Non-pharmacological interventions to reduce psychological distress in patients undergoing diagnostic cardiac catheterization: a rapid review.

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Abstract

Background: Cardiac catheterization is the standard procedure for the diagnosis of coronary heart disease. The threat physically and emotionally from this procedure can effect the patient's perception of their health. The heightened psychological distress associated with this diagnostic procedure can cause adverse patient outcomes. Non-pharmacologic interventions have been implemented to reduce psychological distress associated with cardiac catheterization.

Aims: The objective of this rapid review is to assess the efficacy of non-pharmacologic interventions (procedural education, relaxation techniques, psychological preparation) on psychological distress experienced by patients as they undergo a cardiac catheterization.

Methods: Published, peer-reviewed, English-language intervention studies from 1981 to 2014 were identified in a search of CINAHL, Medline, and Cochrane Library. Eligible studies included adults undergoing cardiac catheterization. Studies included in this review used experimental and quasi-experimental designs and assessed at least one primary outcome: anxiety, depression, and pain to test non-pharmacologic interventions pre and post-cardiac catheterization. Researchers independently extracted data from included studies and completed a quality assessment using a published tool. Data was synthesised as a narrative.

Results: There were 29 eligible experimental and quasi-experimental studies that tested the 3 interventions (n=2504). Findings suggest that non-pharmacologic interventions were able to effectively reduce psychological distress in some patients undergoing cardiac catheterization.

Conclusion: Evidence is stronger in recent studies that non-pharmacologic interventions of procedural education and psychological preparation can reduce psychological distress in patients undergoing cardiac catheterization. Further research is needed to define the various relaxation techniques that can be effectively implemented for patients undergoing cardiac catheterization.

Key Words:

Rapid review, cardiac catheterization, psychological distress, procedural education, relaxation techniques, psychological preparation

Cardiac catheterization and/or coronary angiography are common diagnostic procedures that are performed both electively and emergently for cardiovascular symptoms in conscious patients. Cardiac catheterization procedures, which from this point on will also include coronary angiography, provide information about cardiovascular structures and functioning, while coronary angiography provides images to detect coronary artery disease. In 2010 alone, 1,029,000 Americans underwent a diagnostic cardiac catheterization with 48% having further definitive cardiovascular interventions during this procedure.[1] In the UK, 247,363 diagnostic coronary angiograms were performed during 2013 with 39% having further coronary intervention.[2]

Although cardiac catheterization is relatively low risk for mortality, this procedure is linked to potential for morbidity and considerable psychological distress that occurs before, during and after the procedure.[3, 4] The threat of discomfort associated with cardiac catheterization procedure, the conscious state of the patient during the procedure, and the potential impact of the results from this diagnostic procedure can elicit a profound effect on patient's perception of health.

Many patients consider hospitalization and cardiac catheterization to be psychologically distressing.[5, 6] There is no consensus about the definition of psychological distress, but for the purpose of this review, the focus is on anxiety and depression as markers of emotional status.[7] Anxiety, a common psychological response (60%) in patients with cardiovascular disease, can cause unwanted clinical responses such as arrhythmias and ischemia that can lead to poor cardiovascular patient outcomes during cardiac catheterization.[8, 9] In addition, depression is a common symptom (20%) in patients with cardiovascular disease.[10,11] It is important to understand whether non-pharmacological interventions to reduce psychological distress are effective in people as they undergoing diagnostic cardiac catheterisation.

Several non pharmacological interventions can be delivered by health professionals to reduce psychological distress such as procedural and sensory education, psychological support with cognitive behavioural techniques, relaxation modalities of music ~~therapy~~, massage therapy, relaxation techniques and bio-feedback to name a few. However there is limited information about what approach in clinical practice may be the most effective in reducing psychological distress for patients that are undergoing a cardiac catheterisation.

Objective

The objective of this rapid review is to assess the efficacy of non-pharmacologic interventions (procedural education, relaxation techniques, psychological preparation) on

psychological ~~coping enhancement~~s experienced by patients as they undergo a cardiac catheterization.

Methods

A rapid review approach aims to provide a critique of what is known about a particular policy or practice using systematic approaches that are rigorous but with some concession to the breath and depth of a full systematic review.[12] Accordingly our search within each database was precise but may not have identified all relevant studies as we searched three databases only and not the grey literature.

Search Strategy

The search strategy was designed to locate eligible studies published in the English language between 1981 and through 2014, to reflect the time period from which the most relevant and contemporary work in this area was likely to have been published. Two reviewers and an information technologist agreed upon a list of search terms and key words. Key search terms included: anxiety, stress, coronary angiogram, cardiac catheterization, coronary angiography, heart, information, patient education, quality of life, knowledge, attitude, coping, satisfaction. The identified key words and boolean phrases were used to undertake an advanced search of CINAHL (via EBSCOhost), Medline and the Cochrane Library (Appendix).

Eligibility Criteria:

Experimental and quasi-experimental studies such as randomized clinical trials (RCT), controlled studies, observational studies (e.g. longitudinal, before-and-after studies, quasi experimental studies) of non-pharmacological interventions designed to reduce psychological distress undergoing elective cardiac catheterisation were selected to be included in this review. Specifically, participants were to be aged >18 years undergoing elective diagnostic cardiac catheterisation. The non-pharmacologic interventions included for review were: procedural education, psychological counselling, and relaxation techniques such as bio-feedback/relaxation, music, therapeutic touch, and massage therapy delivered before, during or after diagnostic cardiac catheterisation in a hospital catheterization laboratory.

Studies were included if they measured changes in anxiety, depression and procedural-related pain using questionnaires/surveys/self-reports and /or physiological measures indicative of psychological distress such as heart rate, blood pressure, respiration, and

measures of muscle relaxation, in patients undergoing cardiac catheterization. These measures were collected pre, during and / or post procedure within 12 months of cardiac catheterisation.

