

# Effects of Passive Music Therapy on Lung Cancer Patients in First PICC Catheterization: A Randomized Controlled Clinical Trial

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## ABSTRACT

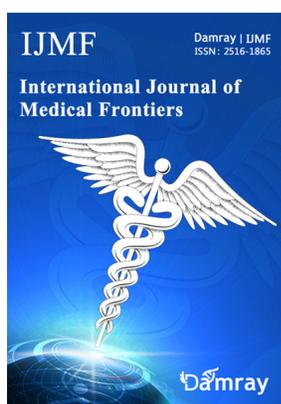
**Objective:** To examine the effects of passive music therapy on anxiety and vital signs of first-time, peripheral-insertion central catheter lung cancer patients.

**Methods:** A controlled randomized clinical trial was conducted. Three hundred and four lung cancer patients meeting the inclusion and exclusion criteria were recruited and randomly assigned to either a test group or a control group. The control group received standard care only. The test group received standard care and passive music therapy while undergoing catheterization, with the interference time during hospitalization and for 24 h post-catheterization.

**Results:** A variance analysis of repeated measurements showed differences in anxiety scores post-intervention ( $F = 68.55, p < 0.001$ ), time ( $F = 938.86, p < 0.001$ ), and time and intervention interactions ( $F = 204.56, p < 0.001$ ) between the test group and control group before, during, and after catheterization was statistically significant. A comparison of diastolic blood pressures and heart rates before and after catheterization between the two groups showed a significant statistical difference ( $p < 0.05$ ). A comparison of systolic blood pressures and respiration between the two groups was not statistically significant.

**Conclusions:** Passive music therapy during PICC placement can reduce anxiety lung cancer patient anxiety, lower patient diastolic blood pressure, and slow heart rate resulting in better experience patients and having it clinical application significance.

**Keywords:** Passive Music Therapy; Lung Neoplasm; Peripherally Inserted Central Catheter (PICC); Anxiety



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## 1 INTRODUCTION

PICC catheterization is an invasive technique prone to induce stress and anxiety in first-time catheterized patients. A large number of studies [1-3] have shown that music therapy during invasive medical procedures can alleviate patient nervous anxiety and intraoperative discomfort. The music therapy was divided into active and passive forms abroad. Active music therapy refers to therapy requiring patient participation such as singing, dancing, playing instruments in order

to complete the treatment. Passive music therapy refers to therapy consisting only of listening to music and do not participate [4]. Music therapy is currently being actively studied. However, there appears to be a lack of randomized controlled trials of large sample sizes for the lung cancer patients undergoing their first PICC catheterization. Passive music therapy was used as an intervention measure any application effect on first-time the PICC catheterized lung cancer patients.

## 2 SUBJECTS AND METHODS

### 2.1 Subjects

Three hundred and four lung cancer patients hospitalized for treatment and scheduled for with first-time PICC catheterization at the Tumor Center of a Chengdu Third-Level Hospital in between May 2016 and December 2017 were enrolled. Inclusion criteria: a. patients with clinicopathologically diagnosed lung cancer; b. hospitalized patients requiring chemotherapy and willing to receive PICC catheterization; c. aged 18 or older; d. life expectancy of one year or more; e. agreement and signed informed consent to participate; and, f. mentally competent and able to understand, express orally and in writing and having no aphasia or intellectual disability. Exclusion criteria: a. previously or contemporaneously mentally-disordered, as diagnosed by a psychiatrist, patients (excluding also those with adverse emotional experiences or symptoms such as anxiety, depression, or psychological distress); b. patients with physical pain; c. hearing-impaired patients; d. patients who disliked to listen to music; e. patients in critical condition or failed to complete the questionnaire. During the study, 2 patients from each group were withdrawn. One hundred and fifty patients from each group completed the study.

### 2.2 Methods

#### 2.2.1 Intervention during the catheterization

**Control Group:** The patient entered the catheterization room 15 min prior to catheterization. ICC nurses explained the purpose and significance of the catheterization. The patient was placed in a prone position on the bed according to catheterization requirements. PICC nurses then prepared the catheterization supplies while patient, maintaining a comfortable position, was informed by intervenors the patient about catheterization precautions per the PICC health education manual and activity ball during catheter insertion. The patient was then removed from the catheterization room.

**Test Group:** The procedure for the test group was identical to the Control group except that the

patient wore headphones in order to listen to music throughout the entire procedure beginning after instructions were given.

#### 2.2.2 Intervention beginning the first day post-catheterization to day before discharge

**Control Group:** PICC nurses and intervenors made daily observations of the catheterization puncture site and provided routine catheter maintenance beginning immediately after the catheterization ended until the day before discharge. They provided patient education on self-observation and maintenance, and cautions and instruction regarding possible complications. This instruction was to the patients and their families. They assessed the level of patient knowledge and awareness of their as of the day before discharge and answered patient and patient family questions.

**Test Group:** Test group care and control group case was identical except that music therapy was performed twice a day either late morning, at around 10:00 am, and late afternoon around 16:00 pm, for 30 min each time until patient discharge.

