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**Is music therapy intervention effective in decreasing pain after
standard wound care in hospitalized burn patients?**

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A SELECTIVE EVIDENCE BASED MEDICINE REVIEW

In Partial Fulfillment of the Requirements For

The Degree of Master of Science

In

Health Sciences – Physician Assistant

Department of Physician Assistant Studies
Philadelphia College of Osteopathic Medicine
Suwanee, Georgia

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ABSTRACT

OBJECTIVE: The objective of this selective evidence based medicine review is to determine whether or not music therapy intervention is effective in decreasing pain after standard wound care in hospitalized burn patients.

STUDY DESIGN: Systematic review compiling data from three randomized controlled trials in 2016, all in the English language.

DATA SOURCES: After a thorough search of PubMed and Cochrane, three pertinent studies were found to include in this review. The selected studies were evaluated to assess the effectiveness of music therapy in decreasing pain after wound care in hospitalized burn patients.

OUTCOMES MEASURED: Decrease in pain symptoms were measured by three self-reported pain scales: The Persian version of burn specific pain anxiety scale (BSPAS) ranging from 0–100¹¹, a self-reported numeric rating scale of 0-10¹², and a patient reported score on a visual analog scale from 0-100¹³.

RESULTS: Two of the three randomized control trials showed a statistically significant decrease in pain amongst the group receiving music intervention.^{11,13} One study showed a mean pain score amongst the control group of 91.17 versus 68.12 amongst the intervention group with a p-value of <0.001.¹¹ Another showed a reduction in pain of 29.20 in the intervention group and an increase of 1.03 in the control group with a p-value of <0.001.¹³ The last study did show a lower overall pain score amongst the intervention group of 1.828 versus 2.000 in the control group, but the p-value showed no statistical significance at p=0.57.¹²

CONCLUSION: Based on the systematic review of these three studies, music therapy does likely aid in relieving post-procedural burn pain, but the evidence is not conclusive and warrants more research. With that said, the findings in all three studies are encouraging that music therapy is in fact effective and will be proven effective with further research.

KEY WORDS: music; music intervention; burns

INTRODUCTION

A burn is classified as severe when it involves greater than 20 percent of the body surface area of an adult (with the exception of a 1st degree burn), as well as any burn that is accompanied by a major trauma/inhalation, or by means of chemicals/high-voltage electricity regardless of body surface area.¹ Burns to the skin are classified by the depth of injury to the tissues, which is also one of the largest predictors of prognosis. The different degrees are referred to as 1st, 2nd, 3rd, and 4th degree burns or superficial, partial thickness, full thickness burns, and deep, respectfully, in order of mild to most severe. Superficial burns are limited to the epidermal layer, partial-thickness extend to the dermis, full thickness burns incorporate all layers of the skin including the dermis, and deep, fourth degree burns, involve underlying tissue such as bone and muscle.² Regardless of the degree, the goal of burn wound care is to shield the surface of the wound from further injury or infection, along with maintaining an optimal environment to promote healing, all whilst managing the patient's pain.³ While there are many methods of pain control during wound care of burns, this paper evaluates three randomized control trials (RCTs) comparing the efficacy of music therapy at decreasing pain after wound care management among hospitalized burn patients.

Current methods for controlling pain in burn victims, including during and after dressing changes, mainly involves the use of medications. Opioid analgesics as in fentanyl, hydromorphone, and morphine, are used intravenously and orally, but are concerning for dependence and addiction.⁴ Nonopioid analgesics like dexmedetomidine, ketamine, ketorolac, and gabapentin have been utilized but can often times be ineffective at pain control in this patient population.⁴ Anxiolytics (haloperidol, quetiapine) and anesthetics, such as deep sedation, peripheral nerve block, and neuraxial anesthesia, have also been used, but have many side effects

and different levels of efficacy.⁴ Although these medications are beneficial when used appropriately, the addition of other, safer, techniques that can be supplemented for additional pain relief are much needed.