Study Selection and Data Abstraction

All studies identified in the search were independently assessed by two researchers based on the information given in the title and abstract (if available) against the inclusion/exclusion criteria.. Seventy-seven studies were included and full versions of the studies retrieved. Two researchers independently read all 77 studies. Data were independently extracted from each study by the researchers and tabulated. A meeting to reach consensus on selection was convened and the input from a third independent researcher sought if consensus could not be reached. A further 48 studies did not match the inclusion and exclusion criteria and were excluded leaving 29 studies in the review. The search findings and process are shown in Figure 1.

Quality appraisal of included studies was conducted independently with at least two researchers. The purpose of this was to use a systematic approach to evaluate the quality of the studies. We also recognise that there is no consensus on which tool to use to appraise methodologically diverse studies.

The researchers used the Down & Black Checklist[13] as it can be used to evaluate methodologically diverse studies. The checklist evaluates factors that measure: the intervention, potential confounders, and the outcome. Evaluation of 4 factors, reporting, internal and external validity and power, verifies the association between the intervention and the outcome by assessing design bias. The checklist includes 27 items. The reporting subscale consists of 10 items that assess whether the information in the article was sufficient to allow a reader to make an unbiased assessment of the study findings. Total score for reporting is 11. External validity consists of 3 items, total score of 3 that address the generalizability of findings to the population of concern. Internal validity, bias of measurement and selection of subjects, consists of 13 items with a total score of 13. One item measures power and is scored from 0 to 5. The power item attempts to assess whether negative findings of a study could be due to chance. Total score for the checklist ranges from 0 to 32, with a higher score indicating higher quality. Original Internal consistency for the checklist was .89, test-retest reliability .88 and inter-rater reliability was .75.[13] Three independent researchers completed their assessment. A statistician provided the expert analysis and scoring of the power calculation for each study

Initially, 4 studies were randomly selected for independent appraisal by the three researchers to assure inter-rater reliability. The appraisal process and scoring of one of the studies was tested for consistency of interpretation and fine detail amendments were made to the appraisal tool. The tool was then applied to the other three initial articles and agreement on scores was reached. Of 27 items, there was discrepancy in $\leq$ 3 items resulting in an 88% inter-rater reliability.

The remaining studies were distributed equally among the three researchers to ensure that two researchers independently appraised each study. Difference in overall scores between reviewers was $\leq$ 6 items (inter-rater reliability 78%) and following further joint scrutiny and discussion between the three researchers a consensus of the overall score was reached. The final analysis included 29 studies. Table 1 presents data extraction details of these 29 studies.

RESULTS

The search identified 2030 records for potential inclusion. Figure 1 shows a flow diagram of results. Twenty nine studies, conducted across 10 countries (USA (13), India (1), China (3), Canada (5), Germany (1), Austria (1), Denmark (1), Italy (1), Taiwan (1), Iran (2)), with 2504 participants were included in the final synthesis. Study characteristics and findings are shown in Table 1. Studies were grouped by intervention into three broad categories; procedural education, psychological preparation, and relaxation techniques including music, biofeedback, therapeutic touch, and massage.

Fifteen studies were reported at randomised controlled trials, 13 as quasi-experimental design, and one study was described as descriptive evaluation. The majority (80%) of the studies utilized a pre and post-test method to measure changes in psychological distress. The most frequently measured outcome was anxiety measured across 27 studies using a variety of tools. The most commonly used tool was the state-trait anxiety inventory (STAI) while other used the Profile of Mood States (POMS), Multiple Affect Adjective Checklist (MAACL), and investigator developed visual analogue scales.

Procedural Education

There were 12 studies (n = 1093 participants) that used a variety of structured forms of procedural education for patients undergoing cardiac catheterization.[6, 14-24] Of the 12 studies that provided procedural knowledge, 3 studies[14, 19, 23] added a second group that received

sensory procedural information and 1 study[14] tested a combination of both of procedural knowledge and sensory education. Two recent studies used video or multimedia as the format for the education.[16, 24] There were positive effects from procedural education sessions with 11 studies demonstrating a reduction in anxiety scores as the measure of psychological distress.[6, 14-18,20-24] The majority of these studies used the State Trait Anxiety Inventory (STAI) as the method of measurement.[25] Houston and colleagues[19] was the only study that found no difference between 2 procedural education sessions, structured and patient guided. These investigators used the Multiple Affect Adjective Checklist (MAACL) that measures more generalized mood state including anxiety, depression and hostility and both groups received an educational intervention with no control group for comparison.

Those that tested procedural sensory education sessions (n=3), that is information about the sensations that are experienced during cardiac catheterization, all found that providing patients with sensory information about cardiac catheterization lowered anxiety scores.[14, 21, 23] Three studies assessed the tendency to seek out or avoid threat-relevant information by using the Miller Behavioral Style Scale (MBSS).[20,21,23] Higher score indicates that the subject is a monitor, those who seek out threat-relevant predictability information. Monitors were found to have lower anxiety scores in general. While those with lower scores on the MBSS, patients that avoided threat-relevant information and labelled blunters, had higher levels of anxiety. In these studies, there were significant effects on anxiety based on behavioral style and type of information. For those who avoid information, the blunters, anxiety was lowered by only receiving procedural education that was provided, while for monitors, anxiety was lessened with the addition of procedural sensory education.

