

## Original Article

# Effect of multidimensional comprehensive intervention on medication compliance, social function and incidence of MACE in patients undergoing PCI

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**Abstract:** Objective: To analyze the effect of multidimensional comprehensive intervention on medication compliance, social function and incidence of major adverse cardiovascular events (MACE) in patients undergoing percutaneous coronary intervention (PCI). Methods: Ninety-eight patients with coronary heart disease (CHD) who underwent PCI in our hospital were selected and divided into the regular group (n=46, receiving regular nursing intervention) and the comprehensive group (n=52, receiving multidimensional comprehensive nursing intervention) according to the different nursing intervention methods. The medication compliance, social function, quality of life, and incidence of MACE were compared between the two groups. Results: The comprehensive group showed significantly higher rates of taking medication on time, taking medication according to the proper amount, taking medication at the recommended times, no increase or decrease in the amount of medication, and taking medication without interruption than the regular group ( $P < 0.05$ ). The comprehensive group exhibited significantly higher scores of medication compliance than the regular group ( $P < 0.05$ ). The Social Disability Screening Schedule (SDSS) scores of both groups during intervention for 8 weeks were lower than those before intervention and after intervention for 2 and 4 weeks ( $P < 0.05$ ). The SDSS scores of intervention for 2, 4, and 8 weeks in the comprehensive group were significantly lower than that in the regular group ( $P < 0.05$ ). After intervention, the comprehensive group showed significantly higher scores of physiological function, psychological function, cognitive function, emotional function, role function, and total quality of life than the regular group ( $P < 0.05$ ). The incidence of MACE in the comprehensive group was significantly lower than that in the regular group ( $P < 0.05$ ). Conclusion: The use of multidimensional comprehensive intervention for patients undergoing PCI can effectively improve patients' medication compliance, social function and quality of life, and reduce the incidence of MACE.

**Keywords:** Multidimensional comprehensive intervention, percutaneous coronary intervention, medication compliance, social function, adverse cardiovascular events

## Introduction

Coronary heart disease (CHD) is heart disease caused by coronary atherosclerosis, which leads to myocardial hypoxic ischemia. It is the leading cause of heart failure. Percutaneous coronary intervention (PCI) is the first choice for the treatment of CHD, which can quickly recanalize the obstructed coronary artery, restore the perfusion of the ischemic site, and relieve the clinical symptoms of CHD patients

[1]. However, the course of atherosclerosis in CHD patients can still progress after PCI, and patients have a high recurrence rate and mortality rate after treatment [2]. Data shows that the incidence of restenosis after PCI is about 5%-8%, and some patients even have major adverse cardiovascular events (MACE) such as angina and myocardial infarction [3].

MACE is a difficulty in the intervention treatment of CHD and will reduce the effect of PCI.

Therefore, it is necessary to develop a comprehensive and long-term risk control method, with a program to correct unhealthy living habits and create medication treatment plans for patients after PCI, thus promoting postoperative recovery. Patients after PCI need to take corresponding medication for a long time to maintain the therapeutic effect. However, some patients may have relatively poor medication compliance due to factors such as low education, affecting the effect of PCI and increasing the risk of MACE. Therefore, after PCI, CHD patients need to be given corresponding nursing intervention to improve their medication compliance and reduce the incidence of MACE.

It has been clinically found that PCI patients have poor medication compliance after regular nursing intervention, and the risk of postoperative MACE is relatively high. A study has shown that comprehensive and continuous care can effectively improve the treatment effect of patients and promote their recovery with good prognosis [4]. Multidimensional comprehensive nursing intervention provides patients with continuous, professional and high-quality care through the multidisciplinary collaboration of nurses, physicians, nutritionists, and psychological counselors, with the purpose of improving patients' awareness of the disease and promoting the effect of PCI treatment [5]. However, there is no relevant research on the application of multidimensional comprehensive intervention to PCI patients. Based on this, the present study investigated CHD patients undergoing PCI, and analyzed PCI patients receiving multidimensional comprehensive intervention and the effects of medication compliance, social function, quality of life and the incidence of MACE.

