# Nursing interventions for improving quality of life among patients with coronary heart disease after percutaneous coronary intervention: A scoping review

**Firman Sugiharto[1], Aan Nuraeni[2], Yanny Trisyani[2*], Azalia Melati Putri[3], Nuraulia Aghnia Armansyah[3]**

[1] Master Study Program, Faculty of Nursing, Universitas Padjadjaran, Bandung, West Java, Indonesia
[2] Department of Critical Care and Emergency Nursing, Faculty of Nursing, Universitas Padjadjaran, Bandung, West Java, Indonesia
[3] Nurse Professional Program, Faculty of Nursing, Universitas Padjadjaran, Bandung, West Java, Indonesia

OPEN ACCESS

**Jurnal Keperawatan Padjadjaran (JKP)**

Volume 12(1), 86-97

http://dx.doi.org/10.24198/jkp.v12i1.2294

**Article Info**

Received : May 08, 2023
Revised : November 30, 2023
Accepted : December 13, 2023
Published : April 01, 2024

***Corresponding author**

**Yanny Trisyani***
Department of Critical Care and Emergency Nursing at Faculty of Nursing, Universitas Padjadjaran, Bandung, West Java, Indonesia; Jl. Ir. Soekarno Km. 21 Hegarmanah, Jatinangor, Sumedang Regency, West Java 45363; Phone: +6281222073465, E-mail: yanny.trisyani@unpad.ac.id

**Citation**

Sugiharto, F., Nuraeni, A., Trisyani, Y., Putri, A.M., & Armansyah, N.A. (2024). Nursing interventions for improving quality of life among patients with coronary heart disease after percutaneous coronary intervention: A scoping review. *Jurnal Keperawatan Padjadjaran, 12*(1), 86-97. http://dx.doi.org/10.24198/jkp.v12i1.2294

**Website**

http://jkp.fkep.unpad.ac.id/index.php/jkp



**E-ISSN**: 2442-7276
**P-ISSN**: 2338-5324

## Abstract

**Background:** Percutaneous coronary intervention (PCI) aims to improve the quality of life (QoL) for coronary heart disease (CHD) patients, but many patients still have poor QoL. The impact of poor QoL causes long-lasting feelings of frustration, anxiety, fear, and worry that make a person give up or lose enthusiasm for the future.
**Purpose:** This study aimed to describe nursing interventions to improve the QoL of CHD patients after PCI.
**Methods:** This research used the scoping review method by including all full-text primary studies written in English and published between 2013 to 2023 from three databases, EBSCO-host, PubMed, and Scopus, and one e-resource, Sage Journals. The keywords used were "coronary artery disease OR myocardial infarction OR cardiovascular disease AND quality of life AND percutaneous coronary intervention OR PCI OR Angioplasty AND Nursing care OR nursing intervention."
**Results:** A total of eight articles discussed nursing interventions to improve the QoL among CHD patients after PCI. There are two categories of interventions that nurses can carry out: hospital-based (inpatient or outpatient) rehabilitation and cardiac tele-rehabilitation.
**Conclusion:** Hospital-based (inpatient or outpatient) rehabilitation and tele-rehabilitation interventions potentially improve post-PCI patients' QoL, psychological well-being, cardiovascular capacity, social support, and adherence to CHD rehabilitation program. Standardized intervention guidelines need to be created in the future for each outcome of interest based on evidence-based findings so that specific interventions to improve the quality of life of CHD patients can be applied directly in daily practice.

**Keywords:** coronary heart disease; PCI; quality of life

## Introduction

Coronary Heart Disease (CHD) is a significant health problem with high morbidity and mortality rates in various countries (World Health Organization (WHO), 2021). CHD is a non-communicable disease caused by blockage of the coronary arteries due to oxidized fat or cholesterol deposition, resulting in insufficient blood supply to the heart (Shahjehan & Bhutta, 2022). If this process lasts long, it can lead to cardiac ischemia and myocardial infarction (Benjamin et al., 2017).

CHD patients generally experience various symptoms, both physically and psychologically (Shahjehan & Bhutta, 2022). As a result, the condition has a negative impact on quality of life (QoL) (Kleisiari et al., 2021). QoL is a person's perception of their position in life, as seen in the context of

their culture and value system, regarding the goals, expectations, standards and concerns in which they live (World Health Organization, 2012). Poor QoL can cause a person to quickly feel frustrated, anxious, afraid, annoyed, and worried for a long time, so they give up or lose enthusiasm for the future (Bahall et al., 2020; Shan et al., 2014; Takematsu et al., 2015). In contrast, someone with a good QoL will be more confident, happy and grateful for himself, and their enthusiasm for their future is higher (Shan et al., 2014). Hence, reperfusion therapy is essential for patients with CHD (Reynolds et al., 2021).

PCI is a revascularization intervention used extensively in treating CHD (Reynolds et al., 2021). This intervention has effectively improved post-PCI patients' QoL, especially in the first six months after the procedure (Reynolds et al., 2021). Previous studies reported increased quality of life in physical limitations and angina frequency domains (Abdallah et al., 2013; Safley et al., 2014), and also in social, emotional, and physical domains (Yazdani-Bakhsh et al., 2016).

Regardless those positive impacts of PCI, other studies showed that post-PCI patients reported a decrease of QoL in some months after PCI (Musthofa et al., 2022). Previous studies described that patients who have undergone PCI > 3 months reported a decrease of QoL in the physical domain (73.7%), social domain (70%), and environmental domain (70%) (Anggraini & Andani, 2018; Hutagalung et al., 2013). The effect of intervention on quality of life only emerged between two months and two years after PCI treatment. Most likely, the benefit of PCI on QoL after two years is small (Abdallah et al., 2013). Other study noted that the PCI interventions are proven to have effectively improved patients' QoL only if the patients adhered to a healthy lifestyle and practiced appropriate activities (Takematsu et al., 2015).

Nurses have a significant role in improving the QoL of CHD patients by building and increasing awareness of risk factors for the disease (Cho et al., 2015). In addition, nurses and other health professionals can play a role in changing health behavior (low-fat diet, reducing salt intake, quitting smoking, reducing or stopping drinking alcohol, and regular exercise) and anticipating stress, anxiety, and depression, as well as strengthening spirituality to maintain QoL post-PCI among CHD patients (Musthofa et al., 2022). However, there have yet to be any specific reviews discussing the types of nursing interventions to improve QoL in CAD patients after PCI.

