

Research Article

The Contribution of Music Therapy to the Operating Room: A Randomized Control Study

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Abstract

Introduction: *The operating theatre still causes anxiety and apprehension in many patients, which can lead to a refusal of care or difficult working conditions. It, therefore, appears necessary to implement methods of conditioning and relaxation of patients operated on under local anesthesia to optimize the care and working conditions. This is the context of music therapy, the benefits of which have been demonstrated in the literature.*

Objectives: *To compare the effect of listening to the music associated with standard care versus standard care alone by applying the main principles of music therapy, its functioning and its implementation within the operating theatre.*

Method: *This prospective, randomized, and controlled study was carried out on 68 patients undergoing scheduled surgery, within 6 months. Patients were selected and divided into two groups: music therapy group (music before, during, and after surgery) and control group (without music before, during, and after surgery). All patients underwent anesthesia under local or loco-regional anesthesia. Patients over 18 years of age who were scheduled to undergo surgery under local anesthesia were included. Patients with emergency surgery, eye surgery, hearing or cognitive impairment were excluded from the study.*

Results: Pain and anxiety scores were lower in the music therapy group compared to the control group ($p < 0.05$). Vital signs such as heart rate, respiratory rate and blood pressure decreased in the music therapy group after the procedure and their comfort level increased.

Conclusion: Music therapy, which is a non-pharmacologic intervention, is an effective method, without side effects, with positive effects on patients under local anesthesia. It is also effective in reducing anxiety, pain and vital signs.

Keywords: Music Therapy, Pain, Anxiety, Operating Room, Patient.

Introduction

The operating theatre is a specific part of the hospital; it is independent from the other departments. Indeed, the operating theatre has a very different organization compared to conventional services (1).

It is a closed ward with several intervention rooms and its own circulation with the other departments. It is an unknown and mysterious place for the patients who lead to multiple emotions: from simple worry to fear, from anxiety to a panic attack. It appears necessary to implement methods for the conditioning and relaxation of patients and nursing staff in order to optimized care and working conditions. It is in this context that music therapy comes into play, the benefits of which have been demonstrated in the literature.

Methods

This is a prospective, observational, randomized, comparative study. The inclusion period took place over a period of 6 months, between October 2019 and March 2020.

Inclusion criteria:

Patients over the age of 18 years, undergoing surgery under local or regional anesthesia were included in the study.

Criteria for non-inclusion:

Not included in the study:

Patients who refused to listen to music.

Patients who had preoperative sedatives.

Patients who are deaf or have a significant hearing loss.

Patients with an intellectual disability -Patient undergoing eye surgery.

Exclusion criteria:

The following were excluded from the study:

Patients who expressed a desire to interrupt music listening.

Patients who require general anesthesia during the procedure.

The drawing of lots is carried out by randomization list by blocks using a software "*Filemaker Pro*" which will constitute two groups: Group "Music therapy" and Group "Control".

It is simple blind randomization (that means a trial in which the patient, but not the observer, does not know which of the possible treatments he or she is receiving) in order to obtain an equal number of affected patients in two groups to reduce the study bias and balance the need for scientific objectivity.