### Materials and methods

#### *General materials*

Ninety-eight CHD patients underwent PCI in our hospital were selected and divided into the regular group (n=46) and the comprehensive group (n=52) according to different nursing intervention methods. Inclusion criteria: ① patients were diagnosed with CHD by coronary angiography; ② patients who received PCI for the first time. Exclusion criteria: ① patients with severe brain diseases; ② patients with other heart diseases; ③ patients with autoim-

mune diseases and malignant tumors; ④ patients with contraindications to PCI; ⑤ patients who had taken statins within 1 month before treatment; ⑥ patients with severe liver and kidney dysfunction; ⑦ patients with psychological disorders or mental illnesses that may affect the study; ⑧ patients who were lost follow-up. This study was approved by the Ethics Committee of Zibo Municipal Hospital. The research subjects and their families were informed of the study and they signed a fully-informed consent form.

#### *Methods*

The regular group received regular nursing intervention, including electrocardiogram (ECG) monitoring, vital sign monitoring, instructing patients to perform exercise of tightening and loosening the fist, postoperative limb movement, postoperative health training, paying attention to the mental state of patients, and dietary guidance.

The comprehensive group was given multidimensional comprehensive nursing intervention as follows: (1) Establishment of a multidimensional nursing team. The head nurse was responsible for overall planning, 1 nurse-in-charge was responsible for task transmission, 4 primary nurses were responsible for nursing implementation, 1 chief physician was responsible for the formulation of PCI perioperative treatment plans, 2 attending physicians were responsible for plan implementation, and 1 nutritionist and 1 psychological counselor were responsible for diet and psychological guidance. (2) Implementation of the comprehensive nursing. The primary nurses evaluated and analyzed the patients' nursing needs and classified the problem. The physicians diagnosed the condition, and then formulated and implemented a treatment plan. The nurses, nutritionist, and psychological counselor determined the nursing plan based on the evaluation results together. (A). Basic nursing. It included skin nursing and living nursing. The targeted care was given according to patients' self-nursing ability. For example, patients with self-nursing ability were given instructions on defecation and urination in bed, while patients without self-nursing ability were given urinary and defecation assistance and oral care assistance. The patients were turned over regularly

after the operation and were guided to pay attention to the condition of the skin. (B). Activities and rest. Before the operation, the patients were asked to rest and take appropriate exercise according to their own conditions to prevent muscle atrophy and lower limb venous thrombosis. The exercise plan was formulated by the physicians after evaluating the condition, most of which were Tai Chi and walking, and they needed to be accompanied by a companion during exercise. Patients needed to be strictly confined to the bed (supine position) 24 hours after operation in order to reduce forced defecation and coughing. (C). Strengthening the observation of the patient's condition. After the operation, the patients were given continuous and comprehensive condition monitoring and recording. The nurses closely observed whether the patients' wound was bleeding, whether there was arrhythmia, and the temperature and color of the lower limb skin on the operating side, and notified the physicians if any abnormalities were found. (D). Psychological nursing. The psychological counselor formulated targeted psychological counseling programs for patients' problems. First, the patients were informed about the disease and related knowledge of PCI, and former patients with a successful operation were invited to communicate with the patients before the operation, so as to reduce their fear and tension. The progressive relaxation training was given to those who were mentally stressed which affected the sleep, so as to relieve their negative emotions. (E). Diet nursing. The nutritionist formulated a diet plan based on the patients' condition, and guided the patients to eat less and more frequent meals before the operation with a light and digestible diet. Patients were guided to eat 40 per cent less food with enough fruits and vegetables to prevent constipation; the patients fasted 4-6 hours before the operation and emptied the bowels. The postoperative diet of the patients was the same as that before the operation. On this basis, soy products and dairy products were restricted to prevent abdominal distension; the patients were instructed to drink a lot of water after the operation, and the urine output should reach more than 800 mL, 4 h after operation. (F). Medication nursing. Before the operation, the patients were informed about