Psychological Preparation

There were 4 studies (n= 333 participants) that assessed various strategies used to provide psychological support to patients before and during cardiac catheterization.[26-29] These strategies included; modelling, cognitive-behavioural coping skills training, and cognitive behavioural interventions. There were noted reductions in anxiety, though not consistently in all studies.[26, 27] Mott [28] demonstrated no significant changes in anxiety but had no comparison to a standard of care group. Davies and colleagues[27] assessed participants based on coping style. They demonstrated that regardless of coping style participants found that information provided by a model on video was a more efficacious mode of providing preparation for cardiac catheterization.

Norris and colleagues[29] followed patients after cardiac catheterization with depressive symptomatology, as measured by the Centre for Epidemiologic Studies Depression (CES-D)

for 6 weeks after randomization to a telephone call by a nurse, a mailing or standard of care. This study demonstrated reduction in depression scores when patients received telephone or mail contact to provide mental health resources. Anderson & Masur[26] used a self-report single item for depression and noted no significant change in depression over 6 hours of follow-up.

Relaxation Techniques

Various relaxation methods have been used in clinical practice. These techniques include progressive relaxation, biofeedback, music, guided imagery, therapeutic touch, and back massage. The impact of these techniques upon anxiety, measured by a combination of physiologic measures and paper and pencil questionnaires, pre and post intervention; before, during and after cardiac catheterization were tested in five randomized clinical trials (RCT) and 8 quasi-experimental studies (n=1078) with mixed results.[30-42]

Relaxation

Cumulatively, Frenn, Rice, and Warner with their colleagues[32,38,41] studied 90 participants undergoing cardiac catheterization, conveniently selected and randomly assigned to control (usual care) or intervention (Benson's relaxation or 'letting go' relaxation techniques) groups. The Rice protocol[38] also included pre and post cardiac catheterization self-reporting and observer rating scales of anxiety did not report a significant difference between control and experimental groups. In Frenn's study[32] the intervention group displayed a consistently lower respiratory rate and in Warner and colleagues[41] intervention group, they reported fewer requests for additional sedatives. Warner[41]also reported a significant fall in post cardiac catheterization anxiety compared to pre in the intervention group considered to be beyond the relief effect and feedback of diagnostic results from the cardiac catheterization.

Mikosch[35] studied the effect of respiratory- sinus- arrhythmia biofeedback techniques on a sample of 212 patients undergoing cardiac catheterization. The investigators found a significant reduction in anxiety levels post cardiac catheterization in both groups that was attributed to the relief and feedback of diagnostic results from cardiac catheterization. However they found in the intervention group had significantly lower anxiety scores and lower blood pressure pre and post cardiac catheterization. The difference was further emphasised between those in the intervention group who used breathing techniques along with biofeedback during the procedure.

Zolfaghari and colleagues[42] investigated the effects of therapeutic touch on women undergoing cardiac catheterization by measuring anxiety, physiological parameters (BP, HR,

respiration) and incidence of cardiac dysrhythmias. There were three groups; Group 1 women received 10-15 minutes of therapeutic touch, Group 2 received 10-15 minutes of simulated touch and group 3 did not receive any therapy. There were 69 female subjects that were assessed for anxiety, physiological parameters and cardiac dysrhythmias. Those in Group 1 had a decrease in state anxiety, respiration, and less incidence of cardiac dysrhythmias except for premature ventricular contractions (p<. 001).

Massage

McNamara and colleagues[34] assessed the impact of a 20-minute and Armstrong and others[30] a 15 minute back massage with and without guided imagery. Both investigative teams found a significant reduction in BP immediately post massage compared with the control group, and the Armstrong study[30] demonstrated reduction in self-reported anxiety and heart rate. In contrast, Okvat and colleagues[37] employed a 10-minute massage and that failed to reveal any difference between groups however they only employed a 10-minute massage and utilised visual analogue scales (VAS) to measure outcomes. There was no significant reduction in pain in either McNamara or Okvat's studies.[34, 37]

Music

The 5 studies that used music as an intervention before or during cardiac catheterization had mixed results.[31, 33, 36, 39-40] Subjects were all randomly assigned before cardiac catheterization to music or a standard of care group. All consecutive patients were enrolled in only one study, while all others used convenient sampling. Due to the intervention, subjects assigned to these interventions were all aware of treatment assignment.

There were four studies that used a standard measure of anxiety with 2 of these studies demonstrating reduce anxiety.[33, 36] Researchers[31]assessing pain with a music intervention found no significant effect on perception of pain. Moradipanah and colleagues found that music had a significant effect on depression immediately after the music intervention.[36]

Quality Assessment

Using the Downs and Black checklist[13] the 29 studies in this rapid review were scored. The small sample size and the lack of reporting all components of the studies hampered this assessment. The ~~total~~ mean score was 20.5 with a range of 1~~0~~2 ~~-~~to 28. The mean scores were calculated based on data from reporting, assessment of internal and external validity and power from the checklist and results for each category are listed.

Reporting

The mean score was 7.8 for all 29 studies with a range from 5 to 10. The reporting of demographic data for comparison and the consideration of confounding factors was variable. Studies did not attempt to control for differences in cardiac medications that may have had some influence upon physiological outcomes that were measured. In addition there was variability on the robust description of the intervention. Hypothesis and outcomes were clearly described.

External Validity

The mean score was 2.5 for all 29 studies with a range of 1 to 3. Subjects recruited were felt to represent the entire population. Subjects were treated predominantly in the environment that patients undergo cardiac catheterization in acute care hospitals. Four studies had 1 or less for external validity.[15, 18, 32, 38]

Internal Validity

The mean score for measurement and selection bias for the 29 studies was 7.8 with a range of 1 to 10. Although random assignment to groups was reported, methods employed were not always explicit. Allocation concealment was not explicitly addressed and subjects completed informed consent. There was no overt reporting bias beyond the researchers explaining more fully the extent to which the intervention group did and did not engage with the interventions before, during, or after cardiac catheterization.

