Use of non-pharmacological intervention to reduce anxiety during cardiac catheterization

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SUMMARY

• Cardiac catheterization is an invasive procedure that is widely used to diagnose patients with cardiovascular diseases.

• Anxiety negatively affects the clinical outcomes of patients undergoing cardiac catheterization.

• Anxiety causes increased heart rate, blood pressure, palpitations, chest tightness, respiratory rate, and peripheral vasoconstriction, which lead to poor patient prognosis.

• Non-pharmacological interventions consist of procedural education; procedural education with video demonstration; and relaxation strategies, such as music therapy, massage, and guided imagery. These techniques can effectively reduce the anxiety level for patients undergoing cardiac catheterization.

INTRODUCTION

Coronary heart disease (CHD) is the end result of the accumulation of atheromatous plaques, which narrow the blood vessels that supply blood and oxygen to the heart (National Institutes of Health, 2015). CHD is one of the leading causes of morbidity and mortality worldwide. This disease led to 17.7 million deaths worldwide in 2015 (World Health Organization, 2017). Cardiac catheterization is a diagnostic and therapeutic procedure for CHD and has a relatively low risk of mortality (American Heart Association, 2017). However, patients subject to cardiac catheterization undergo considerable psychological distress before, during, or after the procedure (Gallagher et al., 2010; Nillson et al., 2009). Anxiety is frequently observed in patients undergoing cardiac catheterization (Taylor–Piliae & Chair, 2002; Chair et al., 2012). Anxiety during cardiac catheterization causes unwanted clinical responses, such as increased heart rate, blood pressure, palpitations, chest tightness and peripheral vasoconstriction (McCaffrey & Taylor, 2005; Taylor-Piliae & Chair, 2002). Anxiety can activate the sympathetic nervous system and increase force of heart constriction, thereby increasing the risk of arrhythmias and causing poor recovery outcomes during cardiac catheterization (Bertrand, 2011; Senay et al., 2008). Nurses can perform different non-pharmacological strategies to reduce the anxiety of patients undergoing cardiac catheterization to achieve satisfactory treatment outcomes.

OBJECTIVE

This summary review aims to assess the effectiveness of non-pharmacological interventions on reducing the anxiety of patients before cardiac catheterization.

METHODS

Search method

An electronic search was conducted using MEDLINE, CINAHL Complete, Academic Search Premier, Academic Search Ultimate, and Academic Search Alumni Edition to determine relevant studies on non-pharmacological interventions for reducing the anxiety of patients undergoing cardiac catheterization. The keywords used in the search process included "coronary angiography," "cardiac catheterization," "anxiety," "anxious," "nervous," "intervention," "program," "education," or "non-pharmacological."

The inclusion criteria for article selection were 1) studies published in English; 2) participants were adult patients aged 18 years or above; 3) patient who are having elective cardiac catheterization; 4) studies providing non-pharmacological intervention to reduce the anxiety of patients who underwent cardiac catheterization; and 4) studies that used outcome measures related to anxiety. The exclusion criteria included: 1) studies that evaluated patients who are suffering from psychiatric conditions; and 2) studies that included patients who previously undergone cardiac catheterization.

RESULTS

Eleven studies published between 2002 and 2016 were selected for this literature review (Table 1). The studies were conducted in the USA (n = 4), Hong Kong (n = 3), Taiwan (n = 1), Canada (n = 1),

Table 1. Studies included in the literature review (n = 11, 2002-2016)