the time of taking the medicine and the possible adverse reactions of the medicine. For the toxic drugs, attention was paid to the changes in blood pressure and heart rate of patients. For diuretic drugs, attention was paid to patients' edema and urine output. For those with poor sleep, diazepam could be taken. (G). Discharge health education. Before discharge, patients were instructed to take medication correctly, exercise moderately, have a light and digestible diet, and control their weight, blood pressure, and blood lipids. The patients were instructed to come to the hospital for review at regular intervals after the operation, so as to find the symptoms of myocardial ischemia and the side effects of the medication in time.

### *Observation indicators*

① Medication compliance was assessed by the Morisky Medication Adherence Scale (MMAS) [6], which included 5 questions including taking medication on time, taking medication according to the correct amount, taking medication on time, no increase or decrease in the amount of medication, and taking medication without interruption. The total score is 20 points. The higher scores indicate better medication compliance. ② Quality of life was assessed by the Quality of Life Evaluation Scale (SF-36) [7], including 6 dimensions of physical function, mental function, cognitive function, emotional function, role function, and total quality of life, with a total score of 100. The higher scores indicate a better quality of life. ③ Social function was evaluated by Social Disability Screening Schedule (SDSS) [8], with a total of 10 items and a total score of 20 points. The higher scores indicate greater social dysfunction. ④ The incidence of MACE after operation was recorded, including myocardial infarction, angina pectoris, heart failure, and myocardial ischemia.

### *Statistical methods*

The statistical analysis of data was processed by SPSS 22.0. Count data were expressed as (*n*, %) and  $\chi^2$  test was adopted; The measurement data were expressed as  $\bar{x} \pm s$ . The independent *t* test and paired sample *t* test were used for inter-group comparisons and intra-group comparisons. For comparison at differ-

**Table 1.** Comparison of baseline data between the two groups ( $\bar{x} \pm s$ ;  $n$ , %)

Groups		Comprehensive Group (n=52)	Regular Group (n=46)	$t/\chi^2$	$P$
Age (years)		69.46±3.41	69.77±3.48	0.445	0.657
Weight (kg)		54.64±4.03	55.09±4.15	0.544	0.588
Gender	Male	29 (55.77)	24 (52.17)	0.127	0.722
	Female	23 (44.23)	22 (47.83)		
Length of education (years)		11.21±2.45	11.06±2.46	0.302	0.763
Hypertension		10 (19.23)	12 (26.09)	0.659	0.417
Diabetes		9 (17.31)	11 (23.91)	0.656	0.418
Hyperlipidemia		5 (9.62)	3 (6.52)	0.312	0.577
LVEF (%)		62.67±20.18	68.47±19.85	1.431	0.156
Number of lesion	One-vessel lesion	28 (53.85)	23 (50)	0.099	0.754
	Two-vessel lesion	17 (32.69)	17 (36.96)		
	Three-vessel lesion	7 (13.46)	6 (13.04)		

ent time points, the variance analysis of repeated measurement data was used to analyze the inter-group differences and the time differences of the measured values at each time point, followed by LSD-t test. The figures were made by Graphpad prism 8.  $P < 0.05$  was considered as statistically significant.

## Results

### Baseline data

The comprehensive group was comprised of 52 patients, including 29 males and 23 females, with a mean age of (69.46±3.41) years and a mean weight of (54.64±4.03) kg. The regular group was comprised of 46 patients, including 24 males and 22 females, with a mean age of (69.77±3.48) years and a mean weight of (55.09±4.15) kg. There was no significant difference between the two groups in age, weight, gender, length of education, hypertension, diabetes, hyperlipidemia, left ventricular ejection fraction (LVEF), and number of lesions ( $P > 0.05$ ) (Table 1).

