# Music therapy for end-of-life care

## Review information

### Authors

Joke Bradt[1], Cheryl Dileo[2]

[1]The Arts and Quality of Life Research Center, Boyer College of Music and Dance, Temple University, Philadelphia, USA

[2]Department of Music Therapy and The Arts and Quality of Life Research Center, Boyer College of Music and Dance, Temple University, Philadelphia, USA

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### Contact person

***Joke Bradt***

The Arts and Quality of Life Research Center
Boyer College of Music and Dance, Temple University
Presser Hall, 2001 North 13 Street
Philadelphia USA

E-mail: jbradt@temple.edu

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## Abstract

### Background

Music therapy in end-of-life care aims to improve a person's quality of life by helping relieve symptoms, addressing psychological needs, offering support, facilitating communication, and meeting spiritual needs. In

addition, music therapists assist family and caregivers with coping, communication, and grief/bereavement.

## Objectives

To examine effects of music therapy with standard care versus standard care alone or standard care combined with other therapies on psychological, physiological, and social responses in end-of-life care.

## Search methods

We searched CENTRAL, MEDLINE, CINAHL, EMBASE, PSYCINFO, LILACS, CancerLit, Science Citation Index, www.musictherapyworld.de, CAIRSS for Music, Proquest Digital Dissertations, ClinicalTrials.gov, Current Controlled Trials, and the National Research Register to September 2009. We handsearched music therapy journals and reference lists, and contacted experts to identify unpublished manuscripts. There was no language restriction.

## Selection criteria

We included all randomized and quasi-randomized controlled trials that compared music interventions and standard care with standard care alone or combined with other therapies in any care setting with a diagnosis of advanced life-limiting illness being treated with palliative intent and with a life expectancy of less than two years.

## Data collection and analysis

Data were extracted, and methodological quality was assessed, independently by review authors. Additional information was sought from study authors when necessary. Results are presented using weighted mean differences for outcomes measured by the same scale and standardized mean differences for outcomes measured by different scales. Posttest scores were used. In cases of statistically significant baseline difference, we used change scores.

## Results

Five studies (175 participants) were included. There is insufficient evidence of high quality to support the effect of music therapy on quality of life of people in end-of-life care. Given the limited number of studies and small sample sizes, more research is needed.

No strong evidence was found for the effect of music therapy on pain or anxiety.These results were based on two small studies. There were insufficient data to examine the effect of music therapy on other physical, psychological, or social outcomes.

## Authors' conclusions

A limited number of studies suggest there may be a benefit of music therapy on the quality of life of people in end-of-life care. However, the results stem from studies with a high risk of bias. More research is needed.

# Plain language summary

### Music therapy for end-of-life care

Music therapy is increasingly used in end-of-life care, with a growing number of music therapists being employed in hospices and hospital-based palliative care programs each year. Music therapy in end-of-life care aims to improve a person's quality of life by helping relieve symptoms, addressing psychological needs, offering support and comfort, facilitating communication, and meeting spiritual needs. In addition, music therapists assist family and caregivers with coping, communication, and grief/bereavement. Music therapy requires the implementation of a music intervention by a trained music therapist, the presence of a therapeutic process, and the use of personally tailored music experiences. These music experiences may include listening to live, therapist-composed, improvised, or pre-recorded music, performing music on an instrument,

improvising music spontaneously using voice or instruments, composing music, and music combined with other modalities (e.g. movement, imagery, art). Results indicate that music therapy may have a beneficial effect on the quality of life of people in end-of-life care. However, the results stem from a limited number of studies and the quality of the evidence is not strong. More research is needed. No evidence of effect was found for pain or anxiety. This may be due to the fact that only two studies with very small samples examined the effects of music therapy on these outcomes. There were insufficient data to examine the effect of music therapy on other physical, psychological, or social outcomes. More research is needed.

# Background

Music therapy is increasingly used in end-of-life care, with a growing number of music therapists being employed in hospices and hospital-based palliative care programs each year (Hilliard 2005). Data from a survey study of 300 randomly selected hospices in the U.S. indicated that the most popular forms of complementary therapies were massage therapy and music therapy (Demmer 2004). This is also true for use of complementary therapies in Canadian hospices, according to a recently completed survey (Oneschuk 2007). Music therapists in end-of-life care work with a broad range of populations with many types of illnesses including cancer (Hanser 2005; Hilliard 2003; Magill 2001), HIV/AIDS (Lee 1996; Neugebauer 1999), congestive heart failure (Dileo 2005c), dementia (Patrick 2005) and neurodegenerative disorders (Magee 2004 ; Scheiby 2005). The primary aim of music therapy in this context is to improve a person's quality of life by helping relieve symptoms, addressing psychological needs, offering support and comfort, facilitating communication, and meeting spiritual needs. In addition, music therapists assist family and caregivers with coping, communication, and grief/bereavement (Dileo 2005b).

Research on the effects of music and music therapy in healthcare has grown rapidly during the past 20 years and has included a variety of outcome measures in a wide range of specialty areas including medical care, geriatric care, and rehabilitation (Dileo 2005a). It is important, however, to make a clear distinction between music interventions administered by medical or healthcare professionals (music medicine) and those implemented by trained music therapists (music therapy). A substantive set of data (Dileo 2005a) indicates that music therapy interventions are more effective than music medicine interventions for improving physiological as well psychological outcomes in medical patients. This difference might be attributed to the fact that music therapists individualize their interventions to meet patients' specific needs, more actively engage the patients in the music making, make use of the therapeutic relationship established with the patient to meet clinical goals and employ a systematic therapeutic process that includes assessment, treatment, and evaluation. As defined by Dileo 1999, interventions are categorized as 'music medicine' when passive listening to pre-recorded music is offered by medical personnel. In contrast, music therapy requires the implementation of a music intervention by a trained music therapist, the presence of a therapeutic process, and the use of personally tailored music experiences. These music experiences include:

1. listening to live, therapist-composed, improvised, or pre-recorded music;
2. performing music on an instrument;
3. improvising music spontaneously using voice or instruments, or both;
4. composing music; and
5. music combined with other modalities (e.g., movement, imagery, art) (Dileo 2007).

In end-of-life care, receptive approaches, i.e. listening to live or pre-recorded music, are common due to the physical limitations of many patients. An example of a receptive intervention aimed at providing psychosocial support is song choice in which the patient selects a song according to specific criteria, e.g., how he or she is feeling (Dileo 2005b). For terminally ill patients, verbally expressing their emotions may be too difficult or threatening. In advanced stages of cancer, for example, speech impairments due to brain damage may prevent patients from verbally expressing their emotions, thoughts, and needs. Other patients may be hesitant to openly express their emotions because of the intensity of the feelings or the need to protect their loved ones. These patients may benefit from song choice as it gives them an "alternative, creative, and

non-threatening medium through which to experience and express their emotions" (Hogan 1999). If the patient is able to engage in music making, active music therapy methods such as songwriting, instrumental improvisation and vocal improvisations are used to improve sense of empowerment, enhance self-esteem, facilitate expression of ideas and emotions, increase socialization, facilitate creativity, and find meaning and hope (O'Callaghan 1997). Music listening, as well as active music making, is also used to help manage physical symptoms such as labored breathing, pain, agitation, and insomnia. Finally, music therapists play an important role in addressing the spiritual needs of patients as music can offer the "creative, lyrical, and symbolic means to address existential and spiritual needs during the process of dying" (Magill 2002, p. 996).

Several research studies on the use of music in end-of-life care have reported positive results. For example, positive effects of music on pain, nausea/vomiting, anxiety, depression, mood and sense of well-being were reported in a meta-analysis combining studies conducted with cancer, terminally ill and AIDS patients (Dileo 2005a). However, this meta-analysis did not examine terminally ill patients as a separate group. In addition, differences in factors such as study designs, methods of interventions, and intensity of treatment have led to varying results. A systematic review is needed to more accurately gauge the efficacy of music therapy in end-of-life care as well as to identify variables that may moderate its effects.

# Objectives

1. To investigate the effectiveness of music therapy in end-of-life care.
2. To compare the effects of music therapy combined with standard care with:
   a. standard care alone, or
   b. standard care and other therapies.
3. To compare the effects of different types of music therapy interventions (e.g. music listening, songwriting, improvisation).

# Methods

## Criteria for considering studies for this review

### *Types of studies*

We included all randomized controlled trials (RCTs), published or unpublished, in any language. Due to the limited number of studies that used proper methods of randomization, we also included studies with quasi-randomized or systematic methods of treatment allocation (for example, alternate allocation of treatments).

### *Types of participants*

This review included participants in specialist palliative care or hospice settings (inpatient or community) or participants in any care setting with a diagnosis of advanced life-limiting illness being treated with palliative intent and with a life expectancy of less than two years (Hancock 2007). There were no restrictions as to age, gender, or ethnicity.

### *Types of interventions*

This review included all studies in which standard care combined with music therapy was compared with:

1. standard care alone, or
2. standard care combined with other therapies.

In addition, studies were considered only if:

1. music therapy was delivered by a formally trained music therapist or by trainees in a formal music therapy program;

2. a therapeutic process was present, and
3. one of the following personally tailored music therapy interventions was used in an individual or group setting:
   a. listening to live, therapist-composed, patient-composed, therapist and patient-composed, improvised, or pre-recorded music;
   b. performing music on an instrument; and
   c. improvising music spontaneously using voice or instruments, or both.

### *Types of outcome measures*

The following outcome measures were included in this review:

1. symptom relief (e.g. of nausea, fatigue, pain);
2. psychological outcomes (anxiety, depression, fear);
3. physiological outcomes (e.g. respiratory rate, heart rate, IgA levels);
4. relationship and social support (e.g. family support, isolation);
5. communication (e.g. verbalization, facial affect, gestures);
6. quality of life;
7. spirituality; and
8. participant satisfaction.

In addition, this review considered the following outcome measures for family members and caregivers:

1. psychological outcomes (e.g. depression, distress, coping, grief);
2. relationship and social support;
3. communication with participant;
4. quality of life.

## Search methods for identification of studies

### *Electronic searches*

We searched the Cochrane Cancer Network Register and the Cochrane Pain, Palliative & Supportive Care Register.

