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## Research Article

### The Effect of Music Therapy on Sleep Quality of Hospitalized Older Adults in Telemetry Units

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#### Abstract

**Background:** Sleep deprivation is found in hospitalized older patients due to unfamiliar environments and hospital atmospheres. Although pharmacological agents are often used to induce sleep, the side effects for older adults are problematic. Music therapy has been found as promising results as a nonpharmacological alternative for sleep in intensive care and medical patients but not yet for hospitalized older adults in telemetry units.

**Objective:** This study aimed to test the effect of music therapy on sleep quality of hospitalized older adults in telemetry units. **Methods:** A quasi-experimental pretest-posttest design was used in this study. Ninety-five patients were randomly assigned into three groups; non-music (n=32), 30-minute music intervention (n= 33) and >30-minute music intervention (n=30). Measurement included the 15-item VSH Sleep Quality scale and vital signs. The VSH Sleep Quality Scale is composed of three dimensions: sleep disturbance, sleep effectiveness, and nap supplementation. The scores were reversed for negative dimensions. Independent t-test and ANOVA were used to analyze data and test the hypotheses.

**Results:** Results indicated: (1) the > 30-minute music intervention group had higher sleep quality compared to the pretest sleep quality score; (2) the 30-minute and the > 30-minute music intervention groups' posttest sleep quality scores were higher than the non-music group; (3) systolic blood pressure was the only physiologic parameter that differed among the groups; (4) systolic blood pressure of the non-music group increased at midnight and 4:00 am; (5) systolic blood pressure of the >30-minute music intervention group was lower at midnight and higher at 4:00 am.

**Conclusion:** The >30- minutes of music therapy was found to be the most effective method to promote sleep quality for hospitalized older adults. This study has a limitation due to the potential confounding effects of the environments on the outcomes.

**Keywords:** Hospitalized older adults; Music therapy; Sleep quality

#### Introduction and Literature Review

Sleep deprivation is one of the most common problems found in hospitalized patients especially older adults. Two earlier studies of hospitalized patients' sleep reported the signs of poor sleep quality and prevalence of the problem. Hospitalized patients

perceived sleep as poor quality and experienced difficulty falling asleep, sleep fragmentation, and decreased Rapid-Eye-Movement (REM) sleep [1,2]. Dines-Kalinowski [3] found that 56% of hospitalized patients had sleeping problems that started since the day of admission. Dobing, et al. [4] studied sleep quality and factors influencing self-reported sleep duration and quality in the general internal medicine in the patient population in Canada. The results revealed that the participants had poorer nighttime sleep

duration and sleep quality in the hospital than at home. The factors that influenced poor sleep in the hospital were noise, nursing interruptions, uncomfortable beds, bright lights, unfamiliar surroundings, and pain.

Adequate sleep is essential to promote the health and well-being of people. Normally, most health care providers rely on pharmacological agents to improve patients' sleep quality. However, some studies indicated that side effects from medication may cause daytime residual effects, tolerance, dependence, alter sleep stages and rebound insomnia [5,6]. Thus, using pharmacological agents may not be the best option to promote sleep, especially for older adults regarding their susceptibility to the side effects of the medicines. Therefore, the study regarding a non-pharmacological method should be explored to reduce sedative drug consumption for sleep.

A literature review revealed that music was one of the non-pharmacological methods that helped promoting positive sleep patterns and quality. Music therapy had been found to be an effective intervention for promoting physiological relaxation, anxiety reduction, improving mood and promoting sleep in critically ill patients [7-9]. In 2003, Johnson investigated the use of music for promoting sleep onset and maintenance and found that music was a media that helped increase time to sleep and reduced the number of nighttime awakenings in older adults [10]. Lai and Good [11] studied the effects of soft music on sleep quality in older community-dwelling men and women in Taiwan. The results revealed that music resulted in better sleep quality, components of sleep quality, perceived sleep quality, longer sleep duration, greater sleep efficiency, shorter sleep latency, less sleep disturbance, and daytime dysfunction in the experimental group. Moreover, Wongman [12] studied the effect of music therapy on sleep quality and physiologic parameter in patients with coronary artery disease in Intensive Care Unit (ICU). The findings revealed that listening to music for 30 minutes resulted in improving sleep quality and also decreasing heart rate and blood pressure of the patients in ICU.