### Medication compliance

The rates of taking medication on time, taking medication according to the proper amount, taking medication on time, no increase or decrease in the amount of medication, and taking medication without interruption in the comprehensive group (75.00%, 84.62%, 82.69%, 73.08%, and 71.15%) were significantly higher than those in the regular group (54.35%,

63.04%, 58.70%, 50.00%, and 45.65%) ( $P < 0.05$ ). The score of medication compliance in the comprehensive group was significantly higher than that of the regular group ( $P < 0.05$ ) (Table 2; Figure 1).

### Social function

Repeated measurements showed that the SDSS scores were significantly different in terms of time-point and inter-group interaction ( $P < 0.05$ ). The SDSS scores of the two groups before intervention showed no significant difference ( $P > 0.05$ ). In the two groups, the SDSS scores at intervention for 8 weeks were lower than those of intervention for 4 weeks, those of intervention for 4 weeks were lower than those of intervention for 2 weeks, and those of intervention for 2 weeks were lower than those before intervention, indicating significant differences ( $P < 0.05$ ). The SDSS score of intervention for 2, 4, and 8 weeks in the comprehensive group was significantly lower than that in the regular group ( $P < 0.05$ ) (Table 3; Figure 2).

### Quality of life

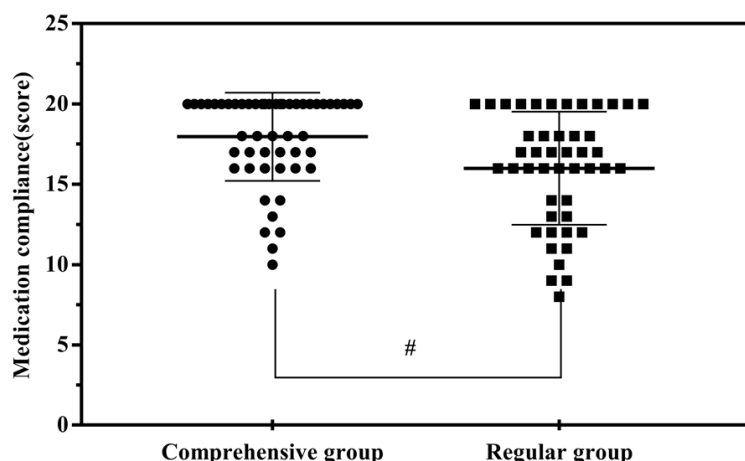
Before intervention, the scores of the two groups in terms of physiological function, psychological function, cognitive function, emotional function, role function, and total quality of life exhibited no significant difference ( $P > 0.05$ ). After intervention, the scores of physiological function, psychological function, cognitive function, emotional function, role function, and total quality of life were increased in both

## Survey of multidimensional comprehensive intervention in patients undergoing PCI

**Table 2.** Comparison of medication compliance between the two groups after intervention (n, %)

Groups	Case number	Medication compliance					Score of medication compliance (point)		
		Take medication on time	Take medication according to the amount	Take medication according by times	No increase or decrease in the amount of medication	Take medication without interruption	< 15	15-19	20
Comprehensive group	52	39 (75.00)	44 (84.62)	43 (82.69)	38 (73.08)	37 (71.15)	7 (13.46)	17 (32.69)	28 (53.85)
Regular group	46	25 (54.35)	29 (63.04)	27 (58.7)	23 (50)	21 (45.65)	14 (30.43)	20 (43.48)	12 (26.09)
$\chi^2$		4.595	5.977	6.887	5.531	6.571		6.984	
<i>P</i>		0.032	0.014	0.009	0.019	0.010		0.008	





**Figure 1.** Comparison of medication compliance scores between the two groups. After intervention, the medication compliance score of the comprehensive group was significantly higher than that of the regular group ( $P < 0.05$ ). # indicates the comparison of medication compliance between the two groups,  $P < 0.05$ .

groups ( $P < 0.05$ ), and the comprehensive group ( $72.51 \pm 4.64$ ,  $80.51 \pm 4.46$ ,  $73.39 \pm 7.02$ ,  $82.54 \pm 3.98$ ,  $72.78 \pm 4.32$ , and  $71.88 \pm 5.06$ ) was significantly higher than the regular group ( $60.56 \pm 4.21$ ,  $66.49 \pm 4.12$ ,  $65.68 \pm 7.46$ ,  $71.29 \pm 2.99$ ,  $62.99 \pm 4.73$ , and  $61.35 \pm 4.16$ ) ( $P < 0.05$ ) (**Table 4**).

