



Interventions in reducing anxiety among patients undergoing percutaneous coronary intervention (PCI): an integrated literature review

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ABSTRAK

Latar belakang: Prosedur intervensi koroner perkutan (PCI) merupakan tindakan untuk memulihkan aliran darah arteri koroner yang berkurang akibat oklusi atau penyumbatan. Tindakan yang kompleks dengan menggunakan alat-alat canggih dengan kondisi pasien yang sadar sepenuhnya dapat menyebabkan klien mengalami kecemasan, baik sebelum, selama, maupun setelah tindakan. Banyak pasien yang menjalani PCI mengalami gejala kecemasan ini. Gejala ini dapat menyebabkan aktivasi saraf simpatis, perubahan status hemodinamik, hingga risiko aritmia selama atau setelah prosedur. Intervensi untuk mengurangi kecemasan diharapkan dapat menstabilkan hemodinamik, menghindari efek yang tidak diinginkan selama dan setelah prosedur, selanjutnya juga dapat meningkatkan kualitas hidup pasien.

Tujuan: Tinjauan pustaka terpadu ini bertujuan untuk mengetahui intervensi pelengkap yang dapat dilakukan secara mandiri untuk mengatasi kecemasan yang dialami pada pasien yang menjalani PPCI.

Metode: Database yang dihimpun diambil dari database EBSCO, Scopus, Clinical Key, ProQuest, Science Direct, PubMed, dan Cochrane, dan diterbitkan pada tahun 2015 - 2020 yang kemudian dicocokkan dengan kata kunci spesifik tertentu untuk mendapatkan artikel yang sesuai. Sebanyak 11 artikel terpilih telah direview dan hasilnya disajikan dalam sebuah tabel. Hasil dari 6 jenis intervensi ditemukan, hampir semuanya signifikan dalam menurunkan kecemasan. Selanjutnya, penilaian kualitas artikel yang dipilih dilakukan dengan menggunakan The Critical Appraisal Skills Program (CASP).

Hasil: Terdapat 11 artikel yang membahas 6 bentuk intervensi yang berbeda dalam mengurangi kecemasan, antara lain terapi fisik (2 artikel), terapi relaksasi (2 artikel), terapi kognitif (2 artikel), terapi psikologis (1 artikel), dan program terapi psikologis. (gabungan) (1 artikel) dan informasi / dukungan / konseling (3 artikel).

Kesimpulan: Intervensi ini selain dapat mengurangi kecemasan juga dapat menurunkan stres, keseimbangan hemodinamik / indikator fisiologis, menurunkan nyeri, meningkatkan kualitas hidup dan mekanisme koping.

KATA KUNCI: intervensi koroner perkutan; intervensi untuk mengatasi kecemasan atau stres; terapi komplementer; intervensi keperawatan

ABSTRACT

Background: The percutaneous coronary intervention procedure (PCI) is an action to restore reduced coronary artery blood flow due to occlusion or blockage. Complex actions using sophisticated tools with the patient's condition fully aware can cause clients to experience anxiety, both before, during, and after the action. Many patients undergoing PCI experience this symptom of anxiety. These symptoms can lead to activation of the sympathetic nerves, changes in hemodynamic status, to the risk of arrhythmias during or after the procedure. Intervention to reduce anxiety hopefully can stabilize haemodynamic, avoid unwanted

effects during and after the procedure, further can also improve the patient's quality of life. **Objectives :** This integrated literature review aims to find complementary interventions that can be carried out independently to overcome the anxiety experienced among patients undergoing PPCI.

Methods: The compiled database was taken from the EBSCO, Scopus, Clinical Key, ProQuest, Science Direct, PubMed, and Cochrane databases, and published in 2015 - 2020 which were then matched with certain specific keywords to get the appropriate articles. A total of 11 selected articles were reviewed and the results were presented in a table. The results of 6 types of intervention were found, almost all of them were significant in reducing anxiety. Next, appraisal of the quality of selected articles is done by using The Critical Appraisal Skills Programme (CASP).

Results: There were 11 articles that discussed 6 different forms of intervention in reducing anxiety, including physical therapy (2 articles), relaxation therapy (2 articles), cognitive therapy (2 articles), psychological therapy (1 article), and psychological therapy programs (combined) (1 article) and information / support / counseling (3 articles).

Conclusions: This intervention in addition to reducing anxiety can also reduce stress, hemodynamic balance / physiological indicators, reduce pain, improve quality of life and coping mechanisms.

KEYWORD: percutaneous coronary intervention; intervention to treat anxiety or stress; complementary therapy; nursing intervention

Article Info:

Article submitted on March 07, 2021

Article revised on May 10, 2021

Article received on June 06, 2021

DOI: [http://dx.doi.org/10.21927/jnki.2021.9\(2\).88-110](http://dx.doi.org/10.21927/jnki.2021.9(2).88-110)

INTRODUCTION

Anxiety in patients undergoing a percutaneous coronary intervention (PCI) procedure can occur both before, during and after the procedure. For many patients undergoing PCI, the pre-procedural period includes periods of increased angina symptoms or acute chest pain and an urgent need for hospitalization, so it is not surprising that anxiety levels are reported to peak before PCI (1). The physical situations and conditions felt before and during the procedure can be psychologically uncomfortable. As for the post-treatment period, the findings of anxiety or depression symptoms indicate that some post-PCI cardiac rehabilitation participants can experience these disorders as more persistent symptoms appear in patients, and from the results of research after three years patients have higher levels of anxiety but depression levels lower than expected, indicating that anxiety symptoms are a long-term

concern after PCI, while depression levels are not (2).

Anxiety is a common symptoms felt by patients who will undergo medical treatment include preoperative. Anxiety level also can be vary depending on patient's condition. These symptoms can lead to activation of the sympathetic nerves, changes in hemodynamic status, to the risk of arrhythmias during or after the procedure (3). Management of anxiety through appropriate interventions is expected to prevent patients from these adverse physical symptoms. Intervention to reduce anxiety hopefully can stabilize haemodynamic, avoid unwanted effects during and after the procedure, further can also improve the patient's quality of life. Successful coronary catheterization results in a significant reduction in physical limitations as well as an increase in health status (4).

The presence of nurses before, during and after the procedure is very important in increasing self-confidence and mental support. This point in time may be a very important time for the nurse to interact with the patient (1). This integrated literature review aims to find complementary interventions that can be carried out independently to overcome the anxiety experienced among patients undergoing PCI.

MATERIALS AND METHODS

This integrated literature review uses PRISMA as an article selection process, as shown in Figure 1. The author collects articles from several studies using quantitative methods and obtains 10 quantitative RCT articles and 1 quasi-experimental article that are considered the most suitable for keywords, to define complementary interventions other than pharmacological therapy, best for dealing with anxiety in patients undergoing PCI. The author collects articles related to the research objectives through several stages of the search process which are illustrated in Figure 1, using the keywords “percutaneous coronary intervention”, “anxiety or stress management intervention”, “complementary therapy”, and “nursing intervention”. The database and search engine for articles published in English used consisted of 7 database sources: EBSCO, Scopus, Clinical Key, ProQuest, Science Direct, PubMed, and Cochrane published in 2015 - 2020. Of the 7 databases, 93 articles were identified. From the search results selected using certain keywords. Then the screening process was carried out by eliminating duplicated articles, articles consisting of only abstracts or short reviews, and articles in languages other than English so that 51 articles were obtained. The next process looks at the appropriateness of the articles collected so that researchers only take full-text articles rather than only review abstracts, eliminate duplication, speak English, the participant subjects are only adult patients, not experimental animals, articles only

take reputable scientific journals and articles that are considered the most suitable with keywords was determined, resulting in 11 articles that entered the integrated literature review. The findings of the articles that best fit all the criteria included in the review are described individually in Table 1, the explanations of the research results on various forms of intervention and anxiety reduction results are described in Table 2, and finally, the summary of critical assessments is described in Table 3.

RESULTS AND DISCUSSION

This Integrated Literature Review focuses on a total of 11 articles on interventions to reduce anxiety in patients undergoing PCI interventions. The number of interventions reviewed included 11 articles that discussed 6 different forms of intervention, including physical therapy (2 articles), relaxation therapy (2 articles), cognitive therapy (2 articles), psychological therapy (1 article), psychological therapy programs (combined) (1 article) and information/support/counseling (3 articles). The critical appraisal process is carried out using the Critical Appraisal Skill Program (CASP) standard checklist for research using the Revised Randomized Control Trial (RCT) method in October 2020 (5).

