

Music Therapy Reduces Nauseas and Pain of Patients Undergoing Autologous Hematopoietic Stem Cells Transplantation

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1. Abstract

1.1. Objective: The autologous hematopoietic stem cell transplantation (HSCT Aut) is a therapeutic medical treatment for various neoplastic hematologic, congenital, genetic or acquired disorders. In this procedure which combines high-dose chemotherapy and/or radiotherapy and has a high degree of cytotoxicity, the patient experiences solitary confinement, which causes psychological distress, anxiety, mood, fatigue, nausea, pain and can lead him/her to depression. Music therapy was applied with the purpose of decreasing this social confinement, measuring the variables nausea and pain, and verifying whether this intervention can decrease these symptoms. This is a randomized clinical trial.

1.2. Method: n = 45 patients were selected randomly. n = 24 were selected for the Experimental Music Therapy Group (EMG) and n = 21 for the Control Group (CG) which received the standard treatment. Interventions of live music were applied using music therapy methods and techniques, by a qualified music therapist. Assessment and quantification made using visual analog scale (VAS).

1.3. Results: The student t test and covariance analysis applied, ($p < 0.05$) were considered statistically significant when comparing the groups, reducing nausea and pain significantly Conclusion: Music therapy reduced nausea and pain of the patients undergoing autologous hematopoietic stem cells transplantation, providing bio-psychosocial welfare.

2. Introduction

The motivation to carry out this investigation took place through music therapy sessions applied in a previous study during the trajectory in the master's degree, developed at the bone marrow transplant service of the clinical hospital complex of the Federal University of Paraná, located in the city of Curitiba, capital of Paraná, Brazil. Variables that were not, investigated but that provoked reflections, due to the patients' reports. Many reported having slept better on the days when music therapy was applied, others forgot about the pain during the music therapy experience; there were also reports of decreased nausea and expressions of relaxation.

Hematopoietic Stem Cell Transplantation (HSCT) is a therapeutic clinical treatment that consists of replacing hematopoietic stem cells of the diseased bone marrow, or deficit, with healthy cells [1]. This procedure combines high doses of chemotherapy, radiotherapy and has a high degree of toxicity, causing damage to the quality of life of patients for 100 days after transplantation [2], the organic toxicity causes heart problems, osteoporosis, infections, cataracts, infertility. In addition, pulmonary and other organ complications occur [3], highlighting the patient's fragility in the face of a malignant disease that threatens life causing physical, social and emotional changes from diagnosis to more advanced stages of the disease [4].

Currently around the world, it is possible to perceive through pub-

lications in scientific journals, an approximation of contemporary medicine with the use of music as a form of therapy for hospitalized patients due to a wide variety of diseases. In recent years, the use of music therapy as a therapeutic method has expanded its field of application. In the medical field, it is used as an alternative complementary resource that aims to reduce stress, fear, anxiety, tension, fatigue and anguish, both for patients and family members. Through it, it is possible to work with the feelings in relation to death, about interpersonal conflict between the patient and his family, assist in decisions about the treatment to be performed, among other benefits [5]. The practice of music therapy, with its binding and welcoming character, can also act in humanization, so the effectiveness of music therapy in the hospital environment is a trend to be followed by the area of contemporary medicine. The inclusion of new protocols in the routine for therapeutic assistance with groups of patients and family members are possibilities for relevant and promising approaches in the hospital context in oncology services and transplant centers [5]. The positive effect of Music Therapy in reducing patients' anxiety is marked: The anxiety that patients feel when being hospitalized, a matter frequently discussed by medical sociology, can undoubtedly be reduced through the use of Music Therapy as an element of harmony in the atmosphere resulting in relaxation and well-being [6].

There are countless works involving music therapy in the relief of human suffering. A research was carried out to determine how the intervention of this specialty could help in the prevention or reduction of psychophysiological stress in adolescent patients with cancer, during the hospitalization period. The results found evidenced the beneficial effects that music therapy brought to the development of strategies to cope with stress during hospitalization. In addition, the reduction of suffering was identified through the inclusion of moments of distraction, entertainment, tranquility, physical and emotional well-being [7].

However, in the hospital context, the premise that music alone does not have the same scope that it can have when applied with the specific knowledge of music therapy and the competence of the Music Therapist is considerable. In Brazil, hospital institutions at the national level still lack the effectiveness of music therapy as a profession. At the same time, it appears that publications with research, related to music therapy in journals with respected scientific impact, are increasingly rising to the top of current therapy modalities. Therefore, the contribution of this specialty to the patient's psycho-emotional balance can be more effective, since it provides comfort, welcoming and decreased morbidity, inherent to the treatment and, consequently, improves the quality of life. The study is also justified by the perspective of more humanized care, and in the context of bone marrow transplantation, music therapy has enabled patients to undergo this treatment that causes a lot

of suffering, with greater emotional balance and bio psychosocial well-being. [8] Show in his study of the music therapy intervention in this population submitted hematopoietic stem cells transplantation allogeneic, results of improved mood, decreased anxiety and pain relief, developed in hospital clinical complex at federal university of Paraná.