Burns can lead to many lifelong physical, emotional, and cosmetic issues for patients, and the pain endured during dressing changes can exacerbate each of these effects. It is still unknown whether decreasing the acute pain of dressing changes on severe burns decreases the long-term risk of post-traumatic stress disorder that many of these patients face.⁵ Burn injuries are among the top 15 leading causes of the burden of disease in the world.⁶ In other words, burn injuries are among the top 15 leading causes of death, decline in health, and/or injuries as calculated by adding together years of life lost and years of life with disability, making this a very prevalent topic for physician assistants in many clinical settings.⁷ In 2015, the Center for Disease Control and Prevention calculated 356,000 emergency room visits in the United States with a primary diagnosis of burns.⁸ One study found the average daily cost for care of hospitalized adults with an average burned body surface area of 27.9% to be \$1330.48 and a mean total cost of hospitalization of \$39,594.90.⁹

Alarming facts such as those show the magnitude of these injuries and further support the need to search for new ways to care for patients that have endured life altering burns. Although the standard treatments discussed above do provide relief for patients, daily dressing changes are still tremendously painful and stressful. Music therapy has been shown to have a moderate ability at reducing pain and could be utilized as adjunctive therapy to the methods currently used in practice.¹⁰

OBJECTIVE

The objective of this selective evidence based medicine (EBM) review is to determine whether or not music therapy intervention is effective in decreasing pain after standard wound care in hospitalized burn patients.

METHODS

The studies chosen for this selective evidence based medicine review are three randomized control clinical trials. The inclusion criteria for the three studies looked at in this EBM review included the type of study, the population, intervention, comparison, and how the outcomes were measured. The patient population for these studies involved patients 18 years or older that were currently involved in inpatient burn care for a severe burn(s). The intervention in each of these studies was music therapy. The intervention group was compared to patients undergoing burn wound care without music therapy, utilizing traditional pain management techniques. It is important to note that the traditional pain management techniques were used with the intervention group as well to provide consistency among the control and intervention groups. The outcome measured in each study that is further investigated in this EBM was the patient's self-reported pain level after standard wound care procedure of burns, which is classified as patient oriented evidence that matters (POEM).

I performed the research by searching Cochrane Library and PubMed to find articles that were chosen based on relevance to my clinical question and if the outcomes in the study were patient oriented evidence that matters. Keywords used to search for these articles included "music", "music intervention", and "burns". All articles were published in English and in peer review journals such as the *Journal of Burn Care Research* and *Burns*. The inclusion and exclusion criteria was consistent across all three of the chosen articles. The inclusion criteria for

the chosen articles in the EBM included studies that were randomized control trials, published after January 2014, and with participants 18 years and older. Any study that involved outpatient burn wound care or was published in a language other than English was excluded. Specific inclusion and exclusion criteria, as well as other demographic information for each of the individual three studies is listed in **Table 1** below. The statistics reported or used in all three studies was the p value, of which <0.05 was considered statistically significant, and the t-test value.

Table 1 - Demographics & Characteristics of included studies

Study	Type	# Pts	Age (yrs)	Inclusion Criteria	Exclusion Criteria	W/D	Interventions
Najafi, <i>The effects of patient-preferred music</i> , 2016(11)	RCT	92	>18	18 years or older, second- or third-degree burn injury and hospitalized for at least 72 hours following the burn injury	Patients with a respiratory problem or hearing impairment and patients who experienced music intervention in previous study	0	Persian classical music of the patient's choosing played through headphones
Hsu, 2016(12)	RCT	73	>18	Hospitalized burn patients with burns within 24 hours of hospitalization and age over 18 with an expected stay in the hospital of more than 7 days; able to communicate clearly	Hearing impairment; acute or chronic psychiatric disorders, hallucinations, delirium, Alzheimer's disorders, drug addiction, or abuse; critical condition with the use of a ventilator; and music therapy experience	3	Music intervention, specifically crystal music, including content from genres such as classical and pop music, playing through a CD player

Najafi, <i>The effects of music intervention</i> , 2016(13)	RCT	100	18-48	Hospitalized burn patients without respiratory injury, 72 hours post burn injury, had background pain, were able to communicate, and had no hearing impairment	Deterioration of patient's condition and participation in less than all three sessions of the study	0	Self-selected music therapy
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OUTCOMES MEASURED

The outcomes measured in the Najafi et al study, *The effects of patient-preferred music*, included anticipatory pain and anxiety associated with burn wound dressing changes as well as post procedural pain and anxiety.¹¹ The focus for this EBM was on the post procedural (burn wound dressing change) pain.¹¹ The Persian version of burn specific pain anxiety scale (BSPAS) was used to measure the patient oriented evidence that matters related to pain.¹¹ The scale is a visual analogue scale with a total of 0 indicating no pain and 100 representing extreme pain.¹¹ The post-procedural pain was measured immediately after wound care and 10-15 minutes thereafter.¹¹ For this EBM, the focus is placed on the measurement taken 10-15 minutes post-procedure.