Several previous reviews with the same population of CAD patients after PCI only identified QoL levels and factors (Musthofa et al., 2022); the efficacy of continuous vital signs monitoring outside the critical care setting is feasible and may provide a benefit in terms of improved patient outcomes and cost efficiency (Downey et al., 2018), QoL benefits (Shan et al., 2014), and the efficacy of acupressure on depression and major adverse cardiovascular events after PCI (Lu et al., 2022; Ma et al., 2022). Therefore, further studies are needed to identify nursing interventions for improving the QoL among CHD patients who have undergone PCI. The review results may provide consideration in optimizing the role of nurses in improving the QoL among CHD patients after PCI.

## Methods

### Design

This review uses a scoping review design. Scoping reviews are a flexible methodological technique for exploring new, rapidly developing topics (Peterson et al., 2017). This design's more comprehensive conceptual range allows various studies with the latest rapidly developing topics to be explored comprehensively (Peterson et al., 2017; Tricco et al., 2018). The PRISMA Extension for Scoping Reviews (PRISMA-ScR) was used in this literature review to find various topics discussing various types of nursing interventions in improving the QoL of CHD patients after PCI.

The PRISMA Extension for Scoping Review (PRISMA-ScR) checklist was used to guide the article selection process (Page et al., 2021). This process is further described graphically (Fig. 1). The inclusion criteria of this study were all full-text primary studies written and published in English within the last ten years (2013-2023). This restriction in years was in line with technological developments that have occurred very rapidly and recently and that can produce various interventions for improving QoL among CHD patients. Therefore, ten years is a reasonable range to reflect this phenomenon.

Articles obtained through the initial search stage were then checked to determine whether they had duplications using a Mendeley reference manager. After duplicates were removed, the articles were divided into three separate folders for review for eligibility by three researchers (F.S, A.M.P, and N.A.A). Each researcher was assigned to independently assess the relevance of the title and abstract of each article in the previously divided folder. Articles with full text that had been selected were then thoroughly reviewed based on determined criteria. All articles that met the criteria

**Table 1. A framework for searching strategy.**

| PCC Framework | Search Strategy |
|---|---|
| Populations | Coronary Artery Disease OR Myocardial Infarction OR Cardiovascular Disease |
| Concept | Quality of life AND Nursing Care OR Nursing Intervention |
| Context | Percutaneous coronary intervention OR PCI OR Angioplasty |

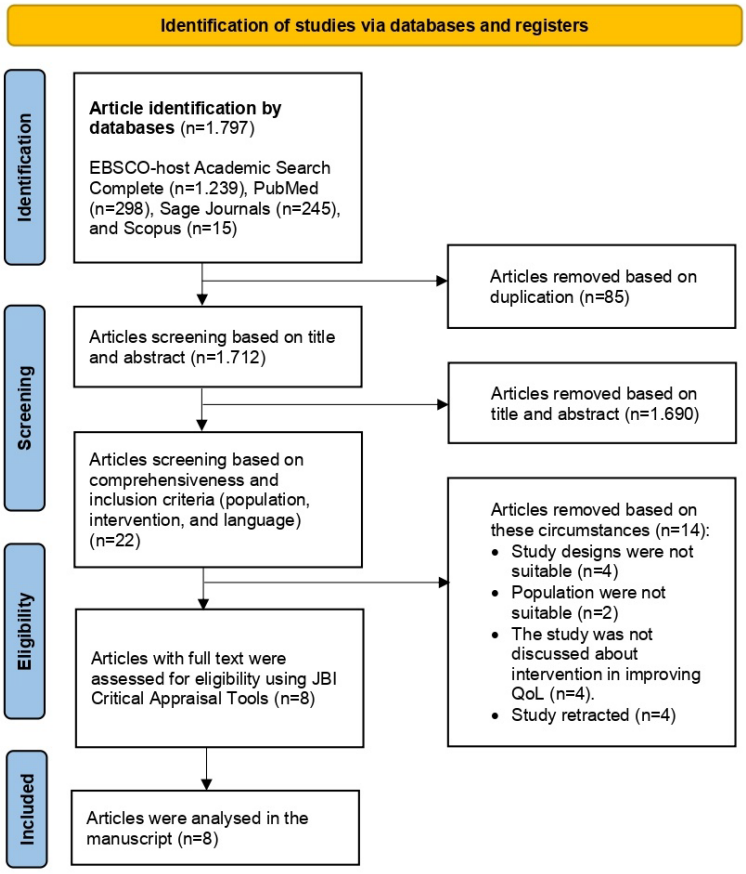


**Figure 1. PRISMA Flow Diagram**

were then examined and further evaluated for quality assessment by two researchers (N.A.A and A.M.P). The final determination of included and excluded articles related to interventions for improving QoL among CHD patients after PCI was carried out by three other researchers considered as expert in the field of critical care nursing (F.S, Y.T, and A.N). Any discrepancies among those evaluators were discussed to gain firm agreement.

## Data Extraction

Data extraction is presented in tabular form to describe all results related to the topics reviewed. The extracted data related to the author, year, research objectives, country, study design, sample characteristics, interventions, results and JBI assessment score based on the study design of the articles analyzed in this review. The primary subject matter of each article in this review can be identified, grouped, and described in further discussion.

## Quality Appraisal

The quality of the articles in this review was assessed based on The Joanna Briggs Institute (JBI) critical appraisal tool checklist with minimum score >70%. In this review, RCT studies assessed JBI with 13 domains and cohort studies with 11 domains. JBI critical appraisal checklist consists of several assessment criteria consisting of “yes,” “no,” “unclear,” and “not applicable” with a score of 1 for each “yes” answer and a score of 0 for other answers.

## Data Analysis

All research included in this scoping review is primary research with a quantitative approach with experimental studies such as randomized control trials and quasi-experimental studies. Therefore, data analysis was carried out thematically using a descriptive exploratory approach. This process begins with identifying and presenting the extracted data in tabular form. After obtaining the data, all authors analyzed and explained the results of each study that focused on interventions to improve the QoL of coronary heart disease patients after PCI therapy.

In this review, the nursing interventions were classified into two categories, namely hospital-based CR and cardiac tele-rehabilitation. Hospital-based CR covered intervention provided at inpatient settings and outpatient settings (Flores, 1995). In addition, Cardiac Tele-rehabilitation is defined as an intervention provided outside of both previous settings and assisted by the use of technology (Knudsen et al., 2020).