Authors and year	Study type	Sample	Interventions	Outcome measures	Findings
Armstrong et al., 2014 (USA)	Quasi-experimental and retrospective study	N = 55, Group 1 = 31, Group 2 = 24, matched comparison group	Group 1: 15-min massage, Group 2: massage with guided imagery	Self-report anxiety analogue scale; anxiety-related hemodynamic parameters	Massage with and without guided imagery resulted in significant reductions in self-reported anxiety (p < 0.0001); patients receiving intervention had lower diastolic BP and HR (p < 0.0001 and p < 0.05)
Ayasrah & Ahmad, 2016 (Jordan)	Randomized controlled trial	N = 186, control = 93, intervention = 93	Control group: standard care, intervention group: 30-min educational session consisting of a video, booklet and discussion	Spielberger State Anxiety Inventory; physiological parameters of anxiety	Significant reduction in perceived anxiety in the intervention group (p < 0.001); no significant difference in physiological parameter associated with anxiety
Chair et al., 2012 (Hong Kong)	Quasi-experimental study	N = 128, control = 64, intervention = 64	Control group: standard care, intervention group: individual education with video	Chinese version of the State-Trait Anxiety Inventory; Chinese version of Mishel Uncertainty in Illness Scale; visual analogue scale for satisfaction	State anxiety and uncertainty significantly differed between intervention and control group; intervention group exhibited higher satisfaction and knowledge levels than control group
Chan & Cheung, 2003 (Hong Kong)	Randomized controlled trial	N = 62, control = 31, intervention= 31	Control group: standard care, intervention group: one-hour patient procedural education class	Chinese version of the State-Trait Anxiety Inventory; 8-item knowledge test	State anxiety at time before and after cardiac catheterization were significantly higher in the control group with p <0.001 and p =0.049 respectively; the mean knowledge level increased significantly in the intervention group
Chang et al., 2011 (Taiwan)	Randomized controlled trial	N = 54, control = 27, intervention = 27	Control group: standard care, intervention group: 30-minute long music	State-Trait Anxiety Inventory; anxiety-related hemodynamic parameters; visual analog scale for music preference	Listening to music significantly reduce the state of anxiety; heart rate decrease in both the intervention and control groups
Foji et al., 2015 (Iran)	Randomized controlled trial	N = 62, control = 31, intervention = 31	Control group: standard care, intervention group: guided Imagery CD for 18 min	State-Trait Anxiety Inventory; anxiety-related hemodynamic parameters	The mean level of anxiety significantly decreased for the guided imagery group after the intervention; no significant difference in hemodynamic parameters before or after intervention between the 2 groups
Gavigan et al., 2014 (USA)	Quasi-experimental study	N = 185, control = 91, intervention = 94	Control group: standard care, intervention group: a 15-minute informational video intervention	State-Trait Anxiety Inventory; satisfaction with preparatory information questionnaire	No significant difference between groups on state anxiety; significant improvement in satisfaction in intervention group (p = 0.003).
Harkness et al., 2003 (Canada)	Randomized controlled trial	N = 228, control = 114, intervention = 114	Control group: standard care, intervention group: nurse delivered information/education session with video	State-Trait Anxiety Inventory; verbal self-rating for anxiety	Significant difference (p = 0.002) between the intervention and control groups in self-reported anxiety score
McNamara et al., 2003 (USA)	Randomized controlled trial	N= 40, control = 20, intervention = 20	Control group: standard care, intervention group: 20-min back massage	Profile of Moods States; physiological parameters of anxiety	Significant difference in reduction in systolic BP (p < 0.05) between groups.
Taylor-Piliae & Chair, 2002 (Hong Kong)	Experimental three-group repeated measure study	N = 45, Group 1 = 15, Group 2 = 15, Group 3 = 15	Group 1: control, Group 2: music therapy, Group 3: sensory information	Spielberger's State-Anxiety Inventory; Profile of Mood States; Mishel Uncertainty in Illness Scale	No significant reduce in anxiety, uncertainty, and affect in Group 2 & 3 after controlling for age.
Weeks & Nilsson, 2011 (USA)	Randomized controlled trial	N = 98, Group 1 = 34, Group 2 = 30, Group 3 = 34	Group 1: usual sound environment, Group 2: loudspeaker music, Group 3: audio pillow	Self-rating Anxiety Scale; study-specific designed well-being questionnaire	Anxiety decreased significantly and well-being increased significantly in the two music groups compared to the control group (p <0.05), but there is no significant difference between the two music group in anxiety score.

