

## EFFECTIVENESS OF MUSIC AS INTERVENTION FOR PERIOPERATIVE ANXIETY: A SYSTEMATIC REVIEW

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### ABSTRACT

**Introduction:** Anxiety is a general problem experienced by patients who had surgery and invasive procedures. The attempt to reduce anxiety level easily, safely and cheaply is through music intervention. There are differences in results from different studies related to music intervention to reduce patients' anxiety of perioperative; thus deeper analysis needs to be performed. **Method:** The search for literature from online databases and review or evaluation to 17 research journals fulfilling inclusion and exclusion criteria have been carried out. **Results:** Thirteen studies (76%) have shown that there is a significant effect of giving music as intervention on anxiety level. Four research reports (24%) have indicated that there is no statistically significant difference in anxiety level between experimental and control groups with music as intervention. **Conclusions:** In general, music used as the intervention is regarded effective to reduce patients' anxiety in perioperative and invasive procedures.

**Keywords:** Music, Anxiety, Preoperative, Surgery, Adult

### INTRODUCTION

Patients who have been hospitalized and have undergone surgery and other invasive procedures generally will experience increasing anxiety. Anxiety is emotional state which is a manifestation of behavior accompanying patients who had surgery and this happens to 11%-80% adult patients with surgery (Stark Weather et al, 2006 cited in Labraguedan McEnroe-Petitte, 2014).

The factors contributing to increasing anxiety of patients with surgery are: Separation from the family, worry of complication, surgery results, pain post surgery, physical impairment, financial problems, waiting for surgery, personal life difference, worry of malpractice, and change of environment (Jawaid et al, 2007).

The therapy for the anxiety can be pharmacologic and non-pharmacologic. Pharmacologically, patients can be given anxiolytic medication such as Benzodiazepines, but this may have other side effects such as hemodynamic instability, long-term amnesia, agitation and

hyper-activity (Bringman et al, 2009 cited in Pittman & Kridli, 2011).

The challenge for preoperative nurses is developing non-pharmacologic therapy as a safe, easy, cheap, and free from effect side intervention. The relaxing effects of music observed not only reduces stress and anxiety as psychological parameter but also as physiologic parameters in the forms of decreasing heart rate, breath or respiration rate, basal metabolism rate, oxygen intake, muscle tense, epinephrine level, sweat gland activity and blood pressure (Arslan et al, 2008).

Out of 17 reviewed research reports, there is a contradiction; therefore, this systematic review seeks to evaluate the effectiveness of giving music as therapy for adult patients who will have invasive and surgery procedures.

The objective of this systematic review is to describe several variations in approaches used to examine the effectiveness of music as intervention to decrease anxiety of adult patients with invasive and surgery procedures. Furthermore, the reviewer also examines

duration and the type of music used and description of pain level, heart rate, BP, and respiration rate of patients.

## METHODS

Music in this context is the recorded music played through tape recorder or compact disk (CD) player. Music as intervention is defined as the music played for patients during scheduled treatment and for intended outcomes. Specifically, music

is given to patients who have invasive and surgery procedures.

After searching for related literatures, finally 17 research articles fulfilling inclusion have been found for this systematic review.

## Inclusion Criteria

In this systematic review, for article relevance, some inclusion criteria are set as follows

**Table 1. Judgment of Risk of Bias in the 17 Studies Included in A Effectiveness Of Music As Intervention For Perioperative Anxiety, Based on the Cochran Quality Criteria**

Study	Random Generation of Allocation <sup>a</sup>	Concealment of Allocation <sup>b</sup>	Blinding of Participant and Personnel <sup>c</sup>	Blinding of Outcome Assessors <sup>d</sup>	Incomplete Outcome Data <sup>e</sup>	Selective Outcome Reporting <sup>f</sup>	Other Sources of Bias <sup>g</sup>
Mohammadi et al, (2014)	Unclear	No	No	Yes	Yes	No	Yes
Weeks & Nilsson,(2010)	Yes	Unclear	Yes	Yes	Yes	Unclear	No
Ni, et al, (2010)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Twiss, et al, (2006)	Yes	Yes	Yes	Unclear	No	Unclear	Yes
Ignacio, et al, (2012)	Yes	Yes	Yes	Unclear	Yes	Unclear	No
Demarco, et al, (2012)	Yes	Unclear	No	Unclear	No	Unclear	Unclear
Kushni et al, (2012)	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes
Lee, et al, (2011)	Yes	Yes	Yes	Unclear	No	Unclear	Unclear
Lee, et al (2011)	Yes	Yes	Yes	Yes	Yes	Yes	No
Hook, et al, (2008)	Unclear	Unclear	Unclear	Yes	Yes	Yes	No
Moradipanah, et al, (2009)	No	No	No	No	Unclear	Yes	No
Reza, et al, (2007)	Yes	Yes	Yes	Yes	Yes	Unclear	No
McLeod (2011)	No	Unclear	No	No	Yes	Unclear	Yes
Arslan (2008)	No	No	No	No	Yes	Yes	No
Cutshall et al, (2011)	Yes	Yes	Yes	No	Yes	Unclear	No
Nilsson, (2009)	Yes	Yes	No	Yes	Yes	Yes	No
Li, et al (2011)	Yes	Unclear	No	Yes	No	Yes	Yes