The objective this study was to apply music therapy intervention and to measure the variables nausea and pain, statistically quantify whether music therapy can help reduce these symptoms in hospitalized patients to perform autologous hematopoietic stem cell transplantation.

3. Material and Methods

3.1. Study Design: It is a randomized clinical trial.

3.2. Place: Erasto Gaertner Hospital Bone Marrow Transplant Unit.

3.3. Population: Adult patients undergoing autologous hematopoietic stem cell transplantation (HSCT).

Approved by the ethics committee in the research of the Erasto Gaertner Hospital Certificate of Ethical Presentation and Appreciation (CAAE) number 82882017.6.0000.0098 and (REBEC) Registration Brazilian Clinical Trials RBR 3h4csb <http://www.ensaiosclinicos.gov.br/rg/RBR-3h4csb/>

3.4. Sample Calculation:

The calculation of the sample size based on a previous pilot study for which an average of 5.4 identified for the pain and nausea score with a standard deviation of 1.9. It was felt that this group corresponded to the control group of the new study, and a minimal difference in the score of 1 point lower in the experimental group would be clinically relevant. For a significance level of 5% and a test power of 80%, it would require at least 25 cases in each group (Control Group and Experimental Music Therapy Group).

3.5. Randomization:

Before starting the research, the randomization of 100 numbers, carried out by the program <http://www.randomizer.org>, which were inserted into an opaque envelope in the randomized order and the envelopes numbered from the outside in the sequential order from 1 to 100.

The random selection for allocation of the patient into the groups, took place as follows. After the patient agreed to participate in the research and having signed the free and informed consent form (FICF), the envelope was opened in front of the patient and it was agreed that the "even" number would comprise the group that will receive the music therapy intervention, referred to as the experimental music therapy group (EMG) and the 'odd' number will make up the Control Group (CG) this group that will not receive the music therapy intervention.

3.6. Inclusion Criteria:

The invitation made to each patient submitted to Autologous (HSCT) between 18 and 70 years of age, if the patient accepted to participate in the research, he/she would then have to sign the Free and Informed Consent Form (FICF).

4. Method

Live music was applied through music therapy techniques, provided by a qualified music therapist performing popular songs that are part of the social/musical/cultural identity of the patients. For example: The music therapist and patient sang together the participant's/patient's favorite and chosen songs with guitar accompaniment, with the patient following the rhythm of the music playing percussion instruments, such as bongo, tambourine, bells, triangle or maracas, among others, in an interactive process, using music therapy techniques. Popular songs were chosen by patients, while the music therapist conducted the session singing, playing guitar, and bringing the patient to the musical experience; and then the patient would soon start singing with the music therapist and tapping the rhythm of the songs, sometimes with his/her hands or with small percussion instruments placed at the patient's reach. The sessions were individual and took place in the room beside the patient's bed, three times a week, with each session in the Experimental Music Therapy Group lasting 30 minutes.

Live music has tremendous power to energize patients and provides greater emotional impact. In addition, the human presence of the music therapist results in patients feeling welcomed, in a relation of attention, care, resonance and enhancement of the interactive expressions of the patient.

5. Material

Visual Analog Scale (VAS) [9] was used to assess the dependent variables nausea and pain, Quantitative data regarding the subjective responses of patients to visual analog scale (VAS) applied before and after the intervention in EMG was collected. The data was collected also in the CG that did not receive music therapy. Visual analog scale (VAS), is a numerical scale ranging from 0 to 10, it is widely used to measure the intensity of pain, but also in this study was used to measure nausea.

Operating range (pain=0 No pain, pain=10 Extreme pain), (nausea =0 No nausea, nausea =10 Extreme nausea)

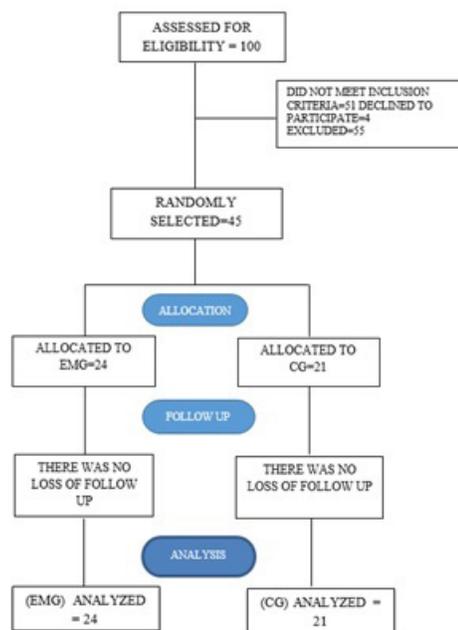
Demographic Questionnaire Clinical: Personal data and clinical patient demographics were also collected, such as name, address, age, gender, religion, education, social class.