### Incidence of MACE

The comprehensive group had 1 case of myocardial infarction, 1 case of angina pectoris, 0 cases of heart failure and 0 cases of myocardial ischemia. The regular group had 2 cases of myocardial infarction, 4 cases of angina pectoris, 1 case of heart failure and 1 case of myocardial ischemia. The incidence of MACE in the comprehensive group (3.85% vs. 17.39%) was significantly lower than that in the regular group ( $P < 0.05$ ) (**Table 5**).

## Discussion

The postoperative secondary prevention in PCI patients is an important part of the treatment of CHD, including intervention in patients' negative living habits, rational use of medication to reduce the incidence of MACE and mortality of the patients, and avoiding exposure of risk factors. A study has shown that the global incidence of CHD is about 14.4% [9], and PCI is widely used in the treatment of CHD, thus improving patients' medication compliance is the key to the treatment of CHD. Other studies

have shown that, medication compliance can be affected by factors such as the patient's education level, payment method, age, etc. CHD patients in China have relatively poor medication compliance, and those with low educational level have relatively poorer medication compliance because of their lower understanding of medical knowledge [10, 11]. Therefore, appropriate nursing intervention after PCI not only improves medication compliance in patients, but also has a positive impact on the treatment effect of CHD.

Multidimensional comprehensive intervention is a nursing

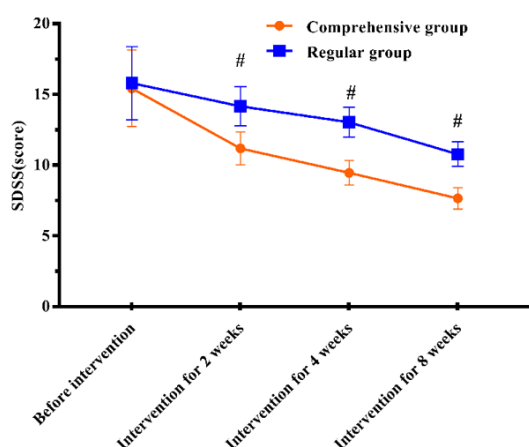
model that integrates multi-scientific assistance, which is composed of physicians, nurses, psychological consultants, nutritionists and other multidisciplinary medical personnel. According to the communication between the primary nurses and the patients, the corresponding treatment plan and nursing measures are formulated, which can effectively improve the treatment effect of PCI and reduce the risk of MACE [12]. In this study, the medication compliance of the comprehensive group was significantly higher than that of the regular group, indicating that multidimensional comprehensive intervention can effectively improve the medication compliance of patients. The reason may be due to the fact that multidimensional comprehensive intervention involves multidisciplinary medical staff to assess the patients' condition and formulate a corresponding treatment plan, and the patients receive individualized, professional, and comprehensive nursing, which effectively improved the treatment effect [13]. What's more, multidimensional comprehensive intervention carried out as health education for patients, improved patients' awareness of diseases and self-nursing ability, and thus improved medication compliance [14].

This study also evaluated the social function and quality of life of patients. The results showed that the SDSS scores of the two groups decreased with the extension of the interven-

**Table 3.** Comparison of SDSS scores between the two groups at different time points ( $\bar{x} \pm s$ )

Groups	Case number	Before intervention	Intervention for 2 weeks	Intervention for 4 weeks	Intervention for 8 weeks	$F_{\text{time point}}$	$F_{\text{inter-groups}}$	$F_{\text{interaction}}$
Comprehensive group	52	15.44±2.70	11.19±1.16 <sup>a</sup>	9.46±0.87 <sup>a,b</sup>	7.65±0.76 <sup>a,b,c</sup>	499.349	102.498	19.489
Regular group	46	15.80±2.59	14.17±1.37 <sup>a</sup>	13.04±1.07 <sup>a,b</sup>	10.78±0.87 <sup>a,b,c</sup>			
<i>t</i>		0.675	11.694	18.183	18.964			
<i>P</i>		0.501	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