Jordan (n = 1), and Iran (n = 1). The selected studies included seven randomized controlled studies, two quasi-experimental studies, one quasi-experimental and retrospective study, and one experimental three-group repeated measures study. The most common measures employed for assessing the anxiety level of patients included State-Trait Anxiety Inventory (n = 8) and self-reported anxiety (n = 3). Psychological state was also assessed using the Profile of Moods States (n = 2) or study-specific designed well-being questionnaire

(n = 1). Four studies used hemodynamic parameters, such as blood pressure and pulse rate, to measure the objective data reflecting the anxiety level of the patients. The interventions used in the studies included procedural education intervention (n = 1), procedural knowledge with video education (n = 4), and relaxation techniques such as music listening intervention (n = 3) and massage and guided imagery intervention (n = 3).

SUMMARY REVIEW

Procedural education intervention

One study adopted procedural education intervention, which provided relevant information to the patients before cardiac catheterization. Chan and Cheung (2003) conducted a randomized experimental design study to examine the effects of education on anxiety among Chinese patients with heart diseases who are undergoing cardiac catheterization in Hong Kong. A total of 62 patients (43 males and 19 females) were recruited, and 31 patients were randomly assigned into either intervention or control group. The intervention group received 1-hour patient education class, and the control group received the routine explanation. The education class included information on the nature of heart diseases, indications for cardiac catheterization, and expectations before, during, and after cardiac catheterization. During the class, nurses provided emotional support and counseling to the patients. State Anxiety Inventory was used to evaluate the levels of anxiety of the participants before receiving any patient education or signing the consent (time 1), prior to cardiac catheterization (time 2) and after cardiac catheterization (time 3).

The state anxiety of all subjects reached the highest at the time prior to cardiac catheterization and recorded the lowest at the time following the procedure. Furthermore, the control group exhibited higher level of state anxiety than the intervention at the three time intervals. This finding indicated that the control group had considerably and significantly higher state anxiety than the intervention group who received education intervention. Hence, appropriate knowledge and education should be provided to the patients to effectively reduce the anxiety of Chinese patients with heart diseases before cardiac catheterization and improve the quality of care. However, this study presented some limitations. First, the study only considered anxiety level as the measure of self-reported data and did not use other measurements, such as heart rate and blood pressure, which may also reflect anxiety levels. Second, the study was conducted in one single institution in Hong Kong and employed small number of subjects (n = 62). As such, the results of the study cannot be generalized (Chan & Cheung, 2003).

Procedural education with video intervention

Four studies investigated the effect of combined procedural education with video demonstration to reduce the anxiety level of patients prior to cardiac catheterization (Harkness et al., 2003; Chair et al., 2012; Gavigan et al., 2014; Ayasrah & Ahmad, 2016). Harkness et al. (2003) conducted a randomized controlled trial in Canada to assess the effect of psychoeducational nursing intervention and viewing of video for the patients waiting for elective cardiac catheterization. A total of 228 patients were recruited and randomly assigned into intervention or control groups. Patients in the intervention group received a 1-hour detailed education session about atherosclerotic disease process, risk factor modification, and current medication.

The intervention was delivered by a nurse while the patients were waiting for elective cardiac catheterization within 2 weeks. Moreover, the nurse explained the cardiac catheterization procedure by viewing the video. The control group only received the routine explanation. The State-Trait Anxiety Inventory and Verbal Self-Rating, that is, self-reported anxiety, were used for measuring anxiety level. The patients were asked to complete State-Trait Anxiety Inventory at the beginning of the waiting period (time 1) and at 1 week before cardiac catheterization (time 2). Verbal Self-Rating was conducted two weeks before the scheduled cardiac catheterization of the patients. The finding showed that there was a main effect for time in state anxiety level (p = 0.028). Moreover, the score of Verbal Self-Rating significantly differed (p = 0.002) between the intervention and control groups. Hence, early education supplemented with video

demonstration significantly influenced patients reported anxiety when they were waiting for cardiac catheterization (Harkness et al., 2003). Similarly, Chair et al. (2012) conducted a quasi-experimental study on 128 Chinese patients undergoing cardiac catheterization to examine the effectiveness of an educational intervention on reducing psychological discomforts, such as anxiety and uncertainty. The experimental group (n = 64) received an individual educational session with a pamphlet and a 12-minute educational videotape. The control group (n = 64) received usual care. The content of the educational session not only covered the information on cardiac catheterization but also the coping strategies.