**Table 2. Characteristics of Study**

| Author & Year | Outcome | Country | Design | Sample & Setting | Intervention | Results | JBI |
|---|---|---|---|---|---|---|---|
| Peng et al. (2022) | Cardiac function and QoL | China | Retrospective cohort study | 100 patients with AMI after emergency PCI<br><br>Setting: Hospital-based (inpatient setting) | Seven-step rehabilitation training program | Training group<br>(QOL score 85.3 ± 4. 21)<br>Control group<br>(QOL score 69.1 ± 5. 65) | 8/11<br>92,7% |
| Yin et al. (2022) | Medication compliance, QoL and prognosis | China | Prospective cohort study | 100 patient with CHD after PCI<br><br>Setting: Hospital-based (outpatient setting) | Omaha System-Based Continuing Care | Before intervention<br>Physical function (52.44±2.84); Social function (50.68±4.51); Emotion (61.32±2.61); Vitality (44.67±4.52); Overall health (65.28±4.82).<br>After intervention<br>Physical function (61.24±2.48); Social function (58.62±4.38); Emotion (69.28±2.54); Vitality (52.77±4.83); Overall health (70.52±4.54) | 9/11<br>81.8% |
| Li et al. (2022) | Adherence and QoL | China | RCT | 80 patients with AMI after PCI<br><br>Setting: Tele-rehabilitation setting | Phase II Remote Home Rehabilitation | Observation group<br>At discharge (64.59 ± 6.78)<br>6 months after discharge (89.46 ± 9.33)<br>Control group<br>At discharge (63.85 ± 7.26)<br>6 months after discharge (77.35 ± 9.21) | 10/13<br>76,9% |
| Wu et al. (2019) | Adherence, QoL, and prognosis. | China | RCT | 154 patients with AMI after PCI<br><br>Setting: Hospital-based (outpatient setting) | Transitional health management | Before the intervention<br>IG (Total score 211.51 (182.45–248.87))<br>CG (Total score 201.51 (173.63–229.52))<br>1 month after discharge<br>IG (484.81±52.91)<br>CG (432.49±34.99)<br>6 months after discharge<br>IG (544.29 (509.99–568.04))<br>CG (494.33 (455.97–530.15)) | 12/13<br>92,3% |
| Chang et al. (2020) | Anxiety and QoL | China | RCT | 80 patients with AMI after PCI<br><br>Setting: Hospital-based (inpatient setting) | Nurse-led psychological intervention | Before intervention<br>IG (QOL 40.1 ± 5.2); CG (QOL 40.7 ± 4.8)<br>12 Months After Intervention<br>IG (QOL 83.6 ± 5.9); CG (QOL 63.7 ± 4.9) | 13/13<br>100% |

**Cont. Table 2. Characteristics of Study**

| Author & Year | Outcome | Country | Design | Sample & Setting | Interven-tion | Results | JBI |
|---|---|---|---|---|---|---|---|
| Xu et al. (2021) | QoL, de-pression, adherence | China | RCT | 100 patients with AMI after PCI<br><br>Setting: Tele-rehabilitation setting | WeChat Apps, Health Man-agement and Refined Continuous Nursing Model | Research group<br>Emotional dimension (24.18 ± 3.46); Physical dimension (21.26 ± 4.32); Economic dimension (17.24 ± 2.63)<br>Reference group<br>Emotional dimension (31.22 ± 3.27); Physical dimension (29.31 ± 4.36); Economic dimension (22.31 ± 2.84) | 10/13<br>76.9% |
| Zhou et al. (2020) | Complica-tion, psy-chological status, QoL | China | Retro-spective case-control study | 63 patients after PCI<br><br>Setting: Tele-rehabilitation setting | WeChat Platform to Implement Continuous Nursing | Before intervention<br>Angina frequency (63.1±9.2); angina stability (53.2±8.4); degree of physical limitation (60.5±10.5); cognitive perception of the disease (65.3±12.5); and satisfaction with treatment (75.2±11.2)<br>After intervention<br>Angina frequency (65.3±10.7); angina stability (54.1±9.9); degree of physical limitation (61.4±11.7); cognitive perception of the disease (63.5±11.4); and satisfaction with treatment (73.6±12.5). | 9/11<br>81.8% |
| Hu et al. (2022) | QoL, social support and self- man-agement | China | RCT | 60 patients after with PCI<br><br>Setting: Tele-rehabilitation setting | Long-term nursing intervention | Before Intervention<br>IG (63.98 ± 8.86); CG (65.13 ± 9.80)<br>After intervention<br>IG (85 ± 7.50); CG (70.73 ± 8.95) | 11/13<br>84,6% |

# Results

## Study Selection

We identified 1,797 articles in our initial search: 1,239 from EBSCOhost, 298 from PubMed, 245 from sage journals, and 15 from Scopus. We excluded 85 duplicate articles and 1,690 other studies because the title was irrelevant, and 22 then remained. Then, the selection was made based on inclusion criteria, leaving eight articles (see Fig.1) with 14 articles excluded because they were not intervention studies, the respondents were non-cardiac patients, they did not discuss QoL, or the study retracted.

## Quality Appraisal Results

Tables 1 and 2 in supplementary files show the results of the quality of articles assessed based on the JBI critical appraisal tool following the study design of the included studies. All studies included in the analysis had a JBI score ≥70%. However, most RCT studies still do not meet some criteria, such as participants blind to treatment assignment, those delivering treatment blind to treatment assignment, and blinding outcomes assessors. In addition, most cohort studies still do not meet the two criteria for identifying confounding factors and strategies for dealing with confounding factors. Studies with limitations in addressing confounding factors tend to provide less consistent evidence or have a lower level of confidence, which will reduce the generalizability aspect of this review.

## Characteristic of Study

Most of the articles analyzed in this scoping review were RCTs (n=5) and three studies used a cohort design (n=3). Of the eight articles, all research was conducted in China. All participants in the articles analyzed were CHD patients after PCI, with a total of 737 participants. The characteristics of the studies analyzed in this review can be seen in more detail in Table 1.

## Types of Nursing Intervention

We found eight articles discussing nursing intervention to improve QoL among patients with CHD after PCI. These are classified into two types of intervention.