Those studies on relaxation technique were not able to blind subjects to intervention nor was blinding applicable. Some researchers were restricted to 3 and 2 days respectively per week for selection and therefore subjects were randomized based on the day of the procedure which may have injected a degree of selection bias.[30, 34, 35]

We identified the studies of relaxation techniques, excluding music, that did not find a significant difference between Intervention and control groups to be at higher risk of bias according to evaluation based upon Downs and Black checklist.[32, 37, 38] The five studies which did establish a difference had a lower risk of bias based on Downs and Black checklist.[30, 35, 41, 42]

The five studies of music as a relaxation technique also had a lower risk of bias with a mean score of 21.8 on the Downs and Black checklist.[31, 33, 36,37,49] There were 2 studies of music as a relaxation intervention that had no significant change in anxiety from pre to post the music intervention.[31, 39]

Power

The mean power score was 1.9 with 11 of the studies scoring 0. The studies with a score of 0 lacked any discussion of power.[14, 15, 19, 21, 26, 28, 30, 38, 39, 41,42] There were 4 studies that had a score of 5 [6,18,35,39] and 3 studies with a score of 4.[23,31,33]

DISCUSSION

This rapid review demonstrates that non-pharmacologic interventions, preparatory education, psychological preparation, and relaxation techniques are able to effectively reduce psychological distress in certain patients undergoing cardiac catheterization. Efficacy was evident in 24 of the 29 studies.[6, 14-18, 20-24, 26, 27, 29-30, 32-36, 39-42]

The use of procedural education in 11 studies demonstrated significant reductions in psychological distress, specifically anxiety.[6, 14-18, 20-24] The cohort of studies focused upon the delivery of procedural education to patients used either a quasi-experimental design, or with randomised controlled trials, with one or more experimental arms compared to usual care. Most studies reported that that the delivery of an educational intervention had some benefits in reducing psychological distress, in particular self-reported anxiety levels. To what extent the reduction in such parameters might be clinically meaningful remains to be seen. Sample sizes were typically modest but consideration had been given to the sample size required to detect an effect in several of the trials.

There are several key challenges in the design of such studies. Firstly the background level of psychological distress pre-cardiac catheterisation is likely to be elevated in response to the uncertainty of undergoing treatment and not all studies compared the characteristics of the experimental and control groups at baseline. Secondly, it is very difficult in the context of a hospital environment, to quality assure the fidelity of the intervention and avoid potential bias around intervention allocation. Accordingly it is difficult to attribute the reduction in anxiety post-catheterisation solely to the delivery of an educational intervention although it seems likely that it confers some benefit.

For psychological preparation, studies demonstrated significantly lower anxiety using a combination of modelling and cognitive behavioural skills or a modelling video with a patient model as the presentation style.[26, 27] These studies used the Miller Behavioural Style Scale to identify subject as either a monitor or a blunter.

The studies using procedural sensory modelling appeared to be optimal for monitors, while the procedural modelling video appeared to be optimal for blunters as measured by anxiety scores after the study intervention. The monitor results are similar to Watkins and colleagues

though not for blunters.[23] Anderson and Masur[26] demonstrated that modelling was effective in reducing anxiety and the addition of cognitive behavioural skills (relaxation, distraction, reframing) had similar results though those with cognitive behavioural skills did report more positive adjectives that those with modelling alone. The limited number of studies and the small sample size limits the conclusions that can be drawn from these studies. The use of non-validated questionnaires and multiple measurements of anxiety influence the mean quality scores for all psychological preparation studies.

For relaxation techniques, 3 studies noted lower anxiety scores as measured by the STAI after the relaxation intervention.[41, 32, 35] The 2 studies that introduced relaxation therapies the night before cardiac catheterization may have affected participant comfort and subsequent engagement with the approach by having time to introduce the technique.[35, 41] These researchers also suggest that the emphasis upon compliance with strategies during the procedure may be the key to improved psychological outcomes and merit further attention. Alternatively, use of strategies such as massage, which do not require participant training may be more applicable if preparatory time is limited. However massage may be an equally unfamiliar experience for many and may have similar issues of participant comfort and acceptance. Secondly, availability and cost of employing such expertise may be an additional issue.

However, by virtue of the time taken to teach relaxation therapy or provide a massage, the intervention group inevitably received longer spans of healthcare professional attention. For example, the intervention groups interacted twice as long in the study done by Rice and colleagues[38] than the usual care group. Although Warner and others ensured that both groups received equal attention, variance in the time to post catheter STAI completion may have affected their results.[41] In addition, Warner and colleagues suggest that measuring anxiety pre intervention and post cardiac catheterization but not pre cardiac catheterization may not have revealed the full impact of the relaxation training.[41] Similarly, Okvat and colleagues[37]and Zolfaghari and others[42] attempted to mediate against the potential impact of variance in the amount of healthcare attention devoted to each group as the therapist sat with the control group for a period of 10 or 15 minutes of rest and quiet. In view of the resource, time and training implications of relaxation and/or massage therapies, investment in further research to establish which methods are most effective in reducing psychological distress is recommended

Three of the 5 studies that assessed a music intervention identified significant reductions in anxiety. Thorgaard[40] used an investigator developed questionnaire calling into question the

reliability of results, while Taylor-Pillae and others did not reach adequate sample size.[39] Bally and colleagues, even with an appropriate sample size, did not find a statistically significant impact from music on the outcome of anxiety.[31] The apparent conflict in findings warrants further study to clarify the specific impact of music therapy.