In addition, we searched the following electronic databases and trials registers:

1. Cochrane Central Register of Controlled Trials (CENTRAL) (*The Cochrane Library*, 2009, issue 3);
2. MEDLINE (1950 to September 2009);
3. EMBASE (1980 to October 2009);
4. CINAHL (1982 to September 2009);
5. PsycINFO (1967 to September 2009);
6. LILACS ( 1982 to September 2009);
7. CancerLit (1983 to September 2009);
8. CAIRSS for Music (retrieved on September 23 2009);
9. Proquest Digital Dissertations (1861 to September 2009);
10. ClinicalTrials.gov (www.clinicaltrials.gov) (retrieved on September 23 2009);
11. Current Controlled Trials (www.controlled-trials.com) (retrieved on September 23 2009);
12. National Research Register (www.update-software.com/National) (retrieved on September 23 2009);
13. www.musictherapyworld.de (retrieved on May 8 2009).

Please see the Appendices (Appendix 1; Appendix 2; Appendix 3; Appendix 4; Appendix 5; Appendix 6; Appendix 7; Appendix 8; Appendix 9; Appendix 10; Appendix 11; Appendix 12; Appendix 13) for the search

strategies that were employed for each database.

### *Searching other resources*

#### Handsearching

We handsearched the following journals from their first available date:

1. Australian Journal of Music Therapy
2. Australian Music Therapy Association Bulletin
3. Canadian Journal of Music Therapy
4. The International Journal of the Arts in Medicine
5. Journal of Music Therapy
6. Musik-,Tanz-, und Kunsttherapie (Journal for Art Therapies in Education, Welfare and Health Care)
7. Musiktherapeutische Umschau
8. Music Therapy
9. Music Therapy Perspectives
10. Nordic Journal of Music Therapy
11. Music Therapy Today (online journal of music therapy)
12. Voices (online international journal of music therapy)
13. New Zealand Journal of Music Therapy
14. The Arts in Psychotherapy
15. British Journal of Music Therapy
16. Journal of Society for Integrative Oncology
17. Evidence Based Complementary and Alternative Medicine
18. Japanese Journal of Music Therapy

In an effort to identify further published, unpublished and ongoing trials, we searched the bibliographies of relevant studies and reviews, contacted experts in the field, and searched available proceedings of music therapy conferences. Music therapy association websites were consulted to help identify music therapy practitioners and conference information (e.g., American Music Therapy Association (www.musictherapy.org), The British Society for Music Therapy (www.bsmt.org), The Association of Professional Music Therapists (APMT) (www.apmt.org), Music Therapy World (http://musictherapyworld.de)) .

## Data collection and analysis

### *Selection of studies*

One review author (JB) conducted the electronic searches. One review author (JB) and a research assistant scanned the titles and abstracts of each record retrieved from the search. If information in the abstract clearly indicated that the study did not meet the inclusion criteria, we rejected the study. When a title or abstract could not be rejected with certainty, the full article was retrieved and the two review authors independently inspected the article. Both review authors used an inclusion criteria form to assess the study's eligibility for inclusion. If a study was excluded, we kept a record of both the article and the reason for its exclusion.

### *Data extraction and management*

Both review authors independently extracted data from the selected studies using a standard coding form. We discussed any differences in the data extraction. The data that was extracted from the included studies is outlined in Additional Table 1. Where data was unavailable from the studies identified, we contacted the study author for clarification.

## Assessment of risk of bias in included studies

Both review authors, blinded to each other's assessment, assessed all included studies for quality, using the following criteria.

### 1. Method of randomization:

- was the study reported as randomized? Yes or no;
- was the method of randomization appropriate? Yes, no, or unclear.

We rated randomization as appropriate if every participant had an equal chance to be selected for either intervention. We regarded the use of date of birth, date of admission, or alternation as inappropriate.

### 2. We used allocation concealment ratings of:

A (adequate), B (unclear), and C (inadequate) in accordance with section 6.3 of the Cochrane Handbook for Systematic Reviews of Interventions (Higgins 2006).

A: adequate, where methods to conceal allocation included 1. central randomization; 2. serially-numbered, opaque, sealed envelopes; or 3. other descriptions with convincing concealment.
B: unclear, where authors did not adequately report on method of concealment.
C: inadequate, where allocation was not adequately concealed (e.g., alternation methods were used).

### 3. Blinding: yes, no, or unclear

With music therapy studies it is not possible to blind participants and those providing the music therapy interventions. However, outcome assessors can be blinded. In studies that used self-report measures, blinded outcome assessment was, of course, not possible. In this review, we marked blinding as yes, no, or unclear as it pertains to blinding of outcome assessors for objective outcomes.

### 4. Incomplete outcome data addressed: adequate, inadequate, unclear

We gave a rating of adequate when numbers of dropouts and reasons for drop-out were reported or if we were able to obtain this information from the study author. If there were no withdrawals and this was indicated in the study, the study received a rating of adequate.

The above four criteria were used to give each article an overall quality rating (based on section 6.7.1 of the Cochrane Handbook for Systematic Reviews of Interventions) (Higgins 2006).
A. Low risk of bias: all four criteria met.
B. Moderate risk of bias: one or more of the criteria only partly met.
C. High risk of bias: one or more criteria not met.

We did not exclude studies based on a low quality score.

## Dealing with missing data

Data were analyzed on an endpoint basis, including only participants for whom final data point measurement was obtained (available case analysis). It was not assumed that participants who dropped out after randomization had a negative outcome.

## Assessment of heterogeneity

Heterogeneity was investigated using the I-squared test with $I^2$ > 50% indicating significant heterogeneity.

## Assessment of reporting biases

We had planned to examine publication bias visually in the form of funnel plots. However, this was not possible because of the limited number of studies per outcome. It needs to be noted though that three out of the five

studies are unpublished studies.

### Data synthesis

JB entered the data of included studies into Review Manager (RevMan 2008). CD checked data entry for errors. We presented the main outcomes in this review as continuous variables. Where studies used different instruments to measure the same conceptual phenomenon (for example, quality of life) we reported the standardized mean difference (SMD) with 95% confidence intervals (CI). When there were sufficient data available from various studies using the same measurement instrument (for example, The Hospice Quality of Life Index-Revised) we computed a weighted mean difference (MD) with 95% CI. We calculated pooled estimates using the fixed-effect model. In case of significant heterogeneity (I-squared value > 50%), we used the random-effects model. We determined the levels of heterogeneity by I-squared ($I^2$) (Higgins 2002).

The following treatment comparisons were made:

1. standard care and music therapy versus standard care alone;
2. standard care and music therapy versus standard care combined with other treatment.

### Subgroup analysis and investigation of heterogeneity

The following sub-analyses were planned *a priori* as described by Deeks *et al* (Deeks 2001) and as recommended in section 8.8 of the Cochrane Handbook for Systematic Reviews of Interventions (Higgins 2006), but could not be carried out because of an insufficient number of studies. These sub-analyses would have compared:

1. different types of music therapy interventions;
2. different duration and frequency of music therapy;
3. different diagnoses.

### Sensitivity analysis

We had planned to examine the influence of study quality using a sensitivity analysis where the results including and excluding lower-quality studies are compared. Because all studies received a high risk of bias quality rating, we could not conduct the planned sensitivity analysis for impact of high risk studies.

# Results

## Description of studies

### Results of the search

The database searches and handsearching of conference proceedings and journals resulted in 2964 citations. One review author (JB) and a research assistant examined the titles and abstracts, and 23 references were retrieved for possible inclusion. These were then independently screened by the two review authors resulting in five studies that met all the inclusion criteria. Where necessary we contacted chief investigators to obtain additional information on study details and data.

### Included studies

Five studies with a total of a 175 participants (experimental and control) were included. One study provided music therapy in in-home hospice care (Hilliard 2003) and four studies conducted the music therapy sessions in an inpatient hospice setting (Horne-Thompson 2008; Lee 2005; Nguyen 2003; Wlodarczyk 2007). All study participants were adults with an average age of 68 years. The gender distribution in these studies was balanced with 51% female and 49% male participants. For three studies, ethnicity of the participants was not reported (Horne-Thompson 2008; Lee 2005; Nguyen 2003). For those studies that did report on ethnicity

(Hilliard 2003; Wlodarczyk 2007), the majority of the participants were Caucasian (average of 82.5%). Trial sample size ranged from 10 to 80 participants (see 'Characteristics of included studies' table for sample size of each study). One study provided services exclusively to terminal cancer patients in in-home hospice care (Hilliard 2003) whereas the other studies offered music therapy sessions to inpatient participants with various diagnoses including cancer, congestive heart failure, renal failure, AIDS, amyotrophic lateral sclerosis (ALS).

Four studies used parallel group designs, whereas one study (Wlodarczyk 2007) used a cross-over design.

Various music therapy interventions were used to meet the individual needs of the participants during the music therapy sessions: song choice, music-prompted reminiscence, singing, listening to live music, lyric analysis, instrument playing, song parody, singing with accompaniment using the Iso-principle, planning of funerals or memorial services, song gifts, music-assisted supportive counseling, music and relaxation, music and imagery, improvisation, songwriting, life review, sing-alongs with family and friends, and music for prayer. One study exclusively used live music based on the Iso-principle (Lee 2005). To establish a musical iso, music that matches the patient's current mood is played, after which the music is gradually changed in the therapeutic direction (e.g., a gradual change from music that has a lot of harmonic tension to music that sounds relaxing and peaceful). The music therapy interventions were aimed at developing a rapport with the patient or family, facilitating family interaction, providing support, enabling reminiscence, providing opportunities for spiritual exploration and validation, addressing feelings of anticipatory mourning and grief, and reducing anxiety and pain.

The studies offered the following control conditions: standard care (Hilliard 2003; Nguyen 2003), a visit by a volunteer who engaged the participant in a conversation, read to the participant, or provided emotional support (Horne-Thompson 2008), a visit by the researcher to engage the participant in a conversation about a patient-preferred topic (Wlodarczyk 2007), and a music session where the participant listened to pre-recorded music without a music therapy process or interaction with a music therapist (Lee 2005).