Note: Compared with before intervention, <sup>a</sup>*P* < 0.05; compared with intervention for 2 weeks, <sup>b</sup>*P* < 0.05; compared with the intervention for 4 weeks, <sup>c</sup>*P* < 0.05.



**Figure 2.** Comparison of SDSS score between the two groups. The SDSS scores of the two groups before intervention were not significantly different ( $P > 0.05$ ); the SDSS scores of the comprehensive group of intervention for 2, 4, and 8 weeks were significantly lower than those of the regular group ( $P < 0.05$ ). # indicated that compared with the regular group at the same time point, the difference was statistically significant,  $P < 0.05$ .

tion time, and the SDSS scores of the comprehensive group of intervention for 2, 4, and 8 weeks were significantly lower than those of the regular group; after intervention, the scores of all dimensions of the SF-36 scale were increased in both groups, and the comprehensive group was significantly higher than the regular group. The results showed that multidimensional comprehensive intervention can effectively improve the social function and quality of life of patients. The reason may be that comprehensive intervention provided guidance on activities and rest for patients, helped patients with rehabilitation training, and gave personalized exercise according to the actual conditions of patients, which can promote early recovery of patients, thereby improving their quality of life and social function.

The incidence of MACE is related to the negative living habits of PCI patients and the lack

of awareness of CHD. Therefore, improving the negative living habits of PCI patients and their awareness of the disease is important for preventing MACE [15, 16]. Studies have shown that effective and reasonable rehabilitation exercises for PCI patients are helpful to promote the recovery of patients with an injured artery endothelium, and promote the synthesis of nitric oxide ribozymes in smooth muscle cells, thereby reducing the risk of MACE after operation [17, 18]. The results of this study also showed that the incidence of MACE in the comprehensive group (3.85% vs. 17.39%) was significantly lower than that in the regular group, suggesting that multidimensional comprehensive intervention can effectively reduce the risk of MACE after operation. The reason may be that multidimensional comprehensive intervention can improve medication compliance of patients, as it helps to adopt professional rehabilitation training guidance to improve the physical fitness of patients, and provide health guidance to the patients before discharge, so that patients can carry out rehabilitation training after discharge to ensure the continuity of training, which has a promoting effect on the improvement of the treatment effect, and reduces the incidence of MACE [19, 20].

In a summary, the adoption of multidimensional comprehensive intervention for CHB patients undergoing PCI, with the establishment of a multidimensional nursing team including nurses, physicians, nutritionists, and psychological counselors, and the provision of patients with basic nursing, activity and rest guidance, as well as an emphasis on disease observation, and diet nursing, psychological nursing, medication nursing, discharge health education and other comprehensive nursing, all of which can effectively improve medication compliance of patients, improve their social function and quality of life, and ultimately reduce the incidence of MACE. However, the sample size of this study was relatively small, and the

**Table 4.** Comparison of quality of life between the two groups before and after intervention ( $\bar{x} \pm s$ )

Groups	Time point	Physiological function	Psychological function	Cognitive function	Emotional function	Role function	Total quality of life
Comprehensive group (n=52)	Before intervention	51.65±3.07	56.01±2.29	51.93±4.86	54.55±3.26	50.68±2.28	53.84±3.92
	After intervention	72.51±4.64	80.51±4.46	73.39±7.02	82.54±3.98	72.78±4.32	71.88±5.06
$t_a$		27.037	35.239	18.125	39.232	32.625	20.324
$P_a$		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Regular group (n=46)	Before intervention	51.37±3.28	55.39±2.55	52.29±6.05	55.34±4.35	50.26±2.45	54.28±3.71
	After intervention	60.56±4.21	66.49±4.12	65.68±7.46	71.29±2.99	62.99±4.73	61.35±4.16
$t_a$		11.679	15.538	9.455	20.494	16.208	8.603
$P_a$		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
$t_b$		0.436	1.268	0.326	1.024	0.879	0.569
$P_b$		0.664	0.208	0.745	0.308	0.382	0.571
$t_c$		13.286	16.093	5.269	15.654	10.708	11.164
$P_c$		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

