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Critical review

Music Therapy

Music interventions during end-of-life care

C L Nightingale[1*], N M Cranley[1], E L Kacel[1], S S Wong[1], D B Pereira[1], G Carnaby[1]

Abstract

Introduction

Music interventions have been identified as a burgeoning area of integrative medicine services to promote quality of life and reduce suffering. The purpose of this review is to explore the impact of music interventions on quality of life and its reported physiological and clinical outcomes in patients and informal caregivers during end-of-life care.

Materials and methods

A literature search was conducted for eligible studies that (a) tested a music intervention, (b) focused on terminally ill patients receiving end-of-life care or informal caregivers of terminally ill patients, (c) measured quality of life or some aspect of quality of life (i.e. psychological, physical, social, spiritual) or a physiological or clinical outcome, (d) were accessible in full text, (e) peer reviewed, (f) used a quantitative design, and (g) were published in English from years 2000 – 2014. Data were abstracted from studies that met these eligibility criteria.

Results

Studies (N = 7) demonstrated heterogeneity across study design, patient diagnosis, intervention characteristics, and outcomes assessed. Studies noted a positive effect of music interventions from pre-intervention to post-intervention or when comparing the intervention and control groups in pain, anxiety, fatigue, tiredness and drowsiness, mood, and overall quality of life.

Conclusion

Our findings suggest a positive effect of music interventions on various aspects of quality of life during end-of-life care. Given the paucity of music intervention studies during end-of-life care, more research is needed in this population to confirm its value in supporting quality of life for this unique group. In addition, more research should explore the positive benefit on informal caregivers of terminally ill patients.

*Corresponding author
Email: Chandylen@gmail.com

[1] University of Florida, Gainesville, USA

Introduction

End-of-life care refers to the care of patients with a terminal illness that has become advanced, progressive, and incurable. Due to significant distress and poor quality of life in patients during end-of-life care[1,2], medical testing and treatment often stop, and supportive care services, such as palliative care, are implemented to support overall quality of life and reduce physical and psychosocial suffering[3,4]. Healthcare costs during the last year of life account for approximately 27%, or $88 billion, of the total US healthcare budget[5,6].

Consequently, an ongoing challenge in palliative care is identifying cost-effective, supportive care services that can translate into practical applications for end-of-life services. As such, the integration of music activities in palliative care is a burgeoning area of research that may provide a clinically and cost effective complement to existing supportive services at end-of-life. Substantial literature has shown that music in general can be therapeutic for patients undergoing end-of-life care[7]. Specifically, music has been found to reduce emotional and physiological pain[8], induce relaxation[9], provide spiritual support[10], and increase distress tolerance[11], feelings of belongingness, closeness, and acceptance[12].

Implementation strategies for musical interventions vary within the medical field. For example, certified music therapists may facilitate interventions by tailoring approaches based on each client's therapeutic and clinical needs. In contrast, some music-based interventions offer a less tailored approach and may be implemented by a clinical researcher, medical or healthcare personnel. Likewise, studies evaluating each approach have demonstrated mixed findings.

Several authors have synthesized the music intervention literature in an attempt to draw broader conclusions regarding its efficacy. For example, Nightingale et al.[13] conducted a meta-analysis and systematic review on the impact of music interventions on anxiety among adult cancer patients. Although the narrative review indicated there was a positive effect on anxiety, the associated meta-analytic analyses did not corroborate this finding. Similarly, Archie et al.[14] reviewed music interventions in palliative cancer care and reported that these interventions may have a positive effect on a variety of psychosocial and physical outcomes.

Bradt and Dileo[15] conducted a review on music therapy during end-of-life care and found a lack of evidence in the mitigation of pain or anxiety. However, the review excluded studies that did not utilize a therapeutic approach facilitated by a trained music therapist. In addition, the review was also limited to randomized controlled trials, only[15]. In this paper, the aim is to review the impact of all music interventions independent on study design on quality of life and physiological and clinical outcomes in patients and informal caregivers during end-of-life care.

