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How Music Reduces Anxiety and Amount of Sedatives Used in Patients During Surgery

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Abstract

Aim: This literature review provides an overview of published data with regards to the inclusion of music in surgery, and its effects on: (i) The dosage of anaesthesia or sedation and (ii) Stress and anxiety levels.

Methods: An electronic search in various databases was accomplished to identify related articles. Research evidences provided were assessed based on the "hierarchy of evidence" reflecting the authority of various types of medical research i.e., the relative strengths on the main types of research and medical studies.

Results: 14 relevant citations touched on how the use of music during surgery resulted in the decreased dosage of anaesthesia used. A majority of the studies have concluded, based on a large scale of randomized controlled trials, that music did in fact have great positive responses from patients by greatly reducing stress/anxiety levels and also reducing the dosage required for anaesthesia during surgery.

Conclusion: Music is a non-pharmacological alternative and potent intervention in surgical procedures; showing conclusive evidence in reducing the dosages of sedation and anxiety levels in patients.

Keywords: Anaesthesia; Sedatives, Surgery; Interventions; Systemic review; Music therapy; Spinal anaesthesia; Sedative; Midazolam; Operation theatre

Introduction

Music is ubiquitous and is found in various cultures and countries with wide discrepancies and personalities elicited by individual groups of people. Over the last 55,000 years, there has been evolutions in music and is considered an essential constituent of human life. Music is a vitalizing experience that elicits both physiological and psychological responses in its listener. It has a general melody of sounds that can unify the mind and soul, without the deterrence of language.

Music is an aesthetic and allegorical medium which has the power to dissipate fear and anxiety associated when one faces the unchartered alone. Therefore, it provides a quintessential backing for patients undergoing surgery where non-general anaesthetics are administered to. Music has been proven to reduce the perceptions of pain and consequently, the dosage of anaesthetics and sedatives used during surgery. Additionally, the pain reducing effects of music is mediated by a decrease in activity of stress-responsive systems in the body thereby reducing levels of stress and anxiety in patients.

Although music is a mild anxiolytic, it is however rendered relatively impotent when the pain is severe. Therefore, the effectiveness of music would depend on each individual's disposition and their exposure of the severity of pain stimulus. Also, it is important to take into consideration a patient's perspective; if the inclusion of music is viable in their circumstances. Though, there has been largely positive feedback from patients that the implementation of music has diverted their attention and increased their threshold of pain. This can be accounted for music being an intimate and cultural medium to which they can associate with.

This literature review aims to discuss the relative efficacy of music in terms of its ability to reduce stress levels and dosage of sedations in individuals undergoing surgery. It also entails future prospects for the use of music in medicine.

Methods

A search was made based on the publications and relevant articles. It includes systemic reviews and randomized controlled trials of a non-pharmacological intervention implemented on the day of surgery or anaesthesia. Study quality was evaluated by the Jadad's scale. The random effect model was used to pool the effect from individual trials and the Cohen Q-statistic was used to determine heterogeneity. Egger's regression was used to detect publication bias.

During the search of relevant articles, there were certain inclusions and exclusions made for the topic. The exclusions presented were: Types of music used during surgery, how music changes the physiological state of the human body during surgical procedures and how music affects patients in post-operative state (ie. Recovering and resting) Inclusions: Playing patient selected music, blocking out operating room noises and effects of music during surgery with regards to dosage of sedatives used.

Electronic databases searches were done using: PubMed Central (National centre for Biotechnology Information), EBSCOhost, Journal of clinical and diagnostic research, Science Daily (Yale university source) and Cochrane Library. These were done under the time restriction from 2001 to 2015. The database searches were performed using subsequent word terms and subject headings: "Anaesthesia, sedatives, surgery, interventions, systemic review, Music Therapy, Spinal Anaesthesia, Sedative, Midazolam, and Operation Theatre

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(OT)". During the database searches, adaptations from American and British English were made. There were no inputs of language limitations. Abstracts found in the combination searches were assessed for potential inclusion. Articles were also accessed whether there is substantial evidence of music being a primary reason for the decreased use of sedatives during the surgery.

Research papers were also chosen based on certain principles. Firstly, duplicated papers during the searches of multiple databases were excluded. The titles and abstracts of various papers were identified and scanned through, and irrelevant papers were rejected. In the third phase, the full text was attained and examined. This allows only for relevant papers to be included in the review. The suitability of the relevant papers based on the different outcomes was checked through screening. However, the screening phases were elicited by a single reviewer. (Figure 1).

The required data retrieved from the papers would include common features of the study (Author's name, Year of Study, Topic of study). Data extracted also included methods, individual participants (age group, type of operation procedures), intervention (Exposure to music and dosage of anaesthesia and sedatives), outcomes and limitations.