## Hospital-Based Intervention

In this review, hospital-based interventions are classified into two categories, namely inpatient and outpatient. In the inpatients category, there are two nursing interventions, namely the seven-step rehabilitation training program (Peng et al., 2022) and nurse-led psychological intervention (Chang et al., 2020). The seven steps of the rehabilitation program are carried out with active and passive exercises for the limbs in stages every day (Peng et al., 2022). The first step starts with washing hands, washing the face, eating, and using the potty in bed. Medical personnel also assist the patient in sitting for 15-30 minutes. In the second step, the patient is trained to perform personal hygiene (washing and wiping) at the bedside. Then, the patient starts walking to the toilet and walks slowly 30 meters. Next, the patient practices walking on the spot 10-15 times and goes to the bathroom on his own. In the fifth step, it is recommended to take three steps on the training escalator and walk 150 meters and walk about 150 meters twice a day. Furthermore, the patient is allowed to increase their exercise by adding two more steps from the previous exercise that is carried out twice a day. Then, twice a day, the patient begins walking ten steps up the training escalator (Peng et al., 2022).

Another nursing intervention that potentially improves QoL in post-PCI patients is a nurse-led psychological intervention (Chang et al., 2020). This intervention emphasizes structured counselling for 30 minutes daily when the patient has completed PCI at the hospital. This intervention is carried out by consultant nurses with psychological therapy and counselling qualifications. The psychological intervention consists of individual cognitive behavioral therapy and teaching relaxation techniques. These steps include identifying the causes of anxiety, challenging and changing unhelpful thoughts or attitudes that may trigger or worsen anxiety, and the development of personal anxiety coping strategies for the prevention and treatment of anxiety (Chang et al., 2020).

In the outpatient category, post-PCI interventions provided in outpatient settings either through follow-up after discharge or centralized remote monitoring carried out by hospital staff consist of two interventions: Omaha System-based continuous care and transitional health management (Wu et al., 2019; Yin et al., 2022). In general, post-PCI patients receive standard interventions such as health education about CHD, pharmacological therapy, and daily precaution (diet, exercise, and psychological care) before discharge and are asked to make a return visit to the hospital (Yin et al., 2022). Meanwhile, Omaha System-based continuous nursing interventions are divided into four categories such as health education, pharmacological therapy and surgery, case management, and supervision (Yin et al., 2022). The fundamental difference between these interventions lies in continual monitoring and evaluation of outcome achievement. The components of the Omaha System itself are assessment, care plan, and evaluation (Martin et al., 2011). This intervention emphasizes providing care to post-PCI patients on an ongoing basis through intervention strategies prepared based on the results of regular assessment and analysis of actual and potential problems (Yin et al., 2022).

Another intervention included in the outpatient category is health management interventions (Wu et al., 2019). Through this intervention, patients receive assistance for three months, with follow-ups carried out 1-2 times a week for 10 minutes. The follow-up content includes assessing the patient's learning needs, emphasizing the importance of maintaining a

good lifestyle, and helping patients strengthen their self-management skills, such as quitting smoking and drinking and doing routine work. Participants also receive a handbook containing guidelines for caring for patients and their families at home. This study found that this intervention effectively improved patients' self-management skills, including exercise and food and drink consumption (Wu et al., 2019).

### Cardiac Tele-Rehabilitation

Cardiac Tele-Rehabilitation is an intervention that utilizes the use of technology that can be provided outside of inpatient and outpatient care (Knudsen et al., 2020). Four types of nursing interventions fall into the tele-rehabilitation category namely remote home rehabilitation, health management and refined continuous nursing model, WeChat Platform to Implement Continuous Nursing, and long-term nursing intervention (Hu et al., 2022; Li et al., 2022; Xu et al., 2021; Zhou et al., 2020). These four interventions can significantly improve QoL in CHD patients after PCI.

In this review, the four studies analyzed used the WeChat platform as a medium for implementing tele-rehabilitation programs. First, phase II is remote home rehabilitation (Li et al., 2022). The rehabilitation program combines follow-up management by a medical rehabilitation team that is divided into six groups through the WeChat group (Li et al., 2022). Each group has one doctor and nurse who monitor the training program implementation process. The nurse tracks the patient's medication and exercise completion through a monitoring "daily checklist" and then collects and records the patient's heart rate, Borg level, and other discomforts after exercise. Then, patients would be followed up by phone once a week. Based on the study results, this intervention facilitates AMI patients to improve heart function, activity tolerance, and QoL.

The second nursing intervention is health management and refined continuous nursing model using WeChat (Xu et al., 2021). These nursing interventions include forming a team and a WeChat group to arrange planned monthly family visits and at least weekly follow-up calls. At the time of the visit, the family receives health education about self-management and follow-up treatment. Then, if the patient experiences negative emotions such as depression and anxiety, it can be communicated to the health worker through the WeChat platform. For three months, nurses need to remind patients four days before finishing treatment.

Third, continuous nursing using the WeChat application was also carried out by Zhou et al. (2020). Through this platform, patients and families will receive health education covering three parts: rehabilitation, personal health, and WeChat support. First, the component of rehabilitation includes information about diet and activity management, behavior management, and first aid for self-rescue. Second, the individual component displays the patient's primary health file and contains various information, such as psychological status, medication reminders, rate of recovery, and lifestyle management (daily diet, sleep, and exercise). Then, the WeChat platform supports answers to patient questions, provides medication adherence reminders, and counsels on psychological problems.

Lastly, long-term nursing intervention (Hu et al., 2022). This intervention consists of health education, providing a diary based on records of their disease conditions and medical procedures (medication, exercise, diet, and others), updating important information about CHD and answering questions from patients through groups on the WeChat platform every day. During the intervention, patients must fill in the diary at weeks 1, 4, 8, and 12 after discharge from the hospital. The patient diary includes six items, namely rehabilitation training, three daily meals, daily life, and routine medication. Follow-up is carried out by telephone every week with a duration of 15-30 minutes to evaluate compliance with filling in the diary that has been given previously. The study's results reported that this intervention could improve QoL, social support, and self-management in the intervention group (Hu et al., 2022).

### Improved Quality of Life Domains

Based on the results of the review, it shows that there are several domains of QoL in CHD patients that experience improvement after undergoing PCI. The QoL domains identified as having increased after PCI are physical, emotional, economic, function or level of physical limitations, angina frequency, angina stability, social, psychosocial, and cognitive function. In addition, the domain most identified as experiencing improvement in CHD patients after PCI was the physical domain (Wu et al., 2019; Xu et al., 2021; Yin et al., 2022; Zhou et al., 2020), emotional (Xu et al., 2021; Yin et al., 2022), and psychological domain (Peng et al., 2022; Wu et al., 2019). Two other studies reported improvements in total QoL scores without investigating scores from individual domains (Hu et al., 2022; Li et al., 2022).

