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Music therapy following cardiac surgery—is it an effective method to reduce pain and anxiety?

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Summary

A best evidence topic in cardiac surgery was written according to a structured protocol. The question addressed was: In patients undergoing cardiac surgery, is postoperative music therapy effective in reducing pain and anxiety? Altogether, 153 papers were found using the reported search method, of which 7 represented the best evidence to answer the clinical question. Six of the included studies were randomized trials, with 1 further non-randomized trial. The specific music protocols utilized widely varied, ranging from 1 short session on day 1 postoperatively to multiple sessions per day over a 72-h period. Most therapies involved music of a relaxing type, typically between 50 and 60 dB. All 7 studies reported on pain, with 4 demonstrating significant differences in pain score; however, 3 of these were not associated with reduction in analgesia requirements. Five studies reported on anxiety, with 2 demonstrating a statistically significant improvement in levels of anxiety. These results need to be contextualized by the small number of participants within each study and the heterogeneity in the therapy protocols utilized. The current best available evidence fails to support the benefits of music therapy as an effective non-pharmacological option in reducing pain and anxiety following open-heart surgery. While there is scarce evidence demonstrating efficacy, the current literature contains very small-sample-sized studies in utilizing music therapy protocols which in turn have wide range of variability in terms of duration, frequency, timing in the postoperative period and specific choice of music utilized in each protocol.

Keywords: Music therapy • Cardiac surgery • Analgesia • Anxiety • Postoperative

INTRODUCTION

A best evidence topic was constructed according to a structured protocol as fully described in the ICVTS [1].

THREE-PART QUESTION

In [patients undergoing cardiac surgery], is [postoperative music therapy] effective in [reducing pain and anxiety]?

CLINICAL SCENARIO

Your surgical team is looking after a patient who is recovering after undergoing coronary artery bypass grafting surgery. The patient tells you that she is feeling particularly anxious and is requesting to listen to some music to calm herself down. You oblige, and 1-h later you notice your patient looking much more relaxed and you wonder whether there is any evidence to support music therapy as a non-pharmacological option to improve pain and anxiety in such circumstances. You decide to examine the literature and present your findings to your colleagues.

SEARCH STRATEGY

A literature search was performed on the MEDLINE database (1950–April 2018) through the PubMed interface using the terms [music OR musical OR auditory] AND [cardiac surgery OR cardiothoracic OR coronary artery bypass graft OR CABG OR valve replacement OR AVR OR aortic valve OR MVR OR mitral valve OR valve repair] AND [pain OR analgesia OR anxiety OR depression OR tension OR fatigue OR stress OR relaxation OR satisfaction OR mood].

SEARCH OUTCOME

A total of 153 publications were found using the search strategy. Of these, 7 represented the best available evidence to answer the clinical question. These are summarized in Table 1.

Table 1: Postoperative pain and anxiety—control versus music therapy

Author, date, journal and country Study type (level of evidence)	Patient group	Outcomes	Key results	Comments
Nilsson (2009), Heart Lung, Sweden [2] Randomized trial (level 1b)	58 adult patients undergoing CABG or aortic valve replacement *n* = 30 (usual postoperative care) (control) *n* = 28 (usual postoperative care and music therapy) Intervention details: Music type: soft and relaxing, 60–80 beats per minute, melodies in new-age style Administration method: MP3 music pillow Volume: 50–60 dB Duration: 30 min Frequency: once per day Sessions: 1 Timing: 12 PM postoperative day 1	Pain (NRS/10)	Preintervention Control: 2.7 Intervention: 3.3 *P* > 0.02 30-min postintervention Control: 1.4 Intervention:1.9 *P* > 0.02 60-min postintervention Control: 1.7 Intervention: 1.6 *P* > 0.02	*P* < 0.02 was deemed as statistically significant. For relationships described as not statistically significant, no *P*-values were presented The important issue of disease transmission was raised (e.g. through headphone sharing); the use of an MP3 pillow representing a new innovation to overcome this risk was demonstrated
		Anxiety (NRS/10)	Preintervention Control: 1.7 Intervention: 1.6 *P* > 0.02 30-min postintervention Control: 1.2 Intervention: 0.9 *P* > 0.02 60-min postintervention Control: 1.2 Intervention: 0.7 *P* > 0.02	
		Analgesia requirements	No difference was noted in postoperative requirement for analgesia between the intervention and control groups (no *P*-value stated)	
Cutshall *et al.* (2011), Altern Ther Health Med, USA [3] Randomized trial (level 1b)	100 adult patients undergoing CABG and/or cardiac valve surgery *n* = 51 (usual postoperative care) (control) *n* = 49 (usual postoperative care and music therapy) Intervention details: Music type: patient choice of 'summer song', 'autumn song', 'bird song' or 'night song' Administration method: CD player Volume: no information Duration: 20 min Frequency: twice per day (morning and afternoon) Sessions: 6 Timing: postoperative days 2–4	Pain (change in VAS/10)	Day 2 session 2 Control: -0.4 ± 1.4 Intervention: -1.4 ± 1.4 *P* = 0.01 Day 2 session 1, day 3 session 1–day 4 session 2 *P*: 0.11–0.67	No participant in either control group or the intervention group was prevented from listening to their own music; this has the potential to weaken the effect seen The authors recognize the need to explore the effect of different frequency and timings of therapy in addition to the patient preference of music type No detail was provided relating to music type other than the 4 CD titles (e.g. beat and volume)
		Anxiety (change in VAS/10)	Day 2 session 1–day 4 session 2 *P*: 0.09–0.97	
		Relaxation (change in VAS/10)	Day 2 session 1 Control: 0.3 ± 2.9 Intervention: 1.9 ± 2.7 *P* = 0.03 Day 2 session 2–day 4 session 2 *P*: 0.33–0.94	
		Analgesia requirements (fentanyl or oxycodone)	Day 2 session 1–day 4 session 2 *P*: 0.07–0.89	