Questionnaire of music therapy: was created to collect musical information, musical preferences, from the family, the parents and patients. Possession of musical information the music therapist preparing a unique repertoire for each patient, and thus begins the process of the session's interventions production of live music by the techniques of music therapy recreation of songs and improvisation with rhythmic production activities.

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Prior and informed consent form (PICF): Was signed by all patients that participated in the research (Flow Chart).

Flow Chart of the Research



6. Results

For a description of the quantitative variables the statistics, mean, median, value minimum, value maximum and standard deviation were considered. For the summarization of the qualitative variables, frequencies and percentages was considered. To evaluate the homogeneity of the groups in relation to the distribution of scores of qualitative variables the Chi-square test was considered. For comparison of groups, in relation to quantitative variables, the student t test and analysis of covariance was considered. P values less than 0.05 indicated statistical significance.

For each of the qualitative variables analyzed, we tested the null hypothesis of equal distribution of ratings in both groups versus the alternative hypothesis of different distributions (Table 1).

6.1. Comparison of Experimental Music Therapy Group and Control Group in Relation to Assessments of Nausea

The table below shows the descriptive statistics for the variable nausea at the two moments before intervention and after intervention evaluated as well as the p value of the statistical group EMG and the value of reduction (Table 2).

6.2. Comparison Experimental Music Therapy Group (EMG) Evaluation of Nausea Before Versus Control Group (GC)

The null hypothesis of equal nausea assessment means was tested in the EMG group (assessment before) and in the GC group versus the alternative hypothesis of different means, removing the social class effect. The table below shows the descriptive statistics for this variable at the two moments evaluated, as well as the p value of the statistical EMG (Table 3).

Table 1: Demographic Data

Gender	EMG		CG		
	N	%	N	%	
Female	10	41,7%	7	33,3%	
Male	14	58,3%	14	66,7%	
Total	24	100%	21	100%	P: 0,565
Age					
Adult	12	50,0%	16	76,2%	
Elderly	12	50,0%	5	23,8%	
Total	24	100%	21	100%	P: 0,186
Schooling					
First Degree	11	45,8%	8	38,1%	
High School	5	20,8%	7	33,3%	
University Degree	8	33,3%	6	28,6%	P: 0,639
Total	24	100%	21	100%	
Social Class					
Low	9	37,5%	16	76,2%	
Average	15	62,5%	5	23,8%	
Total	24	100%	21	100%	P: 0,009
Religion					
Evangelical	7	29,2%	11	52,4%	
Catholic	17	70,8%	10	47,6%	
Total	24	100%	21	100%	P: 0,43
Diagnostic					
Non-hodgkin lymphoma	6	25,0%	10	47,6%	
Multiple myeloma	17	70,8%	10	47,6%	
Testicular Tumor	1	4,2%	1	4,8%	
Total	24	100%	21	100%	

Table 2: Comparison Nausea EMG (Before) and (after) intervention

Group EMG	n	Mean	Median	Minimum	Maximum	Standard Deviation	Value p*
Nausea before	24	4.3	4.19	1	7.75	2.05	
Nausea after	24	0.91	0.69	0	3.13	0.77	
Reduction	24	3.39	3.31	0.38	6.63	1.74	< 0.001

(*) Student t test; p < 0.05

Table 3: Comparison Nausea EMG before versus CG

Comparison Groups	n	Mean	Median	Minimum	Maximum	Standard Deviation	Value p*
EMG (Before)	24	4.3	4.19	1	7.75	2.05	0.33
CG	21	3.45	2.63	0	8.25	2.38	

(*) Covariance analysis; p < 0.05

6.3. Comparison Experimental Music Therapy Group (EMG) – Evaluation of Nausea After Versus Control Group (CG)

The null hypothesis of equal nausea assessment means was tested in the EMG group (assessment later) and in the CG group versus the alternative hypothesis of different means, removing the social class effect. The table below shows the descriptive statistics for this variable at the two moments evaluated, as well as the p value of the statistical EMG (Table 4).

6.4. Comparison of Experimental Music Therapy Group and Control Group in Relation to Assessments of Pain

The table below showed the groups when compared and the statis-

tics about the pain. The pain measured before the intervention and after the intervention compared is with the control group and the value of the reduction (Table 5).

