.

3.2 Positive psychological intervention Positive psychology interventions promote the recovery of mental health by fostering positive emotions, the sense of life's meaning, and personal strengths in patients[22]. The positive psychology-motivation interview intervention model developed by Huffman *et al.* [23] has shown promising results in ACS patients, significantly enhancing their positive emotions and physical activity levels through 12 weeks of telephone guidance. Middle-aged patients may be more responsive to positive psychology interventions. Research indicates that compared to elderly ones, middle-aged ACS patients show more significant improvements in psychological measures and behavioral compliance after receiving positive psychology interventions[24]. This may be due to the unique developmental tasks and psychological traits characteristic of middle age.

3.3 Telemedicine psychological intervention Telemedicine psychological intervention offers a new approach to overcome the limitations of traditional face-to-face therapy[25]. O'Neil *et al.* [26] conducted the MoodCare randomized controlled trial, which provided depression intervention for ACS patients through telephone and online platforms. The 12-month follow-up results showed that the patients in the intervention group significantly improved their depressive symptoms and quality of life.

Internet-based CBT (ICBT) is widely used in Nordic countries. The U-CARE heart trial by Norlund *et al.* [27] showed that patients with myocardial infarction who received 14 weeks of ICBT showed significant improvement in depressive and anxiety symptoms, which was maintained for up to 12 months of follow-up.

4 Clinical effects and evidence-based psychological intervention

4.1 Effect on the improvement of depressive and anxiety symptoms Multiple systematic reviews and Meta analyses have confirmed the effectiveness of psychological interventions in improving depressive and anxiety symptoms in patients with ACS. Reavell *et al.* [28] systematic review included 12 randomized controlled trials, which showed that CBT can significantly reduce depressive and anxiety symptoms in patients with cardiovascular disease. A specialized analysis for ACS patients revealed even more significant effects of psychological interventions. Meta-analysis of Yu *et al.* [29] indicated that CBT not only improves depressive and anxiety symptoms in ACS patients but also enhances their quality of life, with these benefits lasting for a considerable period after treatment.

4.2 Effects on cardiovascular prognosis The impact of psychological interventions on cardiovascular outcomes is a key focus and challenge in research. The SUPRIM study, conducted by Gullikson *et al.* [30] in Sweden, marked a significant breakthrough in this field. This study involved 362 patients under the age of 75 with coronary heart disease, who were randomly assigned to either a conventional treatment group or a CBT intervention group. The CBT group underwent a one-year stress management program, which included 20 sessions of 2-h group therapy. After a median follow-up of 94 months, the results showed that patients in the CBT group had a significantly reduced risk of cardiovascular events and a marked decrease in the risk of recurrent acute myocardial infarction.

However, not all studies have yielded consistent results. While Davidson *et al.* [31] COPES trial found that intensive depression treatment improved depressive symptoms, it did not significantly affect cardiovascular events. These differences may be related to the specific content, intensity, duration of the intervention, and patient characteristics[32].

4.3 Promotion of regression work The role of psychological intervention in promoting patients' return to work has been a new focus of research in recent years. Although there are few studies that directly focus on return to work as the main endpoint, subgroup analysis of several studies provides valuable information[33]. Fernandes *et al.* [34] research indicates that brief inpatient psychological education interventions not only enhance patients' understanding of ACS but also foster healthy behaviors, which are beneficial for the recovery of work capacity. The study found that patients in the intervention group showed better disease knowledge and more positive health behaviors at a 2-month follow-up after discharge.

4.4 Comparison of different intervention modes Different psychological intervention models each have their own advantages. Individual therapy can offer more personalized services, but it is more expensive and less accessible[35]. Group therapy offers cost-effectiveness and peer support, which can be more effective in certain areas[36]. Regarding the timing of intervention, early intervention during hospitalization may be more beneficial. Ski *et al.* [37] found that brief psychological interventions (2 – 3 sessions) during hospitalization can produce lasting positive effects. However, some studies suggest that patients' psychological acceptance is lower during the acute phase, making post-discharge intervention more appropriate[38].