Norris and colleagues[29] was the only study that provided follow-up care after discharge after cardiac catheterization specifically for those patients that indicated depression on the CES-D. The investigators demonstrated that early recognition strategies and referral for mental health needs decreased depressive symptomatology in the short term. Depression is a risk factor for poor health outcomes in patients with cardiovascular disease and this study identified a simple method to reduce this potential risk factor.[7, 8]

Pain was measured in 3 of the relaxation studies only.[31, 34, 37] All of these studies used visual analogue scales with no significant effects for music or massage on pain perception. Pain levels were relatively low both before and after intervention with little to no impact on pain after cardiac catheterization with a number of subjects having no pain.

It is noteworthy that four studies which failed to demonstrate a difference were all conducted at least 10 years ago, whereas the more recent studies which identified a positive difference were conducted during the last decade.[19, 28, 38, 39] This may reflect changes in cardiac catheterization service delivery and subsequent time and opportunities to provide specific intervention. Mikosch's study perhaps better reflects that the preparation today, the amount of preparation, information, technical capability, speed of delivery and results almost certainly differ from 10 to 20 years ago.[35]

Limitations

Like all reviews, we are limited by the quality and quantity of the original research articles. Recognition that the impact of judgment and balance upon the findings can only be reduced and made more explicit but not wholly removed by the rigour of the systematic review.

CONCLUSIONS

The strength of this rapid review is identifying evidence that preparatory education and psychological preparation may reduce anxiety and depression in patients undergoing diagnostic cardiac catheterization. The quality of the articles in this rapid review, limits the ability to drawn conclusions, but begins to define the evidence for these interventions. This

provides preliminary support for these interventions to be used to prepare patients for cardiac catheterization.

This rapid review highlights areas for further research. As research in the area of cardiac catheterization laboratories spans the international community, we recommend that use of standard measurements of psychological distress, assessment of effect, description of the interventions tested for replication, and treatment fidelity be measured. Specifically, more research in relaxation techniques is needed to define the impact of various relaxation techniques including massage and music on pain and depression.

IMPLICATONS FOR PRACTICE

Procedural education reduces psychological distress

Matching behavioural style to psychological preparation lowers anxiety

Some relaxation techniques require patient training and resources limiting their use

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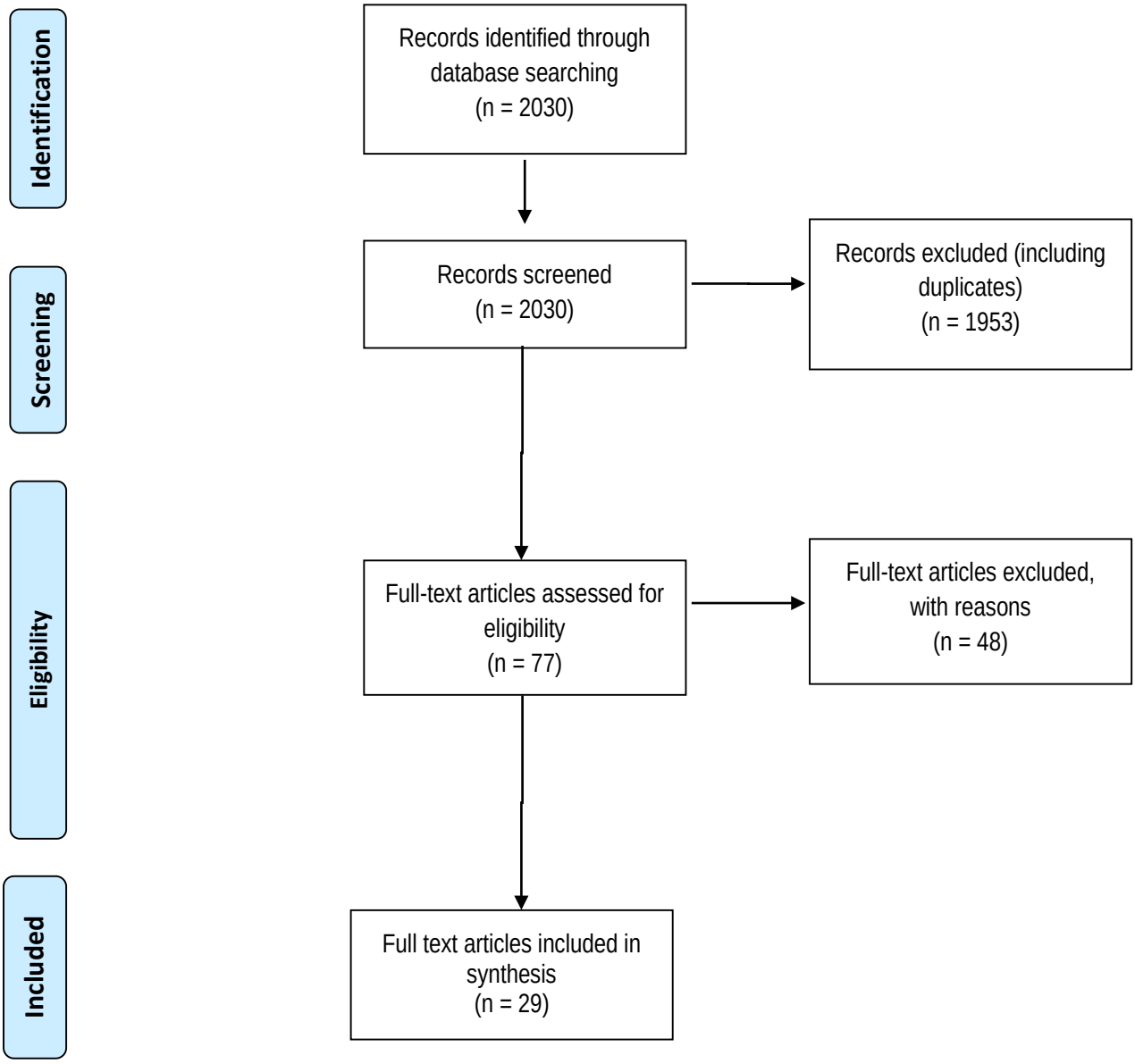
Figure 1: Flow diagram of results