Materials and methods

Articles were searched using PubMed, PsycINFO, Web of Science, and CINAHL. Keywords included "music therapy", "music intervention", "end-of-life", "palliative", and "hospice." Articles meeting the following inclusion criteria were selected: (a) tested a music intervention, (b) focused on terminal

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patients receiving end-of-life care or informal caregivers of these patients, (c) measured quality of life or some aspect of quality of life (i.e. psychological, physical, social, spiritual) or a physiological or clinical outcome (d) were accessible in full text. The following criteria were used to exclude studies: (a) not peer reviewed (b) used a qualitative design, (c) not published in English, and (d) published prior to the year 2000. Studies published prior to 2000 were excluded in an effort to provide the most current state of evidence for the impact of music interventions on physiological, clinical, and patient-reported outcomes.

Data were systematically abstracted from all articles by two authors (CN) (NC) using an evidence table. Data recorded included authors and publication year, sample size, participant type (i.e., patient or caregiver), and participant characteristics such as age, diagnosis and medical treatment type. Study details were also recorded such as design, the intervention and control activities, intervention facilitator, intervention duration and frequency, outcome(s) assessed and study results.

Results

A total of 7 studies met eligibility criteria and were included in this review. Reasons for not meeting eligibility criteria varied, although the most commonly noted reason included having a broad focus on palliative care patients in general, and not necessarily end-of-life patients, specifically.

Characteristics of Study Samples

Studies were conducted between 2001 and 2013. Sample sizes ranged from 10 to 200. Six studies focused on patients[16,17,18,19,20,21], although two of these studies[19,20,21] allowed family members to participate in the intervention activities. One study focused solely on caregivers[22]. Age was not reported in a consistent fashion across studies; however, for studies that reported mean age[16,18,20,21], values ranged from 56 - 76 years of age. Participants were heterogeneous across studies with respect to diagnoses that qualified them for end-of-life care. However, of the four studies that reported diagnosis, patients with cancer were included in each sample[16,17,18,19]. See table 1 for characteristics of study samples.

Study Design

Three studies reported a randomized controlled trial design (see Table 2)[16,17,18]. Three additional studies used a pretest-posttest design[19,20,22]. Although two of these studies did not state their study design[19,20], their design was determined during the data abstraction process for this review. Of these pretest-posttest design studies, only one included a control group[22]. The remaining study utilized an ABAB design, which used participants as their own controls[21].

Intervention Facilitator

Interventions varied in regards to the use of a facilitator. A music therapist facilitated the majority of the interventions administered[16,17,18,19]. Wlodarcyzk[21] reported that the study researcher facilitated the music intervention in their study. One study did not report the intervention facilitator[22]. The facilitator for the remaining study was not clearly described, although the authors, reported that three therapists and two nurses were "present" during intervention delivery[20] (p.164).

Intervention Activities

A variety of different activities were utilized as study interventions. The majority of the studies tailored intervention activities to participants' preferences and needs[17,18,19,21]. Only one study included multiple intervention conditions[22]. The level of subject participation in music activities ranged both within and across studies. For example, one of the conditions in Choi's[22] study included music listening, only. In contrast, several studies incorporated more active music participation such as writing songs, singing, playing instruments, song discussion and lyric analysis[17,18,19,20,21].

Some studies supplemented activities using non-musical techniques. One of the conditions in Choi's[22] study included progressive muscle relaxation in addition to music listening. Similarly, other studies included relaxation and imagery/visualization techniques[16,18,19]. In some cases, music was combined with additional activities such as counseling[17,18], reminiscence or life review[17,18,21], planning funerals or memorial services[17], dedicating song gifts[17,21], and music for prayer or worship[21].

Control Group Activities

Control group activities included sitting in silence[22], relaxation[16], routine or standard care[17], conversation and/or emotional support[18], and conversation only[21]. Interestingly, Horne-Thompson and Grocke[18] reported that control group participants received music therapy services outside of their study. Lastly, two studies did not include a control group[19,20].

Outcomes Assessed

All studies assessed outcomes that pertained to various domains of quality of life. In addition, Nakayama et al.[20] assessed cortisol, Horne-Thompson and Grocke[18] assessed heart rate, and Hilliard[17] assessed length of life during hospice care. Psychological constructs included anxiety[18,22], depression[18], and mood[20]. Physical outcomes included; fatigue[22], drowsiness, tiredness[18], aspects of pain[16,18,19], nausea, appetite, shortness of breath[18], physical status relative to palliative care[17], physical comfort and relaxation[19]. Two studies measured quality of life as a broad construct[17,22], and one study also assessed it by domain (i.e., functional, psychophysiological, and social/spiritual)[17]. Only one study assessed "well-being" as an outcome[18].