The selection of RCTs in the majority of the selected article methods is based on an important reason that studies that do not use randomization are at risk of having systematic differences between groups, which cannot determine whether the intervention, or other factors, ultimately influences the outcome of the study (6) Although 1 article with quasi-experimental was included as well because it has a good appraisal. The articles selected in this integrated literature review involved patients who underwent intervention both before, during and after the PPCI procedure. A summary of the intervention outcomes (differences between groups for treatment vs control or comparison groups) for all forms of intervention and the results are presented in Table 2, while the results of the appraisal are presented in Table 3.

Anxiety Reduction Interventions

Physical therapy: Massage Therapy and Tai Chi.

A total of 11 articles regarding methods of reducing anxiety, only 2 mentioned physical therapy in patients undergoing PCI, namely massage therapy (Hong, et.al., 2015) and 24-form Tai Chi Exercise (Liu, et.al., 2020).

The massage therapy, mentioned in the article, is carried out for 20 minutes before the procedure in a quiet environment without interference with the sitting patient. Although it does not mention whether the massage therapist should pass the training or not, the procedures and steps for the order of body parts are specified in the massage intervention. This therapy did not significantly reduce trait anxiety ($p > 0.05$) but state anxiety was significantly higher in the control group compared with the intervention group ($p < 0.001$). Massage therapy also had a significant physiological impact (SBP, DBP and HR), which in the intervention group was significantly lower than in the control group ($P < 0.05$). The level of pain was also reported to have decreased statistically significant in the intervention group ($P = 0.009$), with the percentage of level 3 pain level in the control group being higher (10.3% vs 3.4%).

Tai Chi exercises carried out in the study used certain techniques, namely 24 forms according to the reference The Health Qigong 24 Taijuquan form, nor was it stated whether they were carried out / taught by trained instructors or simply by following references The results obtained after applying 2 times per day in the morning and evening, for 10 months, there was a decrease in the severity of anxiety and depression between the intervention and control groups ($p < 0.05$), stress scores ($p = 0.001$), improved quality of life ($p < 0.05$) and increased physiological indicators in the form of serum miR-17-92 ($p = 0.001$) in the comparison of the intervention and control groups.

Relaxation Therapy: Music Therapy, Natural Sound, MBSR and CBT.

Auditory therapy is currently a complementary therapy that is developing as a non-pharmacological anxiety management strategy that is widely applied in research. One of the most common non-pharmacological anxiety management strategies is music therapy. Music therapy is a safe, simple, inexpensive, and non-invasive nursing intervention that can be used as a complementary therapy for anxiety management.

This therapy was studied by Forooghy (2015) and Akarsu (2019) in patients undergoing PCI. Music media of various types of genres played with headphones is quite effective in reducing anxiety. Instrumental music for 20-40 minutes selected by the patient as well as the nature sound 30 minutes before the action showed the same significant results in reducing anxiety ($p = 0.014$ and $p < 0.05$).

In Akarsu's (2019) study also compared with a comparison group using earplugs with the same significant results compared to natural sounds, and there was no difference between the two ($p > 0.05$). The voice of nature has the advantage that it is not specific to the culture of a particular geography and can be applied to anyone. Sound affects the central nervous system and causes a physiological response namely increased parasympathetic activity and decreased sympathetic nerves.

Cognitive Therapy: MBSR and CBT

Mindfulness Based Stress Reduction (MBSR) and Cognitive Behavioral Therapy (CBT) are known as adjunctive therapies that incorporate the patient's cognitive elements, by increasing awareness and having an effect on the character building of the patient's behavior.

The MBSR applied in the research of Hou, et.al. (2019) used alternative telephone interactions for follow-up of patients who continued the intervention independently at home. While

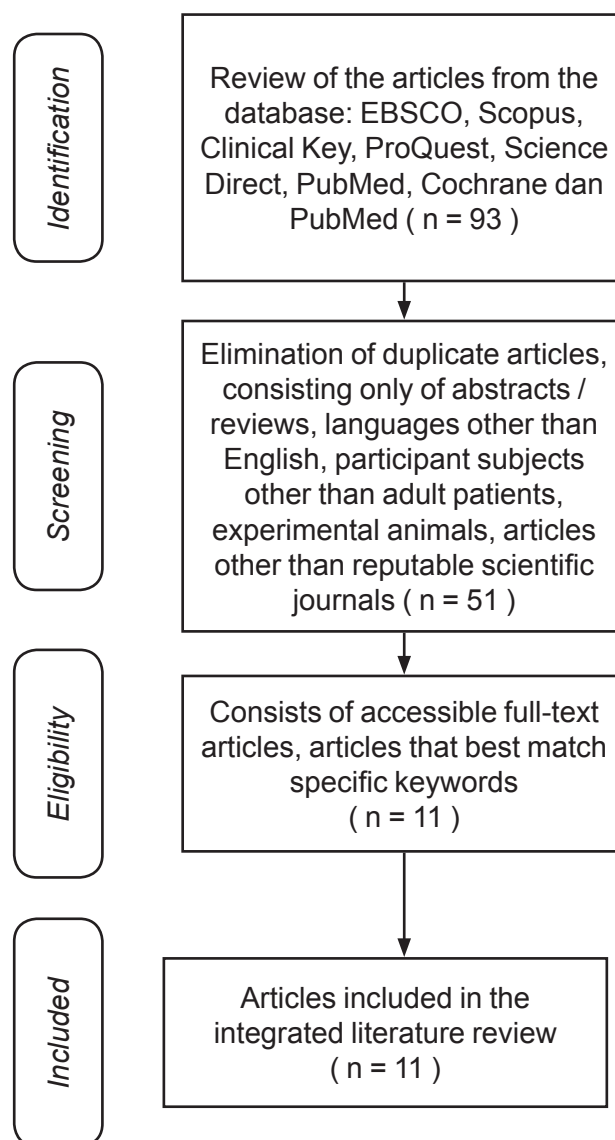


Figure 1. Article Selection Process based on the PRISMA Model

CBT by Lv, et.al. (2016) conducted by a clinical psychologist in a face-to-face manner. The long duration of MBSR (6 weeks) and CBT (1-2 times per week total 6 sessions, evaluation after 8 weeks) resulted in a significant reduction in anxiety ($p = 0.006$ and $p = 0.003$).

Psychological Therapy

There is only 1 article that discusses psychological therapy, namely research by Chang, et.al. (2020). The form of intervention was a nurse-led psychological intervention consisting of structured counseling sessions for 30 minutes a day before and 24 hours after PCI, which was

carried out by consultant nurses with therapeutic and psychological counseling qualifications. The method used was question-and-answer, and focused on increasing the patient's comfort level and confidence in participating in post-PCI care recommendations. This intervention caused the average score of anxiety scale in the control group to be higher than in the intervention group ($P < 0.01$), but did not show a significant difference between baseline and post-intervention scores ($p > 0.05$). It is possible that the results are influenced by the short time of intervention, so they have not shown significant results.

Psychological Therapy Program (Combined cognitive therapy, relaxation, and emotional support)

A series of psychological therapy programs with a combination of cognitive therapy, relaxation therapy and emotional support were investigated by Shen, et.al. (2018). Details of the three components of the intervention program include: 1) cognitive therapy (the day before the action for 30 minutes); 2) relaxation therapy (every day in hospital, morning and evening 15-30 minutes); and 3) emotional support (daily communication with patient and family). Well scheduled program sequences. Cognitive therapy is started when the patient decides to undergo the action (30-45 minutes) and the day before the action (30 minutes), with audiovisual media in the form of a video that shows the process of action and things to pay attention to after the action by bedside. Relaxation therapy is carried out every morning and evening during treatment at the hospital (15-30 minutes). Emotional support through daily communication aims to create a relaxed and warm atmosphere for the patient and his family, providing moral reinforcement and daily care. Patients and families are supported to communicate with each other, and are welcome to visit post-PCI patients in the ICU.

This intervention program gave significantly lower anxiety scores in the intervention group than in the control group (15.17 ± 3.74 vs 21.97 ± 7.02) significantly after the test ($p < 0.05$).

Provision of Information / Support / Counseling

DISCUSSION

Three interventions that provide methods in terms of providing information are carried out in 2019 by Coronas Watkins (7) with nursing led-intervention, Haddad, et.al. in 2018 with nursing-led video (8), and Brand, et.al. (9) with medical graphic narratives in the form of an informed consent process using visual media pictorial / comics.