<sup>a</sup>Yes/rated as: If sequence generated by referring to a good random technique; no: If sequence generated by poor/random technique; unclear: Insufficient information to permit judgment.

<sup>b</sup>Yes refers to participants and investigators enrolling participants could not foresee assignments before assigning subjects to groups;no: If participants or investigators enrolling participants could possibly foresee assignments;unclear: Insufficient information to permit judgment.

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<sup>c</sup>Yes indicates blinding of participants and key study personnel ensured; no: blinding of key study participants and personnel attempted; unclear: Insufficient information to permit judgment.

<sup>d</sup>Yes implies blinding of outcome assessment ensured; no: Blinding of outcome assessment attempted, but likely that the blinding could have been broken; unclear: Insufficient information to permit judgment.

<sup>e</sup>Yes implies no missing outcome data or loss to follow-up <10%;no: loss to follow-up >10%; unclear: Insufficient reporting of exclusions to permit judgment.

<sup>f</sup>Yes implies the study protocol is available; no: not all of the study's pre-specified primary outcomes have been reported; unclear: Insufficient information to permit judgment

<sup>g</sup>Yes implies the study appears to be free of other sources of bias; no: there is at least one important risk of bias; unclear: Insufficient reporting of attrition/exclusions to permit judgment

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1. The population of the study are hospitalized adult patients.
2. The intervention given is recorded music.
3. The control group is not given music or without any treatment.
4. The results of the research which are observed include: anxiety which can be accompanied with: pain, vital symptoms (blood pressure, heart beat, breath), hemodynamic status and cortisol or catecholamine serum levels.
5. Method of research studies using Randomized Controlled Trial (RCT).
6. The studies are conducted in the last 10 years (2006-2016).
7. Research reports are written in English.

### Strategies of Journal searching

Most research articles are obtained from online searching, making use of the following databases: CINAHL, Medline, PsycINFO, Pubmed, Ebscohost, Proquest, SAGE and Google Scholar.

The key words are written using analysis of PICOT (Population, Intervention, Comparison, Outcome, Time). The PICOT format is used to answer research questions (Riva et al, 2012).

From this method, several key words are found as follows: P= Preoperative or Surgery, Adult; I= Music or Music Intervention; C= No Music Intervention; O= Anxiety; T=2006-2016.

### Research Design

All studies reviewed employ experimental research design using RCT (Randomized Controlled Trial).

### Instruments

Out of 17 research, nine of them use STAI (State Trait test Anxiety Inventory) to measure the anxiety level either pre and post intervention. STAI is a twenty item questionnaire which is widely used because of good reliability and validity (Spielberger et al., 1970 cited in Twiss et al. 2006).

Meanwhile, VAS (Visual Analogue Scale) or VASA (Visual Analogue Scale for Anxiety) is used in 4 studies. A study by Hook et al. (2008) uses both STAI and VAS.

Numeric Rating Scale (NRS) is a scale of measurement using numbers to measure anxiety and pain. Two studies employ NRS. They are those of Weeks & Nilsson, 2010 and Nilsson, 2009.

In addition to all of those instruments, Depression Anxiety Stress Scale (DASS) is another instrument used to measure depression state, anxiety and stress levels used in a study of Moradipanah et al, 2009.

### RESULTS

Based on Table 1.1, it is concluded that 13 out of 17 (76%) of the reviewed studies demonstrate that the patients who received music as intervention have experienced decreasing anxiety shown by statistically significant decreasing in the scores of STAI. Mohammadi et al. (2014), Ni et al, (2010), Lee et al, (2011) found that the patients who have pre surgery procedures experience decreasing scores in STAI after listening to music.

Four out of 17 studies (24%) reported that there is no significant difference in anxiety level between patients given music as intervention and those who did not receive music as intervention.

Only 1 out of 17 studies evaluates the level of cortisol serum level and patients' catecholamine. Nilsson (2009) found that after the first 30 minute bed-rest, there is significant difference in cortisol level but it was not found any significant difference in cortisol level in the second 30 minute bed-rest.