Study Findings

The majority of studies reported a significant improvement in outcomes from pre-intervention to post-intervention[16,17,18,19,20,22].

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Table 1: Study Demographics

Author (year)	Sample size	Patients/ Caregivers	Age	Diagnosis	Medical Treatment type
Choi[22]	N = 32	Caregivers (spouse = 20; adult child = 12)	45-54 (n = 1); 55-64 (n = 5); 65-74 (n = 14); 75-84 (% = 4); 85-94 (% = 8)	Patient diagnosis not reported	Patients were receiving hospice care
Gutgsell et al.[16]	N = 200 (intervention group n = 100; control group n = 100)	Patients	Overall mean = 56.09, SD = 15.08; Intervention group mean = 57.45, SD = 14.76	Cancer, Non-cancer	Not provided
Hilliard[17]	N = 80 (intervention group n = 40; control group n = 40)	Patients	Participants were evenly divided in each intervention group by age category (under 65 or over 65)	Terminal cancer	Residential hospice care
Horne-Thompson & Grocke[18]	N = 25 (intervention group n = 13; control group n = 12)	Patients	Overall mean = 73.9; Intervention mean = 76.2; Control mean = 71.4	Cancer, end-stage organ failure	Not reported
Krout[19]	N = 80	Patients & family members	Range = 38-97	Cancer, renal failure, encephalopathy, dementia, AIDS, coronary obstructive pulmonary disease, cardiovascular accidents, congestive heart failure, and others.	Not reported
Nakayama, Kikuta, & Takeda[20]	N = 10	Patients	Mean = 73.10	Not reported	Not reported
Wlodarczyk[21]	N = 10	Patients & family members	Mean = 67.6	Cancer, renal failure, AIDS, amyotrophic lateral sclerosis, cardiomyopathy, congestive heart failure	Not reported

Among these studies, significant improvements were noted in anxiety[22], fatigue[22], tiredness and drowsiness[18], pain[18], pain intensity[16], pain control[19], mood-related "refreshment"[20], and overall quality of life[17,22]. Interestingly, anxiety, fatigue, quality of life[22], and pain intensity[16] significantly improved in control conditions as well. Additional findings included a significant reduction in cortisol output from pre-intervention to post-intervention for 60% of participants in Nakayama et al.'s[20] study and a positive trend toward optimal spiritual well-being during music days for participants in Wlodarczyk's[21] study.

When focusing specifically on the five studies that compared a music intervention group with a control group[16,17,18,21,22] the studies utilizing an RCT design (n = 3) noted at least one significantly better outcome in the intervention group[16,17,18]. Specifically, Gutgsell et al.[16] noted a significantly greater reduction in pain intensity for

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participants in the music intervention group compared to control group participants. In addition, music intervention participants demonstrated significantly decreased functional pain scores whereas the control group did not[16]. Hilliard[17] reported significantly higher quality of life scores for music intervention participants in comparison to control group participants. Lastly, Horne-Thompson and Grocke[18] found significantly less anxiety in the music intervention group in comparison to the control group. Moreover, authors reported a significant decrease in pain, tiredness, and drowsiness for music intervention participants only[18].

Among the two studies that did not utilize a control group, significant improvements in scores were noted in at least one outcome from pretest to posttest scores[19,20]. Krout[19] reported a significant increase in pain control, physical comfort, and relaxation. In addition, Nakayama et al.[20] reported a significant increase in "refreshment" from pre-test to post-test scores.

Discussion

The authors have referenced some of their own studies in this review. These referenced studies have been conducted in accordance with the Declaration of Helsinki (1964) and the protocols of these studies have been approved by the relevant ethics committees related to the institution in which they were performed. All human subjects, in these referenced studies, gave informed consent to participate in these studies.

Both terminally ill patients and their caregivers are affected by the nature of care received during end-of-life[1]. Confronting a life threatening illness as a patient or caregiver imposes a complex mix of psychological, spiritual, and physical challenges, which may not be fully addressed by conventional standards of care[23].

Findings from this review indicate that research into the impact of music therapy has suggested that simple, cost-effective practices with few side effects may have an important impact on reducing physical and psychosocial distress in patients and caregivers in palliative care settings. In this regard, several studies have found that music interventions can improve quality of life and reduce symptoms such as pain and anxiety, which may be especially salient for patients in the advanced stages of disease.