In clinical practices, the music was used in diverse ways according to the preference of users. It was found to be turned on overnight for some patients and was also turned on only a few minutes to aid the patients' sleep. No criteria of how long the music should be turned on to help improving patients' sleep quality were located. The literature indicated that music had psychological and physiological effects and promoted sleep for critically ill patients. However, the literature regarding the music therapy to improve sleep quality for older adults hospitalized in telemetry units was not found. Therefore, this study aimed to test the effect of music therapy on sleep quality of older adults hospitalized in telemetry units. The results of this study would guide clinical practice of how to use the music to promote sleep quality for older patients hospitalized in the telemetry units.

**Research Question:** Does music therapy improve sleeping quality for older adults hospitalized in telemetry units?

**Hypothesis 1:** After receiving music therapy, older adults hospitalized in the telemetry units would have better sleeping quality than before receiving music therapy.

**Hypothesis 2:** Older adults hospitalized in the telemetry units who received music therapy would have better sleeping quality than older adults hospitalized in the telemetry units who did not receive music therapy.

**Hypothesis 3:** Sleep quality and Physiologic parameters would differ among the non-music intervention group, 30-minute-music intervention group, and over 30-minute-music intervention group.

## Methods

### Study Design

A quasi-experimental research design was used to test the effect of music therapy on sleep quality of older adults who hospitalized in the telemetry units.

### Research Sample

The convenience sample was selected from adults over age 65 admitted to two Telemetry Units of the Southern California non-profit Health Center. The estimated sample size for this study was 100 patients, with 33-34 patients assigned to each of the groups. Participants were recruited according to the following criteria:

### Inclusion Criteria

- Age  $\geq$  65 years
- Good consciousness and cooperation
- No hearing problems
- Able to understand, speak and read English
- Willing to participate in this study by completing the written informed-consent form

### Exclusion Criteria

- Hospitalized older adults who had hearing impairments and communication problems
- Hospitalized older adults who refused to complete the questionnaires
- Hospitalized older adults who had unstable conditions during the study

### Protection of Human Subjects

Prior to the study, the project proposal was approved by the Internal Review Board (IRB) of the Southern California non-profit Health Center. The process of informed consent was completed

prior to the data collection. The potential participants were informed about the study's details, assured of their confidentiality, and the freedom to discontinue the participation at any time throughout the process of the study. The participants who met the inclusion criteria and agreed to join the study were asked to sign a consent form.

## **Instruments**

This study used two instruments to obtain study data, a demographic questionnaire and sleeping quality questionnaire.

**Sleeping Quality Questionnaire:** Verran-Snyder-Halpern (VSH) Sleep Scale was used to measure sleeping quality. The VSH Sleep Scale was a visual analogue scale developed by Snyder-Halpern and Verran in 1987 with 15 items, each with a response line 0-100 mm long. The 15 items were divided into three dimensions: sleep disturbance (7 items), sleep effectiveness (4 items), and nap supplementation (4 items). In the original studies, the scores on sleep disturbance ranged from 0 to 700 mm, while sleep effectiveness and nap supplementation subscales ranged from 0 to 400. The scores were calculated separately for each subscale with a higher score of negative dimensions indicated a high level of sleep disturbance and nap supplementation. The higher score of positive dimension indicated great sleep effectiveness. Disturbance questions included the following characteristics: 1) Mid-sleep awakening, 2) wake after sleep onset, 3) movement during sleep, 4) soundness of sleep, 5) quality of disturbance, 6) sleep latency and 7) quality of latency. Effectiveness questions include the following characteristics: 1) rest upon awakening, 2) subjective quality of sleep, 3) sleep sufficiency evaluation, and 4) total sleep time. Supplementation questions include the following characteristics: 1) daytime sleep, 2) morning sleep, 3) afternoon sleep and 4) wake after final arousal. The internal consistency reliability Chronbach's theta coefficient for the VSH was .82 [13]. Prior studies obtained a Chronbach's alpha of .82 [14], .72, and .77 [12]. The total VSH alpha coefficient for this study was .86.

**Demographic Questionnaire:** The following demographic data was gathered from a chart review: age, gender, weight, height, body mass index, marital status, health history, and hospitalization history. Moreover, a documented history regarding sleeping patterns, including Obstructive Sleep Apnea (OSA), insomnia, sleep movement disorders, or chronic sleep aid use were interviewed by the patients.

## **Data Collection Methods**

One hundred patients  $\geq$  age 65 who hospitalized in the telemetry units and volunteered for the study were randomly assigned to three groups: 1) no music therapy before bedtime; 2) 30 minutes of music therapy; or 3) over 30 minutes of music therapy.