### Pain

Five out of 17 (29%) studies examine the pain level. Two out of 5 (40%) studies reveal that pain level decreases because of intervention and three out of 5 (60%) studies demonstrate that there is no significant difference in pain level between those with intervention and those without intervention.

### Blood Pressure

There are 3 studies examining the effect of listening to music on blood pressure. All those studies conclude that listening to music before invasive

procedures and surgery decrease systolic and diastolic blood pressures (Mohammadi et al, 2014; Ni et al, 2010; and Kushnir et al, 2012).

### Heart rate

There are six out of 17 studies (35%) which examine the relationship between music and heart rate. Five out of 6 studies (83%) reveal tendency of decreasing heart rate of patients listening to music before surgery. Mohammadi et al (2014) found that individuals listening to music for about 20 minutes will experience decreasing heart rate from 73 to 70 times per minute. Similarly, Kushnir et al, (2012) found that there is decreasing heart rate of patients from 82 to 80 who listen to music for about 40 minutes. Lee et al. (2011) also reveals that by listening for about 10 minutes, the patients' heart rate decreases from 73 to 72 times per minute.

Table 2. Evaluation of Music Intervention

Author	Anxiety	Pain	BP	H R	RR	Music	Duration	Sample
Arslan (2008)	SD	NM	N M	N M	N M	Selection : Classic turkey, folk, Pop	30' Waiting OR	M (32) NM (32) =64
Cutshall et al, (2011)	SD	SD	SD	SD	N	Selection: Summer, Autumn, Bird and night song	2 x 20 ' Day 2 until day 4 20'	M(49) NM(51) =100 M (14) NM (12) =26
Demarco, et al, (2012)	SD	NM	M	M	N M	Determined: composer by dr. Joseph Nagler		
Hook, et al, (2008)	SD	SD	N M	N M	N M	Selection: Western, Melayu, China Music	2 x before & 3days postop	M(51) NM (51) =102
Ignacio, et al, (2012)	NS	NS	N M	N M	N M	Music selection various types	30' per day	M (12) NM (9)
Kushni et al, (2012)	SD	NM	SD	SD	SD	Selection: pop,classical, Music israel	40'	M (28) NM (32) =60

Lee, et al, (2011) Taiwan	SD	NM	N M	SD N	N M	RelaxationMusic c Folk, pop	10'	M (64) NM (76) =140
Lee, et al (2011) Taiwan	SD	NM	N M	NS N	N M	Relaxation music folk songs, pop music	10'	Hp (48) Bc (66) NM (53)
Li, et al (2011) China	SD	NM	NS M	NS N	N M	Selection: China classic, Music world, china relaxation music	2 x 30'	M (60) NM (60)
McLeod (2011) UK	NS	NM	N M	N M	N M	Selection: Light, classical, relaxation,conte mporary	During surgery	M (40) NM (40)
Mohamma di et al, (2014)Iran	SD	NM	SD SD	SD SD	SD SD	Selection: non classicalvocal, Natural sounds	20'	M (30) NM(30) = 60
Moradipan ah, et al, (2009) Iran	SD	NM	N M	N M	N M	Selection: relaxation music	20'	-M (37) -NM (37) =74
Ni, et al, (2010) Taiwan	SD	NM	SD SD	SD SD	N M	Music option Pop china, Pop Taiwan	20'	M (87) NM (87) =174
Nilsson, (2009) Sweden	NS	NS	N M	NS NS	NS NS	Determined: Soft relaxation music	30'	M (28) NM(30) =58
Reza, et al, (2007) Iran	NS	NS	N M	N M	N M	Music Guitar Player Spanyol	Intraop in OR	M(50) NM (50)
Twiss, et al, (2006)USA	SD	NM	N M	N M	N M	Selection: 'Prescriptive music'	During and after surgery	M (42) NM(44)
Weeks & Nilsson, (2010) US	SD	NM	N M	N M	N M	Determined -classical music -sound environment	During the procedur	-NM(34) -FM (34) -LS (30)

BP=Blood Pressure HR=Heart Rate RR=Respiration Rate SD=Significantly Descending  
NS=No Significant NM=Not Measure OR=Operating Room M=Music NM=Non Music  
FM=Focused Music LS=Loudspeaker Hp=Headphone Bc=Broadcast

Nilsson (2009) demonstrates that by listening music for about 30 minutes, the heart rate decreases from 79 to 78 times per minute. However, statistically, this does not give significant effect on groups who listen

to music compared to the groups who did not listen to music.