6.5. Comparison Experimental Music Therapy Group (EMG) – Evaluation of Pain Before Versus Control Group (GC)

The null hypothesis of equal pain assessment averages was tested in the EMG group (assessment before) and in the CG group versus the alternative hypothesis of different averages, removing the social class effect. The table below shows the descriptive statistics for this variable at the two moments evaluated, as well as the p value of the statistical EMG (Table 6).

Table 4: Comparison Nausea EMG after versus CG

Comparison Groups	n	Mean	Median	Minimum	Maximum	Standard Deviation	Value p*
EMG (After)	24	0.91	0.69	0	3.13	0.77	< 0.001
CG	21	3.45	2.63	0	8.25	2.38	

(*) Covariance analysis; $p < 0.05$

Table 5: Comparison Pain EMG before and after intervention

Group EMG	n	Mean	Median	Minimum	Maximum	Standard Deviation	Value p*
Pain before	24	3.29	3.25	0	7.5	1.93	
Pain after	24	1.37	1.06	0	5.25	1.16	
Reduction	24	1.92	1.69	0	4.63	1.22	< 0.001

(*) Student test for paired sample; $p < 0.05$

Table 6: Comparison Pain EMG versus CG

Comparison Group	n	Mean	Median	Minimum	Maximum	Standard deviation	Value p*
EMG (Before)	24	3.29	3.25	0	7.5	1.93	0,11
GC	21	4.35	4.25	1.13	10	2.26	

(*) Covariance analysis; $p < 0.05$

6.5. Comparison Experimental Music Therapy Group (EMG) – Evaluation of Pain After Versus Control Group (CG)

The null hypothesis of equal pain assessment averages was tested in the EMG group (later evaluation) and in the CG group versus

the alternative hypothesis of different averages, removing the social class effect. The table below shows the descriptive statistics for this variable at the two moments evaluated, as well as the p value of the statistical EMG (Table 7).

Table 7: Comparison Pains EMG After versus CG

Comparison Groups	n	Mean	Median	Minimum	Maximum	Standard deviation	Value p*
EMG (After)	24	1.37	1.06	0	5.25	1.16	< 0.001
CG	21	4.35	4.25	1.13	10	2.26	

(*) Covariance analysis; $p < 0,05$

7. Discussion

The patient diagnosed with neoplastic hematologic disease goes through great emotional, physical, psychological, and social distress. It was observed that patients experience a lot of anxiety, pain and mood disorders, nausea, insomnia, and fear of death. The action of Music therapy interventions enabled the reduction of symptoms, side effects of the treatment, redeeming the socio-cultural-sound contact, through the recreation of songs, their cultural environment, and by reducing the feeling of social confinement imposed by the (HSCT Aut) procedure. In this randomized experimental trial, the Visual Analog Scale (VAS) was used to assess the dependent variables of nausea and pain, and which were statistically treated with the execution of the covariance and student t tests, resulting in a significant decrease of nausea and pain symptoms.

The interactive music experience makes the patient closer to his/her cultural universe, bringing him/her to a process of rescuing moments experienced through music, shifting away from hospital problems and the disease itself, conducting the patient through a musical sound experience, providing relaxation, which enabled improvement of the symptoms. The presence of the professional in interactive activity with the patient, singing and playing a percussion instrument, and accompanying himself on the guitar, listening to their musical expressions and giving emphasis to the patient's experience, was a differential, in addition to providing presence, welcoming, care and monitoring of the patient during this journey

towards the success of the treatment. Several current studies published around the world show that despite being methodologically diverse, but with similarities in relation to patients facing cancer treatment is a focal point in common with the present study, such as nausea and pain reduction [10],[11]. The impact of music therapy intervention in this study was effective in reducing negative effects the nausea and pain disorders were measured and analyzed statistically and resulting significantly in the decreased nausea and pain, reflective in the wellbeing of the patients submitted to autologous HSCT.

The Erasto Gaertner hospital treats exclusively low-income people and it was found that these patients do not have access to culture, and that the only way to access music is by listening to the radio so this facilitated the work of music therapy. For many of them it was the first time that they had this opportunity to get in touch with live music. In addition to the results found in this study there was improvement in the quality of life of the patients that underwent the treatment. Therefore, music therapy intervention was effective contributing to the humanization of the hospital environment and resulting for the patients in bio psychosocial well-being.

8. Conclusion

Music therapy showed a decrease in the results of nausea and pain with significance statistical in the present study. More results with a greater number of patients may be interesting for contributing with the growth of this modality of therapy. Because it is non-ex-

pensive and non-invasive, it is very well accepted by patients and does not offer any risks in this extremely controlled environment. We hope that other researchers around world can reapply more studies.

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