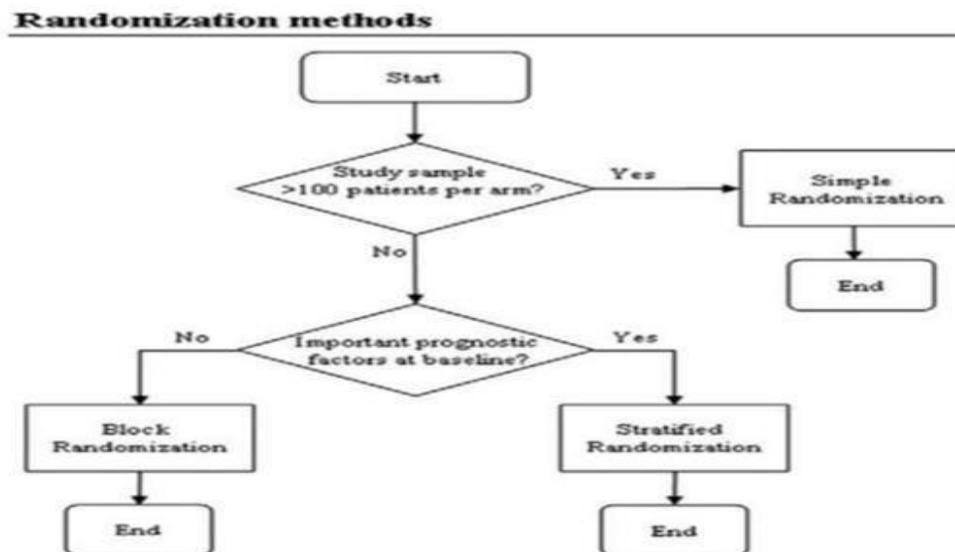


Figure 1: Flow chart illustrating how to choose between the main types of randomization

Work protocols:Music Therapy Group:

The first part of the study was the creation of a playlist after the patients participating in the intervention were given access to a playlist using headphones or earphones connected to an mp3 player containing musical extracts.

Anxiety, pain and vital signs were assessed before, during and after the intervention with music listening and recorded on an observation grid.

Monitoring was established on a regular basis throughout the procedure to prevent any adverse reactions to the patient.

Controlled Group:

In the controlled group, the anxiety, pain and vital signs of the operated patient were assessed at the access to the operating room, during and after surgery without music therapy.

Anxiety, pain and vital signs were assessed before, during and after surgery and recorded on an observation grid.

Criteria for judgments:

Primary Judgement Criteria: Variation in anxiety score before/after the intervention.

Secondary Endpoints: Visual Analog Scale (VAS) pain assessment score.

The patient's vitals:

- Cardiac Rhythm
- Rhythm of Respiration
- Blood pressure

Results:

Between October 2019 and March 2020, 68 patients were included in the study.

- 65 patients completed the entire protocol.
- 3 patients were excluded:
 - 1 due to the change in anesthesia from a locoregional anesthesia protocol to general anesthesia.
 - 2 patients were considered lost due to the impossibility of collecting their final data. Among the 65 patients analyzed, the population is composed of 41 women and 24 men. The average age is 42 years, with extremes between 20 and 78 years.

Concerning the type of intervention, (46%) of patients undergo orthopedic surgery, (29%) gynecological surgery which is female, (21%) general surgery, and (4%) neurological operations.