The nurse-led clinic uses an individual-centered approach in providing health education

according to patient needs, health assessments, and post-discharge support. Communication is carried out interactively, using visual and verbal methods. This intervention showed a decrease in trait anxiety, namely a moderate reduction in the intervention group ($d = 0.50$), and there was a worsening state anxiety in some patients in the control group (6 people; 30%); and improvement and recovery were seen in the majority of patients in the intervention group (9 people; 69.25%).

Nursing-led video is an intervention to provide information through a 20-minute video accompanied by a summary pamphlet (2 hours before the procedure), using photos and animated illustrations to explain some information, including: PCI procedures, benefits and consequences, team members on the PCI action procedures that will be performed, the anesthesia team, arterial access location, use of iodine contrast, length of procedure, position after procedure, fluid intake, and post-procedure care. This video intervention showed a reduction in anxiety at 4-6 hours post-PCI, in both groups, but was more significant in the intervention group ($p < 0.001$).

Medical graphic narratives is the shortest intervention because it is only implemented when taking informed consent (IC), which distinguishes it from the control group in the form of IC with graphic / comic illustrations which are considered to provide clearer information. The results of this intervention showed a good effect on the anxiety status of periprocedural ($p < 0.001$).

From 11 articles reviewed by researchers, it was found that the role of nurses in communicating and supporting patients is very important. As many as 7 out of 11 articles use this approach, both in the form of nursing-led intervention and with alternatives such as mindfulness based stress reduction (MBSR) and cognitive behavioral therapy (CBT). Intense, periodic and patient-centered forms of communication have been shown to be effective in reducing anxiety.

Many factors influence the emotional state of the patient during the period before the PCI procedure (both before and after the procedure), such as lack of knowledge about interventional therapy and uncertainty about the safety of the procedure, these factors can easily cause anxiety in PCI patients (10). Anxiety is an important factor in cardiovascular disease, therefore in 2008, the American Heart Association (AHA) recommended routine depression screening in patients with coronary heart disease to guide treatment options and in 2014 the AHA proposed depression as a risk factor for adverse outcomes in patients with ACS and was studied by Xiao et al., in 2019 (11). Measurement of the outcome of patients with cardiovascular disease has been widely studied since 1995, including in addition to physical indicators it also includes psychological and mental indicators, including on anxiety, depression and stress. The quantitative analysis of a prospective study covering a total of 6,000 plus patients with cardiovascular conditions showed that type D personality (distress) was associated with a more than 3-fold increased risk of side effects and long-term psychological distress. In a study of patients with acute coronary syndrome, the personality of patients who were prone to depression could predict stress symptoms. This personality can predict the prevalence, persistence, and severity of anxiety symptoms in cardiac patients, as well as adjustment for depressive symptoms (12). Indicators of psychological factors such as depression and anxiety are related to the development, manifestation and progression of coronary heart disease (13).

Research has shown that severe anxiety is associated with decreased immunity and changes in cardiovascular function, which can lead to symptoms, such as arrhythmias and vascular inflammation, and can lead to damage to coronary artery conditions (10). Anxiety significantly causes activation of the sympathetic nerves, resulting in increased heart rate, hypertension, increased

chances of arrhythmias (14), furthermore it can even lead to delayed wound healing, increased risk of infection, electrolyte and fluid imbalance, changes in sleep patterns, increased pain after treatment, and late discharge from the hospital, and the role of nurses is very large in overcoming this (10).

Zhang (2015) mentioned that there was a large number of studies have shown that patients after PCI have high levels of anxiety / depression and other negative emotions, which can seriously affect post-treatment rehabilitation and disease healing, accentuating the psychological burden of patients and families (15). According to the research, the incidence of anxiety after undergoing the PCI action was found to be more in women than men. This could be influenced by the frequency of high stressful life events and lower perceptions of social support, which are described as factors associated with a higher frequency of depression in women (13).

Even patients who have undergone the PCI procedure will still reflect on the diagnosis they received (coronary heart disease) and its implications for their life plans. This is particularly likely the case in patients undergoing PCI for the first time, who are more anxious than those undergoing recurrent PCI (1). Patients in the setting for emergency PCI or PCIP (primary compressive coronary intervention) also had higher anxiety than those with planned elective PCI.

The full presence of the nurse makes it possible to help the patient manage anxiety by addressing the problems that the patient considers most important. The most common patient concerns before the procedure are related to the procedural outcome, information about the overall success rate of PCI and the probability of risk that the nurse can convey when preparing for the procedure, or even when asking for informed consent using media that is attractive and easily understood by the patient (9). However, there is clearly a need for re-administration of

this information upon discharge from hospital, as this concern becomes more common once the patient has been discharged, so that the patient is routinely controlled and continues the rehabilitation program. This is due to depression that was reported after the patient experienced acute coronary syndrome (ACS) and undergo PCI, thereby reducing control and rehabilitation rates, and have a greater tendency to stop before completing therapy (16).

CONCLUSION AND RECOMMENDATION

The form of independent intervention by nurses that can be easily carried out in addition to complementary therapy, still needs to be studied and explored in its implementation, one of which is quite easy to apply with proven results is communication therapy in the form of providing information, support, and counseling.. Intense, periodic and patient-centered communication which is one of the most frequently performed therapeutic interventions by nurses, is free of charge and does not require special training or certification, unlike CBT and MBSR. Interventions with therapeutic communication should be easily implemented and become an inspiration in conducting independent nursing interventions, which can be applied in the setting of cardiovascular disease care services, either before, during or after PCI measures such as emergency rooms, inpatient rooms, cardiac catheterization rooms (Cath Lab) and cardiac rehabilitation, in order to reduce anxiety and further improve the quality of life and prevent patients from unwanted physiological effects due to anxiety or depression.

REFERENCES

1. Trotter R, Gallagher R, Donoghue J. Anxiety in patients undergoing percutaneous coronary interventions. *Hear Lung J Acute Crit Care*. 2011;40(3):185–92.
2. Olsen SJS, Schirmer H, Wilsgaard T, Bønaa KH, Hanssen TA. Cardiac rehabilitation and symptoms of anxiety and depression after percutaneous coronary intervention. *Eur J Prev Cardiol*. 2018;25(10):1017–25.
3. Delewi R, Vlastra W, Rohling WJ, Wagenaar TC, Zwemstra M, Meesterma MG, et al. Anxiety levels of patients undergoing coronary procedures in the catheterization laboratory. *Int J Cardiol [Internet]*. 2017;228:926–30. Available from: <http://dx.doi.org/10.1016/j.ijcard.2016.11.043>
4. Chaudhury S, Srivastava K. Relation of depression, anxiety, and quality of life with outcome after percutaneous transluminal coronary angioplasty. *Sci World J*. 2013;2013.
5. CASP. CASP Randomised Controlled Trial Standard Checklist. *Casp [Internet]*. 2020;(September 2020):4–7. Available from: https://casp-uk.net/wp-content/uploads/2020/10/CASP_RCT_Checklist_PDF_Fillable_Form.pdf
6. Cavaleri R, Bhole S, Arora A. Critical appraisal of quantitative research. *Handb Res Methods Heal Soc Sci*. 2019;1027–49.
7. Coronas-Watkins KM, Theobald KA, White KM. Outcomes of a randomised pilot trial of a nurse-led clinic for patients after percutaneous coronary intervention. *Aust Crit Care [Internet]*. 2019;32(4):285–92. Available from: <https://doi.org/10.1016/j.aucc.2018.06.009>
8. Haddad NE, Saleh MN, Eshah NF. Effectiveness of nurse-led video interventions on anxiety in patients having percutaneous coronary intervention. *Int J Nurs Pract*. 2018;24(4):1–8.
9. Brand A, Gao L, Hamann A, Martineck S, Stangl V. Annals Graphic Medicine - Patient-Informed Consent. *Ann Intern Med*. 2019;170(8):W90–106.
10. Qin S, Gu Y, Song T. Effect of peer support on patient anxiety during the coronary