Note: Compared with before treatment,  $^aP < 0.05$ ; compared with 1 course of treatment,  $^bP < 0.05$ ; compared with 2 courses of treatment,  $^cP < 0.05$ .

**Table 5.** The incidence of MACE of the two groups (n, %)

Groups	Case number	Myocardial infarction	Angina pectoris	Heart failure	Myocardial ischemia	Total
Comprehensive group	52	1 (1.92)	1 (1.92)	0 (0.00)	0 (0.00)	2 (3.85)
Regular group	46	2 (4.35)	4 (8.7)	1 (2.17)	1 (2.17)	8 (17.39)
$\chi^2$		0.484	2.312	1.142	1.142	4.887
$P$		0.487	0.128	0.285	0.285	0.027

intervention time was only 8 weeks. Therefore, further larger-sample tests are still needed, and the intervention time should be appropriately extended to analyze the long-term effects of multidimensional comprehensive intervention on PCI patients in the future.

#### Disclosure of conflict of interest

None.

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#### References

- [1] Hahn JY, Song YB, Oh JH, Cho DK, Lee JB, Doh JH, Kim SH, Jeong JO, Bae JH, Kim BO, Cho JH, Suh IW, Kim DI, Park HK, Park JS, Choi WG, Lee WS, Kim J, Choi KH, Park TK, Lee JM, Yang JH, Choi JH, Choi SH and Gwon HC. 6-month versus 12-month or longer dual antiplatelet therapy after percutaneous coronary intervention in patients with acute coronary syndrome (SMART-DATE): a randomised, open-label, non-inferiority trial. *Lancet* 2018; 391: 1274-1284.
- [2] Lin TC, Lu TM, Huang FC, Hsu PF, Shih CC, Lin SJ and Hsu CP. Coronary artery bypass surgery versus percutaneous coronary intervention for left main coronary artery disease with chronic kidney disease. *Int Heart J* 2018; 59: 279-285.
- [3] Prati F, Romagnoli E, La Manna A, Burzotta F, Gatto L, Marco V, Fineschi M, Fabbiochi F, Versaci F, Trani C, Tamburino C, Alfonso F and Mintz GS. Long-term consequences of optical coherence tomography findings during percutaneous coronary intervention: the Centro Per La Lotta Contro L'infarto - Optimization Of Percutaneous Coronary Intervention (CLI-OPCI) LATE study. *EuroIntervention* 2018; 14: e443-e451.
- [4] Basketter V, Benney M, Causer L, Fleure L, Hames D, Jones S, Patel K and White L. Continuous, comprehensive and crucial care: the role of the CNS in the metastatic castration-resistant prostate cancer patient pathway. *Br J Nurs* 2018; 27: S1-S8.
- [5] Caskey R, Moran K, Touchette D, Martin M, Munoz G, Kanabar P and Voorhees B. Effect of comprehensive care coordination on medicaid expenditures compared with usual care among children and youth with chronic disease: a randomized clinical trial. *JAMA Netw Open* 2019; 2: e1912604.
- [6] Cabral AC, Moura-Ramos M, Castel-Branco M, Fernandez-Llimos F and Figueiredo IV. Cross-