### 2.3 Observation indicators and tools

#### 2.3.1 General Information Questionnaire

The researcher-designed questionnaire consisted of two parts. The patient-completed first part included, among other data points, age, gender, marital status, educational level, religious or spiritual beliefs, family economic status, residence, medical expense payment method, smoking and alcohol histories. The second part was completed by the PICC nurses and included diagnosis, pathological type, clinical stage, chronic disease combination situation, such as hypertension, coronary heart disease, or, diabetes, PICC catheter placement-related information, and other records.

#### 2.3.2 Visual analogue scale for anxiety (VASA)

VASA was developed from a visual analogue scale (VAS), with marks at 0 and 10 at opposite ends of a 10cm-long horizontal ruler. A "0" indicates no anxiety while a "10" indicates the most severe anxiety imaginable. Patients were required to mark a number which reflected their perception of their situation. Anxiety was classified using the VASA scale: a "0" indicating no anxiety;  $0 < A \leq 2$  mild anxiety;  $2 < A \leq 5$  moderate anxiety;  $5 < A \leq 8$  severe anxiety; and,  $8 < A \leq 10$  for panic [5].

#### 2.3.3 Passive music therapy tool

**Creating the music library:** Slow-tempo, low-pitched, melodic and relaxing music including songs at about 60-72 beats per minute were selected as by consulting the literature. Three music libraries

consisting of 3 music styles: classical, light, and folk were created, with 10 pieces each constituting each library. The classical was selected from composers such as Mozart, Beethoven, and Bach, and included works such as Mozart’s “Une petite musique de nuit in G Major”, and Beethoven’s “Für Elise”. Light music was from modern musicians in Bandari’s musical works and included such works as, The Wizard of Oz, Snow Dreams, and, The First Snow. Folk music had a strong national flavor in line with China’s cultural background and preferences. It primarily from modern instrumental works, including, “Tinkling Spring”, “The Moon Reflected in The Second Spring”, “Lofty Mountains and Flowing Water”, etc.

How the music was played: a wireless, plug-in headset (Micro SD Player TM-001) was used. The three libraries were copied, one each, to three secure digital (SD) memory cards. Patients were invited to select a music library from the intervention track for loop play according to their preference. Researchers modulated volume between 45-60 dB. Patients were informed of a sound button that allows them to adjust the volume.

**2.3.4 Physiological indicator measurements**

The objective physiological indicators of blood pressure, heart rate, and respiration were measured using an electrocardiogram monitor (Mindray Ipm-9800).

**2.4 Statistical analysis**

A database was created using EpiData3.1 to sort

and enter the data. A statistical analysis of data was performed using SPSS19.0. A statistical description was done using mean data ± standard deviation, frequency, and composition ratio. A statistical analysis was performed via variance analysis using t test, Chi-square test, and repeated measurement. Test level  $\alpha=0.05$  and  $p < 0.05$  indicated the difference was statistically significant.

**3 RESULTS**

**3.1 Baseline data comparison between the two groups**

The difference of baseline data in the patients of the two groups was compared using t test or  $\chi^2$  test. The results show no statistically significant differences ( $p > 0.05$ ) between the test group and control group with respect to gender, age, marital status, education level, family address, belief, payment method for medical expenses, smoking, alcoholism, chronic disease, pathological type, or TNM staging, and they were comparable.

**3.2 Comparison of anxiety before, during, and after the PICC catheterization between the two groups**

A two-way multi-level variance analysis of repeated measurement was performed on patient tension anxiety scores of the two groups before, during, and after PICC catheterization. The analysis shows a statistically significant difference in anxiety scores between test group and control group during and after the catheterization ( $p < 0.05$ ) (Table 1)

**Table 1. Variance analysis of repeated measurement for anxiety scores between the two groups (n = 300)**

Source of variation	df	SS	MS	F	P
Intervention	1	292.410	292.410	68.553	0.001
Time	1.507	1593.620	1057.459	938.857	0.001
Intervention X time	1.05 7	347.220	230.401	204.559	0.001

**3.3 Comparisons of heart rate, respiration, and blood pressure between the two groups before and after catheterization.**

The t test of two independent samples was performed on heart rate (HR), respiratory rate (RR), and blood pressure (BP) before and after catheterization between the two groups. The results showed no

statistically significant differences ( $p > 0.05$ ) in HR, RR or BP between the two groups before the catheterization. A difference of HR and diastolic blood pressure in the comparison between the patients in test group and control group was statistically significant ( $p < 0.05$ ). The difference of systolic blood pressure and RR between them was not statistically significant ( $p > 0.05$ ). (Table 2).