## Discussion

This review aims to identify types of nursing interventions to improve the QoL of CHD patients after PCI. The results of this review show two categories of nursing interventions, namely namely hospital-based interventions and long-distance rehabilitation (tele-rehabilitation). This review shows how important the role of nurses is in improving the QoL of CHD patients through post-PCI interventions. Thus, nurses need to be oriented toward improving health outcomes and a better QoL (Zhang & Qi, 2021).

Even though PCI is the primary treatment method that can provide a better health prognosis, significantly improving the QoL in CHD patients, this procedure still has shortcomings, one of which is the

occurrence of post-PCI restenosis, which can affect clinical benefits (Al-Lamee et al., 2019; Giacoppo et al., 2017). This has the potential to provide more limitations in the patient's life, which can later make it difficult for them to adapt and experience a decrease in QoL (Szpilewska et al., 2018). In addition, quality and consistent continuity of healthcare is needed in CHD patients after PCI. Interventions to improve the QoL of patients with CHD will then be discussed further based on two categories.

## Hospital-based Intervention

Traditional hospital treatment and follow-up methods can no longer meet the long-term recovery requirements of patients after PCI (Yin et al., 2022). Continuing care can be widely applied in various clinical practices as it has been proven to improve patients' medication adherence and their quality of life (Shahrani et al., 2016). This effort can be optimized through various interventions facilitated by hospitals, both in inpatient and outpatient settings.

Post-PCI CHD patients may benefit from early rehabilitation exercises (Vallabhajosyula et al., 2019; Yeow et al., 2020). Based on the results of a study by Peng et al. (2022) using the seven-step rehabilitation training guidelines of the American Heart Association (AHA), the number of patients with LVEF ≥50% was significantly higher in patients who received the intervention in stages. Exercise can gradually restore physical fitness and improve cardiovascular regulation in relatively good condition with increasing ventricular systolic function (LVEF) (Giannitsis et al., 2019). The improvement of patient's health condition can support them to do more daily physical activity, especially in the aspect of self-care (Peng et al., 2022). According to Majumdar et al. (2014), a person who has better activities of daily living has a better quality of life across all domains. Therefore, early rehabilitation exercises can improve QoL in post-PCI patients.

Previous reviews reported that many post-PCI patients experience depression and anxiety (Liu et al., 2019). Chang et al. (2020) reported that there was a significant increase in anxiety scores and the proportion of patients meeting criteria for generalized anxiety disorder 12 months after PCI. If the patient's mental health problems cannot be treated properly, this will trigger long-term discomfort that interferes with daily work and reduces the patient's QoL. Counseling is one intervention that nurses can do to overcome this problem. According to a study conducted by Chang et al. (2020), brief psychological counseling by a trained nurse the day before and after PCI was associated with significantly reduced anxiety scores, and higher scores on QoL measures. Improving the psychological condition of post-PCI patients can help patients adopt positive coping styles, increase endocrine hormone levels and reduce symptoms of psychological stress (Shen et al., 2018).

Yin et al. (2022) reported that Omaha System-based continuous care can improve patient treatment adherence and QoL after PCI. It can strengthen patients' health knowledge on the one hand, and, on the other hand, this intervention can educate patients to be aware of relevant diseases, the importance of taking medications, and the risks of drug discontinuation (Yin et al., 2022). The data are also consistent with previous studies, that continuous care based on the Omaha System can increase patient medication adherence, which has been proven to improve the quality of life of CHD and myocardial infarction patients (Wei, 2018).

Strengthening health management during the transition period of patient care from hospital to outpatient settings is important to prepare post-PCI patients after being discharged from the hospital. According to previous studies, a large number of CHD patients (25%-40%) do not adhere to the treatment regimen and this leads to recurrence acute myocardial infarction (Ho et al., 2014; Wong et al., 2013). Through this intervention, patient readmission and relapse rates decreased along with improved patient prognosis (Wu et al., 2019). Improved patient prognosis and reduced recurrence rates have been proven to be associated with a better quality of life for CHD patients (Weintraub et al., 2008).

## Cardiac Tele-Rehabilitation

During the short hospital stay after PCI, patients cannot thoroughly learn from healthcare professionals how to manage their illness. However, post-CHD patients cannot rely completely on the curative effects of PCI and still require long-term treatment to prevent recurrence and readmission (Kim et al., 2019). On the other hand, patients are also more susceptible to experiencing depression and anxiety after being discharged (Zhou et al., 2020). Meanwhile, the current standard of care for post-PCI patients still does not implement continuous and comprehensive post-discharge care (Kim et al., 2019). Technology is essential in facilitating sustainable patients' treatment after leaving the hospital.

In this review, all studies utilized the WeChat platform for communication and intervention (Hu et al., 2022; Li et al., 2022; Xu et al., 2021; Zhou et al., 2020). This application supports patients receiving long-term and sustainable care and helps them develop good living habits outside the hospital (Hu et al., 2022). Through the WeChat platform, patients can educate themselves on topics relevant to their health at their convenience (Mihalko, 2015).

The use of technology such as WeChat can not only improve QoL, but previous studies reported that this application can also improve psychological status and reduce complication rates after PCI (Zhou et al., 2020). In addition, other studies also report the same thing, where the WeChat platform can provide better social support and self-care and can reduce the level of depression in patients with CHD after PCI (Hu et al., 2022; Xu et al., 2021). Lack of social support in CHD patients after PCI will

increase the mortality rate of myocardial infarction patients, worsen the prognosis, and can even cause psychological problems such as depression (Hu et al., 2022).

We Chat is one of the most popular and frequently used social media apps in China. This application is often used as a communication medium to access and share information related to medical services and healthcare (Zhou et al., 2020). Through the WeChat platform, health workers can provide information and understanding to patients who have wrong perceptions of the management of CR. Furthermore, WeChat has a variety of information formats, such as text, sound, animation, and video. This is beneficial in ensuring the accuracy and professionalism of nursing interventions and increasing patient understanding in receiving information visually from home (Wang et al., 2022). In addition, WeChat can also effectively reduce the missed readmission rate and enhance its initiatives for long-term and chronic rehabilitation management among CHD patients.