- angiography or percutaneous coronary intervention perioperative period: A protocol for a systematic review and meta-analysis of randomised controlled trials. *BMJ Open*. 2020;10(3):1–5.
11. Xiao Y, Li W, Zhou J, Zheng J, Cai X, Guo M, et al. Impact of depression and/or anxiety on patients with percutaneous coronary interventions after acute coronary syndrome: A protocol for a real-world prospective cohort study. *BMJ Open*. 2019;9(9):1–6.
 12. Denollet J, Schiffer AA, Spek V. A general propensity to psychological distress affects cardiovascular outcomes: Evidence from research on the type D (distressed) personality profile. *Circ Cardiovasc Qual Outcomes*. 2010;3(5):546–57.
 13. Furuya RK, Costa E de CA, Coelho M, Richter VC, Dessotte CAM, Schmidt A, et al. Anxiety and depression among men and women who underwent percutaneous coronary intervention. *Rev da Esc Enferm*. 2013;47(6):1333–7.
 14. Johnson B, Francis J. Stress and cardiac arrhythmias. *Indian Pacing Electrophysiol J*. 2014;14(5):230–2.
 15. Zhang PY. Study of Anxiety/Depression in Patients with Coronary Heart Disease After Percutaneous Coronary Intervention. *Cell Biochem Biophys*. 2015;72(2):503–7.
 16. McGrady A, McGinnis R, Badenhop D, Bentle M, Rajput M. Effects of depression and anxiety on adherence to cardiac rehabilitation. *J Cardiopulm Rehabil Prev*. 2009;29(6):358–64.
 17. Peng S, Ying B, Chen Y, Sun XM. Effects of massage on the anxiety of patients receiving percutaneous coronary intervention. *Psychiatr Danub*. 2015;27(1):44–9.
 18. Liu J, Yu P, Lv W, Wang X. The 24-Form Tai Chi Improves Anxiety and Depression and Upregulates miR-17-92 in Coronary Heart Disease Patients After Percutaneous Coronary Intervention. *Front Physiol*. 2020;11(March):1–10.
 19. Forooghi M, Mottahedian Tabrizi E, Hajizadeh E, Pishgoo B. Effect of Music Therapy on Patients' Anxiety and Hemodynamic Parameters During Coronary Angioplasty: A Randomized Controlled Trial. *Nurs Midwifery Stud*. 2015;4(2).
 20. Akarsu K, Koç A, Ertuğ N. The effect of nature sounds and earplugs on anxiety in patients following percutaneous coronary intervention: A randomized controlled trial. *Eur J Cardiovasc Nurs*. 2019;18(8):651–7.
 21. Hou Y, Zhao X, Lu M, Lei X, Wu Q, Wang X. Brief, one-on-one, telephone-adapted mindfulness-based stress reduction for patients undergoing percutaneous coronary intervention: A randomized controlled trial. *Transl Behav Med*. 2019;9(6):1216–23.
 22. Lv J, Zhang X, Ou S, Gu S, Su Z, Tong S, et al. Influence of cognitive behavioral therapy on mood and quality of life after stent implantation in young and middle-aged patients with coronary heart disease. *Int Heart J*. 2016;57(2):167–72.
 23. Chang Z, Guo A qing, Zhou A xia, Sun TW, Ma L le, Gardiner FW, et al. Nurse-led psychological intervention reduces anxiety symptoms and improves quality of life following percutaneous coronary intervention for stable coronary artery disease. *Aust J Rural Health*. 2020;28(2):124–31.
 24. Shen, X. Z, Y. WW, Y. Z, L. Y, Y. WW, et al. Effects of a psychological intervention programme on mental stress, coping style and immune function in percutaneous coronary intervention patients. *PLoS One* [Internet]. 2018;13(1):e0187745. Available from: <http://www.embase.com/search/results?subaction=viewrecord&from=export&id=L620299256%0Ahttp://dx.doi.org/10.1371/journal.pone.0187745>

Appendix

Table 1. Results of a review of various types of interventions to reduce anxiety in patients undergoing percutaneous coronary intervention (PCI).

No.	Author, Year & Research Location	Research Design and Objectives	Population and Sample	Intervention and comparison / control	Measured output	Other outputs measured	Research result	Other measured research results	Conclusion
1.	Peng, 2015 Zhejiang Province, China	<i>Randomized Controlled Trial</i> Purpose: To find out whether massage therapy is effective in reducing anxiety levels.	The population of patients from 3 general hospitals in Zhejiang province, the samples were selected based on inclusion and exclusion criteria. The sample was divided into 2 sample groups (n = 117): IG =59 and CG = 58.	Patients in CG receive routine care and do not receive massage, whereas IG patients are given massage interventions. All patients were in a relatively quiet and distraction-free environment during the intervention. The IG patients are positioned seated, their backs facing the massager. The massage time is 20 minutes before the procedure, and the main body parts being massaged are the head, neck, shoulders and back.	Anxiety level: measurement uses the State-Trait Anxiety Inventory (STA). Two measurements are used, namely state anxiety (S-AI) and trait anxiety (T-AI), each consisting of 4 levels on a Likert scale. Data were collected at 3 times: baseline the day before the treatment, 1 hour before and 2 days after admission. The sum of each item gets the total score. A high score indicates a high level of patient anxiety.	There are 3 indicators of physiological stress response, namely: HR is measured with a stethoscope, SBP and DBP are measured with a sphygmomanometer cuff. Pain Level Measurement: 4-level verbal scale for pain severity assessment by Blenkham et al. (2002). Based on complaints in the form of pain degrees: Likert scale 0 to 3 (not significant pain to severe pain).	General information: The two groups showed differences in TS in terms of gender, age, and the number of stents required by patients. The difference in T-AI between the two groups at any time point was not statistically significant (P> 0.05). However, the S-AI scores from IG and CG are both high. The difference in CG was statistically significant (P = 0.022), while the difference in GI was not significant (P = 0.332). The day before surgery, S-AI on CG was significantly higher than that of IG, and changes in BG difference values were statistically significant (P <0.001).	Physiological Stress Response Indicators: One hour before treatment, the 3 indicators of GI were significantly lower than CG (P <0.05). Comparison of WG shows that SBP, DBP, HR in IG and CG gradually increased up to the time of PCI action, but was less prominent in IG than CG. Pain Level Measurement: IG was lower than CG, and the difference was statistically significant (P = 0.009). The difference in BG was also statistically significant (P = 0.010). Percentage level 3 pain grade with CG> IG (10.3% vs 3.4%).	Massage therapy interventions reduce the anxiety levels of cardiovascular patients prior to PCI. Post-intervention BP, HR, and pain scores were significantly better in IG than CG.

