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ORIGINAL ARTICLE

Patients' perception of music versus ordinary sound in a postanaesthesia care unit: A randomised crossover trial

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Summary We performed an experimental single-blind crossover design study in a postanaesthesia care unit (PACU): (i) to test the hypothesis that patients will experience a higher degree of wellbeing if they listen to music compared to ordinary PACU sounds during their early postoperative care, (ii) to determine if there is a difference over time, and (iii) to evaluate the importance of the acoustic environment and whether patients prefer listening to music during their stay. Two groups received a three-phase intervention: one group ($n = 23$) experienced music—ordinary sound—music and the second group ($n = 21$) experienced ordinary sound—music—ordinary sound. Each period lasted 30 min, and after each period the patients assessed their experience of the sound. The results demonstrated a significant difference ($p < 0.001$) between groups in the proportions of patients reporting that the acoustic environment was of *great importance* for their wellbeing during the three-phase intervention, and most participants ($n = 36$ versus $n = 8$) noticed that they were exposed to different sounds during the PACU period. The results also revealed that most participants ($n = 32$) preferred listening to *music* versus listening to *ordinary sound* ($n = 3$) while in the PACU ($p < 0.001$). These findings promote use of listening to music to establish a healing environment for patients in a postanaesthesia care unit.

Introduction

Clinical practitioners face many challenges in caring for the physical needs of their hospitalised patients. Meeting the holistic needs of patient's poses another challenge because these therapeutic interventions, e.g. listening to music, are usually viewed as ''extras'' (Nilsson, 2008). Nurses have the responsibility to establish holistic care; care that includes

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a healing environment for the patient and an environment that reduces stress. A healing environment helps patients refocus from negative stimuli to something pleasant and familiar, allowing them to escape into ''their own world'' (Dunn, 2004; Heiser et al., 1997; McCaffrey, 2008; Nilsson, 2008). One feature of such an environment might be soothing music, an intervention that can help patients focus their awareness on the music and help in relaxation. Listening to music is an interdisciplinary tool that uses recorded music to facilitate patients' healing (Nilsson, 2008). Music is also closely linked to emotions and arousal. Evidence suggests that listening to music modulates emotional arousal as indexed by changes in cardiovascular and respiratory activity (Bernardi et al., 2006). It has also been suggested that music has an analgesic effect in reducing anxiety and directing attention away from negative experience, thus helping patients cope with emotional stress (Good et al., 2001; Nilsson, 2008).

Postoperative recovery has been defined as an ''energy-requiring process of returning to normality and wholeness. It is defined by comparative standards, achieved by regaining control over physical, psychological, social and habitual functions, resulting in a return to the preoperative level of independence/dependency in activities of daily living and optimum level of psychological wellbeing'' (Allvin et al., 2007, p. 552). In a recent review of using different types of relaxing music in perioperative care, Nilsson (2008) concluded that soothing music can improve patients' postoperative recovery process by reducing subjective pain experience and reducing requirements for morphine-like analgesics. These results were also found in a Cochrane review on music and pain (Cepeda et al., 2006) and in a meta-analysis on music medicine and music therapy (Dileo and Bradt, 2005). More recent studies on postoperatve pain, i.e. not included in the three reviews reported above, found pain reduction in the first two days after gynaecologic surgery (Good and Ahn, 2008) and in immediate postoperative recovery following elective caesarean section surgery (Ebneshahidi and Mohseni, 2008). However, Reza et al. (2007) did not find a reduction in pain following elective caesarean section surgery.

Other positive effects on patients' postoperative recovery, e.g. reduced acute confusion and delirium in elderly patients undergoing elective hip and knee surgery (Ruth and Locsin, 2004) and reduced anxiety and intubation time after cardiovascular surgery have been reported (Twiss et al., 2006). Studies have also shown a reduced physiological stress response in the immediate postoperative period, e.g. in recovery of decreased cortisol levels after hernia repair surgery (Nilsson et al., 2005) and after different types of day surgery (Leardi et al., 2007). However, listening to music postoperatively seems to have little or no effect on vital signs such as blood pressure, heart rate and respiratory rate (Dileo and Bradt, 2005; Ebneshahidi and Mohseni, 2008; Nilsson, 2008).