This review study has several methodological limitations, especially regarding that year restriction limits publication years (2013-2023) in inclusion criteria. Although the search for study results in this review is based on the criteria of the last ten years (2013-2023) and has the potential to limit the scope of findings beyond that period, the acquisition of the latest data based on up-to-date sources allows relevant studies to be identified and utilized. In addition, the articles analyzed in this review are quite heterogeneous (cohort, RCT, and quasi-experimental). Cohort studies were included because there were no additional studies conducted as RCTs or quasi-experiments. The cohort studies included in the analysis also have good quality because the critical appraisal was carried out with the JBI tool. Therefore, future research can carry out similar interventions in RCT study designs so that additional studies in the future will strengthen the results of this review.

## Conclusions

This scoping review shows that eight articles discuss the types of nursing intervention for improving QoL in CHD patients after PCI. In this study, there are two categories of interventions that nurses can carry out: hospital-based (inpatient or outpatient) rehabilitation and tele-rehabilitation. All interventions analyzed in this review significantly improve QoL in CHD patients after PCI. Therefore, these findings provide the options for nurses to maximize their role in providing interventions to improve QoL of CHD patients after undergoing PCI. In line with the promising potential of nursing interventions to improve the quality of life of CHD patients, implementing evidence-based interventions in nursing care settings remains a challenge. Standardized intervention guidelines need to be created in the future for each outcome of interest based on evidence-based findings, so that specific interventions to improve the quality of life of CHD patients can be applied directly in daily practice.

### Declaration of conflict of interest

The authors declare no conflict of interest.

### Acknowledgment

All authors would like to thank Universitas Padjadjaran, Bandung, Indonesia, for facilitating the data base for this research.

### Funding

This review study received no external funding.

### Data Availability

Not applicable.

## References

Abdallah, M. S., Wang, K., Magnuson, E. A., Spertus, J. A., Farkouh, M. E., Fuster, V., & Cohen, D. J. (2013). Quality of life after PCI vs CABG among patients with diabetes and multivessel coronary artery disease: A randomized clinical trial. *JAMA, 310*(15), 1581–1590. https://doi.org/10.1001/jama.2013.279208

Al-Lamee RK, Nowbar AN, Francis DP. (2019). Percutaneous coronary intervention for stable coronary artery disease. *In Heart, 105*(1), 11–19. https://doi.org/10.1136/heartjnl-2017-312755

Anggraini, D., & Andani, T. Z. (2018). Quality of life of patients after percutaneous coronary intervention (PCI). *Jurnal Keperawatan Kom, 4*(2), 98–105. https://doi.org/https://doi.org/10.33755/jkk.v4i2.117

Bahall, M., Legall, G., & Khan, K. (2020). Quality of life among patients with cardiac disease: The impact of comorbid depression. *Health and Quality of Life Outcomes, 18*(1), 1–10. https://doi.org/10.1186/s12955-020-01433-w

Benjamin et al. (2017). Heart disease and stroke statistics-2017 update: A report from the american heart association. *Circulation, 135*(10), e146–e603. https://doi.org/10.1161/CIR.0000000000000485

Chang, Z., Guo, A.-Q., Zhou, A.-X., Sun, T.-W., Ma, L., Gardiner, F. W., & Wang, L.-X. (2020). Nurse-led psychological intervention reduces anxiety symptoms and improves quality of life following percutaneous coronary intervention for stable coronary artery disease. *The Australian Journal of Rural Health, 28*(2), 124–131. https://doi.org/10.1111/ajr.12587

Cho, E., Sloane, D. M., Kim, E. Y., Kim, S., Choi, M., Yoo, I. Y., Lee, H. S., & Aiken, L. H. (2015). Effects of nurse staffing, work environments, and education on patient mortality: An observational study. *International Journal of Nursing Studies, 52*(2), 535–542. https://doi.

org/10.1016/j.ijnurstu.2014.08.006

Downey, C. L., Chapman, S., Randell, R., Brown, J. M., & Jayne, D. G. (2018). The impact of continuous versus intermittent vital signs monitoring in hospitals: A systematic review and narrative synthesis. *International Journal of Nursing Studies, 84*, 19–27. https://doi.org/10.1016/j.ijnurstu.2018.04.013

Flores, A. M. (1995). Hospital-based cardiac rehabilitation. *Physical Medicine and Rehabilitation Clinics of North America, 6*(2), 243–261. https://doi.org/10.1016/s1047-9651(18)30465-0

Giacoppo, D., Colleran, R., Cassese, S., Frangieh, A. H., Wiebe, J., Joner, M., Schunkert, H., Kastrati, A., & Byrne, R. A. (2017). Percutaneous coronary intervention vs coronary artery bypass grafting in patients with left main coronary artery stenosis: A systematic review and meta-analysis. *JAMA Cardiology, 2*(10), 1079–1088. https://doi.org/10.1001/jamacardio.2017.2895

Giannitsis, E., Clifford, P., Slagman, A., Ruedelstein, R., Liebetrau, C., Hamm, C., Honnart, D., Huber, K., Vollert, J. O., Simonelli, C., Schröder, M., Wiemer, J. C., Mueller-Hennessen, M., Schroer, H., Kastner, K., & Möckel, M. (2019). Multicentre cross-sectional observational registry to monitor the safety of early discharge after rule-out of acute myocardial infarction by copeptin and troponin: the Pro-Core registry. *BMJ Open, 9*(7), e028311. https://doi.org/10.1136/bmjopen-2018-028311

Ho, P. M., Lambert-Kerzner, A., Carey, E. P., Fahdi, I. E., Bryson, C. L., Melnyk, S. D., Bosworth, H. B., Radcliff, T., Davis, R., Mun, H., Weaver, J., Barnett, C., Barón, A., & Del Giacco, E. J. (2014). Multifaceted intervention to improve medication adherence and secondary prevention measures after acute coronary syndrome hospital discharge: A randomized clinical trial. *JAMA Internal Medicine, 174*(2), 186–193. https://doi.org/10.1001/jamainternmed.2013.12944

Hu, H., Zhao, Y., & Ma, J. (2022). Effect of long-term nursing intervention on quality of life and social support of patients with coronary heart disease after percutaneous coronary intervention. *Journal of Cardiac Surgery, 37*(12), 4495–4499. https://doi.org/10.1111/jocs.17047