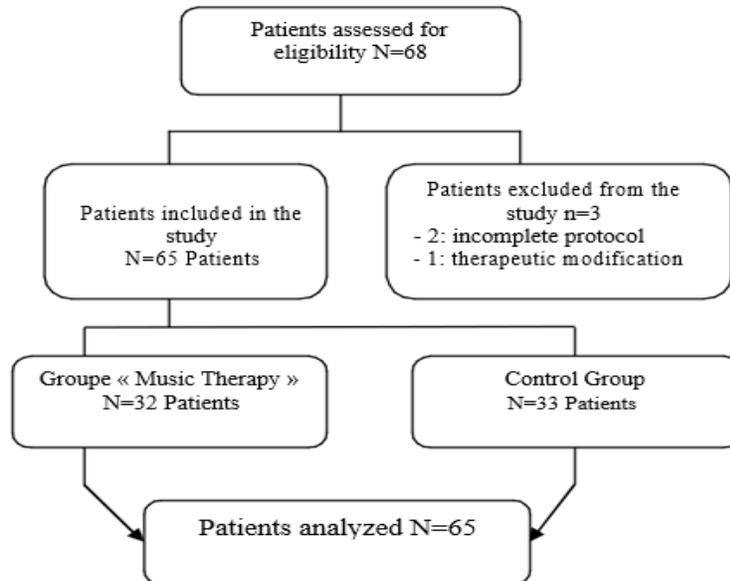


Figure 2: Flow chart

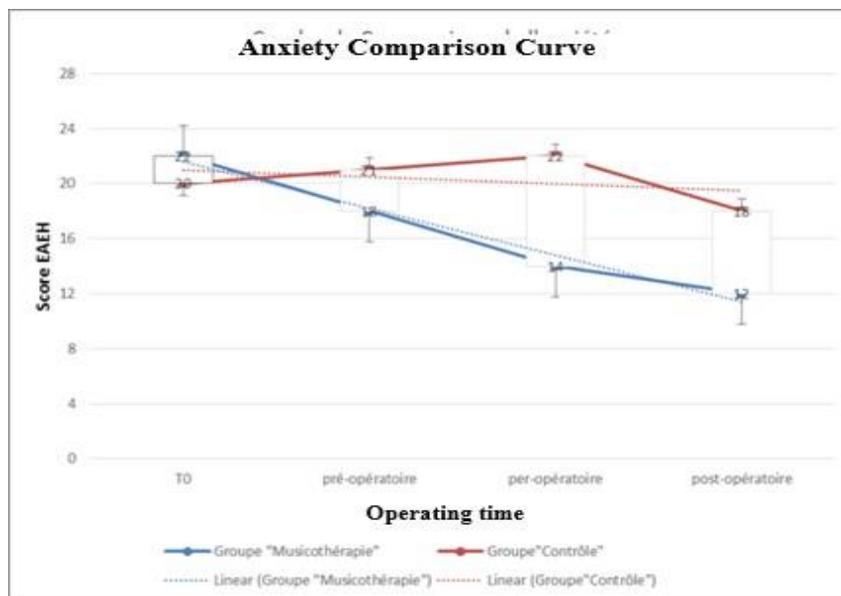


Figure 3: Anxiety Comparison Curve

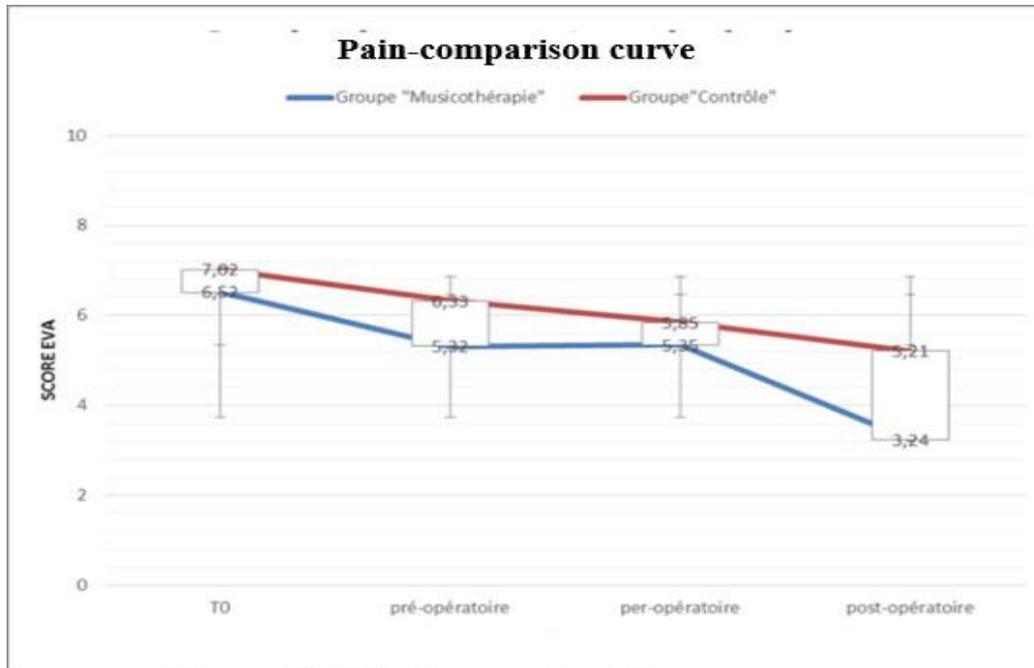


Figure 4: Pain Comparison Curve

Summary table of main results

Variable	Average variation	% of patient's improved	p
Anxiety rates	$\sigma=41.89$	76,22% (24)	$p=0.0316^*$
Pain rate	$\sigma=36.45$	52.56% (18)	$p=0.022^*$
Respiratory Rate	$\sigma=24.92$	42.68% (14)	$p=0.0724$
Heart rate	$\sigma=38.42$	66.67% (22)	$p=0.0063^*$
Blood Pressure	$\sigma=44,57$	52.86% (18)	$p=0.042^*$

Figure 5: Table of main results

Discussion:

The objective of this study was to evaluate the contribution of music therapy in the operating theatre, using a reproducible technique that could be easily used by health professionals on patients operated on under local anesthesia.