Two studies offered one music therapy session (Horne-Thompson 2008; Lee 2005), two studies offered two music therapy sessions (Nguyen 2003; Wlodarczyk 2007). In the Hilliard 2003 study, participants received a minimum of two sessions with some participants receiving up to 13 sessions. However, Hilliard 2003 only included data of the second session in his data analysis.

Not all studies measured all outcomes identified for this review.

The studies were conducted in two different countries: USA (Hilliard 2003; Lee 2005; Nguyen 2003; Wlodarczyk 2007) and Australia (Horne-Thompson 2008).

Further details of the studies included in the review are shown in the table of 'Characteristics of included studies'.

## *Excluded studies*

We identified 18 additional experimental research studies. However, these were excluded because of the following reasons: (a) no control group or control condition (Brown 2006; Calovini 1993; Kitawaki 2007; Krout 2001; Nakayama 2009; Segall 2007; Whittall 1989; Whittsitt 2006), (b) no random or pseudo-random (i.e. alternate group allocation) assignment to groups or conditions (Abbott 1995; Okamoto 2005; Patrick 2004), (c) ex post facto research without randomization (Gallagher 2006), and not an end-of-life care study (Martinez 2007; Mihara 2006). Four studies were excluded because the intervention was not a music therapy intervention (as defined by the authors in the background section) even though the study was conducted by a music therapist (Curtis 1986) or music therapy student (Choi 2007; Kerr 2004; Kim 2006). In these studies, the participants listen to pre-recorded music without the implementation of a therapeutic process.

Details of the excluded trials are listed in the 'Characteristics of excluded studies' table.

## Risk of bias in included studies

We included studies that used appropriate methods of randomization (e.g. computer-generated table of random numbers, draw of lots, flip of coins) (Horne-Thompson 2008; Nguyen 2003) as well as studies that used alternate group assignment as allocation method (Lee 2005; Wlodarczyk 2007). One study stated that random assignment was used, but the randomization method was not specified. Attempts to receive this information from the author were unsuccessful (Hilliard 2003). Only one study used allocation concealment (Horne-Thompson 2008).

All studies used self-report measures. Blinding of outcome assessors for these measures was, therefore, not possible. Two studies included additional physiological and physical outcomes, but blinding of outcome assessors did not take place (Lee 2005) or was unclear (Hilliard 2003). This inevitably introduced potential for biased assessment and, subsequently, overestimation of the effect size. Blinding of intervention allocation is not possible in music therapy interventions, adding another layer of possible bias.

For two studies, the drop-out rate was unclear (Hilliard 2003; Nguyen 2003). Two studies reported a drop-out rate of less than 20% (Horne-Thompson 2008; Lee 2005). One study had a very high drop out rate (51%), but this was likely due to the fact that the data collection was spread over seven days. The authors reported that within that time frame, many of the participants passed away or became non-responsive. High drop-out rates are to be expected in end-of-life studies.

As a result, all studies were rated to have a high risk of bias. Risk of bias is detailed for each study in the risk of bias tables included in the 'Characteristics of included studies' table.

As all studies were rated as high risk, sensitivity analysis on the basis of overall quality rating was not carried out.

## Effects of interventions

### *Primary outcomes*

#### Symptom relief

Two studies (Horne-Thompson 2008; Nguyen 2003) examined the effect of music therapy on pain in hospice patients. Their pooled estimate indicated no strong evidence of effect of music therapy (SMD = -0.33, 95% CI -0.92 to 0.26, P = 0.27) (Analysis 1.1). Lee 2005 compared the effects of live music therapy with listening to pre-recorded music on patients' self-reported pain (using a 10-point graphic rating scale) and found that live music therapy based on the Iso-principle (posttest M = 3.02, SD = 1.86) was more effective (P = 0.025) in reducing pain than the use of pre-recorded music (posttest M = 4.63, SD = 2.34).

Horne-Thompson and Grocke (Horne-Thompson 2008) investigated the effects of music therapy on other symptomatic issues common for patients in end-of-life care. Participants were asked to rate the severity of their symptoms using the Edmonton Symptom Assessment System (ESAS) (0 to 10 scale for each symptom). The authors reported that music therapy was effective in reducing tiredness (P = 0.024) and drowsiness (P = 0.018), but not in improving nausea (P = 0.2), appetite (P = 0.09), and shortness of breath (P = 0.07).

One study (Nguyen 2003) found a statistically significant difference (P = 0.006) between post-intervention levels of discomfort (as measured on a 100 mm visual analogue scale (VAS)) in hospice patients receiving standard care and music therapy (n = 10, M = 11.1, SD = 14.34) and hospice patients receiving standard care alone (n = 10, M = 52.1, SD = 41.82).

Finally, Hilliard 2003 included physical status as measured by the Palliative Performance Scale (PPS), but found no statistically significant difference between the music therapy group (M = 35.8, SD = 13.7) and the standard care group (M = 32.5, SD = 16.9). The PPS is a nursing assessment scale which includes measurement of the patient's conscious level, nutritive intake, self-care, ambulation, activity, and evidence of disease, with 0% indicating death and 100% indicating full functioning and no evidence of disease

(Hilliard 2003).

## Psychological outcomes

Two studies included anxiety as an outcome measure and had a homogeneous SMD of -0.31 (95% CI -0.90 to 0.28, P = 0.30) (Analysis 1.2). However, this effect was not statistically significant.

Two studies (Horne-Thompson 2008; Nguyen 2003) reported on the effect of music therapy on depression or sadness in participants who were terminally ill. Their data resulted in a homogeneous SMD of -.51 (95% CI -1.11 to 0.10, P = 0.10), but this was not statistically significant (Analysis 1.3).

## Physiological outcomes

Only two studies included a physiological outcome, namely pulse rate. However, because one study used a volunteer visit as the control condition (Horne-Thompson 2008), and the other study used listening to prerecorded music as the control condition (Lee 2005), their estimates could not be pooled. Neither of the studies found a statistically significant effect of music therapy on pulse rate.

## Relationship and social support

None of the studies included relationship and social support outcomes such as family support or isolation. Two studies used the Hospice Quality of Life Index - Revised (HQLI-R) which includes a social/spiritual well-being subscale, but social well-being was not considered separate from spiritual well-being. Results of these two studies are discussed below under the quality of life outcome.

## Communication

We did not find any studies that examined the effect of music therapy on communication variables such as verbalization, facial affect, and gestures.

## Quality of life

The pooled effect of two studies (Hilliard 2003; Nguyen 2003) indicated that music therapy has a beneficial effect (MD = 37.08, 95% CI 22.45 to 51.72, P < 0.00001) on quality of life in patients in end-of-life care and results were consistent between the two studies ($I^2$ = 0%). Both studies used the Hospice Quality of Life Index-Revised (HQLI-R). Horne-Thompson and Grocke (Horne-Thompson 2008) used the Edmonton Symptom Assessment Scale (ESAS) to examine the effects of music therapy on several symptomatic issues in palliative care patients, including well-being (measured on a 0-10 scale); they did not find statistically significant differences between the music therapy group and the control group. Pooling the results of their study with the Hilliard 2003 and Nguyen 2003 study resulted in a moderate but heterogeneous effect size (SMD = 0.69, 95% CI 0.11 to 1.27, P = 0.02; $I^2$ = 51%) (Analysis 1.4).

The HQLI-R is a self-report questionnaire using a Likert scale of 0 to 10 with a total of 28 items designed for hospice patients with cancer. It includes three subscales: functional well-being (i.e. daily activities, concentration ability) (total possible score of 70), psychophysiological well-being (i.e. anger, pain, nausea) (total possible score of 130), and social/spiritual well-being (i.e. meaning in life, family support, relationship with God) (total possible score of 80). The results of two studies (Hilliard 2003; Nguyen 2003) suggest that music therapy has a positive effect on psychophysiological well-being (MD = 17.41, 95% CI 9.10 to 25.72, P < 0.0001; $I^2$ = 0%) (Analysis 1.6), functional well-being (MD = 13.40, 95% 7.25 to 19.54, P < 0.0001; $I^2$ = 0%) (Analysis 1.5), and social/spiritual well-being (MD = 6.02, 95% 1.67 to 10.37, P = 0.007; $I^2$ = 0%) (Analysis 1.7).

In one study (Hilliard 2003), it was found that even though the physical status of participants receiving music therapy declined over time, as indicated by their scores on the Palliative Performance Scale, their quality of life scores increased. In the standard care group, both physical status and quality of life declined over time. Hilliard 2003 also included length of life as an outcome variable. The average length of life (in days) for the music

therapy participants was 69.5 (SD = 60.5) days and 57.8 (SD = 45.5) days for the control group. More studies are needed to examine the impact of music therapy interventions on length of life.

### Spirituality

One study (Wlodarczyk 2007) considered spirituality as an outcome. Even though two other studies reported results on social/spiritual well-being on the HQLI-R, this subscale did not separate spiritual well-being from social well-being and, therefore, their results could not be pooled with the Wlodarczyk study.

Wlodarczyk 2007 reported that music therapy was significantly more effective (P = 0.01) than a non-music visit in enhancing spiritual well-being (M = 78.5, SD = 20.93 and M = 73.95, SD = 20.76, respectively) in hospice patients.

### Participant satisfaction

None of the studies compared satisfaction of experimental group participants with satisfaction of control group participants. One study included a family satisfaction questionnaire for the music therapy participants. In this questionnaire, participants were asked how beneficial music therapy was for them and their loved ones. The following ratings (10-point scale) were obtained: (a) The use of music therapy within end-of-life celebration is beneficial for me: M = 9.4, SD = 0.97, (b) The use of music therapy within end-of-life celebration is beneficial for my loved one: M = 9.7, SD = 0.48, (c) I enjoy the use of music therapy within the hospital setting: M = 9.7, SD = 4.2, (d) I believe that music therapy with an end-of-life celebration has or will bring closure for me: M = 8.9, SD = 1.55, and (e) I believe that music therapy with an end-of-life celebration has or will bring closure for my loved ones: M = 8.6, SD = 1.7.

# Discussion

## Summary of main results

The results of this review show that there is insufficient evidence to reliably conclude a beneficial effect of music therapy on the quality of life of patients at the end of life. These results are based on a few studies with small sample sizes (125 participants combined). More studies are needed to strengthen the evidence.