**Interventions:** Music therapy was delivered through a specific Light Music Channel on the television at each patient's bedside. The channel provided continuous light music with approximately about 3-4 minutes for each song. The study physiologic measures were assessed at 8 pm, at midnight and again at 4 am. If the patient was assigned to receive music therapy, the Music Channel would be turned on after the physiologic measures and turned off after the designated time for their study intervention groups which were 30 minutes and over 30 minutes. For over 30-minute group, the participants listened to the music all night long until waking up in the morning. All participants completed the 15-item VSH Sleep Quality survey the first day they were enrolled in the study and the next morning at 06:00 am.

## **Data Analysis**

Data were analyzed through use of descriptive statistics. ANOVA and independent t-test were used to test hypotheses. The significance level was set at  $\alpha = .05$ .

## **Results**

One hundred subjects were approached from two telemetry units. Five subjects were excluded from the study due to failure to complete the questionnaires. Thus, a total of subjects in this study were 95 persons including 48 persons from one unit, and 47 persons from another unit. The subjects were randomly assigned into 3 groups; non-music group ( $n=32$ ), 30-minute music intervention group ( $n= 33$ ) and over 30 minutes of music intervention group ( $n=30$ ). The subjects in this study were older adults who admitted in the telemetry units; age ranged from 65 to 97 with mean age equaled 78.20. Most of the subjects were female (51.6%,  $n = 49$ ). Their BMI varied from 13 to 70  $\text{kg}/\text{m}^2$  (Mean = 27.47). Sleeping time was between 0 to 12 hours; nap time varied from 0-3 hours. Most of the subjects did not use sleeping pills (83.2%,  $n = 79$ ) and had no experience of sleep apnea (85.3%,  $n = 81$ ). The majority of subjects had diagnosis of cardiovascular disease (31.6%,  $n = 30$ ), pulmonary diseases (21.1%,  $n = 20$ ), and neurological disorders (20%,  $n = 19$ ).

## **Hypothesis Testing**

**Hypothesis 1:** After receiving music therapy, older adults hospitalized in the telemetry units would have better sleeping quality than before receiving the music therapy. The findings revealed that after listening to the music, the over 30 minutes of music intervention group had statistically significant mean scores of total sleep quality higher than before receiving the music therapy ( $t = -3.504$ ,  $p < .05$ ).

**Hypothesis 2:** Older adults hospitalized in the telemetry units who received music therapy would have better sleeping quality than older adults hospitalized in the telemetry units who did not receive music therapy. The findings revealed that there was a statistically

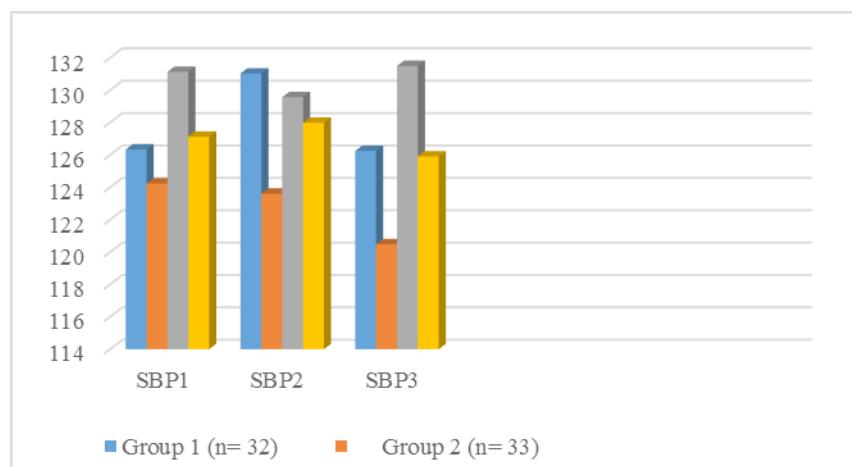
significant difference of mean scores in sleep quality among the three groups: non-music, 30-minute music intervention and over 30 minutes of music intervention group at post-test ( $F=3.503$ ,  $p<.05$ ). The 30-minute music intervention and the over 30 minutes of music intervention group had significant higher mean scores of total sleep quality than the no-music group at post-test ( $p<.05$ ).