Continued

Table 1: Continued

Author, date, journal and country Study type (level of evidence)	Patient group	Outcomes	Key results	Comments
Ciğerci and Özbayir (2016), Turkish J Thorac Cardiovasc Surg, Turkey [4] Randomized trial (level 1b)	68 patients undergoing coronary artery surgery *n* = 34 (usual postoperative care) (control) *n* = 34 (usual postoperative care and music therapy) Intervention details: Music type: Turkish classical and folk (verbal and instrumental) Administration method: headphones Volume: 50–60 dB Duration: 30 min Frequency: once per day Sessions: 4 Timing: once in the ICU and once per day in the recovery ward	Pain (VAS/10)	ICU Control: 6.5 ± 2.6 Intervention: 4.0 ± 2.4 *P* = 0.001 Day 1 Control: 3.7 ± 3.3 Intervention: 1.2 ± 2.2 *P* = 0.002 Day 2 Control: 3.4 ± 3.3 Intervention: 0.5 ± 1.4 *P* = 0.001 Day 3 Control = 2.9 ± 2.8 Intervention = 0.4 ± 1.5 *P* = 0.001	The authors recognize the small sample size as the major limitation of the study
		Anxiety (State-Trait Anxiety Index/10)	ICU Control: 40.2 ± 6.5 Intervention: 38.1 ± 5.1 *P* = 0.12 Predischarge Control: 41.4 ± 7.2 Intervention: 39.0 ± 6.6 *P* = 0.09	
		Analgesia requirements	ICU Control: 3.3 ± 2.2 Intervention: 1.6 ± 0.9 *P* = 0.001	
Sendelbach *et al.* (2006), J Cardiovasc Nurs, USA [5] Randomized trial (level 1b)	86 adult patients undergoing CABG and/or valve surgery *n* = 36 (usual postoperative care) (control) *n* = 50 (usual postoperative care and music therapy) Intervention details: Music type: the music met the following criteria: (i) no dramatic changes, (ii) consonance, (iii) instrumental music and (iv) 60–70 beats per minute. Music was a choice of 'easy listening', 'jazz' or 'classical' Administration method: headphones from cassette player Volume: no information Duration: 20 min Frequency: twice per day (morning and evening) Sessions: 6 Timing: postoperative days 1–3	Pain (NRS)	Postoperative day 1 AM Control: 3.16 Intervention: 2.20 *P* = 0.009 Postoperative day 1 PM Control: 3.18 Intervention: 2.00 *P* = 0.009 Postoperative day 2 AM Control: 3.16 Intervention: 2.05 *P* = 0.009	The authors recognize a number of limitations to this study. Firstly, participants were interrupted occasionally despite efforts to maintain a quiet environment. Secondly, the extent of missing data meant no analysis was performed on day 2 PM, day 3 AM or day 3 PM The authors express the need to investigate the impact of frequency of therapy on outcomes
		Anxiety (State Personality Inventory)	Postoperative day 1 AM Control: 17.56 Intervention: 12.82 *P* = 0.004 Postoperative day 1 PM Control: 17.06 Intervention: 14.45 *P* = 0.004 Postoperative day 2 AM Control: 17.55 Intervention: 13.46 *P* = 0.004	