There was no strong evidence for effect of music therapy on pain and anxiety. Unfortunately, only two studies included these outcomes and their total sample size was very small (45 participants combined). Clearly, more studies are needed to further evaluate the effects of music therapy on these outcomes.

Single studies reported that music therapy was effective for enhancing spirituality (Wlodarczyk 2007), reducing tiredness and drowsiness (Horne-Thompson 2008), and alleviating discomfort and sadness (Nguyen 2003), but no support was found for effects of music therapy on nausea, appetite, shortness of breath, depression (Horne-Thompson 2008) or decreasing heart rate (Horne-Thompson 2008; Lee 2005).

None of the studies included communication, social support, or physiological outcomes other than pulse rate. Only one study (Wlodarczyk 2007) evaluated patient satisfaction with music therapy services. Results indicated that most patients found music therapy to be highly beneficial to themselves and their loved ones, and that music therapy greatly contributed to bringing closure.

## Overall completeness and applicability of evidence

This review included five controlled trials. The strength of our review is that we searched all available databases and a large number of music therapy journals (English, German, French, and Japanese language), checked reference lists of all relevant studies, contacted relevant experts for identification of unpublished trials, and reviewed publications for eligibility without restricting language. In spite of such a comprehensive search, it is still possible we missed some published and unpublished trials. We requested additional data where

necessary for all studies we considered for inclusion. This allowed us to get accurate information on the trial quality and data for most studies and helped us make well-informed study selection decisions.

There is insufficient evidence of high quality to support the effect of music therapy on quality of life of people in end-of-life care. Even though many clinical reports and data from non-controlled trials indicate beneficial effects of music therapy for palliative care and hospice patients and their families (e.g. Hanser 2005; Hilliard 2005; Gallagher 2006; Krout 2001; Magill 2001; O'Callaghan 1996), it is clear that more RCTs are needed before conclusions can be drawn.

Because only two small studies investigated the effect of music therapy on pain and anxiety, the evidence is not clinically applicable at this time. More research is needed.

Given the high chance for participant loss due to death or rapid cognitive decline, the studies in this review included a limited number of music therapy sessions. Because multiple sessions allow for the development of a therapeutic relationship and deepening of the therapeutic process through the music, it is possible that providing more than two sessions could result in larger effects. Because not all studies in this review addressed all main outcome variables, it was not possible to conduct a subgroup analysis to examine frequency and duration of sessions as moderator variables.

All studies provided music therapy interventions by a trained music therapist and used live music. Studies that used listening to pre-recorded music without a therapeutic process were excluded. Therefore, the results of this review are only applicable to music therapy interventions as defined by the authors in the background section.

One can question the generalizability of these results to various cultural groups since little information was provided in these studies about the cultural make-up of the samples. For those studies that did include information about ethnicity specifically (as one aspect of culture), the majority of the participants were Caucasian. Persons' cultures may strongly influence their music preferences, their views of music as a therapeutic agent and its use at end of life, as well as their attitudes towards therapy in general. It can be assumed that the culture will influence individuals' expectations of music and music therapy at the end of life and consequently study outcomes.

### Quality of the evidence

The quality of reporting in general was poor with only one study (Horne-Thompson 2008) detailing the method of randomization, allocation concealment, and level of blinding. The lead authors of most studies needed to be contacted to provide additional methodological and statistical information. All studies in this review received a high risk of bias rating.

The studies included were generally small (average n = 35, range: 10 to 80) resulting in a lack of precision of treatment effects as evidenced by the rather large confidence intervals. This, combined with the high risk of bias, requires that the results of this review be interpreted with caution.

We are confident that our detailed search strategy combined with extensive handsearching of journals and some conference proceedings identified all relevant published studies. We were able to identify several unpublished studies. It is possible that we did not identify some grey literature, however, it is doubtful that this would have a significant impact on our results. Grey literature tends to include studies with relatively small numbers of participants and inconclusive results (McAuley 2000).

## Authors' conclusions

### Implications for practice

There is limited evidence to support or refute the effectiveness of music therapy for enhancement of quality of life in end-of-life care. Some studies with high risk of bias indicate that music therapy may be beneficial for

quality of life, however, these results need to be interpreted with caution.

No evidence of effect was found for pain and anxiety. However, only two studies with a total of 45 participants investigated the effects of music therapy on these outcomes. Because of the many clinical reports and data from non-RCTs about the pain and anxiety-reducing effects of music therapy, it is clear that more research is needed before conclusions can be drawn regarding clinical implications of these results.

More research is needed to strengthen the available evidence before recommendations for clinical practice can be made.

### Implications for research

Carrying out RCTs with this population creates several challenges. First and perhaps foremost, time is precious and guarded for patients and their families at the end of life, and engaging in research is not a priority for the time remaining. It may be particularly difficult to recruit research participants because of this. Researchers should consider encouraging family members to participate in the sessions, if they so desire. At the same time, the treatment offered should be flexible to the amount of time patients and their families are willing to commit to the sessions. Similarly, the outcome measurements selected for a study need to be short.

When conducting studies with people in end-of-life care, it may be unethical to withhold treatment for even short periods of time when death is imminent. This needs to be carefully considered in research designs. One can opt to use a very brief intervention period or employ a cross-over design in which both conditions are offered within a short timeframe. When life expectancy is several weeks or more, a longer timeframe can be adopted for treatment implementation. Ex post facto research trials with random selection of patients may offer a valuable alternative.

In addition, when determining the sample size for adequately powered studies, researchers need to consider the potential for extensive participant loss due to death as well a rapid cognitive decline. Future studies need to include power analysis so that adequate sample sizes are used.

A final problem in conducting research with those in end-of-life care is the conflict between the requirement of providing an intervention that is sufficiently standardized so as to be adequately evaluated versus the imperative to tailor the intervention to the particular needs of each participant. This conflict is of utmost concern in persons who are dying because of the urgency of providing appropriate and meaningful treatment while the patients are still alive as well as the lack of predictability regarding when death may occur. To address this issue, studies should utilize a standardized treatment that will also allow for flexibility in the music therapy methods used to address the needs of each patient.

Despite these challenges, the studies in this review clearly demonstrate that it is feasible to conduct RCTs with this population, and they can be used as models for future studies. One should not ignore, however, the importance of qualitative research and non-RCT research to gain a better understanding of the qualitative aspects of the experiences of patients and their loved ones as well as to identify factors that may contribute to or limit the effectiveness of music therapy interventions.

Future studies need to include other outcomes as listed in the method section of this review. In addition, studies need to continue to include quality of life as the results of this review show promising results. Researchers should furthermore examine the effects of music therapy on pediatric patients in end-of-life care as well as family members and caregivers. Finally, formal evaluation of the cost & benefit of music therapy is needed.

## Acknowledgements

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# Contributions of authors

Draft the protocol: JB and CD
Develop search strategy: JB
Search for studies: JB
Obtain copies of studies: JB and graduate assistant
Select which studies to include: JB and CD
Extract data from studies: JB and CD
Enter data into RevMan: JB
Carry out the analysis: JB
Interpret the analysis: JB and CD
Draft the final review: JB and CD
Update the review: JB and CD

# Declarations of interest

Both review authors are music therapists

# Differences between protocol and review

The following journals were added for the handsearching: The Japanese Journal of Music Therapy and the Canadian Journal of Music Therapy.

# Published notes

# Characteristics of studies

## Characteristics of included studies

### *Hilliard 2003*

| | |
|---|---|
| **Methods** | Quasi-randomized trial<br>2-arm parallel group design |
| **Participants** | Adults with one of the following terminal cancers: lung (n = 25), colon (n = 7), kidney (n = 3), nasopharynx (n = 1), prostate (n = 3), liver (n = 2), esophagus (n = 3), breast (n = 5), pancreas (n = 5), brain (3), oral cavity (1), ovary (n = 2), stomach (n = 2), endometrium (n = 1), sinus (n = 1), larynx (n = 1), leukemia (n = 2), melanoma (n = 3), multiple myeloma (n = 1), lymphoma (n = 1), head, neck and face (n = 1) and unspecified cancer (n = 3)<br>N music therapy group: 40<br>N control group: 40<br>Mean age: 65.5 Sex: 40 F, 40 M<br><br>Ethnicity: 25% Black, 75% Caucasian<br>Setting: in-home hospice care |

| | |
|---|---|
| **Interventions** | Music therapy group: individual music therapy sessions were provided by the author, other board-certified music therapists, or music therapy interns under supervision of a board-certified music therapist. The music therapists individualized the music therapy interventions according to clients' needs. Techniques often used: 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. The music therapists used live, subject-preferred music.<br><br>Control group: home visit by family support counselor as part of routine care.<br>Number of sessions: minimum of 2 sessions; some participants received up to 13 sessions<br>Length of session: not reported |
| **Outcomes** | ● Quality of life (Hospice Quality of Life Index-Revised): total score and subscale scores of second session<br>● Physical status (Palliative Performance Scale): score of second session<br>● Length of life (in days) |
| **Notes** | |

## Risk of bias table

| Item | Judgement | Description |
|---|---|---|
| Adequate sequence generation? | Unclear | The author stated that random assignment was used but the randomization method was not specified. Attempts to receive this information from the author were unsuccessful |
| Allocation concealment? | Unclear | Attempts to receive this information from the author were unsuccessful |
| Blinding? | No | Subjective outcomes (self-report): blinding not possible |
| Incomplete outcome data addressed? | Unclear | Based on descriptions in the text, there appear to be no withdrawals. However, there is a discrepancy between total number reported in data analyses (N = 80) and number of participants reported per diagnosis (N = 76) |