Adapted from: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Med* 2009; 6(6): e1000097. doi:10.1371/journal.pmed1000097

Table 1 Evidence Table

Author, Year, Location	Design	Participants	Intervention	Quality Score	Outcome Measure & Tool	Findings
Procedural Education						
Byers et al 1984[14] USA	Quasi-Experiment: Pre Post Test	30 Mean age 55.3 years Group 1, 2 ,3 – 10 each	Group 1 - Procedural information Group 2 - Sensory information Group 3 - Both Procedural and sensory information	19	Anxiety – STAI	Significant lower anxiety post procedure in Groups 2 and 3 than Group 1 (p< .01)
Catherine 2005[15] India	Descriptive Evaluative: Pre Post Test	50 76% male	All subjects used Self Instructional Model (SIM) - no control or comparative group	12	Knowledge - Structured knowledge Questionnaire; Anxiety - Hamilton Anxiety Scale	Significant difference in pre and post-test knowledge (p< .05) and anxiety scores (p< .05).
Chair et al 2012[16] China	Quasi-Experiment: Pre Post Test	128 (82 M & 64 F) Mean age – 61.3 years Control = 64 Intervention = 64	Control – standard care Intervention – individual education with video	20	State Anxiety – STAI – Chinese version Uncertainty – Mishel Uncertainty in Illness Scale Satisfaction of care and perceived knowledge	Significant decrease in level of state anxiety (p< .0001) and uncertainty (p< .0001), with increase in satisfaction and perceived knowledge after intervention
Chan et al 2003[17] China	RCT: Pre Post Test	62 (43M & 19F) Mean age 58.2 years Control = 31, Intervention = 31	Control – standard care Intervention – 1 hour group education	24	Knowledge – 8-item knowledge test Anxiety – STAI measured at informed consent, immediately pre-catheterization (cath) and within a day post-cath	Lower anxiety score in intervention group (p< .0001) pre and post cath Knowledge gain in intervention group (p< .001)
Harkness et al 2003[6] Canada	RCT	228 (138M & 90F) Mean age 69 years Control n = 114, Intervention n = 114	Control - Standard care Intervention – Nurse delivered information / education session	28	Anxiety - STAI Quality of Life - SF-36, Seattle Angina Questionnaire	Lower anxiety (p< .03) and improved perceived health (P< .002) after education
Hermann et al 1989[18] Germany	RCT: Pre Post Test	60 (44M & 16F) Mean age 55.2 years Group 1 - 34 Group 2 - 26	Group 1 Control - Info leaflet + Doctor gave standard info. Group 2 Experiment - Info leaflet + Doctor gave standard info + video	26	Anxiety – STAI	Group 1 - no significant reduction in anxiety (p< .08) Group 2 - significant reduction in anxiety (p< .0001)
Houston et al 1996[19] USA	RCT: Pre Post Test	89 (47M & 42F) Mean age 61.3 years Group 1 – 47 Group 2 – 42	Group 1 -guided pre procedure intervention (1:1 based on patient preference guide) Group 2 - structured pre procedure intervention (1:1 teaching by nurse)	19	Affect - MAACL Coping - Coping Resources Inventory (CRI).	No significant difference in affect or coping between groups
Ludwick-Rosenthal & Neufield 1993[20] Canada	RCT: Pre Post Test	72 36M & 36F Mean age 63.5 years Group 1 - 35 Group 2 - 36	Group 1 High prep Info Group 2 Low prep info	20	Coping – MBSS (Blunters and Monitors) Anxiety – STAI Subjective Stress Scale (SSS), Desire to be informed - Krantz Health Opinion Survey Desire to control - Desirability of Control Scale Behavioural anxiety rating - observation HR, BP	Low info males, decrease in anxiety (p< .001) High info females, decrease in anxiety (p< .01) Low info females & high info males – no change High info = more positive self statements (p< .02)