Results

Through the various database searches, 14 possibly relevant citations touched on how the use of music during surgery resulted in the decreased dosage of anaesthesia used. Out of these 14 citations, only 11 were of randomized controlled trials involving sufficient number of patients participating in multiple trials [1-11]. This has met the inclusion criteria for the studies. Some studies had suggested that there is no link found between hearing music or not and patient's comfort level; as well as lowered doses of sedative medications used.

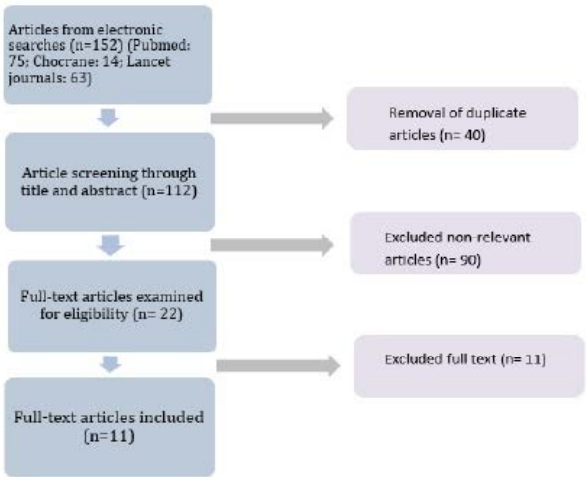

Figure 1: Search procedure to find articles on how music can reduce anxiety levels and dosage of sedatives in patients for surgery purposes.

Study	Study Years	Methods	Participants	Outcomes
William WS Tam [1] [https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2744067/]	2007- 2008	Random-effect models were used to combine the outcome effect, i.e. the (standardized) difference between treated and control groups, for each study	Eight studies with 722 subjects were included in this meta-analysis.	Listening to music is effective in reducing procedure time and amount of sedation during colonoscopy in music group.
Lepage Caroline [2] [https://www.ncbi.nlm.nih.gov/pubmed/11574356]	2000- 2001	Prospective study measured whether music can influence anxiety and perioperative sedative requirements in outpatients undergoing surgery with spinal anaesthesia	Fifty un-premedicated patients were randomly assigned to listen to music of their choice via headset during the perioperative period (Group I) or to have no music (Group II).	It is possible to decrease sedative requirements during surgery under spinal anaesthesia by allowing patients to listen to music to reduce their anxiety.
S Kulkarni [3] [https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3587064/]	2011- 2012	First randomised control study comparing the effects of music on sedation, analgesia and anxiety during radiological procedures	100 patients were randomised in a 1:1 ratio. There were 58 males and 42 females, with a mean age of 58 years.	Sedation requirements were significantly reduced by playing self-selected music to the patient during interventional radiology procedures.
Ilkkaya NK [4] [https://www.ncbi.nlm.nih.gov/pubmed/25261145]	2013- 2014	Open, parallel, and randomized controlled trial	Seventy-five patients aged 18 to 60 years who were scheduled for surgical procedures under spinal anaesthesia	Patient-selected music reduces perioperative anxiety and amount of sedatives used, contributing to higher patient satisfaction during the perioperative period.
Joke Bradt [5] [http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD006908.pub2/full]	2012- 2013	All randomized and quasi-randomized trials that compared music interventions and standard care with standard care alone for reducing preoperative anxiety in surgical patients.	26 trials consisting of 2051 participants. All studies used listening to pre-recorded music.	Music interventions may provide a viable alternative to sedatives and anti-anxiety drugs for reducing preoperative anxiety

Dr. Pranav Bansal [6] [http://www.jcdr.net/article_fulltext.asp?id=833]	2004- 2007	Prospective controlled study	100 cases of ASA Grade I and II between 18-65 years of age from both sexes, undergoing abdominal, urological and lower extremity surgery under spinal anaesthesia.	Music is a non-pharmacological alternative which is suitable for decreasing intraoperative sedative requirements under spinal anaesthesia.
Chakib Ayoub [7] [https://www.sciencedaily.com/releases/2005/05/050527111729.htm]	2004- 2005	Randomized controlled trial at 2 centres	36 patients at Yale-New Haven Hospital and 54 patients at the American University of Beirut Medical Centre	Patients listening to their favourite music required much less sedation during surgery than did patients who listened to white noise or operating room noise
Dr Catherine Meads [8] [http://thelancet.com/journals/lancet/article/PIIS0140-6736(15)60169-6/fulltext]	2014- 2015	Randomised controlled trials (RCTs) of adult patients undergoing surgical procedures, excluding those involving the central nervous system or head and neck, published in any language.	4261 titles and abstracts, and included 73 RCTs in the systematic review, with size varying between 20 and 458 participants	Music was effective when patients were under general anaesthetic, increasing overall patient satisfaction and reduced need for sedatives
Jaclyn Bradley Palmer [9] [https://www.ncbi.nlm.nih.gov/pubmed/26282640]	2012- 2014	A three-group randomized controlled trial design was used	207 female patients undergoing surgery for potential or known breast cancer were randomly assigned to receive either patient-selected live music (LM) preoperatively with therapist-selected recorded music intraoperatively (n = 69), patient-selected recorded music (RM) preoperatively with therapist-selected recorded music intraoperatively (n = 70), or usual care (UC) preoperatively with noise-blocking earmuffs intraoperatively (n = 68).	Including music therapy as a complementary modality with cancer surgery may help manage preoperative anxiety in a way that is safe, effective, time-efficient, and enjoyable. However music therapy was not found to reduce sedative requirements according to BIS monitor indications
Rupérez Ruiz MP [10] [https://www.ncbi.nlm.nih.gov/pubmed/25087308]	2013- 2014	Prospective comparative study with randomized controlled trials	Random sample of 110 patients undergoing or not music therapy.	No relationship was found between hearing music or not and the patient's comfort level. Most patients recommend listening to music in the operating room despite the sounds around do not bother them.
Matthew L Bechtold [11] [https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4087488/]	2005- 2006	Randomized controlled trial of the use of relaxing music during outpatient colonoscopy done under low-dose conscious sedation	One hundred and sixty-seven consecutive adult outpatients presenting for routine colonoscopy under low-dose conscious sedation randomized to undergo their procedures either with music played during the procedure or no music played.	Music does not result in shortened procedure times, lower doses of sedative medications or perceived patient pain. However, the patients who have music playing during their procedures report modestly greater satisfaction with their procedures.