The state anxiety and uncertainty levels of the patients were measured by the Chinese State Anxiety Inventory and the Chinese version of Mishel Uncertainty in Illness Scale, respectively, at baseline prior to education intervention (Time 1), within 2 hours before receiving cardiac catheterization (Time 2), and within 20–24 hours after cardiac catheterization and prior to discharge (Time 3). State anxiety and uncertainty significantly differed between the intervention and control groups. Patients in the intervention group exhibited higher satisfaction and knowledge levels than those in the control group after the educational intervention. The use of videotape and pamphlets to prepare the patients for cardiac catheterization effectively reduced the level of anxiety and uncertainty and to guide the nursing practice. However, this study did not adopt a randomized design, which might lead to bias because whether the two groups had similar characteristics remained unknown. Moreover, the self-reported data only provided subjective findings, which had no clinical significance (Chair et al., 2012).

Gavigan et al. (2014) conducted a study in the USA to investigate the effects of informational video sessions on anxiety level and satisfaction before percutaneous cardiovascular procedure. This quasi-experimental, randomized, prepost design study recruited 185 patients, who were randomly assigned to intervention or control group. The intervention group received an informational video intervention, which included a 15-minute audiovisual presentation and images of the Interventional Cardiovascular Therapy Center. The audio file provided sensory experience of sounds, such as the voices of the medical team and the mechanical noises of the equipment. The intervention provided visual experience to the patients by placing a camera and altering light settings during the procedures. The intervention also provided information about common physical and emotional responses. The control group received standard care (SC) only. The State-Trait Anxiety Inventory was used to assess the anxiety level before and immediately after the procedure. The result showed that the score of State-Trait Anxiety was not significantly different between the two groups, whereas satisfaction significantly improved in the intervention group (p = 0.003). The results did not confirm whether or not the educational video can significantly reduce patient anxiety and it was inconsistent with Chair et al. (2012). One of the explanations may be due to the timing of the information video intervention. The intervention was conducted just before the procedure and thus did not successful led to mind modulations to reduce anxiety (Gavigan et al., 2014). Previous studies showed that the optimal time to conduct preparatory information session is 1–7 days before the procedure during which the anxiety level of the patients is low and they can readily receive the preparatory information (Guo et al., 2012; Suhonen & Leino-Kilpi, 2006).

Ayasrah and Ahmad (2016) conducted a randomized controlled study to explore the effectiveness of educational video intervention on decreasing the anxiety level of Jordanian patients before cardiac catheterization. The experimental group (n = 93) received a 30-min individual educational session, which included a 25-min educational video and 5-min discussion. A booklet that summarized the materials in the video was given to the intervention group. The control group (n = 93) received usual care. Anxiety level was measured by

physiological parameters of anxiety (blood pressure, heart rate, and respiratory rate) and by the Spielberger State Anxiety Inventory. Data were collected before randomization as baseline readings (time 0), 2 hours before cardiac catheterization (time 1), and 6–24 hours after cardiac catheterization (time 2). Only "perceived anxiety" was reduced in the experimental group. Moreover, individual educational video intervention significantly decreased the level of post-procedural anxiety but did not significantly affect physiological parameters associated with anxiety. This study measured both the psychological and physiological aspects of anxiety and thus provided more objective data than previous studies. The result showed that the educational video did not significantly affect any physiological parameters of anxiety possibly because of the premedication effects, such as antihypertensive medication, which reduced changes in the physiological system.