Author, Year, Location	Design	Participants	Intervention	Quality Score	Outcome Measure & Tool	Findings
Peterson 1991[21] USA	RCT : Pre Post Test	72 (44M & 28F) Mean age 60 years Group 1 2, 3, – 24 Ech group	Group 1 - Control Group 2 - Educational intervention Group 3 - Social intervention	22	Anxiety – STAI Coping style – MBSS	Group 2 (p< .001) & group 3 (p< .005) had significant reduction in anxiety
Ruffinengo et al 2009[22] Italy	RCT	93 (76M & 17F) Mean age 65.2 years Control = 45, Intervention = 48	Group 1 - Informative video Group 2 - Control - no video	22	Anxiety –STAI Satisfaction-Investigator questionnaire	Significant decrease in anxiety (p< .00001) and increased information satisfaction (p< .00001) in intervention group
Watkins et al 1986[23] USA	RCT: Pre Post Test	86 (70M & 16F) Group 1 - 28 Group 2 - 29 Group 3 - 29	Group 1 - AV presentation of procedure info; Group 2 - AV presentation of procedure & sensation info; Group 3 - No AV presentation	19	Coping - MBSS (Blunters and Monitors) Affect - MAACL Anxiety - STAI HR, BP	Blunters have higher anxiety (p< .001) Those in Group 1 and 2 had lower anxiety scores (p< .001) and information (p< .013) that those in the no AV presentation group. Those subjects that were monitors who received procedure plus sensation information reported less anxiety, lower HR than those who received only procedural information Those subjects that were blunters who received procedure plus sensation information reported higher anxiety scores and HR than those who received only procedural information
Wu et al 2013[24] Taiwan	RCT: Pre Post test	123 (90M & 33F) Mean age 61.3 years Group 1 = 44 Group 2 = 39 Group 3 = 40	Group 1 regular education (control) Group 2 AEMIE (accessibility-enhanced multimedia informational education) Group 3 Instructional DVD	24	Anxiety – STAI Satisfaction questionnaire – 12 items	Significant reduction in anxiety in AEMIE (group 2) at T2 (p<.004) Higher satisfaction with preparation in AEMIE group (p<.01 -.005)
Psychological Preparation						
Anderson & Masur 1989[26] USA	RCT : Pre Post Test	60 (33 M & 27 F) Mean age 54.18 years 5 groups of 12 subjects	Group 1 - Sensory procedural information Group 2- Modelling Group 3 - Cognitive behavioural coping skills Group 4 - Modelling & cognitive behavioral skills Group 5 – Control / Attention placebo	20	Anxiety, Depression, Perceived Coping - Self Report times 5 Palmar Sweat Index time 4 Information quiz once	Group 4 – Palmar Sweat Index – lower sweat gland activity after intervention (p< .05) Groups 1, 2, 5 = Palmar Sweat Index- Higher sweat gland activity after intervention (p< .05) Groups 2 & 4 = significant lower anxiety (p< .02) & greater perceive coping during catheterization (p< .04) Group 1 to 4 = significant increase in information quiz (P< .001)
Davies et al 1994[27] Canada	RCT : Pre Post Test	145 (107M & 38F) Group 1 – 20 Group 2 – 22 Group 3 – 24	Group 1 - Procedural modelling video Group 2 - Procedural sensory modelling video Group 3 - Procedural sensory Info book	16	Coping – MBSS (Blunters and Monitors) Anxiety – STAI HR, BP	Female monitors and blunters were significantly more anxious (p< .01) Monitors provided procedural sensory video had lower mean anxiety score (p< .01) Blunters provided procedural video had lower mean anxiety scores (p< .01)

Author, Year, Location	Design	Participants	Intervention	Quality Score	Outcome Measure & Tool	Findings
Mott 1999[28] USA	Quasi Experiment : Pre Post Test	30 (20M & 10F) Group 1 - 8 Group 2 – 8 Group 3 - 14	Group 1 - Sensory perceptual info Group 2 - Modeling treatment Group 3 – both	18	Anxiety – STAI	No significant difference between 3 groups
Norris et al 2009[29] Canada	Experiment Pilot study	98 (75M & 25F) Mean age 64.9 years Group 1 – 42 Group 2 – 26 Group 3 – 27	Group 1 - Follow up information on mental health resources via mail Group 2 - Follow up information on mental health resources via telephone interaction Group 3 – Control	20	Depression – Centre for Epidemiologic Depression Scale (CES-D) baseline and 6 weeks	Improvement in CES-D scores in intervention groups – mail group (p< .03) and telephone group (p< .007)
Relaxation Techniques						
Armstrong et al 2014[30] USA	Quasi-Experiment Non-randomized	57 participants Mean age 65.2 years 26 M/29 F Guided imagery =2 Massage = 31 Massage/Guided imagery = 24	Group 1 – Guided Imagery (Excluded) Group 2 – Massage Group 3 – Massage/Guided imagery	17	Anxiety – 10 point analog scale between Group 2 and 3 Matched pair analysis to historical controls for BP, HR analysis	Significant reductions in anxiety (P< .0001) 94% of subjects found intervention to be helpful Matched pairs – no differences between historic controls and intervention groups
Bally et al 2003[31] Canada	Quasi Experiment: Pre Post Test	113 (64M & 49F) Mean age 58.5 years Control group - 55 Intervention group – 58	Control – Standard care Intervention - Music	22	Anxiety – STAI Pain – Visual Analogue Scale HR	No significant differences in anxiety, pain or HR between groups
Frenn et al 1986[32] USA	RCT : Pre Post Test	20 (12M & 8F) Control n = 10, Intervention n = 10	Benson's relaxation technique	13	Anxiety – STAI BP, HR, Respirations	Respirations lower in intervention group (p< .001) All other outcome measure were NS
Hamel et al 2001[33] USA	Quasi experiment: Pre Post Test	101 (63M & 38F) Control n = 50, Intervention n = 51	Control – Standard care Intervention - Music	22	Anxiety – STAI HR, BP	Significant decrease anxiety (p<. 002), & systolic BP (p< .007) in intervention group
McNamara et al 2003[34] USA	RCT: Pre Post Test	46 Mean age 64.9 years Control n = 23, Intervention n = 23	Control – standard care Intervention - 20 min back massage	23	Affect – Profile of Moods States Pain perception – Visual Analogue Scale HR, BP, Respiration, peripheral temperature heart rate variability	Significant reduction in systolic BP (p<. 05) in intervention group
Mikosch et al 2010[35] Austria	Quasi Experiment	212 (116M & 96F) Mean age 65.9 (M) and 67.1 (F) years Control n = 106, Intervention n = 106	Control – standard care Intervention - Structured psychological conversation & Respiratory sinus arrhythmia bio feedback	25	Anxiety -STAI, Risk factors, HR, BP	Significant decrease in anxiety (p< .001) & BP (< .001) in intervention group