This review has evaluated the impact of all types of music interventions during end-of-life care on quality of life and physiological and clinical outcomes. The studies included in this review highlight the diverse ways in which music therapy has been investigated in terminally ill populations. The included studies, while all demonstrating significant outcomes, were highly heterogeneous, creating challenges for clinicians and researchers attempting to synthesize conclusions about the effectiveness of music therapy. The designs used ranged across studies (e.g., RCT's, pre-test-post-test). In addition, there are also great differences in the type of interventionist who facilitated the music therapy.

Typically, a music therapist was responsible for conducting the intervention, but some studies employed their own researchers as well as other types of therapists and nurses. For those studies that focused on music therapists, future research might include descriptions of participating therapist training or special certifications for working with medical and/or palliative care patients. This would be beneficial to determine if characteristics of the interventionist might play a role in the outcome of the intervention. Another variable, which differed across the studies included in this review, was the actual content of the intervention.

Although some studies included detailed descriptions of the procedures used in their respective interventions, many studies tailored the interventions to the preferences and needs of individual patients. Additionally, the range of outcomes explored in the included studies was vast. Some studies focused on physiological outcomes such as heart rate and length of life while others focused on psychosocial outcomes such as anxiety and mood. While the diverse design and implementation of these music interventions reduces comparisons between studies, it does create a rapidly growing and rich research base for continued explorations of music therapy applications. Future research that compares different protocols and facilitator types may clarify the mechanisms by which music therapy may help to reduce physical and psychosocial burden in dying patients and their caregivers.

The diversity of participants, both within and between studies, hinder the ability to compare effects of music interventions for specific populations. While the included studies highlight the experiences of cancer patients, studies in this review also included individuals with other advanced conditions (e.g., AIDS, congestive heart failure).

Unfortunately, the studies typically did not evaluate the effects of the interventions according to disease type or cancer type. Furthermore, many of these studies did not explore if the different types of treatments or symptoms experienced by patients with different diseases resulted in different levels of receptiveness or effectiveness of music therapies. Similarly, the studies included in this review had a limited age range of age 56 to 76.

As with disease type, perhaps the impact of music interventions is affected by participants' age. Thus, future research should further explore the way patients of diverse ages respond to music interventions. Moreover, only one study evaluated the impact of music therapy on informal caregivers, which prevented comparative analyses of the efficacy of music interventions applied to patients versus caregivers.

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Table 2: Study Details and Results

Author (year)	Study Design	Intervention Activity	Control Activity	Outcomes	Results
Choi[22]	Pretest-posttest	Intervention included three different groups: music listening only, progressive muscle relaxation only, and music combined with progressive muscle relaxation. Participants listed to "Awakening" by Steven Halpern via a portable compact disc player for the music portion. The intervention facilitator was not stated. Intervention included two 30 min sessions per week for 2 weeks (4 sessions total).	Sit in silence	Anxiety, fatigue, QOL	● Significantly decreased anxiety and fatigue and increased QOL in all conditions across the four treatment sessions. ● No significant differences between conditions. ● QOL mean score differences were the greatest from pretest to posttest in the control group, followed by PMR, music + PMR, and the music group
Gutgsell et al.[16]	RCT	Intervention was facilitated by a music therapist. A standard protocol was used for all participants which began with adjusting lights, providing a blanket, assessing comfort level, then introducing optional ocean drum tone. Session starts with verbal instructions for autogenic relaxation, awareness of breath, progressive muscle relaxation, and visualization of a "safe place." Several musical pieces were played. At the conclusion of the music, the therapist invited the participant to re-enter the room. The therapist then left the room to allow for post-intervention pain assessment, then returned to discuss the session, offer follow-up, and provide a CD version of the intervention. Intervention included one 20 min session.	Music therapist assessed comfort, adjusted lights, and provided blanket. Participant was told to relax (without specific instructions that were key to the intervention). The therapist then left the room for 20 minutes.	Pain intensity, behavioral observation of patient's pain, functional pain	● Significantly decreased pain intensity from pre- to post-intervention in both groups, significantly greater decreased pain intensity in intervention group. ● Significantly decreased pain behavioral observation score in both groups but not significantly greater in intervention group. ● Significantly decreased functional pain scores in intervention group, but not control group.