5 Problems and challenges in current research

5.1 Limitations of the study design The current research faces numerous methodological limitations. Firstly, the heterogeneity in the content and intensity of interventions makes it challenging to compare the results[39]. The CBT techniques, intervention frequencies, and durations vary widely across studies, lacking

standardized protocols. Secondly, the selection of control groups is controversial. Some studies use a waiting list control, which may overestimate the intervention's effectiveness; in studies using conventional treatment as a control, the details of the conventional treatment are often unclear, complicating the interpretation of the results[40]. Thirdly, there is no uniformity in the selection and measurement standards for outcome indicators. While depressive and anxiety symptoms are common primary endpoints, there is no consensus on the choice of scales, measurement timing, and the definition of clinical significance[41].

5.2 Insufficiency of individualized intervention Currently, psychological interventions often follow a 'one-size-fits-all' approach, with little consideration for individual differences among patients[42]. Young and middle-aged ACS patients exhibit significant variations in age, gender, occupation, family status, and psychological traits, making a one-size-fits-all intervention plan unlikely to meet the needs of all patients. Gender differences are an important but often overlooked factor. Female ACS patients tend to experience more severe psychological symptoms and may respond differently to interventions[43]. Cossette *et al.* [44] found that a considerable number of female patients still exhibited symptoms of depression, anxiety, and stress 6 – 14 months after ACS, suggesting the need for longer-term and more targeted interventions.

5.3 Maintenance of long-term effects While most studies indicate that psychological interventions yield good short-term results, maintaining these effects over the long term remains a significant challenge[45]. Most studies have relatively short follow-up periods, lacking sufficient evaluation of the long-term impact of the interventions. Even in studies with longer follow-ups, it is often observed that the intervention's effectiveness diminishes over time[46]. Maintaining the long-term benefits of interventions is an urgent issue to address. Potential strategies include extending the duration of the intervention, increasing the intensity of therapy, establishing peer support networks, and integrating family and community resources[47].

6 Future development trend and prospect

6.1 The development of precision psychiatry As the concept of precision medicine becomes more widespread, psychological interventions are also evolving towards personalization and precision[48]. Using biomarkers, genetic traits, and psychological assessments to identify high-risk patients, selecting the most suitable intervention plan based on individual characteristics will be a key direction for future development. The application of artificial intelligence (AI) and machine learning technologies has opened up new possibilities for precise psychological interventions[49]. By analyzing large volumes of clinical, behavioral, and physiological data, predictive models can be developed to identify different types of patients and provide personalized intervention recommendations.

6.2 Digital mental health platform The rapid advancement of digital technology has brought revolutionary changes to mental health services[50]. The use of mobile apps, virtual reality, and wearable devices has made psychological interventions more convenient and timely for patients. Digital platforms can also provide real-time monitoring and feedback, enhancing the precision and effectiveness of interventions[51]. For example, smartphone apps can monitor a patient's emotional state, activity level, sleep quality, and other indicators, allowing for timely identification of issues and prompt intervention.

6.3 Multidisciplinary integrated cardiac rehabilitation model Psychological intervention should not be conducted in isolation but should be integrated into a comprehensive cardiac rehabilitation system[52]. A multidisciplinary team approach to cardiac rehabilitation, involving collaboration among cardiologists, nurses, psychologists, rehabilitation therapists, and nutritionists, can provide more comprehensive and systematic services. This integrated model is particularly suitable for young and middle-aged patients, who often require rehabilitation support across multiple dimensions (physical, psychological, social, and occupational)[53]. Through multidisciplinary collaboration, it is possible to better address the various challenges patients face when returning to work and social life.

6.4 Value-based healthcare services As healthcare reform deepens, the value-based medical service model is gaining increasing attention[54]. The economic benefits of psychological interventions are becoming a key area of research. Studies have shown that while effective psychological interventions may increase short-term costs, they can lead to significant long-term economic benefits by reducing readmissions and improving work capacity[55]. Davidson *et al.* [56] COPS study economic analysis indicates that the cost-effectiveness ratio for enhanced depression treatment is 47 000 USD per quality-adjusted life year, which is within an acceptable range.

7 Conclusions

The psychological intervention for young and middle-aged ACS patients presents a complex challenge requiring multidisciplinary collaboration and comprehensive consideration of biological, psychological, and social factors. While effective psychological intervention strategies exist, further investigation is warranted in areas such as personalized treatment, long-term efficacy maintenance, and economic benefit assessment. Future research should prioritize: establishing standardized intervention protocols and evaluation systems; conducting more studies on rehabilitation and social function recovery; exploring personalized, precision intervention strategies; leveraging digital technology applications within psychological interventions; and optimizing the multidisciplinary integrated cardiac rehabilitation model.

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