**Table 2. *t* Test of HR, RR and BP in patients of two groups before and after catheterization (n = 300)**

	Time	Test Group	Control	<i>t</i>	<i>P</i>
HR	Pre- catheterization	81.27 ± 12.91	83.49 ± 11.92	-1.547	0.123
	Post-catheterization	76.70 ± 12.87	81.96 ± 11.88	-3.678	0.001
RR	Pre-catheterization	19.89 ± 1.18	19.87 ± 0.90	0.220	0.826
	Post-catheterization	19.15 ± 1.19	19.32 ± 1.02	-1.356	0.176
Systolic blood pressure	Pre-catheterization	126.02 ± 16.0	125.19 ± 12.40	0.504	0.614
	Post-catheterization	120.90 ± 15.73	121.86 ± 13.84	-0.561	0.575
Diastolic blood pressure	Pre-catheterization	78.98 ± 11.60	80.43 ± 9.08	-1.208	0.228
	Post-catheterization	74.11 ± 9.26	76.60 ± 7.53	-2.558	0.011

## 4 DISCUSSION

Lung cancer malignant tumors result in the highest morbidity and mortality. Because of its poor therapeutic effect, rapid progress and poor prognosis, it is accompanied by physical symptoms such as dyspnea and physical pain in the late stage, which brings severe psychological stress to patients and their families.

It is accompanied by physical symptoms such as dyspnea and physical pain in the late stage. These cause severe psychological stress on patients and their families.

Anxiety and depression are the most prominent psychological symptoms in lung cancer patients. In this study, passive music therapy occurred during catheterization and before discharge. Music therapy method during catheterization was to relieve the patient anxiety about pain or possible complications resulting from the invasive catheterization procedure. Music therapy was continuous for patients post-catheterization and pre-discharge, which is mainly for the patient's anxiety about the disease itself and the side effects caused by the subsequent chemotherapy. The outcome indicators of this study were mainly aimed at the psychological and physiological indicators during the catheterization process of the patients, which were discussed as follows:

### 4.1 Relief of anxiety in lung cancer patients in PICC Catheterization process

This study showed that patient anxiety levels in two groups during the PICC catheterization process was affected by time and music intervention. Patient anxiety decreased by the end of catheterization and music therapy effectively alleviated the patient

anxiety. Na Zhang [6] applied music therapy to patients hospitalized in neurological department and who underwent PICC catheterization and the results showed that music therapy could reduce patient anxiety. A finding which is consistent with this study. Li Zeng [7], and Fengmei Dong [8], et al, both had findings that confirmed that music therapy lessened patient nervousness and anxiety during PICC catheterization. McDaniel C, et al. [9], applied passive music therapy to the patients undergoing PICC and Port placement during interventional therapy room, respectively. The results showed no difference in patient anxiety in the PICC group before, during or after catheterization. Patient anxiety using headphones in the Port Group was significantly reduced compared to patients without music. The difference was statistically significant. This is inconsistent with the this study and may be associated with either the smaller sample size of the McDaniel C study or that there is less psychological stress because the PICC technology is was more mature and that patients more fully understood and accepted the procedure.

### 4.2 Objective physiological indicators pre- and post-PICC catheterization in lung cancer patients

In this study, music therapy had no measurable effect systolic blood pressure rates. It did reduce diastolic blood pressure and heart rates but did not influence respiration rates. The Chen study was a randomized controlled trial of music therapy on 200 tumor radiotherapy patients [10] and showed that music therapy reduced systolic blood pressure with

no effect on diastolic blood pressure. Chen, et al's findings are consistent with this study. A possible reason is that the specific intervention method and intervention times were different. In Chen's study, music intervention lasted 15 minutes before radiotherapy and here it ran throughout the entire catheterization process lasting about 30 minutes. In this study, patients may have adapted to the state of music accompanying the catheterization process and any effect on blood pressure was not significant. A system review made by Jayakar, et al. [11] on 15 RCTs showed that music therapy could reduce the patient blood pressure, which is consistent with this study. Exposing patients to music therapy after thoracic surgery in the Liu Y, et al. [12] study showed that music therapy could reduce patient heart rate, which, again, is consistent with this study. Studies of the effects of music therapy on PICC catheterization patients [13-14] showed that music therapy could stabilize heart rates and confirm the effect of music therapy on heart rates.

Zengin S, et al. [15] used music during the placement of implantable venous access port (access port) placements in tumor cancer patients and found that music intervention reduced patient respiratory rates (RR) which is consistent with this study. It relates to different research subjects. The Zengin S study was primarily on tumor patients during access port placement, while the main targets of this study were

lung cancer patients undergoing PICC catheterization. PICC and access port are both invasive procedures with a main purpose being infusion therapy. They have different patient physical and psychological effects due to the differences in the procedures.

In conclusion, music therapy, as a psychological intervention, can effectively alleviate anxiety in lung cancer patients undergoing their first PICC catheterization. It reduces heart rate and diastolic blood pressure during catheterization. Patient subjective experience of music therapy is positive. It is simple and convenient and worthy of clinical application. This study has its limitations. There was only one sampling location is single and different types of music intervention may have different effects. The scope of research should be expanded carried out at multiple centers in hospitals in different regions and at different grades in order to explore the effects of different types of music establish any physiological and psychological effects.

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