2. Foroughy, et al., 2015, Tehran, Iran	<p><i>Randomized Controlled Trial</i> without blinding, 2 parallel group. Objective: To determine the effect of music therapy on patient anxiety and hemodynamic parameters during PTCA</p>	<p>The study population was patients who underwent PTCA in the Cath Lab unit of Baqiyatallah Hospital, Tehran, Iran, from January to April 2014. Samples were selected based on inclusion and exclusion criteria. the number of samples in each IG and CG were 32 (n = 64).</p>	<p>Patients on CG received the same treatment as IG, except they received no music intervention. IG receives musical intervention with headphones (disinfected before use) to help patients concentrate and to prevent interference to Cath Lab personnel. Music therapy sessions last for 20 - 40 minutes, depending on the length of the PTCA. Music is started 6 minutes after local anesthesia of lidocaine in the groin (ie immediately before inserting the artery sheath and catheter), using a digital MP3 player. The music consists of light instrumentals by Johann Sebastian Bach and Mariko Makino.</p>	<p>The level of anxiety used the Spielberger's State Anxiety Inventory (SSAI), consisting of 20 items that measure anxiety status, a Likert scale ranging from Never (score 1) to Always (score 4). Some items have a negative shape so they are scored backwards. Total SSAI score 20-80. Higher scores mean higher anxiety. SSAI data were collected at the time before the patient entered the Cath Lab. Hemodynamic parameters were recorded at 5 times: 10 minutes before (T1), immediately after initiation of intervention (T2), 10 minutes after (T3), 20 minutes after starting PTCA (T4) and 30 minutes after intervention was completed (T5).</p>	<p>The hemodynamic parameters and demographic questionnaire consisted of questions about the patient's demographic characteristics, including the subject's age, gender, education level, and marital status.</p>	<p>Prior to the intervention, the two study groups were not significant in terms of anxiety levels and hemodynamic parameters. However, the level of postintervention anxiety on GI was significantly lower than CG (32.06 ± 8.57 and 38.97 ± 12.77, respectively; P = 0.014). Compared with baseline reading, the level of anxiety on CG did not change significantly after the study (41.91 ± 9.88 vs 38.97 ± 12.77; P = 0.101); However, on IG, the postintervention anxiety level was significantly lower than the pretest reading (32.06 ± 8.57 vs 41.16 ± 10.6; P = 0.001).</p>	<p>Hemodynamic parameters between the two groups were not significant after the intervention (P > 0.05).</p>	<p>Music therapy is a safe, simple, inexpensive, and non-invasive nursing intervention that can significantly reduce patient anxiety during PTCA.</p>
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Author & Research Location	Research Design and Objectives	Population and Sample	Intervention and comparison / control	Measured output	Other outputs measured	Research result	Other measured research results	Conclusion
3. Lv, 2016, China	<p><i>Prospective, randomized, controlled experiment.</i></p> <p>Purpose: This study aimed to determine the effect of CBT on mental status and QOL after PCI intervention in young and middle-aged patients with CAD.</p>	<p>The population was patients who underwent PCI at the Department of Cardiology, Southwest Hospital, Third Military Medical University between January 2014 and May 2014. Samples were selected based on inclusion and exclusion criteria. Computerized randomization divided into IG CBT (38) and CG (37).</p>	<p>IG with CBT received a combination of CBT, escitalopram, and alprazolam, whereas CG only received escitalopram and alprazolam. The duration of treatment is 8 weeks. Clinical psychologists with knowledge of cardiology who perform CBT, by speaking one-on-one with the patient and recording irrational perceptual and emotional scores in tabular form (the patient is asked to rate the emotional score with 0 meaning no anxiety or depression, and 100 representing anxiety or major depression). The psychologists then conducted CBT by involving families in meetings that were held every 1-2 weeks, each lasting 1 hour, for a total of 6 meetings.</p>	<p>Anxiety was measured using the HAM-D17, HAM-A questionnaire and assessed before and after the intervention. For HAM-D17 score: Points 8-17 indicate mild depression, 18-24 for moderate depression, and >24 for major depression. For HAM-A scores: Points > 29: severe anxiety; 22-28: significant anxiety; 15-21: anxiety; 8-14: possible anxiety; and 0-7: no anxiety; The limit score for anxiety is 14 points.</p>	<p>QOL with the Coronary Revascularization Outcome Questionnaire (CROQ-PTCA-POST, Chinese version) was assessed before and after the intervention. Consists of: symptoms, physical function, mental function, cognitive function, adverse reactions, and satisfaction.</p>	<p>The baseline HAM-D17 and HAM-A scores did not differ between the two groups (HAM-D17: 19.5 ± 6.8 versus 19.0 ± 7.9, P = 0.77; HAM-A: 23.3 ± 7.9 versus 24.2 ± 8.1, P = 0.62). After 8 weeks of treatment, HAM-D17 and HAM-A scores significantly decreased on GI CBT compared to CG without CBT (HAM-D17: 11.7 ± 4.5 versus 15.1 ± 3.9, P = 0.001; HAM-D17: 11.7 ± 4.5 versus 15.1 ± 3.9, P = 0.001; HAM-A: 10.6 ± 3.4 versus 16.5 ± 4.6, P = 0.003).</p>	<p>Age, sex, income, smoking, hypertension, diabetes, hyperlipidemia, causes of CAD, and all parameters for PCI were similar between the two groups (all P > 0.05). At study entry, all aspects of CROQ-PTCA-POST were comparable between the two groups (all P > 0.05). After 8 weeks of treatment, compared with CG, IG with CBT showed a better symptom score (78.8 ± 6.9 versus 74.4 ± 9.1, P = 0.02), physical function (79.6 ± 9) . . 3 versus 75.0 ± 9.8, P = 0.04), psychological functioning (86.9 ± 5.7 versus 80.2 ± 6.4, P < 0.001), and satisfaction (89.5 ± 5.2 versus 77.8 ± 9.5, P < 0.001). There was no difference in cognitive function (74.0 ± 13.4 versus 75.0 ± 14.2, P = 0.77).</p>	<p>CBT can significantly relieve depression and anxiety after PCI in young and middle-aged CAD patients. In addition, CBT can significantly increase QOL.</p>

Author & Research Location	Research Design and Objectives	Population and Sample	Intervention and comparison / control	Measured output	Other outputs measured	Research result	Other measured research results	Conclusion
4. Coronis-Watkins, 2019, Australia	<i>Two-Phase randomised pilot study.</i> Objective: To assess the effectiveness of the nurse-led clinic on self-efficacy, negative psychological symptoms of anxiety and depression 1 week after undergoing PCI and discharge from hospital.	The population was all post-discharge patients from the hospital after undergoing the PCI procedure in two major metropolitan hospital locations (one public hospital and one private hospital). A total of 188 participants were screened to determine a sample based on inclusion and exclusion criteria, resulted 33 participants and randomized using a random number generator (IG = 13 and CG = 20).	IG with the nurse-led clinic uses an individual-centered approach and provides HE according to patient needs, health assessments, and post-discharge support from the hospital. HE was carried out interactively, using visual and verbal methods. In stage 1, the Cardiac Self-efficacy Scale and State-Trait Anxiety Inventory measures the primary outcome, while The Cardiac Depression Scale is used to measure secondary outcomes. Stage 2 evaluates participants' experiences and health care and professional perceptions of the intervention through semi-structured interviews.	Anxiety status and traits: measured using the Spielberger's State-Trait Anxiety Inventory (STAI-T) subscale. Baseline data collection occurred on the day of hospital discharge planning (Time 1). The nurse-led clinic and follow-up were performed by the principal investigator on Day 5-7 (Time 2) after discharge. Then 1 month (Time 3), and 3 months (Time 4) after being discharged from the hospital by the researcher.	Self-efficacy: measured using The Cardiac Self-Efficacy (CSE) questionnaire Depression symptoms: measured using The Cardiac Depression Scale (CDS).	Stage 1: quantitative Self-efficacy: there was a moderate decrease in CSE (d = 0.60) on KI; whereas KK with standard care had no effect (d = 0.19).	Stage 1: quantitative Trait anxiety: Moderate reduction in GI (d = 0.50), whereas effect was nil on CG with standard care (d = 0.16). There was a result of worsening state anxiety in some CG participants (6 people; 30%); improvement and recovery were seen in most of the IC participants (9 people; 69.25%). Stage 2: qualitative 1. Support enhance recovery. 2. Self-awareness can improve self-management. 3. The patient comes to understand the situation.	In Stage 1, IC participants showed no improvement in mental health indicators compared to standard care KK participants, unless there was a moderate decrease in anxiety levels (d = 0.50). Qualitative findings stage 2: The nurse-led clinic is useful for reducing anxiety and supporting measures in the discharge period.

Author & Research Location	Research Design and Objectives	Population and Sample	Intervention and comparison / control	Measured output	Other outputs measured	Research result	Other measured research results	Conclusion
5. Shen, 2018, China	Randomized Controlled Trial The study aimed to assess the effects of psychological interventions on mental stress, coping style and cortisol and IL-2 levels of patients undergoing PCI.	The population enrolled PCI scheduled cardiac patients in 4 cardiovascular inpatient departments at teaching hospitals in northeast China, from August 2013 to May 2014. Samples were selected based on inclusion and exclusion criteria. A total of 207 eligible patients were screened with exclusion criteria (147) to 60 (IG and CG of 30 patients each), without loss to follow-up.	IG is receiving a psychological intervention program, in addition to usual care. The three components of the intervention program include: 1) cognitive therapy (the day before the action for 30 minutes); 2) relaxation therapy (every day in hospital, morning and evening 15-30 minutes); and 3) emotional support (daily communication with patient and family). Both IG and CG receive standard care: the same nursing care, preoperative preparation, and education about disease.	Self-Report Symptom Checklist (SCL-90), produced by L.R. Derogatis 1975. This checklist consists of 90 self-reported items, 9 symptom factors and 1 factor assessing additional items. This scale contains various items about feelings, thoughts, awareness, behavior, life habits, interpersonal relationships, diet, and sleep, among others. The ten factors are somatization, obsessive-compulsive disorder, interpersonal sensitivity, depression, anxiety, hostility, paranoid ideas, psychoticism, anxiety phobia, and others.	Medical Coping Mode Questionnaire (MCMQ), as well as levels of IL-2 and cortisol. All data were collected at the start of the study and the day before leaving the hospital.	Pre-test: the mean mental stress score as measured by the SCL-90 was 192.55 (SD = 38.06). Post-test: Anxiety scores (component SCL-90) were significantly lower on KI compared to KK (15.17 ± 3.74 vs 21.97 ± 7.02) significantly post-test (p < 0.05). Compared with CG, IG patients had better mental state and coping style (confrontation), higher IL-2 levels and lower cortisol levels (all p < 0.05).	Pre-test: the total score of coping force as measured by MCMQ was 48.82 (SD = 3.68), the mean level of IL-2 was 30.54 ng/ml (SD = 8.80) and the mean cortisol was 443.88 ng/ml (SD = 71.49). IG showed higher IL-2 levels and lower cortisol levels (P < 0.05). These significant values represent the majority of moderate effect sizes, with Cohen's d values calculated from ± 0.52 to ± 1.56.	The intervention provides psychological support for PCI patients in a comprehensive and systematic manner and helps patients to gradually adopt a positive coping style in a stressful PCI operating environment, increasing IL-2 and reducing cortisol levels. The main impact is helping patients to deal with the disease in the best physiological and mental state and enhancing the effect of PCI treatment.