Relaxation techniques

Music listening intervention

Three studies adopted music therapy and determined its effect on the anxiety level of patients before and during cardiac catheterization. Chang et al. (2011) conducted a randomized controlled trial in Taiwan and studied 54 patients awaiting cardiac catheterization. The patients were randomized into experimental or control groups. The experimental group listened to sedative music with six musical pieces such as piano, orchestra, jazz, harp, Chinese orchestra, and synthesizer for 30 minutes before cardiac catheterization. The control group rested quietly as routine care. Anxiety state, heart rate, heart rate variability, and skin temperature were measured at 7 time points. The results indicated that listening to music significantly reduced the state of anxiety. However, the heart rate decreased in both the experimental and control groups. Thus, the finding is inconclusive. Moreover, music preference was not significantly associated with the physiological parameters but was significantly correlated with anxiety score of the participants after cardiac catheterization. Hence, participants with high music preference perceived low anxiety level.

Taylor-Piliae and Chair (2002) conducted a similar study on 45 Chinese patients prior to cardiac catheterization. An experimental three-group repeated measure study design was used. The participants were randomly assigned to control group, music intervention group, and sensory information intervention group. Music intervention was given 1 hour before cardiac catheterization. Self-reported anxiety level, uncertainty level, mood state, and physiological measures, such as heart rate and respiratory rate were measured before the intervention, after the intervention, and 1 hour after the cardiac procedure. After controlling for age, music therapy or sensory information did not significantly reduce the anxiety and uncertainty levels, improve the mood state, and decrease the heart rate or respiratory rate of the patients who underwent cardiac catheterization. This non-significant result might due to the small sample size and social and cultural expectations in displaying emotion among Chinese culture.

Weeks and Nilsson (2010) conducted a randomized control trial on 98 patients to examine the effects of focused music, loudspeaker music, and standard sounds on reducing patient anxiety and improving well-being during coronary angiographic procedure in the USA. The focused music group received music from an audio pillow, and the loudspeaker music group received music via ceiling suspended loudspeakers. The music consisted of different melodies of 60 to 80 bpm and was designed to create a calming influence on the participants and minimize any emotional triggers. The participants were randomly assigned in the three groups. The music intervention was delivered to the participants when he/she was placed on the procedure table. The music was then stopped when the participants was transferred to the hospital bed immediately after the procedure. The participants were asked to complete self-rating anxiety scale and study-specific designed well-being questionnaire when he/she was placed in the bed following coronary angiography. The control group exhibited significantly higher levels of anxiety than the focused music group and loudspeaker music group. Anxiety score was not significantly different between the two music groups. Moreover, the two music groups showed significantly higher well-being response than the control group. Hence, the anxiety level of the patients decreased, and their well-being level increased when listening to specially designed music during the coronary angiographic procedure. Furthermore, the patient focused music was preferred. Regarding the sound environment, listening music through audio pillow were rated positively. However, this study presents some limitations. The study only measured subjective anxiety and well-being levels and did not consider any physiological parameters to measure the anxiety of the participants.

Massage and guided imagery intervention

Three studies determined the effect of massage and guided imagery intervention on reducing the anxiety of patients before and during cardiac catheterization. McNamara et al. (2003) conducted a randomized clinical trial to examine the effect of 20-minutes back massage intervention on the patients admitted to cardiac catheterization laboratory for a diagnostic and potential cardiac interventional procedure in Canada. Forty patients were recruited and randomly assigned into control or intervention groups. Back massage was conducted 1 hour before the schedule time for the procedure. Patients in the intervention group lie comfortably in a lateral position with pillows supporting their head and legs on the cardiac catheterization laboratory stretcher. The massage was carried out by massage therapist. Heart rate, blood pressure, respiratory rate, and peripheral skin temperature were used as physiological measure of anxiety. Psychological state was determined using a short form of Profile of Moods States. Data were collected before massage (time 1), immediately following the back massage or standard care (time 2) and 10 minutes later (time 3). The study result showed that all physiological dependent variables, except for systolic blood pressure, were not significantly different between the groups (t = 1.99, p < 0.05). Although McNamara et al. (2003) was unable to demonstrate the significant difference in psychological states between the two groups, the systolic blood pressure of patients in the intervention group decreased, with mean values of 20 and 7 mmHg immediately after and 10 minutes after back massage, respectively. The findings suggested that 20-minutes of back massage decreased unsettling responses prior to cardiac catheterization. Hence, back massage effectively reduced the anxiety of patients who are waiting for cardiac catheterization.