Hutagalung, R. U., Susilaningsih, F. S., & Mardiyah, A. (2015). Quality of Life of Patients After Percutaneous Coronary Intervention. J*urnal Keperawatan Padjadjaran, 2*(1). https://doi.org/10.24198/jkp.v2i1.77

Kim, C., Sung, J., Lee, J. H., Kim, W. S., Lee, G. J., Jee, S., Jung, I. Y., Rah, U. W., Kim, B. O., Choi, K. H., Kwon, B. S., Yoo, S. D., Bang, H. J., Shin, H. I., Kim, Y. W., Jung, H., Kim, E. J., Lee, J. H., Jung, I. H., … Kim, S. (2019). Clinical practice guideline for cardiac rehabilitation in Korea: Recommendations for cardiac rehabilitation and secondary prevention after acute coronary syndrome. *Korean Circulation Journal, 49*(11), 1066–1111. https://doi.org/10.4070/kcj.2019.0194

Kleisiari, A., Kotanidou, A., Toutouzas, K., & Manolis, A. S. (2021). Nursing intervention and quality of life in patients undergoing invasive cardiac procedures. *Hellenic Journal of Cardiology, 62*(3), 256–259. https://doi.org/10.1016/j.hjc.2020.07.005

Knudsen, M. V., Petersen, A. K., Angel, S., Hjortdal, V. E., Maindal, H. T., & Laustsen, S. (2020). Tele-rehabilitation and hospital-based cardiac rehabilitation are comparable in increasing patient activation and health literacy: A pilot study. *European Journal of Cardiovascular Nursing, 19*(5), 376–385. https://doi.org/10.1177/1474515119885325

Li, Z., Hui, Z., Zheng, Y., Yu, J., & Zhang, J. (2022). Efficacy of phase II remote home rehabilitation in patients with acute myocardial infarction after percutaneous coronary intervention. *Contrast Media and Molecular Imaging, 4634769* https://doi.org/10.1155/2022/4634769

Liu, Y., Zhao, Y., Tian, J., Tong, T., Gao, R., & Liu, Y. (2019). The association of depression following percutanous coronary intervention with adverse cardiovascular events: Protocol for a systematic review and meta-analysis. *Medicine, 98*(2), e13952. https://doi.org/10.1097/MD.0000000000013952

Lu, R., Shi, R., Zhang, M., Shao, X., Xue, W., Guo, Q., Wang, C., & Yue, D. (2022). Safety and efficacy of auricular acupuncture in patients with depression after percutaneous coronary intervention: A protocol for systematic review and meta-analysis. *Medicine (United States), 101*(15), E29173. https://doi.org/10.1097/MD.0000000000029173

Ma, Q., Cai, Z., Sui, L., & Wang, X. (2022). Efficacy and safety of acupuncture combined with Xuefu Zhuyu Decoction on major adverse cardiovascular events after percutaneous coronary intervention: A protocol for systematic review and meta-analysis. *Medicine, 101*(46). https://doi.org/10.1097%2FMD.0000000000031735

Majumdar, K. K., Datta, D., & Datta, P. P. (2014). Relationship of activity of daily living with quality of life. *British Medical Bulletin, 2*(4). https://www.researchgate.net/publication/317105848_Relationship_of_Activity_of_Daily_Living_with_Quality_of_Life

Martin, K. S., Monsen, K. A., & Bowles, K. H. (2011). The Omaha system and meaningful use: Applications for practice, education, and research. *Computers, Informatics, Nursing : CIN, 29*(1), 52–58. https://doi.org/10.1097/NCN.0b013e3181f9ddc6

Mihalko, M. C. (2015). We need to talk: The impact on care when electronic communication replaces verbal communication between clinicians.

*Journal of Pediatric Nursing, 30*(4), 626–627. https://doi.org/10.1016/j.pedn.2015.04.002

Musthofa, F., Trisyani, Y., & Mirwanti, R. (2022). The quality of life among coronary heart disease patients after percutaneous coronary intervention: A scoping review. *Malaysian Journal of Medicine and Health Sciences, 18,* 246–253.

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., … Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *The BMJ, 372,* 1–11. https://doi.org/10.1136/bmj.n71

Peng, X., Zhang, J., Wan, L., Wang, H., & Zhang, W. (2022). The effect of a seven-step rehabilitation training program on cardiac function and quality of life after percutaneous coronary intervention for acute myocardial infarction. *Pakistan Journal of Medical Sciences, 38*(1), 123–127. https://doi.org/10.12669/pjms.38.1.4945

Peterson, J., Pearce, P. F., Ferguson, L. A., & Langford, C. A. (2017). Understanding scoping reviews: Definition, purpose, and process. *Journal of the American Association of Nurse Practitioners, 29*(1), 12–16. https://doi.org/10.1002/2327-6924.12380

Reynolds, M. R., Gong, T., Li, S., Herzog, C. A., & Charytan, D. M. (2021). Cost-effectiveness of coronary artery bypass grafting and percutaneous coronary intervention in patients with chronic kidney disease and acute coronary syndromes in the US medicare program. *Journal of the American Heart Association, 10*(7), e019391. https://doi.org/10.1161/JAHA.120.019391

Safley, D. M., Grantham, J. A., Hatch, J., Jones, P. G., & Spertus, J. A. (2014). Quality of life benefits of percutaneous coronary intervention for chronic occlusions. *Catheterization and Cardiovascular Interventions : Official Journal of the Society for Cardiac Angiography & Interventions, 84*(4), 629–634. https://doi.org/10.1002/ccd.25303

Shahjehan, & Bhutta. (2022). Coronary artery disease. Treasure Island (FL): StatPearls Publishing. https://www.ncbi.nlm.nih.gov/books/NBK564304/

Shahrani, A., Daryabeigi, R., Shahriari, M., & Khosravi, A. (2016). Effect of continuous care model on lifestyle modification in patients with hypertension: Randomized clinical trial study. *International Journal of Medical Research & Health Sciences, 5*(7), 231–239. https://www.ijmrhs.com/abstract/effect-of-continuous-care-model-on-lifestyle-modification-in-patients-with-hypertension-randomized-clinical-trial-study-8691.html

Shan, L., Saxena, A., & McMahon, R. (2014). A systematic review on the quality of life benefits after percutaneous coronary intervention in the elderly. *Cardiology, 129*(1), 46–54. https://doi.org/10.1159/000360603