No.	Author & Research Location	Research Design and Objectives	Population and Sample	Intervention and comparison / control	Measured output	Other outputs measured	Research result	Other measured research results	Conclusion
6.	Haddad, 2018, Yordania	<i>Pre-test, post-test quasi-experimental design.</i> This study aimed to evaluate the effectiveness of a nurse-led video-based educational intervention on anxiety in patients undergoing PCI.	The target population is patients who will undergo PCI at the Queen Alia Heart Institute (QAH). Samples were obtained by convenience sampling, and using inclusion-exclusion criteria. There were 64 patients in the sample calculation ($\alpha = 0.05$, moderate effect size 0.45) for the independent sample t-test, power 0.80, Cohen's table (1977). Considering the possibility of attrition, 106 patients were recruited. (IG and CG respectively 53 patients) then 2 patients from IG and 5 CG were discharged because they moved to the ICU post-PCI for open heart, so IG = 51 & CG = 48.	IG received a video-based HE intervention accompanied by a summary pamphlet, 2 hours before the procedure, presented via a 20 minute long Digital Video, using photos and animated illustrations to explain the following: The PCI procedure, its benefits and consequences, team members, anesthesia, arterial access location, use of iodine contrast, procedure duration, position after procedure, fluid intake, and post-procedure care. CG received standard routine care, where they were instructed to visit the hospital 1 day before the procedure to undergo a complete physical examination and screening, and receive preparatory verbal instructions, such as fasting time, skin preparation, and the need to increase post-procedure fluid intake.	The anxiety scale uses the State Anxiety Inventory for adults (SAI), which was collected at 3 time points: at the baseline period (T0), 24 hours before undergoing PCI. The second time period (T1) is 2 hours before the PCI procedure. To evaluate post-PCI anxiety levels, patients were assessed between 4 - 6 hours after the procedure (T2). At this time, anxiety levels were assessed a third time for all patients.	None	The level of anxiety at baseline (T0) did not show a significant difference between the 2 groups. IG patients experienced significantly lower levels of anxiety at T1 (2 hours before PCI) than at T0 (33 vs 49, respectively) ($P < 0.001$). While the highest level of anxiety experienced by patients with CG at T1. At T2 (4-6 h post PCI), anxiety levels decreased in both groups, but were more significant for IG. IG also showed a greater reduction in anxiety levels (mean = 24.1), which according to Spielberger (1985) meant they were anxiety-free. The average anxiety score on CG (mean = 44.17) indicated sustained anxiety. The GI anxiety score was statistically significantly lower than that of CG (M = 44.17, $P < 0.001$).	None	The pre-procedure nurse - led video intervention provided by the video had a significant effect in reducing anxiety levels among patients undergoing percutaneous coronary intervention. Patients in the intervention group experienced a steady and consistent trend of reduced anxiety before coronary intervention and post-PCI.

No.	Author & Research Location	Research Design and Objectives	Population and Sample	Intervention and comparison / control	Measured output	Other outputs measured	Research result	Other measured research results	Conclusion
7.	Chang, 2018, China	Randomized Controlled Trial The aim was to study the effect of nurse-led counseling on anxiety symptoms and quality of life after percutaneous coronary intervention for stable coronary artery disease.	Scheduled patient population underwent elective PCI at a center in rural and remote China between January-December 2014 (12 months). Samples were selected using consecutive sampling, based on inclusion and exclusion criteria. A total of 125 eligible patients, 45 were excluded, 80 were randomly assigned to IG and CG (40 each).	The control and intervention groups received standard pre-PCI care and general counseling about the procedure to be performed. IG received additional nurse-led psychological intervention consisting of a structured counseling session 30 minutes a day before and 24 hours after PCI, by a consultant nurse with a qualification of psychological counseling and therapy, question-and-answer, and focused on increasing the patient's comfort level and confidence in participate in post-PCI care recommendations. CG receives general counseling conducted by the ward nurse on duty during short visits consists of communicating the inpatient process and the PPCI procedures to be performed, and post-procedure care. No individual psychological intervention was given prior to PCI in CG.	Loss and depression symptoms were evaluated with the Zung depression self-rating and anxiety scales. Data were collected at baseline, 6 and 12 months after PCI. The depression scale and report consists of 20 items, to be completed independently. Each item gives a total score of 20 - 80. Higher scores indicate more depressive symptoms or reports. Depression scores of 50-59, 60-69 and 70-80 indicate mild, moderate and severe depression, respectively. Loss scores of 45-59 and 60-80 indicate moderate to severe estimates.	Cardiac outcomes after PCI: followed up in an outpatient clinic monthly for 12 months after procedure. Health outcomes / QOL with the SF-12 scale and the Seattle Angina Questionnaire (SAQ) at 6 and 12 months after PCI. The SF-12 survey consisted of 12 question items about physical functioning, role limitations related to physical health, pain, general health perceptions, energy levels, emotional problems and general mental health. Mental & physical health scores are calculated. Higher scores indicate less physical or mental disability. Disease-specific health status: SAQ, comprising 19 items, score ranging from 0 to 100, five domains, covering frequency of angina, restriction of physical activity, satisfactory treatment, stability of angina chest pain, and quality of life. Each domain: higher scores indicate better health status, with fewer symptoms and better survival.	There was no statistically significant difference in the Zung depression score before and after PCI in the IG or CG groups respectively (P>0.05). The mean score of the Zung anxiety scale on CG was higher than that of IG following PCI (P<0.01). On CG, the number of patients with anxiety symptoms and the mean anxiety rating score after PCI were higher than the baseline value (P<0.05). Twelve months after PCI, only two (2.5%) patients had occasional angina chest pain and recurrent coronary angiograms showed no stenotic lesions in the coronary arteries. Mental and physical health scores on the SF-12 scale also improved 12 months after PCI (P<0.01). The increase in GI was higher than that of CG (P<0.01).	Cardiac outcomes after PCI: None of the patients had myocardial infarction, heart failure, stroke, or cardiac arrest. Three (3.8%) patients were hospitalized for non-cardiac reasons. There were significant improvements in the 3 SAQ domains, frequency of angina, physical limitations and quality of life, 12 months after PCI on IG and CG (P<0.01). Physical limitations and quality of life scores on GI were higher than CG (P<0.05). Twelve months after PCI, only two (2.5%) patients had occasional angina chest pain and recurrent coronary angiograms showed no stenotic lesions in the coronary arteries. Mental and physical health scores on the SF-12 scale also improved 12 months after PCI (P<0.01). The increase in GI was higher than that of CG (P<0.01).	Nurse-led psychological intervention before and after PCI was associated with decreased anxiety scores and increased quality of life measures.

