

## The Effect of Music Intervention on Pain Management in Clinical Practice

Music was used in medical fields for a long history. As an intervention method, it was used in clinical procedures aiming at treatment and rehabilitation. Until now, many literature studies have reported the application of music in the intervention during dental procedure, perioperation, chemotherapy, injection and delivery. It also has been a long time which music intervention was used to manage pain and anxiety in patients during medical procedures.

### **Part 1: Systematic Review and Meta-Analysis**

The Effects of Music Intervention on Burn Patient in Treatment Procedures: A Systematic Review and Meta-Analysis of Randomized Controlled Trials

#### **Backgrounds**

The treatment for burn patients is very challenging since burn is one of the most severe traumas in the world. Burn patients usually face a series of physiological and psychological problems during the treatment. Pain is a major problem occurring at all stages of treatment. In clinical practice, pain is usually managed by pharmacological treatments including analgesic and antianxiotic. However, hemodynamic instability, hypermetabolism and immune disorder are very common for burn patients. The safety issue regarding the use of analgesic and antianxiotic is always controversial. Besides, sedation and analgesia are limited in pediatric burn patients.

Music intervention is also widely used in dressing change, debridement, which helps decrease pain and anxiety of burn patients. Majority of researches indicated that music has positive effects on alleviation of pain, especially non-severe pain for burn patients. However, some researchers had opposite opinions on the clinical application of music therapy on pain management. The result indicated that relaxation music has no significant effects on pain relief. Investigates also found no significant difference in pretest and posttest anxiety across the groups. They believed that the effects of music intervention were still unclear and needed further investigation.

However, few review have been reported regarding the application of music intervention on burn patients. No review study thus far has conducted the Meta-analysis of music intervention for burn patients. The purpose of this systematic review and meta-analysis was to summarize the effects of randomized controlled trials of music interventions on procedure for burn patients during treatment, and to provide recommendations for future research and clinical practice.

Thus, a meta-analysis was conducted to gain a better insight into the effect of music intervention on burn patients during treatment procedure.

#### **Methods**

We searched electronic databases from their first available date until February 2016 through PubMed, EMBASE, and MEDLINE, etc. Selection criteria involved in two key concepts: music interventions (including, music, music therapy and music medicine) and physical activity outcomes (including, pain, anxiety, burn patients, dressing change, wound care, debridement and rehabilitation). Two reviewers

independently screened records and extracted data from all eligible studies. Statistical heterogeneity was determined by Q-test and  $I^2$ . The endpoints were standardized mean difference (SMD) and 95% confidence interval (CI). The publication bias was tested by Begg's funnel plot and Egger's test.

### **Results**

A total of 804 burn patients were included in this review paper from 17 RCTs, which comparing patients undergoing treatments with and without music during treatment. Patients' age ranged from 6 to 86 years old. Average age was reported in 5 literatures. The number of female patients is larger than that of male patients. Types of procedure included dressing change, debridement, preoperative period, range of motion rehabilitation, cold therapy, daily nursing care, during isolation area and hospitalization. Most of the music used in the intervention was self-selected or patients' preferences. Recording music was used in 15 studies, live music was used in 3 studies. The main methods of music interventions in these trials included attention distraction methods like Muralvision or MAE; relaxation methods like MAR and MBI.

**Primary Outcome: Pain.** Meta-analysis of 6 trials and 260 burn patients measured pain intensity demonstrated significant heterogeneity ( $I^2 = 81.6\%$ , ( $P < 0.001$ )). The pooled result from random effects model demonstrated significant differences of the pain scores between the intervention and non-music intervention group (SMD = -1.26, 95% CI [-1.83, -0.68]). The music intervention could release the pain of burn patients during the procedures.

### **Secondary Outcome:**

**Anxiety Level.** Anxiety scores demonstrated statistically significant heterogeneity ( $I^2 = 87.0\%$ , ( $P < 0.001$ )). The results showed a statistically significant reduce of anxiety in burn patients (SMD = -1.22, 95% CI [-1.75, -0.69]) in the intervention compared to that in control group

**Heart Rate.** The effect of music intervention on heart rate of 4 studies were extracted in meta-analysis during burn treatment procedures [17, 20, 22, 33]. Statistical heterogeneity is significant ( $I^2 = 88.8\%$ , ( $P < 0.001$ )). Compared with the usual care group, heart rate was significantly decreased in the intervention group (SMD = -0.60, 95% CI [-0.84, -0.36]).

**Blood Pressure.** Four studies reported the effect of music interventions on blood pressure. Three of those were included in this meta-analysis. The random effects pooled result did not demonstrate differences for between the intervention and control group on blood pressure of burn patients during the procedures (SBP : SMD = -0.37, 95% CI [-1.18, 0.45]; DBP : SMD = -0.24, 95% CI [-0.68, 0.20]; ).

### **Conclusion**

In conclusion, a positive relation between music intervention and pain alleviation, anxiety relieving, heart rate reduction was observed on burn patients. However, Further high quality researches with carefully considered music interventions on burn patients are needed.

## **Part 2: Case study**

## Music Therapy Assisted Stretching for Children with Severe Burn Injuries: Better Outcome and Better Experience

Fang, a 9-year old boy, suffered from a devastating electric shock and subsequent severe burn injuries in February 2015. He was admitted to local hospital and transferred to Burn Research Institute of Southwest Hospital in June 30th, 2015. Post 5 months of injury and lack of hypertrophic scar prevention and management, we found that Fang already suffered from severe hypertrophic scar and limitation of Range of motion on both shoulder, left elbow, left knee, left hip and trunk. Surgery release was performed on left shoulder and pubic area in July 1st, 2015, and he received rehabilitation service including silicone gel, silicone gel sheeting, pressure therapy, passive stretching and functional training afterwards.

Two therapy sessions were provided, one with and one without music therapy. Range of Motion was considered as one of the major outcome measures. Both active range of motion and passive range of motion were measured before and after these two therapy sessions by another therapist who didn't provide therapy to this child. In this study, MBI and MAE were used on burn patients throughout the range of motion during music session.

Fig.1 Treatment 1: the result of Stretching With Music Therapy

Fig.2 Treatment 2: the result of Stretching Without Music Therapy

Fig.3 Treatment 2: the pain of Stretching With/Without Music Therapy

### **Child's feedback:**

After the therapy, therapists made a short interview with his parents. When therapists met the parents, the pediatric patient was smiling and telling his parents that he didn't cry at all today in a short interview. "I was playing guitar with my music therapist! The physical therapist only did some gentle stretching for me, maybe he was hungry today."

### **Parent's feedback:**

The second day after the therapy, the pediatric patient was scheduled to discharge from hospital. The parents came to talk with the therapist, "how many times will you do this therapy? You can do whatever times you need, and we can wait until you finish this therapy". When the therapist told them the rehabilitation was over this time, they were feeling disappointed.