## *Horne-Thompson 2008*

| | |
|---|---|
| **Methods** | RCT<br><br>2-arm parallel group design |
| **Participants** | Adult inpatients receiving palliative care service due to a diagnosis of terminal illness (24 cancer, 1 end stage heart failure)<br><br>N music therapy group: 13<br>N control group: 12 |

| | |
|---|---|
| | Mean age: 73.9 (13.32)<br>Sex: 11F, 14 M<br><br>Ethnicity: not reported<br>Setting: in-patient facility |
| **Interventions** | Music therapy: individual music therapy session. Specific music therapy intervention was determined on a case-by-case basis by the music therapist. The following interventions were used: live familiar music, singing, music and relaxation, music and imagery, improvisation, music-assisted counseling, reminiscence, and listening to recorded music.<br><br>Control: a visit by a volunteer who read to the patient, engaged the patient in conversations, or provided emotional support<br><br>Number of sessions: 1<br><br>Length of session: 20-40 minutes |
| **Outcomes** | Symptomatic issues on Edmonton Symptom Assessment Scale (ESAS)): posttest scores (posttest means and SD received from the author)<br><br>Pulse: posttest value |
| **Notes** | |

## Risk of bias table

| Item | Judgement | Description |
|---|---|---|
| Adequate sequence generation? | Yes | computer-generated number list |
| Allocation concealment? | Yes | Serially numbered opaque envelopes |
| Blinding? | No | Blinding for pulse readings was attempted but author reported (personal communication) that the nurses could still hear the music on the unit and therefore knew which patient was receiving music therapy services. |
| Incomplete outcome data addressed? | Yes | Five patients died or were discharged |

## *Lee 2005*

| | |
|---|---|
| **Methods** | Quasi-randomized trial<br><br>2-arm parallel group design |
| **Participants** | Adults in in-patient palliative care.<br><br>N music therapy group: 20<br>N control group: 20<br>Mean age: not reported<br>Sex: 20 F, 20 M |

| | |
|---|---|
| | Ethnicity: not reported<br>Setting: in-patient facility |
| **Interventions** | Music therapy: live music based on the Iso principle, played for 20-30 minutes. A limited selection of live music from 1920s to 1980s was offered.<br><br>Control: recorded music, played for 20-30 minutes. The recorded music included classical excerpts: (a) Mozart, WA, “Andante from Piano Concerto N. 21,” (b) Bach, JS, “Air On The G-String,” (c) Bach, JS, “Arioso from Cantata N. 156,” (d) and Morisod, A. “Et Les Oiseaux Chantaient.” These selections were recommended as relaxing music because these are based on slow and steady rhythm, long phrases, little dynamic variation, and emotional components<br><br>Number of sessions:1<br><br>Length of session: 20-30 minutes |
| **Outcomes** | Pulse: posttest value (SD were computed by JB from the raw data provided in the Appendix of the thesis)<br><br>Pain (Graphic rating scale): posttest value (SD were computed by JB from the raw data provided in the Appendix of the thesis) |
| **Notes** | |

## Risk of bias table

| Item | Judgement | Description |
|---|---|---|
| Adequate sequence generation? | No | Alternate assignment |
| Allocation concealment? | No | No allocation concealment was used |
| Blinding? | No | No blinding was used |
| Incomplete outcome data addressed? | Yes | Three withdrawals due to refusal to participate or excessive interruptions by hospital staff |

## *Nguyen 2003*

| | |
|---|---|
| **Methods** | RCT<br><br>Posttest only control group design |
| **Participants** | End-of-life adults in palliative care. Most frequent diagnoses: Congestive Heart Failure (N = 4), Chronic Renal Failure (N=2), and different types of Cancer (N = 8) . Other diagnoses included: Syncope and Collapse, Septicemia NOS, Multi-Cranial Nerve Palsy, Hypertension, Intestinal Obstruction, and Respiratory Abnormalities.<br><br>N music therapy group: 10<br>N control group: 10 |

| | |
|---|---|
| | Mean age: 64.5<br>Sex: 10 F, 10 M<br><br>Ethnicity: not reported<br>Setting: in-patient facility |
| **Interventions** | Music therapy: received two music therapy sessions: First session included singing patient preferred music, seeking information about patient's favorite songs, and assessing patient and family levels of coping. Second session was an end of life celebration.<br><br>Control group: standard care, no music therapy services<br><br>Number of sessions: 2<br><br>Length of sessions: not reported |
| **Outcomes** | Quality of life (Hospice Quality of Life Index-Revised): posttest total score and subscale scores (SD were computed by JB from the raw data provided in the Appendix of the thesis)<br><br>Anxiety (VAS): posttest scores of second session (SD were computed by JB from the raw data provided in the Appendix of the thesis)<br><br>Pain (VAS): posttest scores of second session (SD were computed by JB from the raw data provided in the Appendix of the thesis)<br><br>Sadness (VAS): posttest scores of second session (SD were computed by JB from the raw data provided in the Appendix of the thesis)<br><br>Stress (VAS): posttest scores of second session (SD were computed by JB from the raw data provided in the Appendix of the thesis)<br><br>Hope (VAS):posttest scores of second session (SD were computed by JB from the raw data provided in the Appendix of the thesis)<br><br>Discomfort (VAS): posttest scores of second session (SD were computed by JB from the raw data provided in the Appendix of the thesis) |
| **Notes** | |

## Risk of bias table

| Item | Judgement | Description |
|---|---|---|
| Adequate sequence generation? | Yes | Computer-generated list of numbers (personal communication with author) |
| Allocation concealment? | No | No allocation concealment was used |
| Blinding? | No | Subjective outcomes (self-report): blinding not possible |
| Incomplete outcome data addressed? | Yes | Subject loss because of death (personal communication with author) |

## *Wlodarczyk 2007*

| | |
|---|---|
| **Methods** | Cross-over trial<br>Counterbalanced repeated measures design |
| **Participants** | Adult hospice in-patients. Diagnoses: lymphoma, renal failure, stomach cancer, ovarian cancer, pancreatic cancer, rectal cancer, AIDS, ALOS, cardiomyopathy, CHF.<br>Total N = 10<br>Mean age = 67.6<br>Sex = 8F, 2 M<br>Ethnicity: 90% Caucasian, 10% African-American<br>Setting:in-patient hospice |
| **Interventions** | Music therapy condition: music therapist playing guitar and singing patient-preferred music, facilitating patient song choice via printed song book, leading the patient in music-making such as singing and improvising on a variety of percussion, pitched and unpitched instruments, songwriting, music as life review, sing-a-longs with family and friends, music for prayer, and song dedication.<br>Control condition: nonmusic visit consisting of conversations regarding patient-preferred topics.<br>Number of sessions: 2 music therapy and 2 nonmusic visits<br>Length of sessions: 30 min. |
| **Outcomes** | Spiritual well-being (adapted version of the Spiritual Well-being Scale): posttest score of second session (SD were computed by JB from the raw data provided in article) |
| **Notes** | |

## Risk of bias table

| Item | Judgement | Description |
|---|---|---|
| Adequate sequence generation? | No | Alternate assignment (personal communication with author) |
| Allocation concealment? | No | No allocation concealment was used |
| Blinding? | No | Subjective outcomes (self-report): blinding not possible |
| Incomplete outcome data addressed? | Yes | 21 participants enrolled, only 10 completed the 4-day data collection. Subject loss due to death or patients becoming non-responsive |

*Footnotes*

## Characteristics of excluded studies

### *Abbott 1995*

| | |
|---|---|
| **Reason for exclusion** | Group assignment was based on whether the participants had already received music therapy services or not. No random or alternate group allocation |

### *Brown 2006*

| | |
|---|---|
| **Reason for exclusion** | One group pretest-posttest design; no control group |

### *Calovini 1993*

| | |
|---|---|
| **Reason for exclusion** | One group pretest-posttest design; no control group |

### *Choi 2007*

| | |
|---|---|
| **Reason for exclusion** | Not music therapy intervention. Participants listened to pre-recorded music and progressive muscle relaxation tape without a therapeutic process |

### *Curtis 1986*

| | |
|---|---|
| **Reason for exclusion** | Not music therapy intervention. Participants listened to prerecorded music without a therapeutic process |

### *Gallagher 2006*

| | |
|---|---|
| **Reason for exclusion** | Not a RCT; ex post facto research |

### *Kerr 2004*

| | |
|---|---|
| **Reason for exclusion** | Not music therapy intervention. Participants listened to prerecorded music without a therapeutic process |

### *Kim 2006*

| | |
|---|---|
| **Reason for exclusion** | Not music therapy intervention. Participants listened to prerecorded music without a therapeutic process |

### *Kitawaki 2007*

| | |
|---|---|
| **Reason for exclusion** | Not a RCT, two case studies |

### *Krout 2001*

| | |
|---|---|
| **Reason for exclusion** | One group pretest-posttest design; no control group |

### *Martinez 2007*

| | |
|---|---|
| **Reason for exclusion** | Not end-of-life care |

### *Mihara 2006*

| | |
|---|---|
| **Reason for exclusion** | Not end-of-life care |

### *Nakayama 2009*

| | |
|---|---|
| **Reason for exclusion** | One group pretest-posttest design; no control group |

### *Okamoto 2005*

| | |
|---|---|
| **Reason for exclusion** | No random or alternate assignments to groups |

### *Patrick 2004*

| | |
|---|---|
| **Reason for exclusion** | Participants served as own control. No random assignment to treatment sequence |

### *Segall 2007*

| | |
|---|---|
| **Reason for exclusion** | One group pretest-posttest design; no control group |

### *Whittall 1989*

| | |
|---|---|
| **Reason for exclusion** | One group pretest-posttest design; no control group |

### *Whittsitt 2006*

| | |
|---|---|
| **Reason for exclusion** | One group pretest-posttest design; no control group |

*Footnotes*

## Characteristics of studies awaiting classification

*Footnotes*

## Characteristics of ongoing studies

*Footnotes*

# Summary of findings tables

# Additional tables

## 1 Data extraction information from included studies

| General info | Study info | Intervention info | Participant info | Outcome info | Stats outcome info |
|---|---|---|---|---|---|
| ● Author<br>● Year of publication<br>● Title<br>● Journal (title, volume, pages)<br>● If unpublished, source<br>● Duplicate publications<br>● Country<br>● Language of publication | ● Study design (parallel group, cross-over)<br>● Randomization: yes/no<br>● Randomization method<br>● Allocation concealment: yes/no<br>● Allocation concealment method<br>● Level of blinding | ● Type of intervention (e.g. singing, song-writing, music listening, music improvisation)<br>● Music selection (detailed information on music selection in case of music listening)<br>● Music preference (patient-preferred versus researcher-selected in case of music listening)<br>● Length of intervention<br>● Frequency of intervention<br>● Comparison intervention | ● Total sample size<br>● Number of experimental group<br>● Number of control group<br>● Gender<br>● Age<br>● Ethnicity<br>● Diagnosis<br>● Illness stage<br>● Setting<br>● Study-specific inclusion criteria | Statistical information for the following outcomes (if applicable):<br>1. symptom relief (e.g. nausea, fatigue, pain)<br>2. psychological outcomes (anxiety, depression, fear)<br>3. physiological outcomes (e.g. respiratory rate, heart rate, IgA levels)<br>4. relationship and social support (e.g. family support, isolation)<br>5. communication (e.g. verbalization, facial affect, gestures)<br>6. quality of life<br>7. spirituality and<br>8. patient | Statistical information on the following outcome measures for family members and caregivers (if applicable):<br>1. psychological outcomes (e.g. depression, distress, coping, grief)<br>2. Relationship and social support<br>3. communication with patient<br>4. quality of life |

| | | | | | |
|---|---|---|---|---|---|
| | | | | satisfaction | |

*Footnotes*

# References to studies

## Included studies

### *Hilliard 2003*

*Published and unpublished data*

Hilliard RE. The effects of music therapy on the quality and length of life of people diagnosed with terminal cancer. Doctoral Dissertation, Florida State University, USA 2002.