### Breath or Respiration Rate

There are three out of 17(18%) of the reviewed studies which examine the effect of music on breath. Two out of 3 (67%) of the studies reveal that the breath rate of patients listening to music decreases (Mohammadi et al, 2014; Kushnir et al. 2012). Nilsson (2009) found that breath rate of patients who listen to music decreases from 18 to 15 times per minute; however, this is not significant compared to the control group.

### **Types of music**

Types of music include variety of genres. Twelve out of 17 (71%) research articles report that patients chose their own music and listened to music during intervention.

Five out of 17 studies (29%) report that the researchers chose the music for the patients. And 2 studies did not report the type of music but they use “prescriptive music series” by Twiss et al. (2006) and “therapy music composed by dr. Joseph Nagler”. The study is that of DeMarco et al. (2012). One study by Nilsson (2009) did not identify the method of selecting music or type of music used.

Most studies use classical music (6 studies or 35%) and relaxation music (5 studies or 29%) as the intervention.

Four out 17 (24%) studies use different types of pop music such as Chinese pop, Taiwanese pop and western pop for their intervention

Five out of 17 (29%) of the studies offer culture based music as Turkish, Jewish, Chinese pop, Taiwanese pop, western music and Malay music. One study did not report the genre of music but mentioned the musical instrument namely Spanish guitar (Reza et al, 2007).

### **DISCUSSION**

Patients who have surgery or invasive medical procedures in hospital experience increasing anxiety. This leads to examination on the effectiveness of music intervention during preoperative treatment.

There are 13 out of 17 (76%) studies which reveal that listening to music can reduce the patients’ anxiety in surgery and invasive procedures.

Three out of 17 studies examine the effect of listening music on blood pressure. All of them lend support that listening to music has significant effect on blood pressure.

Six out of 17 studies examine the effect of music therapy on heart rate and 5 out of 6 studies demonstrate that patients with music therapy have lower heart rate than that of patients who did not listen to music.

The last, two out of three studies investigating the breath pattern of anxious patients also show that the patients’ breath rate decreases after listening to music.

The contradictory findings on the effects of music on anxiety and vital signs can be related to medication taken by patients. The medication such as anti-hypertension, anti-arrhythmic and beta blockers taken by patients may change patients physiologic response to anxiety and music (Nilsson et al, 2009).

Ignacio et al. (2012) who did research to 21 respondents recommend further studies with larger sample size for more significant research findings.

McLeod et al. (2011) and Reza et al. (2007) state that giving music to patients is not effective during being anesthetized up to wound handling in surgery room since patients lost their control when they are given anaesthesia.

Duration and type of music which is unfamiliar to patients during given anaesthesia might be the cause of inconsistency of effects of music on anxiety and vital signs (Reza et al, 2007). To complement music, the play Spanish guitar seems unfavorable to Iranian respondents; thus, the intervention did not give effect on reducing anxiety.

There are large variations in terms of participants and sample. Sample size ranges from 21-174 participants. Ignacio et al. (2012) recruited 21 patients of post

orthopedic surgery. Mean while DeMarco (2012) did study to 26 patients of intra cosmetic surgery. Both studies have low generalizing power which might be caused by small sample size.

Another issue concerning variability of effects of listening music is duration of intervention. There are some differences in duration of music therapy, ranging from 10 to 40 minutes, although majority of study set 20 minutes of listening to music as intervention. Generally, the researchers present the music to patients once a day, but the studies of Li et al. (2011), Cutshall et al. (2011), and Hook et al. (2008) presented music twice a day to patients.

With regard to the choice of music, 12 out of 17 studies report that the patients chose their own music; 5 studies do not mention type of music and the method of music selection. Reza et.al (2007) in their study mention that the absence of music alternatives and unfamiliarity to music limit their findings. Culture based music can be the reference as the alternatives because of differences in ages, ethnic groups, belief and cultures.

### **Conclusion**

Most studies lend support that music intervention is effective to reduce the anxiety of preoperative patients and patients with other invasive procedures. The effectiveness is indicated by statistically significant decreasing STAI scores, blood pressure, heart beat, and breath of preoperative patients. In general, music intervention is safe, cheap and easy to perform to manage the anxiety level of preoperative patients.

### **Recommendation**

Music intervention can be used as routine treatment particularly to preoperative patients with high anxiety.

Because of limitations and differences in research findings, further studies need to be done by considering sample size, therapy dosage and types of

music relevant to patients' culture and belief, i.e. the music which has spiritual and religious values such as holy Koran recitation, gospel, prayer or God glorifying for their recovery. The spiritual values are expected to reduce their anxiety more effectively.

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