Continued

Table 1: Continued

Author, date, journal and country Study type (level of evidence)	Patient group	Outcomes	Key results	Comments
		Analgesia requirements	There was no difference in the requirement for opioid analgesia between intervention and control groups across postoperative days 1–3 ($P = 0.14–0.68$)	
Özer *et al.* (2013), Pain Manag Nurs, Turkey [6] Non-randomized trial (level 2)	87 adult patients undergoing open-heart surgery $n = 43$ (usual postoperative care) (control) $n = 44$ (usual postoperative care and music therapy) Intervention details: Music type: patient selection from 20 musical pieces (Turkish folk and art music) Administration method: headphones from MP3 player Volume: 50–60 dB Duration: 30 min Frequency: once per day Sessions: 1 Timing: postoperative day 1	Pain (unidimensional verbal pain intensity scale)	Postintervention Control: 2.20 ± 0.51 Intervention: 1.20 ± 0.40 $P = 0.001$	While no data are provided, it is stated that no difference in opioid requirements were noted between the intervention and control groups The authors describe the trial as non-randomized because patients were chosen through convenience sampling (no randomization or blinding took place)
Voss *et al.* (2004), Pain, USA [7] Randomized trial (level 1b)	40 adult patients undergoing CABG $n = 21$ (usual postoperative care) (control) $n = 19$ (usual postoperative care and music therapy) Intervention details: Music type: sedative music operationalized as music without lyrics, with a sustained melodic quality, with a rate of 60–80 beats per minute and a general absence of strong rhythms or percussion Administration method: headphones from a CD tape player Volume: no information Duration: 30 min Frequency: once per day Sessions: 1 Timing: no information	Anxiety (VAS/100) Pain sensation (VAS/100) Opioid requirements	Control: 48 ± 32 Intervention: 13 ± 9 $P < 0.001$ Control: 48 ± 32 Intervention: 13 ± 9 $P < 0.001$ No significant differences in opioid requirements between the intervention and control groups (no P-value available)	The authors recognize the need to investigate the effect of repeated sessions and the determination of optimal length of therapy
Zimmerman *et al.* (1996), Sch Ing Nurs Pract, USA [8] Randomized trial (level 1b)	64 adult patients undergoing CABG $n = 32$ (usual postoperative care) (control) $n = 32$ (usual postoperative care and music therapy)	Pain (verbal rating scale/10)	Pain post-session 1 Control: 1.79 Intervention: 0.90 P = none presented Pain post-session 2 Control: 0.88 Intervention: 0.68 P = none presented	While no group effect was found, a significant time effect was found in both the control and intervention groups (difference between pre-intervention or pre-rest and postintervention or post-rest). This raises the question of whether rest seldom

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Table 1: Continued

Author, date, journal and country Study type (level of evidence)	Patient group	Outcomes	Key results	Comments
	Intervention details: Music type: choice of 'country western', 'fresh air', 'winter into spring' or 'prelude and comfort zone'. All music was described as relaxing Administration method: Volume: controlled by the patient Duration: 30 min Frequency: once per day Sessions: 2 Timing: postoperative days 2 and 3			(without music) results in the same beneficial effects as music therapy

CABG: coronary artery bypass grafting; CD: compact disc; ICU: intensive care unit; NRS: numeric rating scale; VAS: visual analogue scale.

RESULTS

Within the 7 studies representing the best available evidence, there is significant heterogeneity in the protocol of music therapy delivery. Of importance, the frequency, duration and specific timing within the postoperative period widely varied, ranging from 1 session the day following surgery [2] to multiple sessions per day delivered over a 72-h period [3]. While all studies opted for music of a relaxing and sedating type, often at 50–60 dB, none provided a rationale behind the specific music type chosen nor did any provide any explanation upon why the choice of the music type led to the results observed. A number of studies raised important questions around the impact of self-selection of music and the risk of disease transmission through headphone use [2, 3]. The study reported by Nilsson [2] demonstrated innovation through the trialling of a music pillow.

All 7 studies reported on pain, either through a visual analogue scale or a verbal pain intensity scale. Four studies demonstrated a statistically significant improvement in pain as a result of music therapy [4–7]. Of these, only the trial as reported by Ciğerci and Özbayir [4] demonstrated a significant reduction in the requirement for opioid analgesia following music therapy. The trials reported by Cutshall *et al.* [3], Sendelbach *et al.* [5], Voss *et al.* [7] and Zimmerman *et al.* [8] did not reveal any improvements in analgesic requirements, which may contradict the assertion that music therapy reduces levels of pain following cardiac surgery. Five studies reported on anxiety [2–5, 7], again using visual analogue scales, in which 2 demonstrated a statistically significant improvement in anxiety levels as a result of therapy [5, 7]. Nilsson [2] suggested that the reason for poor response to therapy was due to low-moderate levels of pain and anxiety prior to the intervention and the possibility of a Hawthorne effect resulting from investigator observation.

While these results suggest there may be efficacy to music therapy, there are a number of major limitations to the evidence base, which need to be considered. The number of participants within each study is very small, with a mean of 33 participants allocated to the intervention groups across the 7 studies (range 19–50). The study reported by Özer *et al.* [6], which found a significant improvement in levels of pain, demonstrated a non-randomized methodology, limited by convenience sampling without randomization or investigator blinding. The statistical methods were poor, for example, using unconventional *P*-values for significance and citing median values with ranges rather than standard deviations. Because of significant heterogeneity and a small evidence base, there is no evidence to support a specific music therapy protocol as the most effective. This reinforces the need to develop standard music therapy protocols for use in large cohorts of patients, across different sites, to identify the specific cohorts of patients who may gain maximally from music therapy, the optimal duration of the therapy, frequency and timing of therapy and also the impact of self-selected music. Furthermore, there is also the requirement to investigate and report on other important outcomes, including patient satisfaction, physiological parameters and length of stay.

CLINICAL BOTTOM LINE

While there is a small amount of evidence demonstrating reduced pain levels (but not analgesic requirements) with music therapy, there is mixed evidence on anxiety levels. Therefore, at present, there is not enough evidence to recommend postoperative music therapy as an effective non-pharmacological option to reduce pain and anxiety.

Conflict of interest: none declared.

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