* Hilliard RE. The effects of music therapy on the quality and length of life of people diagnosed with terminal cancer. Journal of Music Therapy 2003;40(2):113-37. [MEDLINE: 14505443]

### *Horne-Thompson 2008*

*Published and unpublished data*

Horne-Thompson A, Grocke D. The effect of music therapy on anxiety in patients who are terminally ill. Journal of Palliative Care 2008;11(4):582-90. [MEDLINE: 18454611]

### *Lee 2005*

*Unpublished data only*

Lee HJ. The effect of live music via the Iso-principle on pain management in palliative care as measured by self-report using a graphic rating scale and pulse rate. Master's Thesis, Florida State University, USA 2005.

### *Nguyen 2003*

*Unpublished data only*

Nguyen JT. The effect of music therapy on end-of-life patients' quality of life, emotional state, and family satisfaction as measured by self-report. Master's Thesis, Florida State University 2003.

### *Wlodarczyk 2007*

*Unpublished data only*

Wlodarczyk N. The effect of music therapy on the spirituality of persons in an in-patient hospice unit as measured by self-report. Master's Thesis, Florida State University.

## Excluded studies

### *Abbott 1995*

*Unpublished data only*

Abbott E. The effects of music therapy on the perceived quality of life of patients with terminal illness in a hospice setting. Master's thesis, Western Michigan University 1995.

### *Brown 2006*

*Unpublished data only*

Brown JL. Comparison of the effects of music and conversation on hospice patients' predisposition to communicate and communication behaviors. Master's thesis, Florida State University 2006.

### *Calovini 1993*

*Unpublished data only*

Calovini BS. The effect of participation in one music therapy session on state anxiety in hospice patients. Master's thesis, Case Western Reserve University 1993.

### *Choi 2007*

*Unpublished data only*

Choi YK. The effect of music and progressive muscle relaxation on anxiety, fatigue, and quality of life in family caregivers of hospice patients. Master's thesis, University of Kansas 2007.

### *Curtis 1986*

Curtis SL. The effect of music on pain relief and relaxation of the terminally ill. Journal of Music Therapy 1986;23(1):10-24.

### *Gallagher 2006*

Gallagher LM, Lagman R, Walsh D, Davis MP, Legrand SB. The clinical effects of music therapy in palliative medicine. Supportive Care in Cancer 2006;14(8):859-66. [MEDLINE: 16538499]

### *Kerr 2004*

*Unpublished data only*

Kerr SE. The effect of music on non-responsive patients in a hospice setting. Master's Thesis, Florida State University 2004.

### *Kim 2006*

*Unpublished data only*

Kim, SA. The effect of music listening on mood state and relaxation of hospice patients and caregivers. Master's Thesis, Florida State University 2006.

### *Kitawaki 2007*

*Unpublished data only*

Kitawaki A. The effectiveness of music therapy involving family members of terminally ill patients in hospice on quality of life of the patient and stress levels of family members. Master's thesis, Michigan State University, USA. 2007.

### *Krout 2001*

*Unpublished data only*

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. American Journal of Hospice & Palliative Care 2001;18(6):383-90.

### *Martinez 2007*

*Unpublished data only*

Martinez JB. Effects of Singing in Chronic Obstructive Pulmonary Disease. University of Sao Paulo. ClinicalTrials.gov 2007. [Other: NCT00500526]

### *Mihara 2006*

Mihara B, Mihara Y, Fujimoto M, Nagashima H, Tomita Y, Takao M. The effect of music therapy for patients with amyotrophic lateral sclerosis-evaluation by neuropsychologic and physiological tests. Japanese Journal of Music Therapy 2006;6(1):23-32. [Other: 1346-6119]

### *Nakayama 2009*

Nakayama H, Kikuta F, Takeda H. A pilot study on effectiveness of music therapy in hospice in Japan. Journal of Music Therapy 2009;46(2):160-72.

### *Okamoto 2005*

*Unpublished data only*

Okamoto M. The effects of music therapy interventions on grief and spirituality of family members of patients in a hospice setting. Master's Thesis, Florida State University 2005.

### *Patrick 2004*

*Unpublished data only*

Patrick L. The effects of music therapy entrainment on perceived pain in hospice patients: A pilot study. Master's Thesis, Temple University 2004.

### *Segall 2007*

*Unpublished data only*

Segall LE. The effects of patient-preferred live versus recorded music on non-responsive patients in the hospice setting as evidenced by physiological and behavioral states. Master's Thesis, Florida State University 2007.

### *Whittall 1989*

Whittall J. The impact of music therapy in palliative care: A quantitative pilot study. In: Martin JA, editor(s). The next step forward: Music therapy with the terminally ill. Bronx, NY: Calvary Hospital, 1989:69-72.

### *Whittsitt 2006*

*Unpublished data only*

Whittsitt SG. Music as a mood state inducer for hospice/palliative care patients and its effect on perceived pain. Master's Thesis, Florida State University 2006.

## Studies awaiting classification

## Ongoing studies

# Other references

## Additional references


### *Deeks 2001*

Deeks JJ, Altman DG, Bradburn MJ. Statistical methods for examining heterogeneity and combining results from several studies in meta-analysis. In: Egger M, Davey Smith G, Altman DG, editor(s). Systematic Reviews in Health Care: Meta-analysis in Context. 2nd edition. London: BMJ Publication Group, 2001.

### *Demmer 2004*

Demmer C. A survey of complementary therapy services provided by hospices. Journal of Palliative Medicine 2004;7:510-6.

### *Dileo 1999*

Dileo C. A classification model for music and medicine. In: Dileo C, editor(s). Applications of Music in Medicine. American Music Therapy Association, 1999:1-6.

### *Dileo 2005a*

Dileo C, Bradt J. Medical Music Therapy: A Meta-Analysis & Agenda for Future Research. Cherry Hill: NJ: Jeffrey Books, 2005.

### *Dileo 2005b*

Dileo C, Dneaster D. Introduction: state of the art. In: Dileo C, Loewy JV, editor(s). Music Therapy at the End of Life. Cherry Hill: NJ: Jeffrey Books, 2005.

### *Dileo 2005c*

Dileo C, Zanders M. In-between: Music therapy with inpatients awaiting a heart transplant. In: Dileo C, Loewy JV, editor(s). Music Therapy at the End of Life. Cherry Hill: NJ: Jeffrey Books, 2005:65-76.

### *Dileo 2007*

Dileo C, Bradt J. Music therapy: applications to stress management. In: Lehrer P, Woolfolk R, editor(s). Principles and Practice of Stress Management. 3rd edition edition. New York: Guilford Press, 2007.

### *Hancock 2007*

Hancock K, Clayton JM, Parker SM, et al. Discrepant perceptions about end-of-life communication: A systematic review. Journal of Pain and Symptom Management 2007;34(2):190-200.

### *Hanser 2005*

Hanser SB. Music therapy to enhance coping in terminally ill adult cancer patients. In: Dileo C, Loewy JV, editor(s). Music Therapy at the End of Life. Cherry Hill: NJ: Jeffrey Books, 2005.

### *Higgins 2002*

Higgins JPT, Thompson SG. Quantifying heterogeneity in a meta-analysis. Statistics in Medicine 2002;21:1539-58.

### *Higgins 2006*

Higgins JPT, Green S (eds). Cochrane Handbook for Systematic Reviews of Interventions 4.2.6 [updated September 2006]. In: The Cochrane Library, Issue 4 2006. Chichester, UK: Wiley-Blackwell, 2006.

### *Hilliard 2005*

Hilliard R. Music therapy in hospice and palliative care: a review of the empirical data. Evidence-Based Complementary and Alternative Medicine 2005;2:173-8.

### *Hogan 1999*

Hogan B. Music therapy at the end of life: Searching for the rite of passage. In: Aldridge D, editor(s). Music Therapy in Palliative Care. London: Jessica Kingsley, 1999:68-81.

### *Lee 1996*

Lee C. Music at the Edge. Routledge, 1996.

### *Magee 2004*

Magee WL, Davidson JW. Singing in therapy: monitoring disease process in chronic degenerative illness. British Journal of Music Therapy 2004;18:65-78.

### *Magill 2001*

Magill L. The use of music therapy to address the suffering in advanced cancer pain. Journal of Palliative Care 2001;17:167-72.

### *Magill 2002*

Magill L, Luzzato P. Music therapy and art therapy. In: Berger A, Portenoy R, Weissman D, editor(s). Principles and Practice of Palliative Care and Supportive Oncology. 2nd edition. Philadelphia, PA: Lippincott, Williams and Wilkins, 2002:993-1006.

### *McAuley 2000*

McAuley L, Pham B, Tugwell P, Moher D. Does the inclusion of grey literature influence estimates of intervention effectiveness reported in meta-analyses? Lancet 2000;356:1228-31.