No.	Author & Research Location	Research Design and Objectives	Population and Sample	Intervention and comparison / control	Measured output	Other outputs measured	Research result	Other measured research results	Conclusion
8.	Akarsu, 2019, Ankara, Turkey	<i>Randomized Controlled Trial</i> Objective: to prove the effect of nature sound intervention and ear plugs on the anxiety of patients following the PCI procedure.	The population was patients who underwent PCI in a training and research hospital in Ankara, Turkey, during March - November 2017. Patients who met the inclusion criteria were included in this study. The sample was calculated using G-power analysis with 2 IG & CG @ 34 patients plus 10% to @ 38 patients. A total of 114 people with 2 IG and 1 CG @ 38 patients and allocation using computer randomization.	2 IG received intervention, namely nature sound music intervention (using headphones, 30 minutes) and intervention using disposable earplugs. Meanwhile, CG received the usual treatment, only bedrest.	Anxiety level: The State Anxiety Inventory (SAI), consisting of 20 items, was developed by Spielberger et al. Each item was scored between 1 and 4, as follows: (1) not at all, (2) somewhat, (3) sufficient and (4) very much. Scores are in the 20–80 range, and high scores indicate a high level of anxiety. The recommended cut-off point for the identification of clinically significant anxiety for this instrument is 39-40. Data were collected at 3 time points: first at the time of monitoring in the ICU, the second was done 30 minutes after the first measurement, and the third measurement was carried out 30 minutes after the second measurement.	Physiological parameters: HR, respiratory rate, SBP and DBP of the patient using a patient monitor (GE Carescape B650 pre-calibrated). Visual Analog Scale (VAS); used as an adjunct to SAI in determining anxiety levels, as a vertical straight line 10 cm long. The starting point indicates less anxiety, and the end point shows the highest anxiety. VAS is self-marked by the patient.	There was a statistically significant difference in anxiety scores after comparing the patient's SAI score in IG nature sound and IG earplug immediately after PCI (25.92 ± 5.31, 27.71 ± 4.98 respectively) and 30 minutes thereafter (respectively). 25.18 ± 5.10, 26.63 ± 4.43), with the patient's SAI score in the CG immediately after PCI (32.94 ± 5.13) and 30 minutes thereafter (32.31 ± 5.07) (F = 18.74, p < 0.05). Based on these results, the patient experienced mild to moderate anxiety. No statistically significant differences were found after comparing the VAS, SAI and respiratory values of KI nature sound and KI earplug immediately after 30 minutes and 30 minutes after intervention (p > 0.05).	There was a statistically significant difference in the patient's respiratory rate in IG nature sound and IG earplug immediately after (19.84 ± 1.46, 19.86 ± 1.75 respectively) and 30 minutes after (20.15 respectively). There was no difference in the comparison of patient anxiety measurements between the two interventions (nature sound & earplug) and it was found that both had the same effect in reducing anxiety.	The intervention of nature sound (nature sound) and ear plugs (ear plug) reduced anxiety and decreased respiratory rate in patients undergoing PCI on IG compared with CG.

No.	Author & Research Location	Research Design and Objectives	Population and Sample	Intervention and comparison / control	Measured output	Other outputs measured	Research result	Other measured research results	Conclusion
9.	Brand, 2019, Berlin, Jerman	<i>Randomized Trial</i> Objective: To assess whether the process of complementing standard (ICstandard) or comic (ICcomic) improves understanding, and patient anxiety, and patient satisfaction.	The population is patients undergoing Coronary angiography at Charite-Universitätsmedizin Berlin, Mitte Campus. A total of 135 patients were taken as samples with consecutive sampling. A total of 121 who fit the criteria were taken and randomized (IG = 60, CG = 61). There was no blinding in either the study patient or the doctor explaining the procedure for both groups (IG and CG).	IG received medical graphic narratives intervention in the form of informed consent with graphic illustrations / comics from the IC aspect based on the official consent form (IC comic) (can be seen at www.annals.org/aim/article/doi/10.7326/G19-0008), while CG receives the standard official approval form and a conversation with a doctor (standard IC). With the same doctor explained the procedure to all participants, both IG and CG.	Periprocedural anxiety was evaluated with the Spielberger State-Trait Anxiety Inventory (STAI) before (T1) and after the IC procedure (T2).	Understanding of procedure-related information was assessed by means of a self-designed questionnaire. Satisfaction and perceived understanding of the patient's IC, assessed by the Client Satisfaction Questionnaire (CSQ) -8 and a self-designed questionnaire (available at Annals.org)	At T2, the average STAI score decreased in IG (comic IC) and there was an increase in CG (standard IC), with a difference from the baseline condition of -51 points (95% CI, -7.32 to 12.94 points) . Female patients had a higher baseline score compared to male patients (47.2 vs 40.5 points), with a difference of -6.7 points (95% CI, -10.57 to -2.87 points). The mean STAI score on IG (IC comic) decreased at T2 by 3.6 points for women and 2.5 points for men. In comparison, the mean STAI on CG (standard IC) increased by 1.8 points for women and 2.2 points for men. Over the whole time span, IG (comic IC) showed a good effect on periprocedural anxiety status (p <0.001) and there was no difference in women or men.	At GI 71.7% of patients strongly agreed that they felt well prepared for cardiac catheterization, compared with only 41% of patients on CG (standard IC) with a difference of 30.7% at 95% CI (13.9% to 47, 5%; p = 0.001). The CSQ-8 score after the IC procedure significantly improved on KI (comic IC) and remained unchanged until after completion of coronary angiography.	The results showed a good effect of graphic narrative on IC comics, on patient understanding, anxiety, and satisfaction. The use of complementary chart illustrations can substantially improve patient IC retrieval practices.

No.	Author & Research Location	Research Design and Objectives	Population and Sample	Intervention and comparison / control	Measured output	Other outputs measured	Research result	Other measured research results	Conclusion
10.	Hou, 2019, China	<p><i>Parallel, randomized controlled Trial.</i></p> <p>Purpose: To assess the short-term effectiveness of awareness-based stress reduction adapted via short one-on-one telephone-adapted short MBSR on the psychological distress of PCI patients.</p>	<p>The population is patients who underwent PCI during hospitalization in the cardiology division of the hospital in collaboration with the University in Suzhou, China between June 2016 and January 2017 (196 patients). Samples were selected based on inclusion and exclusion criteria. A total of 70 patients (12 women and 58 men) were randomly assigned to IG and CG (@ 35 patients). There was DO in the research process so that IG = 30 and CG = 31 patients.</p>	<p>IG received an intervention in the form of an MBSR session which was implemented by the first investigator in addition to usual care. The MBSR consists of 3 sessions: body scan, mindful breathing and sitting meditation. Booklets and MP3s containing 3 mindfulness practices were given at the beginning of the study, and 3 sessions were held every 2 weeks. Face-to-face body scan during hospitalization in hospital, mindfulness breathing and sitting meditation were carried out via telephone after returning from the hospital, with a duration of 30-40 minutes. Paisein was then asked to listen to MP3s at least 6 days per week in the next 2 weeks for independent practice. CG receives normal care by doctors and nurses including routine treatment and care, health education about PCI and CAD, and its management.</p>	<p>The results measured were symptoms of anxiety and depression, using the Hospital Anxiety and Depression Scale (HADS). Measurements were made 6 weeks later for both KI and CG. After the research was completed, CG received an MBSR session like IG.</p>	<p>The secondary outcomes measured were perceived stress and mindfulness. Stress was measured by The Perceived Stress Scale (PSS), while mindfulness was measured by the short form The Freiburg Mindfulness Inventory (FMI-s).</p>	<p>Of the 70 patients only 62 patients completed the study. Compared with CG, GI (MBSR group) showed a greater decrease in HADS scores ($p = 0.006$) and Intention To Treat Analysis (ITT) also showed that HADS scores ($p = 0.018$) significantly decreased in GI compared to CG on Sunday, the 6th.</p>	<p>IG showed a greater decrease than CG on PSS ($p = 0.035$). ITT also showed that the PSS score ($p = 0.037$) was significantly decreased in GI compared to CG at 6 weeks.</p>	<p>The short MBSR program by telephone, when compared to routine care, demonstrated increased awareness and decreased psychological distress. The clinical implications of the MBSR program include: its short duration, user-friendliness, and ease of application in clinical practice. The MBSR program can be applied to post-PCI patients aged <70 years to reduce the symptoms of the patient's psychological disorders.</p>