The receptive music therapy technique called "U" mounting was chosen for its demonstrated efficacy in various painful pathologies, its action on anxiety and depressive disorders strongly associated with the patients operated on, and its ease of use by healthcare personnel.

Anxiety is a public health problem due to its high prevalence and its disabling psycho-social consequence in operating theatres. Its management requires consideration of the psychological factors intimately linked to this pathology, which may require the use of non-medicinal therapies. (2).

Recent epidemiological surveys show that among the psychological disorders affecting patients undergoing surgery; anxiety disorders are the most common, followed closely by major depression. According to various studies, the prevalence of operative anxiety varies between 60% and 80%. (3).

Although anxiety disorders can occur at any stage of life, surveys show some variation in the distribution by age group and gender. Indeed, the prevalence of these disorders tends to be higher among women and young adults.

The main results in our study showed that the pain and anxiety scores in the music therapy group were significantly reduced compared to the control group ($p < 0.05$), as well as the vital signs of patients in the music therapy group, decreased after the intervention and their comfort level increased.

The study population included a fairly large age range, between 20 and 78 years of age. The female population was over-represented as only 38% of male patients participated in this study, which limits the extrapolation of results to the men operated on. In terms of the type of surgery, the panel is varied, with the majority of patients having undergone orthopedic surgery (46%).

It is therefore difficult to extrapolate with certainty to the general population, the results of this study carried out on a population of patients operated on in only 4 types of surgery: orthopedics, gynecology, neurology, and digestive surgery since many studies have involved other specialties such as cardiology (4), ORL surgery (5), dermatology (6), and stomatology (7).

Nevertheless, the panel of patients studied in our sample seems large enough to assume the effect of this music therapy technique on an anxious population in the operating theatre.

Moreover, our study showed good compliance with the music therapy protocol. Ninety-one percent of the operated patients analyzed adhered to the music therapy protocol in its entirety, which suggests that this technique is feasible in the operating theatre.

For many people, surgery is a daunting experience that comes with emotional vulnerability (8). These emotions often intensify before surgery, causing overwhelming anxiety and even depressed moods. Pre-operative anxiety and depression have significant consequences if left unattended. Increased preoperative anxiety can lead to postponement or even cancellation of planned surgery, increased need for anesthetic medication to ensure unconsciousness during the intraoperative hospital stay, and lower overall patient satisfaction. (9) (10).

Results from our population suggest that listening to music may have a beneficial effect on anxiety in patients operated on under local anesthesia. Music therapy in the operating room resulted, on average, in a reduction of 2.12 units to that of the pre-operative control group, 7.96 units to that of the intraoperative group, and a reduction of 5.45 units to that of the post-operative control group, as measured by the Hamilton Anxiety Assessment Scale (HALE).

Analysis of surgical anxiety in patients undergoing surgery shows an improvement in the anxiety rate in 76.22% of patients, as well as an average reduction of 32.66% in the anxiety rate after the music therapy protocol ($p=0.0316$).

COOKE M used STAI - S anxiety scales (11) in his study that resulted in a difference of -0.60 standardized units. Although the effect size differs between studies using non-STAI anxiety scales such as our study using EHEA, the trials agreed on the direction of the point estimates. (12).

Concerning the effects of music therapy on pain, our results showed a progressive and continuous decrease during the three operations, particularly postoperative pain, with a reduction in score from 5.21 in the "Control" group to 3.24 in the "Music therapy" group.

The analysis of operative pain in patients undergoing surgery shows a decrease in the rate of pain in 52.56% of patients, as well as an average reduction of 28.92% in the rate of pain per EVA score after the music therapy protocol ($p > 0.022$).

Given that preoperative anxiety is associated with postoperative pain (13), the reduction in pain observed after preoperative music interventions could be the result of a decrease in anxiety. According to van Dijk, the mean changes in anxiety and pain from baseline showed even greater effects of music therapy in reducing pain.(14).

In comparison, music interventions in three studies (Gelatti 2020 (15) ; Mandel 2007a (16) ; Sendelbach 2006 (17)) also resulted in a statistically significant reduction in pain compared to standard care in 210 participants (95% CI -0.80 to -0.05, $p > 0.03$)

Analysis of these parameters, collected by the observation grid, showed a significant improvement of 66.67% of the operated patients in heart rate, 42.68% in respiratory rhythm, and 52.86% in blood pressure.