Hsu et al measured pain through a self-reported numeric rating scale of 0-10 points.¹² A 0 represented no pain and a 10 represented unbearable pain.¹² This study also looked at anxiety in addition to pain, and took measurements before, during, and after wound dressing change.¹² Both the experimental group and the control group listened to music for 15 minutes before the first pain and anxiety scores were assessed, after which the dressing change began.¹² They continued listening to music during the dressing change when the second score was measured.¹² Once the

procedure stopped the music was continued for 30 additional minutes at which time the final post-procedural measurement of pain and anxiety was taken.¹² This review focused on the final pain measurement obtained.

Najafi et al study, *The effects of music intervention*, utilized a patient reported score on a visual analog scale.¹³ The scale was from 0, representing no pain, to 100, representing worst pain.¹³ The researchers assessed pain, anxiety and relaxation.¹³ Patients in this study listened to self-selected music for a total of 20 minutes and measurements in all three areas were taken before and after wound care, although the length of post-procedural time before the measurement was obtained was not specified.¹³

RESULTS

This review analyzed three randomized control clinical trials. All three studies looked at the effectiveness of music therapy in reducing post-procedural pain after wound care in burn patients 18 years and older.

The Najafi et al study, *The effects of patient-preferred music*, examined the influence of music chosen by the patient on post-procedural burn pain.¹¹ The study included patients 18 years or older, with 2nd or 3rd degree burns, who were in the hospital a minimum of 72 hours after the injury.¹¹ In total, 92 patients met inclusion criteria and were studied from 2013-2014.¹¹ All participants received analgesics as a part of routine care, although the specific pharmacological agents were not specified.¹¹ The music was classical Persian music and was all acoustic, without lyrics.¹¹ The music was played at the bedside of the patients with an option to use headphones.¹¹ Of the 92 participants, 46 patients were placed into the control group who did not listen to music during the procedure, and 46 were placed into the intervention group.¹¹ The data was presented as continuous and could not be converted into dichotomous form. There was a large treatment

effect size in the intervention group at the second measurement for pain taken 10-15 minutes after the procedure was complete.¹¹ The mean pain score amongst the control group was a 91.17 (SD=17.54) and the mean pain score amongst the intervention group was a 68.12 (SD=32.24).¹¹ The difference in the patient's self-reported pain at this time was statistically significant and much decreased in the intervention group that has music therapy.¹¹ There was a statistically significant p-value of <0.001.¹¹ These values as well as others are displayed in **Table 2** below. No adverse effects were addressed in this study.

Table 2 – Treatment Effects in Najafi et al study, *The effects of patient-preferred music*

Independent <i>t</i> test	p-value	Effect size (95% CI)
-4.26	<0.001	-0.89 (-1/311, -0.459)

In the study by Hsu et al, there were 73 patients accepted, and 70 of those completed the study.¹² All of the participants were 18 years or older, hospitalized within 24 hours of the burn, and were expected to be in the hospital at least 8 days.¹² The participants were randomized into a control group ($n=36$), which received only the standard analgesic, morphine, and an intervention group ($n=37$), which received music therapy in addition to morphine.¹² Demographics of the two groups did not differ statistically.¹² The amount of morphine received varied from patient to patient but was recorded and assessed.¹² Piano music was played at bedside of the patients in the intervention group during dressing changes and for 30 minutes thereafter.¹² The data was presented as continuous and could not be converted into dichotomous form. **Table 3** indicates statistical findings from this study. The results did not show a statistically significant reduction in pain after wound care (based on the p-value being >0.05).¹² Data was only given on the first day although it was obtained for a total of 5 days.¹² No adverse effects were addressed in this study.