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Hilliard[17]	RCT	Intervention was facilitated by a music therapist (certified or intern). Interventions were designed to meet individual participant needs. Most interventions included one or more of the following music activities: song choice, music-prompted reminiscence, singing, live music listening, lyric analysis, instrument playing, song parody, singing with accompaniment using the iso-principle, planning of funerals or memorial services, song gifts, and music-assisted supportive counseling. Music was selected based on participant preference. Intervention included 2-13 sessions, depending on time of participant death.	Routine hospice care	QOL including three subscales: functional, psychophysiological, and social/spiritual. Physical status relative to palliative care, length of life during hospice care	● Intervention group had significantly higher QOL scores after the first session and in comparison to the control group. ● QOL significantly decreased across the first and second session in the control group. ● No significant differences between groups for well-being and social/spiritual well-being. ● No significant differences between groups in length of life; however, persons lived an average of 12 days longer in experimental group
Horne-Thompson & Grocke[18]	RCT	Intervention was facilitated by a music therapist. Intervention varied at the discretion of the participant and music therapist. Options included playing live familiar music, singing, music and relaxation, music and imagery, improvisation, music-assisted counseling, reminiscence, and listening to recorded music. Intervention included a single session, 20 - 40 minutes, depending on the clinical state of the participant.	Volunteer sat with participant on one occasion and engaged in conversation and/or provided emotional support (patients assigned to control continued to receive music therapy services outside of the study)	Pain, tiredness, nausea, depression, drowsiness, appetite, well-being, shortness of breath, anxiety, HR	● Intervention group had significantly less anxiety than the control group. ● No significant difference in decreased heart rate between groups. ● Intervention group demonstrated significant decrease in pain, tiredness, and drowsiness.
Krout[19]	Pretest-posttest	Intervention was facilitated by a music therapist. Intervention was individualized to each participant and included song choice, singing, song discussion, songwriting, and relaxation and imagery techniques. Intervention included one session.	NA	Pain control, physical comfort and relaxation	● Significant increase in participant pain control, physical comfort and relaxation

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Nakayama et al.[20]	Pretest-posttest	Intervention consisted of a group live session with conversation. In addition to singing, musical instruments included piano, flute, maracas, and touch-bells were utilized. Authors stated three therapists and two nurses were "present" at the intervention. Intervention included a weekly music session for 40 min.	NA	Mood (measured with: (1) alertness/ excitement; (2) refreshment; (3) fatigue; (4) depression; (5) anxiety); cortisol	● Cortisol significantly decreased for 6 out of 10 participants ● Significant differences for "refreshment" in pre versus post music intervention
Wlodarczyk [21]	ABAB	Intervention was facilitated by the study researcher. The study researcher played the guitar and sang the participant's preferred music from a printed song book. Participants were led in music-making which included singing and improvising on a variety of percussion instruments. Intervention also included using music as a life review stimulus, sing-a-longs with family and friends, music for prayer or worship, and participants (including family members) dedicating "gift songs" to each other in memory of a loved one. Intervention included 4 visits within a week, approximately 30 minutes each.	A visit in which the researcher greeted the patient, talked about how the patient was feeling, and engaged in conversation about patient preferred topics.	Spirituality	● Participants' scores on spiritual well-being had a positive trend on music days versus non-music days

Note. QOL = quality of life; PMR = progressive muscle relaxation; HR = heart rate

Lastly, in this review studies were not excluded on the basis of methodological rigor nor were quality ratings utilized for included studies. However, future studies should aim to consider the quality of the evidence in music intervention during end-of-life care using a systematic review and meta-analytic approaches once the corpus of studies increases.

Conclusion

A growing body of evidence supports the usage of alternative medicine treatments, which address terminally ill patient and caregiver needs from a holistic perspective. Music therapy interventions are one type of intervention that presents increasing evidence for its effectiveness in physiological, psychological, and physical domains, and has the potential to impact countless lives each year touched by life-limiting diseases. The findings of this review suggest a positive effect of music interventions on pain, anxiety, fatigue, tiredness and drowsiness, mood and overall quality of life. As this area of research continues to mature, it will be beneficial to make comparisons among the different types of music interventions to ascertain the most effective approach for terminally ill patients.