No.	Author & Research Location	Research Design and Objectives	Population and Sample	Intervention and comparison / control	Measured output	Other outputs measured	Research result	Other measured research results	Conclusion
11.	Liu, 2020, China	<i>Single blinded-Randomized Trial</i> Objective: To determine the effect of 24 forms of Tai Chi on anxiety and depression in CHD patients after PCI	The population took patients at Jilin University Hospital, China who had undergone PCI. The number of samples is calculated by the formula based on previous research, resulting in 32 samples, taking into account the 10% loss to follow-up to @ 35 samples for CG & IG. Samples were selected based on inclusion and exclusion criteria. There was DO in the research process so that IG = 30 and CG = 31 patients. Single blinded and computer randomized for CG & IG allocation.	IG gets regular treatments too, but added 24 forms of Tai Chi training according to the reference to The Health Qigong 24 Taijuquan form issued by the General Administration of State sports in 2003. CG receives routine treatment, examinations, nursing care, and health education.	The results measured were symptoms of anxiety and depression, using the Hospital Anxiety and Depression Scale (HADS). The evaluation was carried out after 10 months of implementation.	Other results measured were stress scores, life quality (SF-36), serum miR-17-92 levels as an important part of the immune system, proliferation of cardiomyocytes, and increased symptoms of anxiety / depression.	There was a change in the anxiety subscale (P = 0.002), with the proportion of anxious (P = 0.045) and depressed (P = 0.042) patients in the IG group being lower than in CG.	After 10 months of the intervention, changes on the depression subscale (P = 0.008), and in the stress score (P = 0.015) were higher in IG when compared to the CG group. The proportion of patients with depression (P = 0.042) in IG was lower than that in the CG group. On the other hand, the improvement in SF-36 score and relative level of miR-17-92 were significantly higher in IG when compared to CG (P <0.05). Serum miR-17-92 levels were negatively correlated with anxiety, depression, and stress scores (P <0.01).	Tai Chi improves symptoms of anxiety, depression, and stress and improves the regulation of miR-17-92 (a non-coding RNA molecule associated with depressive symptoms) in CAD patients after PCI. Tai Chi also improves the quality of life for CAD patients. This suggests that Tai Chi has the potential to improve the emotional parameters of CAD patients.

CBT: Cognitive Behavioral Therapy; DO: Drop Out; IC: Informed Consent; IL-2: Inter Leukin-2; PCI: Percutaneous Coronary Intervention; PTCA: Percutaneous transluminal coronary angioplasty; CAD: Coronary Artery Disease; HE: health Education; QOL: Quality of Life; HR: Heart Rate; IG: Intervention Group; CG: Control Group; SBP: Systolic Blood Pressure; DBP: Diastolic Blood Pressure; SE: Self Efficacy; BP: Blood Pressure; NS: Not Significant; BG: between-group; WG: within group.

Appendix

Table 2. Summary of intervention outcomes (differences between groups for treatment vs control or comparison groups) for all forms of intervention and their outcomes.

Author/Type Intervensi	Anxiety	Stress	Physiologic/ Haemodynamic	Pain	QOL	Coping Mechanism
Physical Therapy						
Peng et al., (2015)/ Massage therapy vs usual care	T-AI: NS S-AI: (+)	NM	(+)	(+)	NM	NM
Liu et al. (2020)/ 24 form Tai Chi exercise vs usual care	(+)	(+)	(+) in miR-17-92 serum	TU	(+) SF36	NM
Relaxation Therapy						
Forooghy et al. (2015)/ Music therapy vs usual care	(+)	NM	NS	NM	NM	NM
Akarsu et al. (2019)/ Natural sound vs <i>earplug</i> vs usual care	(+)	NM	NS	NM	NM	NM
Cognitive Therapy						
Hou et al. (2019)/ Brief 1 on 1 telephone based MBSR vs usual care	(+)	(+)	NM	NM	NM	(+) in mindfulness FMI-s scale
Lv et al. (2016)/ CBT vs non-CBT	(+)	NM	NM	NM	(+) after 8 weeks in CROQ- PTCA-POST, Mandarin version	NM
Psychological Therapy						
Chang, et.al, (2020)/ Nurse-led psychological intervention vs Konsejing standar	NS: just an increase in the mean score of CG	NM	No one experienced heart symptoms 12 months after PCI	NM	(+) 3 from 5 domain of SAQ, (+) SF-12	NM
Psychological Therapy Program (combined) Cognitive Therapy + Relaxation + Emotional Support						
Shen et al. (2018)/ Therapy programme vs usual care	(+)	(+)	Increase in IL-2 and decrease in cortisol	NM	NM	(+)
Providing information / support / counseling						
Corones-Watkins et al. (2019)/ <i>Nursing led intervention</i> vs usual care	(+)	NM	NS	NM	NM	NM
Haddad et al. (2018)/ <i>Nurse-led video interventions</i> vs usual care	(+)	NM	NM	NM	NM	NM
(9)/ IC comic vs IC standard	(+)	NM	NM	NM	NM	NM

(+): Intervention effect is positive and significant; (-): The effect of the intervention is negative, the results do not experience improvement in anxiety / other outcomes expected in the study or greater improvement in the control or comparison group (CG); NS: Not significant; NM: Not Measured; SBP: Systolic Blood Pressure; DBP: Diastolic Blood Pressure.

Appendix

Table 3. Critical Review According To The Critical Appraisal Skills Program (CASP) for the Randomized Controlled Trial (RCT) method in selected articles.

Author/Type of Intervention	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Limitation
Physical Therapy Peng et al., (2015)/ Massage therapy vs usual care	✓	✓	✓	Non-double blind	✓	✓	✓	-	✓	✓	✓	Unable to perform blinding, the sample size is considered small.
Liu et al. (2020)/24 form Tai Chi exercise vs usual care	✓	✓	✓	Single blinded	✓	✓	✓	-	✓	✓	✓	Follow-up was done after 1 year, without periodic evaluation.
Relaxation Therapy Forooghly et al. (2015)/ Music therapy vs usual care	✓	✓	✓	Non-blind	✓	✓	✓	In counting samples	✓	✓	✓	Interventions can be influenced by the psychological and characteristics of the respondents, the sample size is considered small.
Akarsu et al. (2019)/ Natural sound vs earplug vs usual care	✓	✓	✓	Non-blind	✓	✓	✓	In counting samples	✓	✓	✓	Limited population may not be generalized, psychological influence, female > male respondents.
Cognitive Therapy Hou et al. (2019)/ Brief 1 on 1 telephone based MBSR vs usual care	✓	✓	✓	Non-blind	✓	✓	✓	In outcome interpretations	✓	✓	✓	Time is limited, the number of samples is considered small, self-reported outcome → bias.
Lv et al. (2016)/ CBT vs non-CBT	✓	✓	✓	-	✓	✓	✓	-	✓	✓	✓	Short follow-up duration, single center study, small sample size.
Psychological Therapy Chang et al., (2020)/ Nurse-led psychological intervention vs Konseing standar	✓	✓	✓	Staff blinded to the randomized of patients	✓	✓	✓	-	✓	✓	✓	Conducted only in one geographic area, the sample size is considered small
Psychological Therapy Program + (combined) Cognitive Therapy + Relaxation + Emotional Support Shen et al. (2018)/ Therapy programme vs usual care	✓	✓	✓	Blinded researcher who analyzed the data	✓	✓	✓	In counting samples	✓	✓	✓	Small number of participants, one hospital site, short intervention time.
Providing information / support / counseling Corones-Watkins et al. (2019)/ Nursing led intervention vs usual care	✓	✓	✓	Blinded participants and hospital staff	✓	✓	✓	-	✓	✓	✓	Intervention follow-up closer to intervention, One study site
Haddad et al. (2018)/ Nurse-led video interventions vs usual care	✓	✓	✓	-	✓	✓	✓	-	✓	✓	✓	Quasy experimental, one hospital, short follow-up period, medical file number allocation for participant

(9)/ IC comic vs IC standard	√	√	√	-	√	√	√	√	√	√	√	Small sample size, single-center
(√) = the article fulfills the question component;												
(-) = the article does not meet the question component or is not stated												
Q1 = Did the study address a clearly focused research question?;												
Q2 = Was the assignment of participants to interventions randomised?;												
Q3 = Were all participants who entered the study accounted for at its conclusion?;												
Q4 = Where study implemented blinding in participant/ investigators/ people who assessing, analyzed the outcome;												
Q5 = Were the study groups similar at the start of the randomised controlled trial?;												
Q6 = Apart from the experimental intervention, did each study group receive the same level of care (that is, were they treated equally)?;												
Q7 = Were the effects of intervention reported comprehensively?;												
Q8 = Was the precision of the estimate of the intervention or treatment effect reported?;												
Q9 = Do the benefits of the experimental intervention outweigh the harms and costs?;												
Q10 = Can the results be applied to your local population/in your context?; P11=Would the experimental intervention provide greater value to the people in your care than any of the existing interventions?												