**Hypothesis 3:** Sleeping quality and physiologic parameters would differ among the non-music intervention group, 30-minute-music intervention group, and longer than 30-minute-music intervention group. The findings revealed that after listening to the music, there were statistically significant differences in sleep quality among the non-music intervention group, 30-minute-music intervention group, and over 30-minute-music intervention group ( $p<.05$ ). Systolic blood pressure was only one physiologic parameter that had a significant difference among non-music group, 30-minute-music intervention group and the over 30 minutes of music intervention group ( $F=3.694$ ,  $P<.05$ ). Systolic blood pressure of non- music group was slightly increased at midnight and slightly increased at 4:00 am. The 30-minute-music intervention group had a slightly non-significant decrease of systolic blood pressure. Whereas, the over 30 minutes of music intervention group had a significant lower systolic blood pressure at midnight and higher at 4:00 am ( $p<.05$ ) (Table 1 and Figure 1).

Variables	Time		Group 1(n= 32)	Group 1(n= 33)	Group 1(n= 34)	Total (n=95)
Resp.	1	Mean	18	18.24	18.27	18.17
		SD	1.43	1.25	1.2	1.3
	2	Mean	18	18.27	18.13	18.14
		SD	1.19	1.32	1.27	1.26
	3	Mean	18	18.3	18.3	18.23
		SD	1.14	1.33	1.33	1.19
Temp (F)	1	Mean	97.62	97.74	97.89	97.75
		SD	0.69	0.67	0.65	0.67
	2	Mean	97.65	97.53	97.55	97.58
		SD	0.89	0.77	0.61	0.77
	3	Mean	97.68	97.46	97.5	97.55
		SD	0.59	0.73	0.72	0.69
Pulse	1	Mean	76.56	79.94	73.97	76.92
		SD	18.73	11.85	15	15.46
	2	Mean	76.03	76.7	72.37	75.11
		SD	18.79	14.29	12.72	15.48
	3	Mean	75.53	76.15	71.1	74.35
		SD	14.62	14.53	12.69	14.04
SBP	1	Mean	126.34	124.24	131.13	127.13
		SD	15.09	16.88	19.45	17.23
	2	Mean	131.03	123.61	129.57	127.99
		SD	19.36	18.41	19.04	19.01
	3	Mean	126.25	120.48	131.5	125.91
		SD	15.47	15.53	17.29	16.54

DBP	1	Mean	67.25	66.61	66.2	66.69
		SD	9.54	10.84	8.48	9.61
	2	Mean	64.84	65.97	67.23	65.99
		SD	9.19	9.47	9.5	9.34
	3	Mean	65.59	66.06	68.9	67.14
		SD	7.91	10.35	7.53	8.72

**Table 1:** Descriptive Statistics for physiologic parameters and Its Indicators (n = 95).



**Figure 1:** Graph shows the differences of Systolic Blood Pressure at 08:00 pm (SBP1), midnight (SBP2) and 04:00 am (SBP3) among three groups.

## Discussion

The findings revealed that music therapy improved the sleep quality of older adults hospitalized in the telemetry units. The comparison among three groups indicated that the 30-minute music intervention and the over 30 minutes of music intervention group had significant higher mean scores of total sleep quality than the no-music group at post-test. This results confirmed the positive effect of the music on sleep quality of hospitalized older adults. Moreover, when compare the pre and post-test it was found that over 30 minutes of the music intervention group had a better sleep quality than before receiving music therapy. This result was congruence with the study of Wongman [12] who found that music improved the sleep quality of the patients in Intensive Care Unit (ICU). Although, this study found that over 30 minutes of music therapy had the best results in improving sleep quality while Wongman [12] had only one experimental group with the 30 minutes of music therapy.

For physiologic parameter, the pulse rate of all three groups slightly decreased, however, it was no statistical significant in this study. The previous study of Wongman [12] found a significant

decreasing in the heart rate of the patients after listening to the music in ICU. Systolic blood pressures of all participants were elevated at 4:00 AM which was congruent with the previous study of Morris, et al. [15] found the systolic blood pressure peaked at 4:00 am in healthy men with bed rest conditions. In conclusion, this study showed that music promoted sleep quality and it was found to be more effective when providing music to older patients over 30 minutes. The music seemed to help reducing systolic blood pressure in these older patients in telemetry units. However, this study had a limitation due to the potential confounding effects of the hospital environments on the outcomes because noise and the interruption of nursing care might interfere the sleep quality.

## Implication of the Findings

The results of this study guided the clinical practice regarding the music therapy to promote sleep quality for older patients hospitalized in telemetry units with the double bed condition. The over 30 minutes of music therapy was found to be the most effective method to promote sleep quality for this group of population. Also, the physiologic parameters seemed to be better when provided music to this population.

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