Author, Year, Location	Design	Participants	Intervention	Quality Score	Outcome Measure & Tool	Findings
Moradipanah et al 2009[36] Iran	RCT : Pre Post Test	74 (37M & 37F) Mean age 50.6 years Control group - 37 Intervention group - 37	Control – standard care Intervention - Music	23	Depression and Anxiety – Depression Anxiety Stress Scales pre and post angiography	Significant decrease in anxiety (p< .006), stress (p< .001), and depression (p< .02) immediately after intervention but not after procedure (post intervention)
Okvat et al 2002[37] USA	Prospective RCT : Pre Post Test	78 (59M & 1 9F) Mean age 60.9 years Group 1 – 43 Group 2 - 35	Group 1- Standardised 10 min massage. Group 2 - 10 min quiet time with massage therapist	21	Anxiety & Pain – separate visual analogue scales HR, BP analgesic & anxiolytic use	Group 1 – trend toward lower self reported anxiety (p< .08) No significant difference in pain, discomfort, HR, BP, analgesia or anxiolytic use by group
Rice et al 1986[38] USA	Quasi Experiment: Pre Post Test	30 (19M & 11F) Mean age 56.2 years Group 1 – 15 Group 2 – 15	Group 1 - Relaxation Group 2 – Control	19	Anxiety – STAI Behaviour - observation	No significant difference in anxiety or reported distress
Taylor-Piliae et al 2002[39] China	RCT: Pre Post Test	45 (36M & 9F) Mean age 58 years Group 1 – 15 Group 2 – 15 Group 3 - 15	Group 1 – Music therapy Group 2 – Sensory information Group 3 – Control	22	Anxiety - STAI Affect - Profile of Mood States (POMS), Uncertainty- Mishel's Uncertainty in Illness Scale	Affect – Group 2 had less fatigue-inertia (p< .023) and confusion-bewilderment (p< .05) No change in other Affect, anxiety or uncertainty by group
Thorgaard 2008[40] Denmark	Quasi Experiment: Post test	193 124 M/69/F mean age 62 years Group 1 – 84 Group 2 - 99	Group 1 – Music Group 2 – Control	20	Researcher developed questionnaire	Selected music had positive effect on well being - 'less tense, more relaxed and safe'
Warner et al 1992[41] USA	Quasi Experiment: Pre Post Test	40 (23M & 17F) Mean age 59.5 years Group 1 – 20 Group 2 - 20	Group 1 - Relaxation therapy Group 2 – Control	17	Anxiety - STAI, HR, BP, respiration Amount of sedation	Group 1 - significantly lower anxiety scores post catheterization (p< .05) in intervention group Group 1 – received less sedation (p< .05) No difference in HR, BP, respiration between groups
Zolfaghari et al 2012[42] Iran	Quasi-Experiment	69 women Mean age 51 years Group 1 – 23 Group 2 – 23 Group 3 - 23	Group 1 – Therapeutic touch (15 minutes) Group 2 - Placebo (15 minutes of simulated touch) Group 3 – Control	22	Anxiety – STAI BP, HR, & respiration Cardiac dysrhythmias (sinus tachycardia, ventricular tachycardia, Premature atrial contractions, premature ventricular contractions (PVC))	Significant reduction in anxiety in Group 1 (p< .0001) Significant reduction in respirations in Group 1 (p< .0001) Significant reduction in cardiac dysrhythmias except PVC (p< .001)

STAI -State-Trait Anxiety Scale; MBSS - Miller Behavioural Style Scale ; MAACL -Multiple Affect Adjective Check List; HR – heart rate; BP – blood pressure, M – males, F-females

Appendix Search Terms

Astin Coronary Angiography and psychological factors and support – Medline Draft

DA 06.04.11

1. Heart Catheterization/
2. Coronary Angiography/
3. cardiac catheteri?ation*.ti,ab.
4. coronary angiogra*.ti,ab.
5. or/1-4 [coronary angiography terms]
6. Adaptation, Psychological/
7. Anxiety/
8. Stress, Psychological/
9. Fear/
10. Anger/
11. uncertainty/
12. (cope or coping).ti,ab.
13. Perception/
14. patient concern*.ti,ab.
15. Attitude to health/
16. Quality of life/
17. Health Knowledge, Attitudes, Practice/
18. patient* knowledge.ti,ab.
19. Internal-External Control/
20. health locus of control.ti,ab.
21. Preoperative Care/
22. preoperative education.ti,ab.
23. patient-centered care/
24. Professional-Family Relations/
25. physician-patient relations/
26. nurse-patient relations/
27. professional-patient relations/
28. Counseling/
29. psychoeducation.ti,ab.
30. Needs Assessment/
31. exp complementary therapies/
32. Social support/
33. Patient Education as Topic/
34. patient education/
35. exp Patient satisfaction/

36. patient communication*.ti,ab.
37. information leaflet*1.ti,ab.
38. pamphlets/
39. (written adj2 information).ti,ab.
40. (print* adj2 information).ti,ab.
41. booklet*1.ti,ab.
42. health literacy.ti,ab.
43. health information.tw.
44. Comprehension/
45. comprehension.ti,ab.
46. communication/ or information dissemination/
47. health education/
48. information services/
49. information source*.ti,ab.
50. information resource*.ti,ab.
51. information need*.ti,ab.
52. information support*.ti,ab.
53. information seeking.ti,ab.
54. patient* education.ti,ab.
55. ((quality or quantit* or type?) adj2 information).ti,ab.
56. Computer-Assisted Instruction/
57. exp Educational Technology/
58. Internet/
59. video*.ti,ab.
60. (website* or web site* webpage* or web page* or web based).ti,ab.
61. teaching material/
62. (patient adj2 (information or education or instruction? or advice)).ti,ab.
63. ((print* adj2 advice) or instruction?).ti,ab.
64. brochure?.ti,ab.
65. or/6-64 [psychological factors and support terms]
66. 5 and 65 [Coronary Angiography and psychological factors and support terms combined]
67. limit 66 to english language