Shen, X., Zhu, X., Wu, Y., Zhou, Y., Yang, L., Wang, Y., Zheng, Q., Liu, Y., Cong, S., Xiao, N., & Zhao, Q. (2018). Effects of a psychological intervention programme on mental stress, coping style and immune function in percutaneous coronary intervention patients. *PloS One, 13*(1), e0187745. https://doi.org/10.1371/journal.pone.0187745

Szpilewska, K., Juzwiszyn, J., Bolanowska, Z., Bolanowska, Z., Milan, M., Chabowski, M., & Janczak, D. (2018). The acceptance of the disease and the quality of life of the patients with enteric stoma. *Polish Journal of Surgery, 90*(1), 13–17. https://doi.org/10.5604/01.3001.0011.5954

Takematsu, Y., Hasebe, Y., Moriwaki, Y., Kotera, N., Yamada, C., Nakagami, T., Shinoda, K., Furubayashi, A., Kato, S., Sugimoto, I., & Shibayama, K. (2015). Evaluation of quality of life among patients with ischemic heart disease who practiced self-care activities at home after elective percutaneous coronary intervention. *Cardiovascular Intervention and Therapeutics, 30*(2), 115–120. https://doi.org/10.1007/s12928-014-0294-0

Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., Moher, D., Peters, M. D. J., Horsley, T., Weeks, L., Hempel, S., Akl, E. A., Chang, C., McGowan, J., Stewart, L., Hartling, L., Aldcroft, A., Wilson, M. G., Garritty, C., … Straus, S. E. (2018). PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation. *Annals of Internal Medicine, 169*(7), 467–473. https://doi.org/10.7326/M18-0850

Vallabhajosyula, S., Dunlay, S. M., Prasad, A., Kashani, K., Sakhuja, A., Gersh, B. J., Jaffe, A. S., Holmes, D. R. J., & Barsness, G. W. (2019). Acute noncardiac organ failure in acute myocardial infarction with cardiogenic shock. *Journal of the American College of Cardiology, 73*(14), 1781–1791. https://doi.org/10.1016/j.jacc.2019.01.053

Wang, B., Jinsong Li, Hong, Y., Gao, Y., Tian, M., Lin, Q., Wang, J., Wang, Y., & Li, X. (2022). Effect of cardiac rehabilitation therapy combined with wechat platform education on patients with unstable angina pectoris after PCI. *Journal of Healthcare Engineering, 2022*. https://doi.org/10.1155/2022/7253631

Wei, D. (2018). Effect of continuous nursing intervention on psychological state and medication compliance of patients with acute myocardial infarction after PCI. *Journal of Advances in Medicine Science, 1*(1), 9. https://doi.org/10.30564/.v1i1.21

Weintraub, W. S., Spertus, J. A., Kolm, P., Maron,

D. J., Zhang, Z., Jurkovitz, C., Zhang, W., Hartigan, P. M., Lewis, C., Veledar, E., Bowen, J., Dunbar, S. B., Deaton, C., Kaufman, S., O'Rourke, R. A., Goeree, R., Barnett, P. G., Teo, K. K., Boden, W. E., & Mancini, G. B. J. (2008). Effect of PCI on quality of life in patients with stable coronary disease. *The New England Journal of Medicine, 359*(7), 677–687. https://doi.org/10.1056/NEJMoa072771

Wong, M. C. S., Tam, W. W. S., Cheung, C. S. K., Wang, H. H. X., Tong, E. L. H., Sek, A. C. H., Yan, B. P. Y., Cheung, N. T., Leeder, S., Yu, C. M., & Griffiths, S. (2013). Drug adherence and the incidence of coronary heart disease- and stroke-specific mortality among 218,047 patients newly prescribed an antihypertensive medication: A five-year cohort study. *International Journal of Cardiology, 168*(2), 928–933. https://doi.org/10.1016/j.ijcard.2012.10.048

World Health Organization. (2012). QHIQOL User Manual (Revision). https://www.who.int/tools/whoqol#:~:text=WHOdefinesQualityofLife,%2Cexpectations%2Cstandardsandconcerns

World Health Organization (WHO). (2021). Cardiovascular diseases (CVDs). https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)

Wu, Q., Zhang, D., Zhao, Q., Liu, L., He, Z., Chen, Y., Huang, H., Hou, Y., Yang, X., & Gu, J. (2019). Effects of transitional health management on adherence and prognosis in elderly patients with acute myocardial infarction in percutaneous coronary intervention: A cluster randomized controlled trial. *PloS One, 14*(5), e0217535. https://doi.org/10.1371/journal.pone.0217535

Xu, M., Yang, X., Liu, L., Dai, Y., Xu, M., & Lin, S. (2021). Effect of the wechat platform health management and refined continuous nursing model on life quality of patients with acute myocardial infarction after PCI. *Journal of Healthcare Engineering, 2021,* 5034269. https://doi.org/10.1155/2021/5034269

Yazdani-Bakhsh, R., Javanbakht, M., Sadeghi, M., Mashayekhi, A., Ghaderi, H., & Rabiei, K. (2016). Comparison of health-related quality of life after percutaneous coronary intervention and coronary artery bypass surgery. *Arya Atherosclerosis, 12*(3), 124–131. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5055370/

Yeow, R. Y., Van Otteren, C., McCoy, H., DeTroyer, O., Bryant, J., Beach, J., & Stein, A. (2020). Improving cardiac rehabilitation referral rates for patients after acute myocardial infarction. *Journal of the American College of Cardiology, 75*(11), 1619. https://doi.org/10.1016/s0735-1097(20)32246-4

Yin, S., Ou, Y., & Ting, E. (2022). Impacts of omaha system-based continuing care on the medication compliance, quality of life, and prognosis of coronary heart disease patients after PCI. *Brazilian Journal of Cardiovascular Surgery, 37*(4), 472–480. https://doi.org/10.21470/1678-9741-2021-0222

Zhang & Qi. (2021). Greater nursing role for enhanced post-percutaneous coronary intervention management. *International Journal of General Medicine, 14,* 7115–7120. https://doi.org/10.2147/IJGM.S337385

Zhou, S. H., Huang, S. T., Xu, N., Chen, L. W., & Chen, Q. (2020). Application of the wechat platform to implement continuous nursing for patients after percutaneous coronary intervention. *Medical Science Monitor : International Medical Journal of Experimental and Clinical Research, 26,* e925444. https://doi.org/10.12659/MSM.925444