The results of this review suggest that music therapy reduces heart rate, we found that listening to music in the operating room resulted in a reduction in heart rate of 4.69 beats per minute (bpm) compared to 2.67 bpm during music therapy. For respiratory rate, the use of music in the operating room on patients undergoing surgery led to less marked results than for heart rate (reduction of 1.66 breaths per minute). For blood pressure, our study indicated in the results that music significantly reduced blood pressure by 1.5 mm Hg ($p = 0.042$).

Bradt J pointed out in his study that the results also suggested a small effect on heart rate and diastolic blood pressure, but no support was found for reductions in systolic blood pressure, respiratory rate, and skin temperature. (18)

Secondary endpoint analysis shows several additional positive effects of music therapy on the impact of vital signs, primarily on heart rate, respiratory rate, and blood pressure, and on pain rates before, during, and after surgery.

Research of factors predictive of success in music therapy (19) was carried out by analyzing the different characteristics of the patients (20) and then the analysis of the social status, professional category, sex, age, musical preference, and medical and surgical history, did not allow presenting any significant difference between responder and non-responder patients. The failure of this analysis was due to the small size of the study sample.

Recommendations for Music Interventions in Clinical Practice

- Slow and flowing music, approximately 60 to 80 beats per minute.
- Nonlyrical.
- Maximum Volume level at 60 dB
- Patient's own voice, with guidance.
- Suitable equipment chosen for the specific situation.
- A minimum duration of 30 minutes in length.
- Measurement follow up, and documentation of the effects.

Most of the trials used a 30-60-minute session of musical intervention during the surgical procedure only. This clinical consistency adds to the strength of this review but also leaves many questions unanswered. First, the relationship between the frequency and duration of music therapy and treatment effect is unclear. Could it be that several sessions of music therapy before surgery, when possible, lead to greater benefit?

Two studies (Lin 2011 (21); Li 2004 (22)) have offered several sessions of music starting with the first session several days before surgery and continuing until the day of surgery. Both studies resulted in a greater reduction in anxiety.

Some studies suggest that offering several sessions of music listening allows the patient to give his/her opinion on music therapy, to select different music if necessary, and to become more adept at using music for relaxation.(18) Further investigation into the optimal frequency and duration of music interventions for pre-surgical patients is needed.

Our study was conducted with a small sample of patients. The small size of the study limits the extrapolation of the results to a larger scale, particularly on the population of patients operated on under local anesthesia in other specialties.

The aim is to show whether the application of music therapy is an interesting avenue of research to be developed in the prevention of increased anxiety and pain during the surgery and consequently the disruption of vital signs in patients undergoing surgery.

This study showed encouraging results of music therapy using the "U" mounting technique in the management of surgical anxiety for patients undergoing surgery. To formally demonstrate the value of this technique in the operating theatre, larger-scale studies should be carried out.

It seems necessary to conduct future randomized, multicenter, coded studies to establish a satisfactory level of scientific evidence. Studies can be proposed to also determine the factors predictive of success and failure of this method and to optimize its use.

Conclusion

The application of music therapy was based on the observation of the great importance of music in everyday life, as well as the therapeutic effects attributed to it. These effects are becoming increasingly documented in the literature on music therapy and its applications. Music therapy is nowadays a discipline in full development and its use renders many services, both in the hospital environment and in the private sector at the service of the person.

The development of this "paramedical" discipline is also hindered by its youth and its lack of scientific justification, which exists but is still insufficient in comparison with medical disciplines.

Its use in the operating theatre, alone or in combination with other techniques, will help to promote emotional relaxation, reduce anxiety, stress, and pain and restore vital signs in patients who lend themselves to the experience.

The results of this work did not aim to express a universal truth about music therapy, but they encourage the opening to this interesting discipline which is music therapy. This work has also demonstrated the feasibility and reproducibility of music therapy in the operating room and provides a fertile ground for the development of further research, with many proposed tracks and several methodological suggestions.

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Availability of Data and Materials

The data supporting the conclusions of this article are included in this published article.

Ethics approval and consent to participate

Written informed consent was obtained from the patient.

Consent for publication

The patient described in this report has signed informed consent to publish his case, including all accompanying images before writing this manuscript.

Competing interests

The authors have no competing interests to disclose.

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