- cultural adaptation and validation of a European Portuguese version of the 8-item Morisky medication adherence scale. *Rev Port Cardiol (Engl Ed)* 2018; 37: 297-303.
- [7] Al Amer R, Al Khalifa K, Alajlan SA and Al Ansari A. Analyzing the psychometric properties of the short form-36 quality of life questionnaire in patients with obesity. *Obes Surg* 2018; 28: 2521-2527.
  - [8] Qu L, Ge S, Li N, Wang W, Yang K, Wu P, Wang X and Shi J. Clinical evaluation of deep brain stimulation of nucleus accumbens/anterior limb of internal capsule for opioid relapse prevention: protocol of a multicentre, prospective and double-blinded study. *BMJ Open* 2019; 9: e023516.
  - [9] Zhu Y, Yang T, Duan J, Mu N and Zhang T. MALAT1/miR-15b-5p/MAPK1 mediates endothelial progenitor cells autophagy and affects coronary atherosclerotic heart disease via mTOR signaling pathway. *Aging (Albany NY)* 2019; 11: 1089-1109.
  - [10] Li Y, Chang H, Ni L, Xue P, Li C, Yuan L, Cui H and Yu C. Analysis of thrombelastogram-guided medication in patients with coronary heart disease after percutaneous coronary intervention. *Exp Ther Med* 2019; 17: 3047-3052.
  - [11] Kähkönen O, Saaranen T, Kankkunen P, Lami-di ML, Kyngäs H and Miettinen H. Predictors of adherence to treatment by patients with coronary heart disease after percutaneous coronary intervention. *J Clin Nurs* 2018; 27: 989-1003.
  - [12] Griffiths F, Babalola O, Brown C, de Kadt J, Malatji H, Thorogood M, Tseng YH and Goudge J. Development of a tool for assessing quality of comprehensive care provided by community health workers in a community-based care programme in South Africa. *BMJ Open* 2019; 9: e030677.
  - [13] Abdel-Ail M, Abimbola S, Praveen D and Joshi R. What do Accredited Social Health Activists need to provide comprehensive care that incorporates non-communicable diseases? Findings from a qualitative study in Andhra Pradesh, India. *Hum Resour Health* 2019; 17: 73.
  - [14] Hwang EJ and Sim IO. Effect of a comprehensive health care program on blood pressure, blood glucose, body composition, and depression in older adults living alone: a quasi-experimental pretest-posttest study. *Int J Environ Res Public Health* 2019; 17: 220.
  - [15] Nerlekar N, Ha FJ, Cheshire C, Rashid H, Cameron JD, Wong DT, Seneviratne S and Brown AJ. Computed tomographic coronary angiography-derived plaque characteristics predict major adverse cardiovascular events: a systematic review and meta-analysis. *Circ Cardiovasc Imaging* 2018; 11: e006973.
  - [16] Choi DH, Kobayashi Y, Nishi T, Kim HK, Ki YJ, Kim SS, Park KH, Song H and Fearon WF. Combination of mean platelet volume and neutrophil to lymphocyte ratio predicts long-term major adverse cardiovascular events after percutaneous coronary intervention. *Angiology* 2019; 70: 345-351.
  - [17] Hou Y, Yue Y, Zhao M and Jiang S. Prevalence and association of medication nonadherence with major adverse cardiovascular events in patients with myocardial infarction. *Medicine (Baltimore)* 2019; 98: e17826.
  - [18] Tang QJ, Lei HP, Wu H, Chen JY, Deng CY, Sheng WS, Fu YH, Li XH, Lin YB, Han YL and Zhong SL. Plasma miR-142 predicts major adverse cardiovascular events as an intermediate biomarker of dual antiplatelet therapy. *Acta Pharmacol Sin* 2019; 40: 208-215.
  - [19] Raychev RI, Stradling D, Patel N, Gee JR, Lombardi DA, Moon JL, Brown DM, Pathak M, Yu W, Stratton SJ and Cramer SC. Evolution of a US county system for acute comprehensive stroke care. *Stroke* 2018; 49: 1217-1222.
  - [20] Beckman D, Wardian J, Sauerwein TJ and True MW. Evaluation of an interprofessional continuing professional development course on comprehensive diabetes care: a mixed-methods approach. *J Eval Clin Pract* 2019; 25: 148-154.