### *Neugebauer 1999*

Neugebauer L. Music therapy with HIV positive and AIDS patients. In: Aldridge D, editor(s). Music Therapy in Palliative Care. London: Jessica Kingsley, 1999:126-34.

### *O'Callaghan 1996*

O'Callaghan. Music and well-being: Music therapy in palliative care. Annual Journal of the New Zealand Society for Music Therapy 2006:4-19.

### *O'Callaghan 1997*

O'Callaghan CC. Therapeutic opportunities associated with music when using song writing in palliative care. Music Therapy Perspectives Music Therapy Perspectives 1997;15:32-8.

### *Oneschuk 2007*

Oneschuck D, Balneaves L, Verhoef M, Boon H, Demmer C, Chiu L. The status of complementary therapy services in Canadian palliative care settings. Supportive Care in Cancer 2007;15:939-47.

### *Patrick 2005*

Patrick L, Avins K. Music therapy approaches for patients with dementia at end of life. In: Dileo C, Loewy J, editor(s). Music Therapy at the End of Life. Cherry Hill: NJ: Jeffrey Books, 2005.

### *RevMan 2008*

Review Manager (RevMan) [Computer program]. Version 5.0 for Windows [Computer program]. Copenhagen: The Nordic Cochrane Centre, The Cochrane Collaboration, 2008.

### *Scheiby 2005*

Scheiby BB. Dying alive - A transpersonal, analytical music therapy approach for adults with chronic, progressive neurological diseases. In: Dileo C, Loewy JV, editor(s). Music Therapy at the End of Life. Cherry Hill: NJ: Jeffrey Books, 2005.

### Other published versions of this review

# Data and analyses

### 1 Music therapy versus standard care

| Outcome or Subgroup | Studies | Participants | Statistical Method | Effect Estimate |
|---|---|---|---|---|
| 1.1 Pain | 2 | 45 | Std. Mean Difference (IV, Fixed, 95% CI) | -0.33 [-0.92, 0.26] |
| 1.2 Anxiety | 2 | 45 | Std. Mean Difference (IV, Fixed, 95% CI) | -0.31 [-0.90, 0.28] |
| 1.3 Depression | 2 | 45 | Std. Mean Difference (IV, Fixed, 95% CI) | -0.51 [-1.11, 0.10] |
| 1.4 Quality of Life | 3 | 125 | Std. Mean Difference (IV, Random, 95% CI) | 0.69 [0.11, 1.27] |
| 1.5 Functional well-being | 2 | 100 | Mean Difference (IV, Fixed, 95% CI) | 13.40 [7.25, 19.54] |
| 1.6 Psychophysiological well-being | 2 | 100 | Mean Difference (IV, Fixed, 95% CI) | 17.41 [9.10, 25.72] |
| 1.7 Social/spiritual well-being | 2 | 100 | Mean Difference (IV, Fixed, 95% CI) | 6.02 [1.67, 10.37] |

# Figures

# Sources of support

### Internal sources

- No sources of support provided

### External sources

- State of Pennsylvania Formula Fund, USA

# Feedback

# Appendices

## 1 MEDLINE search strategy

The following search strategy was used for MEDLINE (Ovid) and adapted for the other databases:

Database: Ovid MEDLINE(R) <1950 to September Week 2 2009>

---

1 randomized controlled trial.pt. (280715)

2 controlled clinical trial.pt. (80569)

3 random allocation.sh. (66134)

4 double blind method.sh. (103950)

5 single blind method.sh. (13431)

6 or/1-5 (419136)

7 (animals not humans).sh. (3351990)

8 6 not 7 (386901)

9 exp Clinical Trial/ (592292)

10 (clin* adj25 trial*).ti,ab. (166458)

11 ((singl* or doubl* or trebl* or tripl*) adj (blind* or mask*)).ti,ab. (101017)

12 placebos.sh. (28458)

13 "placebo*".ti,ab. (119631)

14 "random*".ti,ab. (461853)

15 research design.sh. (57860)

16 or/9-15 (999050)

17 16 not 7 (924382)

18 17 not 8 (551530)

19 comparative study.sh. (1465760)

20 exp Evaluation Studies/ (127079)

21 follow up studies.sh. (394373)

22 prospective studies.sh. (269217)

23 (control* or prospectiv* or volunteer*).ti,ab. (2130739)

24 or/19-23 (3663325)

25 24 not 7 (2808458)

26 25 not (8 or 18) (2286249)

27 8 or 18 or 26 (3224680)

28 palliative care/ or terminal care/ or hospice care/ or terminally ill/ (49332)

29 "hospice*".tw. (6008)

30 (palliat* or (terminal* adj6 ill*) or (terminal* adj3 care) or (end adj3 life)).tw. (44333)

31 ((care adj5 dying) or (caring adj5 dying) or (support$ adj5 dying) or (dying adj5 patient$)).tw. (5670)

32 ((advanced adj6 cancer) or (advanced adj6 carcinoma$) or (advanced adj6 neoplasm$) or (terminal$ adj6 cancer$) or (terminal$ adj6 carcinoma$) or (metastatic adj6 cancer) or (metastas$ adj6 cancer$) or (metastat$ adj6 carcinoma$) or (metastas$ adj6 carcinoma$) or (metastatic adj6 neoplasm$) or (metastas$ adj6 neoplasm$)).tw. (118468)

33 exp heart failure, congestive/ (66370)

34 exp liver failure/ (14011)

35 exp kidney failure/ (95611)

36 amyotrophic lateral sclerosis/ (9152)

37 exp Acquired Immunodeficiency Syndrome/ (69137)

38 exp pulmonary disease, chronic obstructive/ (12792)

39 (heart failure or cardiac failure or liver failure or kidney failure or renal failure or AIDS or ALS or COPD).tw. (270393)

40 or/28-39 (569525)

41 music therapy/ (1667)

42 (music$ or melod$).tw. (8474)

43 (sing or sings or singer$ or singing or song$).tw. (6779)

44 or/41-43 (14976)

45 40 and 44 (461)

46 27 and 45 (142)

## 2 CINAHL search strategy

(((((TX ( ( sing OR sings OR singer* OR singing OR song* ) ))) OR ((TX ( ( music* OR melod* ) ))) OR ((( MH "Music Therapy" ))))) AND ((((TX ( ( ( ( advanced N6 cancer ) OR ( advanced N6 carcinoma* ) OR ( advanced N6 neoplasm* ) OR ( terminal* N6 cancer* ) OR ( terminal* N6 carcinoma* ) OR ( metastatic N6 cancer ) OR ( metastas* N6 cancer* ) OR ( metastat* N6 carcinoma* ) OR ( metastas* N6 carcinoma* ) OR ( metastatic N6 neoplasm* ) OR ( metastas* N6 neoplasm* ) ) ) ))) OR ((TX ( ( ( ( care N5 dying ) OR ( caring N5 dying ) OR ( support N5 dying ) OR ( dying N5 patient* ) ) ) ))) OR ((TX ( ( ( palliat* OR ( terminal* N6 ill* ) OR ( terminal* N3 care ) OR ( end N3 life ) ) ) ))) OR ((TX ( hospice ))) OR (((MH "Terminally Ill Patients+"))) OR (((MH "Hospice Care"))) OR (((MH "Palliative Care"))) OR (((MH "Terminal Care+")))))) (443)

## 3 PsycInfo search strategy

Database: PsycINFO <1806 to September Week 3 2009>

---

1 palliative care/ or terminal care/ or hospice care/ or terminally ill/ (6302)

2 hospice$.tw. (2330)

3 (palliat$ or (terminal$ adj6 ill$) or (terminal$ adj3 care) or (end adj3 life)).tw. (8648)

4 ((care adj5 dying) or (caring adj5 dying) or (support$ adj5 dying) or (dying adj5 patient$)).tw. (1862)

5 ((advanced adj6 cancer) or (advanced adj6 carcinoma$) or (advanced adj6 neoplasm$) or (terminal$ adj6 cancer$) or (terminal$ adj6 carcinoma$) or (metastatic adj6 cancer) or (metastas$ adj6 cancer$) or (metastat$ adj6 carcinoma$) or (metastas$ adj6 carcinoma$) or (metastatic adj6 neoplasm$) or (metastas$ adj6 neoplasm$)).tw. (2054)

6 congestive heart failure.mp. (412)

7 kidney failure.mp. (71)

8 liver failure.mp. (92)

9 amyotrophic lateral sclerosis.mp. (980)

10 exp AIDS/ (9815)

11 chronic obstructive pulmonary disease.mp. (746)

12 (heart failure or cardiac failure or liver failure or kidney failure or renal failure or amyotrophic lateral sclerosis or AIDS or ALS or COPD or chronic obstructive pulmonary disease).tw. (29466)

13 or/1-12 (41002)

14 music therapy/ (2418)

15 music/ (8223)

16 (music$ or melod$).tw. (20899)

17 (sing or sings or singer$ or singing or song$).tw. (7545)

18 or/14-17 (26960)

19 empirical study.md. (1201714)

20 followup study.md. (31592)

21 longitudinal study.md. (58814)

22 prospective study.md. (10267)

23 quantitative study.md. (411458)

24 "2000".md. (15215)

25 treatment effectiveness evaluation/ (11023)

26 exp hypothesis testing/ (2009)

27 repeated measures/ (461)

28 exp experimental design/ (40485)

29 placebo$.ti,ab. (23078)

30 random$.ti,ab. (84840)

31 (clin$ adj25 trial$).ti,ab. (15016)

32 ((singl$ or doubl$ or trebl$ or tripl$) adj (blind$ or mask$)).ti,ab. (14268)

33 or/19-32 (1251197)

34 33 and 18 and 13 (131)

35 limit 34 to human (129)

## 4 CAIRSS search strategy

| | |
|---|---|
| Hospice OR (Hospice$) | 13 |
| (support? AND dying) OR (dying AND patient?) OR (caring AND dying) | 2 |
| Cancer OR Carcinoma? OR neoplasm? | 38 |
| terminal? OR metastatic OR palliative | 30 |
| COPD OR chronic obstructive pulmonary disease | 2 |
| congestive heart failure OR amyotrophic lateral sclerosis | 0 |
| kidney failure OR renal failure **OR** liver failure OR AIDS | 40 |
| heart failure OR cardiac failure | 0 |
| End of life | 0 |