Armstrong et al. (2014) further investigated the effect of massage with or without guided imagery in the USA by using a quasi-experimental and retrospective study. A total of 55 out-patients and in-patients were recruited and placed in a massage chair in the Heart Center waiting room or in their own bed in hospital room before cardiac catheterization, respectively. The patients received either 15-min massage, 20-min guided imagery, or both. The guided imagery included a woman's voice with soft music playing in the background; this intervention included three steps, namely, progressive relaxation exercise, followed by guiding the patients to a beautiful calming beach setting, and gently bringing the patient back to their current environment. Physiological measures such as blood pressure and heart rate were determined. Another group of patients were recruited through a retrospective chart review to compare with the intervention and matched comparison groups in terms of physiological measures before and during cardiac catheterization. The intervention groups also completed a 10-point analog scale to measure their pre and post intervention anxiety levels. The self-reported anxiety level was significantly reduced in massage with and without guided imagery

intervention groups (p < 0.0001). Moreover, diastolic blood pressure and heart rate was lower in the intervention groups than those in the comparison group upon entering the catheterization laboratory. Hence, massage with or without guide imagery could immediately reduce the anxiety level of the patient. This study presents several limitations. The study employed a relatively small sample size and did not use a randomized control design study. The matched comparison group was created retrospectively, and the patients were not given opportunity to receive the interventions.

Foji et al. (2015) conducted another randomized clinical trial on 62 patients with cardiac diseases to assess the effect of guided imagery on anxiety and hemodynamic variable on patients undergoing cardiac catheterization in Iran. The intervention group was placed into a quiet and relaxing room and allowed to listen to 18-min music and create a guided mental image through headphones before cardiac catheterization. Anxiety was measured by Spielbergger state-trait anxiety questionnaire before and after cardiac catheterization. Blood pressure, pulse rate, and respiratory rate were recorded. The mean level of anxiety significantly decreased after receiving guided imagery in the intervention group. The hemodynamic parameters slightly decreased after the intervention, but the reduction was not significant. Hence, guided imagery, which is a non-medicine technique, can eliminate the anxiety of patients. The limitation of this study includes small number of subjects in experimental and control groups. This study should be replicated to compare the effect of guided imagery with other relaxation techniques.

CONCLUSIONS

Cardiac catheterization is a common and invasive procedure used to diagnose cardiovascular diseases (Lewis et al., 2004). Patients undergoing cardiac catheterization commonly experience anxiety due to unpleasant feeling and fear (Trotter et al., 2011). This undesirable state of nervousness activates the sympathetic nervous system and negatively affects the clinical outcome of the patients who underwent this procedure (Player & Peterson, 2011). This summary review illustrates that non-pharmacological interventions, such as procedural education, procedural education with video demonstration, music therapy, and massage and guided imagery can effectively reduce the anxiety level of patients undergoing cardiac catheterization. These interventions are safe and non-expensive and can be delivered by nurses or incorporated into nursing intervention to improve patient prognosis. However, this review did not perform meta-analysis. Future systematic literature review is suggested to confirm the effectiveness of these non-pharmacological interventions.

REFERENCES

American Heart Association (2017). Cardiac catheterization (online). Available at: http://www.heart.org/HEARTORG/Conditions/HeartAttack/SymptomsDiagnosisofHeartAttack/Cardiac-Catheterization_UCM_451486_Article.jsp#.WSPo6Ge1uM8 Accessed 23 May 2017.

Armstrong K, Dixon S, May S, et al. (2014). Anxiety reduction in patients undergoing cardiac catheterization following massage and guided imagery. Complementary Therapies in Clinical Practice 20, 334-338.

Ayasrah SM, Ahmad MM (2016). Educational video intervention effects on periprocedural anxiety levels among cardiac catheterization patients: A randomized clinical trial. Research & Theory For Nursing Practice 30(1), 70-84.