Table 3 - Hsu et al. control group vs. experimental group

Group	Mean pain score (SD)	Independent <i>t</i> test	p-value
Intervention	1.828 (1.403)	-0.56	0.57
Control	2.000 (1.111)		

Najafi et al study, *The effects of music intervention*, included 100 adults, 18-48 years of age, who were at least 72 hours post initial burn injury.¹³ All 100 met eligibility requirements.¹³ Participants were randomly assigned to treatment groups, totaling 50 in each.¹³ All participants completed the study and are included in the results.¹³ The mean total body surface area burned for the control group was 23.02% in the control group and 24.08% in the intervention group.¹³ Baseline demographics were similar in both groups.¹³ All patients still received some analgesic (opioid and/or nonopioid) and the patients in the intervention group had the addition of self-selected music played during the dressing changes.¹³ The patients' self-reported pain was taken prior to starting the interventions.¹³ Intervention and data collection were performed for three days and the mean scores were calculated.¹³ The data was presented as continuous and could not be converted into dichotomous form. **Table 4** indicates the statistical findings from this study. The results were statistically significant as indicated by a p-value of < 0.001.¹³ No adverse effects were addressed in this study. This study in particular assessed objective clinical data, monitoring the patient's vital signs to see if there was any influence of music on heart rate, blood pressure, or respiratory rate. Although this EBM is not assessing those factors, it is important to note there were no increases or signs of adverse effects of the music on any of these vital signs.

Table 4. The effects of music intervention, mean scores of changes in participants' pain

Group	Pain Before (SD)	Pain After (SD)	Change in pain score (SD)	Independent <i>t</i> test of change	p-value of change
Intervention	72.00 (19.52)	42.80 (23.76)	-29.20 (15.42)	-12.28	<0.001
Control	87.17 (13.47)	88.20 (17.69)	1.03 (8.07)		

DISCUSSION

In each of the three studies assessed in this evidence based medicine selective review, the intervention group had a lower subjective pain score than the control group who was only receiving standard pain medications. The Najafi et al study, *The effects of music intervention*, and the Najafi et al study, *The effects of patient-preferred music*, both had a p-value of <0.05, which shows statistically significant data supporting the effectiveness of music therapy at decreasing pain. Although Hsu et al also showed positive effects at decreasing pain amongst the intervention group, at a p-value of 0.57 it was not statistically significant. No outliers were addressed in any of the three studies.

This review looked at music therapy as related to pain from burns, but music therapy and pain reduction has been studied in numerous different clinical scenarios. Mandel et al showed there is a positive effect of music intervention on heart rehabilitation.¹⁴ Sendelbach et al reported significant pain reduction amongst cardiac surgery patients with music therapy.¹⁵ Weeks et al showed decrease in anxiety with the use of music therapy during coronary angiography procedures.¹⁶ Additionally, a study that looked at patients with chronic stroke deficits showed an improvement in function, depression and mood with the use of music therapy.¹⁷ This is not an exhaustive list, but a few notable studies that have seen many positive effects from music therapy in many different clinical scenarios.

It is important to address some of the limitations of the studies used in this review. First, with an intervention such as music, there is no way to do a blind (much less double-blind) study. Participants are going to be aware if they are listening to music or not, as are the researchers, which leads to a possible Hawthorne effect. Another important limitation of each of these studies was the length. One study took data during one single dressing change, another for 3 total days,

and the other for a maximum time of 5 days. Additionally, these studies were limited to a minimum age of 18, although burns in pediatric age individuals are prevalent and equally as painful and traumatic. Another important limitation is the method of listening to music differed amongst the three studies, making it unclear if headphones or lack thereof has any influence on the effectiveness.

CONCLUSION

The evidence presented in these three studies supports the notion that music therapy does aid in decrease pain after wound care, but the evidence is not conclusive and warrants more research in this area. With that said, the findings in all three studies are encouraging that music therapy is in fact effective and will be proven effective with further research. Two of the three studies showed a statistically significant decrease in pain amongst those who received music intervention. The remaining study did in fact show a decrease in pain but was not statistically significant. The data was not entirely statistically significant and overwhelmingly supportive, but even so, these results show promise that music therapy will be proven effective with future research.

Future studies should focus on expanding the data into different populations, particularly pediatrics. There should also be focus placed on any difference between the delivery of the music. Specifically, whether or not headphones that could potentially drown out sounds from the procedure have any influence on pain reduction. Music therapy is relatively harmless, inexpensive, and readily available, and it is important to utilize it in the clinical setting if further research continues to support its effectiveness in pain reduction.

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