## 5 CancerLit search strategy

| | | |
|---|---|---|
| #15 | Search **#13 AND #14** Limits: **Cancer** | 59 |
| #14 | Search **#7 OR #8 OR #9 OR #10 OR #11 OR #12** Limits: **Cancer** | 883 |
| #13 | Search **#1 OR #2 OR #5 OR #6** Limits: **Cancer** | 28566 |
| #12 | Search **(sing OR sings OR singer$ OR singing OR song$) .tw** Limits: **Cancer** | 21 |
| #11 | Search **melody** Limits: **Cancer** | 52 |
| #10 | Search **music** Limits: **Cancer** | 830 |
| #9 | Search **(music$ OR melody) .tw** Limits: **Cancer** | 0 |
| #8 | Search **(music$ or melod$).tw** Limits: **Cancer** | 0 |
| #7 | Search **music therapy/** Limits: **Cancer** | 371 |
| #6 | Search **((care adj5 dying) or (caring adj5 dying) or (support$ adj5 dying) or (dying adj5 patient$)).tw** Limits: **Cancer** | 0 |
| #5 | Search **(palliat$ or (terminal$ adj6 ill$) or (terminal$ adj3 care) or (end adj3 life)).tw** Limits: **Cancer** | 40 |

| | | |
|---|---|---|
| #2 | Search **hospice Limits: Cancer** Limits: **Cancer** | 12 |
| #1 | Search **palliative care/ or terminal care/ or hospice care/ or terminally ill/ Limits: Cancer** Limits: **Cancer** | 28550 |

## 6 CENTRAL search strategy

MeSH descriptor PALLIATIVE CARE this term only

MeSH descriptor TERMINAL CARE this term only

MeSH descriptor HOSPICE CARE this term only

(palliat* in Title, Abstract or Keywords or (terminal* in Title, Abstract or Keywords near/6 ill* in Title, Abstract or Keywords) or (terminal* in Title, Abstract or Keywords near/6 care in Title, Abstract or Keywords) or (end in Title, Abstract or Keywords near/6 life in Title, Abstract or Keywords) )

( (care in Title, Abstract or Keywords near/6 dying in Title, Abstract or Keywords) or (caring in Title, Abstract or Keywords near/6 dying in Title, Abstract or Keywords) or (support* in Title, Abstract or Keywords near/6 dying in Title, Abstract or Keywords) or (patient* in Title, Abstract or Keywords near/6 dying in Title, Abstract or Keywords) )

( (advanced in Title, Abstract or Keywords near/6 cancer in Title, Abstract or Keywords) or (advanced in Title, Abstract or Keywords near/6 carcinoma* in Title, Abstract or Keywords) or (advanced in Title, Abstract or Keywords near/6 neoplasm* in Title, Abstract or Keywords) or (terminal* in Title, Abstract or Keywords near/6 cancer* in Title, Abstract or Keywords) or (terminal* in Title, Abstract or Keywords near/6 carcinoma* in Title, Abstract or Keywords) or (metastatic in Title, Abstract or Keywords near/6 cancer* in Title, Abstract or Keywords) or (metastas* in Title, Abstract or Keywords near/6 cancer* in Title, Abstract or Keywords) or (metastatic in Title, Abstract or Keywords near/6 carcinoma* in Title, Abstract or Keywords) or (metastas* in Title, Abstract or Keywords near/6 carcinoma* in Title, Abstract or Keywords) or (metastatic in Title, Abstract or Keywords near/6 neoplasm* in Title, Abstract or Keywords) or (metastas* in Title, Abstract or Keywords near/6 neoplasm* in Title, Abstract or Keywords) )

MeSH descriptor HEART FAILURE, CONGESTIVE explode all trees

MeSH descriptor LIVER FAILURE explode all trees

MeSH descriptor KIDNEY FAILURE explode all trees

MeSH descriptor NEURODEGENERATIVE DISEASES explode all trees

MeSH descriptor ACQUIRED IMMUNODEFICIENCY SYNDROME this term only

(heart next failure in Title, Abstract or Keywords or liver next failure in Title, Abstract or Keywords or kidney next failure in Title, Abstract or Keywords)

"AIDS" in Title, Abstract or Keywords

neurodegenerative in Title, Abstract or Keywords

(#1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14 or #15)

MeSH descriptor MUSIC THERAPY this term only

music* in Title, Abstract or Keywords

melod* in Title, Abstract or Keywords

(sing in Title, Abstract or Keywords or sings in Title, Abstract or Keywords or singer* in Title, Abstract or

Keywords or singing in Title, Abstract or Keywords or song* in Title, Abstract or Keywords)

(#17 or #18 or #19 or #20)

(#16 and #21)

## 7 Embase search strategy

### *Database: EMBASE <1980 to 2009 Week 40>*

1 randomized controlled trial/ (174302)

2 exp controlled clinical trial/ (186571)

3 exp randomization/ (27081)

4 double blind procedure/ (74240)

5 single blind procedure/ (8566)

6 4 or 1 or 2 or 5 or 3 (228315)

7 (animal not human).sh. (14494)

8 6 not 7 (228265)

9 clinical trial/ (558078)

10 (clin* adj25 trial*).ti,ab. (153448)

11 ((singl* or doubl* or trebl* or tripl*) adj (blind* or mask*)).ti,ab. (95808)

12 (placebo* or random*).ti,ab. (459826)

13 (placebo or methodology).sh. (543436)

14 12 or 11 or 13 or 10 or 9 (1304446)

15 14 not 7 (1301414)

16 15 not 8 (1076802)

17 (comparative study or follow up or prospective study).sh. (474644)

18 exp evaluation/ (55561)

19 (control* or prospectiv* or volunteer*).ti,ab. (1815407)

20 19 or 18 or 17 (2161261)

21 20 not 7 (2159141)

22 21 not (8 or 16) (1731034)

23 22 or 8 or 16 (3036101)

24 palliative care/ or terminal care/ or hospice care/ or terminally ill/ (20192)

25 "hospice*".tw. (2497)

26 (palliat* or (terminal* adj6 ill*) or (terminal* adj3 care) or (end adj3 life)).tw. (34238)

27 ((care adj5 dying) or (caring adj5 dying) or (support$ adj5 dying) or (dying adj5 patient$)).tw. (3456)

28 ((advanced adj6 cancer) or (advanced adj6 carcinoma$) or (advanced adj6 neoplasm$) or (terminal$

adj6 cancer$) or (terminal$ adj6 carcinoma$) or (metastatic adj6 cancer) or (metastas$ adj6 cancer$) or (metastat$ adj6 carcinoma$) or (metastas$ adj6 carcinoma$) or (metastatic adj6 neoplasm$) or (metastas$ adj6 neoplasm$)).tw. (103437)

29 exp heart failure, congestive/ (29777)

30 exp liver failure/ (17829)

31 exp kidney failure/ (104844)

32 amyotrophic lateral sclerosis/ (10375)

33 exp Acquired Immunodeficiency Syndrome/ (70145)

34 exp pulmonary disease, chronic obstructive/ (32598)

35 (heart failure or cardiac failure or liver failure or kidney failure or renal failure or AIDS or ALS or COPD).tw. (217705)

36 or/24-35 (485644)

37 music therapy/ (1456)

38 (music$ or melod$).tw. (6070)

39 (sing or sings or singer$ or singing or song$).tw. (4872)

40 or/37-39 (11091)

41 36 and 40 (286)

42 23 and 41 (108)

## 8 Specialist Music Therapy Research Database

### *Available at musictherapyworld.de*

The site's research register, dissertation archive, and bibliography were searched for the following terms: end-of-life, palliative, terminal care, terminally ill, hospice, dying (14)
This database is no longer functional.

## 9 Proquest Digital Dissertations

1. (Hospice OR Hospice$ OR Palliative OR Palliat$) AND ((Music Therapy) OR Music$ OR Sing$ OR Song) (14)

2. ((Hospice care) OR (Palliative care)) AND ((Music Therapy) OR Music$ OR Sing$ OR Song) (6)

3. ((Terminal care) OR (Terminally ill)) AND ((Music Therapy) OR Music$ OR Sing$ OR Song) (4)

4. (End-of -life ) AND ((Music Therapy) OR Music$ OR Sing$ OR Song) (5)

5. ((metastas$ adj6 neoplasm$) OR (congestive heart failure)) AND ((Music Therapy) OR Music$ OR Sing$ OR Song) (1)

6. ((amyotrophic lateral sclerosis) OR ALS OR AIDS) AND ((Music Therapy) OR Music$ OR Sing$ OR Song) (1064)

7. ( kidney failure OR liver failure) and ((Music Therapy) OR Music$ OR Sing$ OR Song) (1)

8. ((chronic obstructive pulmonary disease) OR COPD OR (heart failure) OR (cardiac failure) AND ((Music Therapy) OR Music$ OR Sing$ OR Song) (6)

9. ((liver failure) OR (kidney failure) OR (renal failure)) AND ((Music Therapy) OR Music$ OR Sing$ OR Song) (2)

Duplicates removed: 1094 hits

## 10 ClinicalTrials.gov search strategy

music OR (music therapy) OR singing OR song OR songs OR melody (240)

## 11 Current Controlled Trials search strategy

Music OR (music therapy) (18)

Sing OR sings OR singing OR song OR songs OR melody OR melodies (11)

## 12 National Research Register search strategy

(music OR (music therapy) OR (music near therapy)) AND ((end-of-life) OR (terminal illness) OR (terminally ill) or (terminal care) or hospice) (165)

## 13 LILACS search strategy

Music$ [Palavras] and ((end-of-life) OR (terminally ill) OR (terminal care) OR (terminal illness) OR (hospice)) [Palavras] (1 )

(music therapy) [Palavras] and ((end-of-life) OR (terminally ill) OR (terminal care) OR (terminal illness) OR (hospice)) [Palavras] (1 )

(sing OR sings OR singing OR song OR songs ) [Palavras] and ((end-of-life) OR (terminally ill) OR (terminal care) OR (terminal illness) OR (hospice)) [Palavras] (0)