Bertrand M (2011). What are the current risks of cardiac catheterization? Methodist DeBakey Cardiovascular Journal 7, 35-39.

Chair SY, Chau MY, Sit WH, et al. (2012). The psychological effects of a videotape educational intervention on cardiac catheterization patients. Contemporary Nurse 40(2), 225-233.

Chan D, Cheung H (2003). The effects of education on anxiety among Chinese patients with heart disease undergoing cardiac catheterization in Hong Kong. Contemporary Nurse 15(3), 310-320.

Chang H, Peng T, Wang J, et al. (2011). Psychophysiological responses to sedative music in patients awaiting cardiac catheterization examination: A randomized controlled trial. Journal Of Cardiovascular Nursing 26(5), E11-18.

Foji S, Tadayonfar AA, Mohsenpour M (2015). The study of the effect of guided imagery on pain, anxiety and some other hemodynamic factors in patients undergoing coronary angiography. Complementary Therapies in Clinical Practice 21, 119-123.

Gallagher R, Trotter R, Donoghue J (2010). Preprocedural concerns and anxiety assessment in patients undergoing coronary angiography and percutaneous coronary interventions. European Journal Of Cardiovascular Nursing 9(1), 38-44.

Gavigan A, Cain C, Carroll DL (2014). Effects of informational sessions on anxiety precardiovascular procedure. Clinical Nursing Research 23(3), 281-295.

Guo P, East L, Arthur A (2012). A per-operative education intervention to reduce anxiety and improve recovery among Chinese cardiac patients: A randomized controlled trial. International Journal of Nursing Studies 49, 129-137.

Harkness K, Morrow L, Smith K, et al. (2003). The effect of early education on patient anxiety while waiting for elective cardiac catheterization. European Journal Of Cardiovascular Nursing 2(2), 113-121.

Lewis S, Heitkemper M, Dirksen S (2004). Medical Surgical Nursing, St. Louis: Mosby.

McCaffrey R, Taylor N (2005). Effective anxiety treatment prior to diagnostic cardiac catheterization. Holistic Nursing Practice 19(2), 70-73.

McNamara M, Burnham D, Smith C, et al. (2003). The effects of back massage before diagnostic cardiac catheterization. Alternative Therapies In Health And Medicine 9(1), 50-57.

National Institutes of Health (2015). Coronary heart disease (online). Available at: http://www.nlm.nih.gov/medlineplus/ency/article/007115.htm Accessed 23 May 2017.

Nilsson U, Lindell L, Eriksson A, et al. (2009). The effect of music intervention in relation to gender during coronary angiographic procedures: A randomized clinical trial. European Journal Of Cardiovascular Nursing 8(3), 200-206.

Player MS, Peterson LE (2011). Anxiety disorders, hypertension, and cardiovascular risk: a review. The International Journal of Psychiatry in Medicine 41(4), 365-377.

Senay U, Huriye V, Mehmet U, et al. (2008). State and trait anxiety levels before coronary angiography. Journal of Clinical Nursing 17, 602-607.

Suhonen R, Leino-Kilpi H (2006). Adult surgical patients and the information provided to them by nurses: a literature review. Patients Education and Counseling 61, 5-15.

Taylor-Piliae R, Chair S (2002). The effect of nursing interventions utilizing music therapy or sensory information on Chinese patients' anxiety prior to cardiac catheterization: a pilot study. European Journal Of Cardiovascular Nursing 1(3), 203-211.

Trotter R, Gallagher R, Donoghue J (2011). Anxiety in patients undergoing percutaneous coronary interventions. Heart & Lung 40(3), 185-192.

Weeks B, Nilsson U (2011). Music interventions in patients during coronary angiographic procedures: A randomized controlled study of the effect on patients' anxiety and well-being. European Journal of Cardiovascular Nursing 10(2), 88-93.

World Health Organization (2017). Cardiovascular diseases (CVDs) (online). Available at: http://www.who.int/mediacentre/factsheets/fs317/en/ Accessed 23 May 2017.