Table 1: Summary of the characteristics and features of the studies included in the literature review.

One of the studies has also raised the point that music may not be viable in all circumstances for every single patient. It further reiterates that music can be rendered ineffective if the pain during operation is severe. However, a majority of the studies have concluded, based on a large scale of randomized controlled trials, that music did in fact have great positive responses from patients by greatly reducing stress/anxiety levels and also reducing the dosage required for anaesthesia during surgery (Table 1).

Discussion

People awaiting surgical procedures often experience high levels of anxiety. Such anxiety may result in negative bodily responses, such as increased blood pressure and heart rate, leading to slower wound healing and increased risk of infection. High anxiety may also affect the start of anaesthesia and slow down postoperative recovery.

To decrease patient anxiety, sedatives and anti-anxiety drugs are usually administered before surgery. However, they often have negative side effects, such as drowsiness and breathing problems. They may also interact with anaesthetic drugs, increasing recovery and discharge time.

As a result, there has been greater focus on music therapy and music medicine interventions, amongst other non-pharmacological interventions, for reduction of preoperative anxiety. Interventions are labelled as 'music medicine' when passive listening to pre-recorded music is provided by medical personnel. In contrast, music therapy requires the implementation of a music intervention by a trained music therapist, the presence of a therapeutic regiment, and the use of personally tailored music experiences.

Music has been shown to be a good non-pharmacological alternative to sedatives used during surgery and has also been proven to decrease anxiety levels in patients and increase overall patient satisfaction. All of the papers had investigated the effects of the use of music in their respective surgeries and anaesthesia used [1-11]. They have also assessed the factor on patient's anxiety levels and their overall satisfaction levels. Journals and articles had included multiple types of operations and different anaesthetics in their investigations, as it was difficult to locate sufficient articles for comparison on a single type of operation or anaesthesia used.

Some of the studies have shown that there was a decrease in amount of sedatives used during operatives and surgery; also decreasing anxiety levels and increase overall patient satisfaction levels [1-8]. Other studies have proven that music did not decrease the dosages of the sedatives used during operation but did in fact result in greater patient satisfaction levels [9-11].

The studies were not limited to a single type of surgery or operation. There might have differences in the types of experience faced by most patients and thus the effects of music on them.

Colonoscopy procedures were performed in [1,11]. Operations requiring the use of spinal anaesthesia were performed in [2,4,6]. Radiological procedures involving general anaesthesia were performed in [3]. General anaesthesia and operations were investigated [5,7,8]. Women undergoing ambulatory breast surgery for cancer diagnosis and treatment was researched [9]. Lastly, orthopaedic surgery and regional anaesthesia [10]. It is not known how much the different types of operations and their respective anaesthesia had any effects on the results of the investigations. However, a general consensus was that patients were overall satisfied with the use of music and that it had distracted them away from the pain.

Conclusion

Continued research is required to determine other factors that can influence an individual's predisposition to music and surgery. A number of individual factors that is likely to influence responses to music includes: Age, gender, and emotional state, and music preference, personal associations with the music, prior musical training, and culture, which are likely to influence the outcomes. However, these were not discussed in this literature review. Therefore, further systemic reviews are required in order to accurately gauge the effectiveness of music in surgery; in reduction of dosage of sedation used and anxiety in patients. It is also important to identify other variables that may moderate the effects. The use of music in place of drugs and other interventions might be a better solution for patients undergoing various types of surgery.

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