References

1. Wright AA, Zhang B, Ray A, Mack JW, Trice E, Balboni T, et al. Associations between end-of-life discussions, patient mental health, medical care near death, and caregiver bereavement adjustment. JAMA. 2008;300(14):1665-73.
2. Wright AA, Keating NL, Balboni TA, Matulonis UA, Block SD, Prigerson HG. Place of death: correlations with quality of life of patients with cancer and predictors of bereaved caregivers'

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All authors abide by the Association for Medical Ethics (AME) ethical rules of disclosure.

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mental health. J Clin Oncol. 2010;28(29):4457-64.
3. Gaertner J, Weingärtner V, Wolf J, Voltz R. Early palliative care for patients with advanced cancer: how to make it work? Curr Opin Oncol. 2013;25(4):342-52.
4. Ramchandran K, Von Roenn JH. Palliative care always. Oncology (Williston Park). 2013;27(1):13-6, 27-30, 2-4 passim.
5. Hogan C, Lunney J, Gabel J, Lynn J. Medicare beneficiaries' costs of care in the last year of life. Health Aff (Millwood). 2001;20(4):188-95.
6. Hoover DR, Crystal S, Kumar R, Sambamoorthi U, Cantor JC. Medical expenditures during the last year of life: findings from the 1992-1996 Medicare current beneficiary survey. Health Serv Res. 2002;37(6):1625-42.
7. Black BP, Penrose-Thompson P. Music as a therapeutic resource in end-of-life care. Journal of Hospice and Palliative Nursing. 2012;14(2):118-25.
8. Hart J. Music therapy for children and adults with cancer. Alternative and Complementary Therapies. 2009;15(2):221-5.
9. Nicholson K. Weaving a circle: A relaxation program using imagery and music. Journal of Palliative Care. 2001;17(3):173-6.
10. Magill L. Enhancing spirituality at the end of life. In: Dileo C, Loewy J, eds, editors. Music Therapy at the End of Life. Cherry Hills, NJ: Jeffrey Books; 2005. p. 2-18.
11. Brown S, Martinez M, Parsons L. Passive music listening spontaneously engages limbic and paralimbic system. NeuroReport. 2004;15(13):2033-7.
12. Magill L. The meaning of the music: The role of music in palliative care music therapy as perceived by bereaved caregivers of advanced cancer patients. American Journal of Hospice and Palliative Medicine. 2009;26(1):33-9.
13. Nightingale CL, Rodriguez C, Carnaby G. The impact of music interventions on anxiety for adult cancer patients: a meta-analysis and systematic review. Integr Cancer Ther. 2013;12(5):393-403.
14. Archie P, Bruera E, Cohen L. Music-based interventions in palliative cancer care: a review of quantitative studies and neurobiological literature. Support Care Cancer. 2013;21(9):2609-24.
15. Bradt J, Dileo C, Grocke D, Magill L. Music interventions for improving psychological and physical outcomes in cancer patients. Cochrane Database Syst Rev. 2011(8):CD006911.
16. Gutgsell KJ, Schluchter M, Margevicius S, DeGolia PA, McLaughlin B, Harris M, et al. Music therapy reduces pain in palliative care patients: a randomized controlled trial. J Pain Symptom Manage. 2013;45(5):822-31.
17. Hilliard RE. The effects of music therapy on the quality and length of life of people diagnosed with terminal cancer. J Music Ther. 2003;40(2):113-37.
18. Horne-Thompson A, Grocke D. The effect of music therapy on anxiety in patients who are terminally ill. J Palliat Med. 2008;11(4):582-90.
19. Krout RE. The effects of single-session music therapy interventions on the observed and self-reported levels of pain control, physical comfort, and relaxation of hospice patients. Am J Hosp Palliat Care. 2001;18(6):383-90.
20. Nakayama H, Kikuta F, Takeda H. A pilot study on effectiveness of music therapy in hospice in Japan. Journal of Music Therapy. 2009;XLVI(2):160-72.
21. Wlodarczyk N. The effect of music therapy on the spirituality of persons in an in-patient hospice unit as measured by self-report. J Music Ther. 2007;44(2):113-22.
22. Choi YK. The effect of music and progressive muscle relaxation on anxiety, fatigue, and quality of life in family caregivers of hospice patients. J Music Ther. 2010;47(1):53-69.
23. Pan CX, Morrison S, Ness J, Fugh-Berman A, Leipzig RM. Complementary and alternative medicine in the management of pain, dyspnea, and nausea and vomiting near the end of life: A systematic review. Journal of Pain and Symptom Management. 2000;20(5):374-87.

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