The studies discussed include different types of soft and relaxing music with 60—80 beats per minutes (bpm) apart from the study by Good and Ahn (2008), which used Korean music with 80—110 bpm. However, a clear picture has not emerged regarding which genre is most beneficial (Dileo and Bradt, 2005; Nilsson, 2008). The soft and relaxing music (MusiCure, 2009) used in our study includes different melodies composed of harp, cello and strings with elements of natural sound, e.g. rainforest, birdcalls and falling rain. The music has no dramatic changes. This MusiCure music was composed specifically for relaxation (by Niels Eje, Gefion Records, Copenhagen, Denmark) based on an investigation of the acoustic environment in hospitals and its impact on patients in a postanaesthesia care unit (PACU) (Thorgaard et al., 2005). MusiCure music has been tested in relation to patients' pain, discomfort and wellbeing during placement of a femoral nerve block (Nikolajsen et al., 2009) and patients' pain and stress responses in heart surgery (Nilsson, in press-a). It was also tested in relation to relaxation (Nilsson, in press-b) on day one of postoperative recovery and in relation to patients' pain, angina, anxiety and experience of the acoustic environment during percutaneous coronary intervention (Nilsson et al., in press). Two of these studies found some positive effects, e.g. decreased cortisol levels (Nilsson, in press-a) and increased oxytocin levels and subjective relaxation levels (Nilsson, in press-b). The other two studies showed no effects (Nikolajsen et al., 2009; Nilsson et al., in press).

In summary, we found evidence showing that different genres of soothing music have a positive effect on patients' postoperative recovery as reflected in reduced pain and analgesic requirements. Such music also appears to reduce stress. However, there is no evidence that demonstrates that soothing music, such as MusiCure, has a positive effect on patients' postoperative wellbeing and whether or not patients prefer listening to music comparison to ordinary sound during their immediate postoperative recovery. For the purpose of this study wellbeing is defined as the sense of satisfaction in the present moment.

Aim

The aims of this study were: (i) to test the hypothesis that patients will experience a higher degree of wellbeing if they listen to music compared to ordinary PACU sounds during their early postoperative care; (ii) to determine if there is a difference over time and (iii) to evaluate the importance of the acoustic environment and whether patients prefer listening to music during their postanaesthesia care period

Methods

Participants and settings

This study was an experimental, single-blind cross over design study. It included 50 patients and was conducted at the postanaesthesia care unit in a university hospital. Patients were consecutively and prospectively enrolled between Monday and Thursday during September 2004. Inclusion criteria for patients were: 18 years or older; could read and understand Swedish; had undergone surgery and expected to need at least two hours of recovery in a PACU. Exclusion criteria were: hearing impairment; postoperative recovery care after 17:00 h; or difficulty to cooperate in measurements, e.g. cognitive impairment.

Procedure

Consecutive patients were asked to participate in the study on registration in each ward on the day before surgery. Verbal and written information described the aim of the study as an evaluation of the acoustic environment at the PACU, i.e. no mention was made about music. Patients were randomly allocated to one of two groups based on random envelopes that the PACU staff drew from two boxes, one for men and one for women, on entry into the trial. The groups were divided to ensure an equal number of men and women. The first author picked the next available number for entry into the trial and conducted all interventions and outcome assessments. Patients were not aware of their assigned group.

All patients used an ergonomic audio pillow, 65 cm × 30 cm (Wellness Musicpillow, 2009). The pillow contained two loudspeakers, connected to a compact disc (CD) player. Only the patient lying on the pillow heard the music, which was inaudible to other patients or the staff. Three audio pillows were available and were hygienic and technically approved by the biomedical technology department. Each pillow was covered with a pillowcase. The audio pillow was placed on the patient's bed before he/she arrived at the PACU.

Intervention

Two groups received a three-phase intervention: one group ($n = 23$) experienced music, ordinary sound and music (MOM) and the second group ($n = 21$) experienced ordinary sound, music and ordinary sound (OMO). Each period lasted 30 min and after each period the patients assessed their experience of the sound. The music used was MusiCure (MusiCure, 2009) and the ordinary sound intervention implied no music, i.e. ordinary sound from the PACU environment. The interventions started after 30 min of standard care in the PACU (Fig. 1).

MOM group: music—ordinary sound—music
During their first 30 min of the intervention the patients listened to music delivered via a music pillow. Then the music was stopped and 30 min passed with no music being delivered via the pillow, i.e. ordinary sound. After this period the patients again listened to 30 min of music (Fig. 1).

OMO group: ordinary sound—music—ordinary sound
This group received the same type of intervention as the *MOM* group, but the *ordinary sound* and the *music* periods were presented in reversed order, i.e. 30 min of silence, 30 min of music and 30 min of silence (Fig. 1).

Outcome assessment

The questionnaire was study-specific and developed by the authors based on knowledge of the research field and professional experience of PACU care. The questionnaire included the following issues:

1. Patient's level of wellbeing assessed by a five-point scale from ''*excellent*'' to ''*very poor*''.

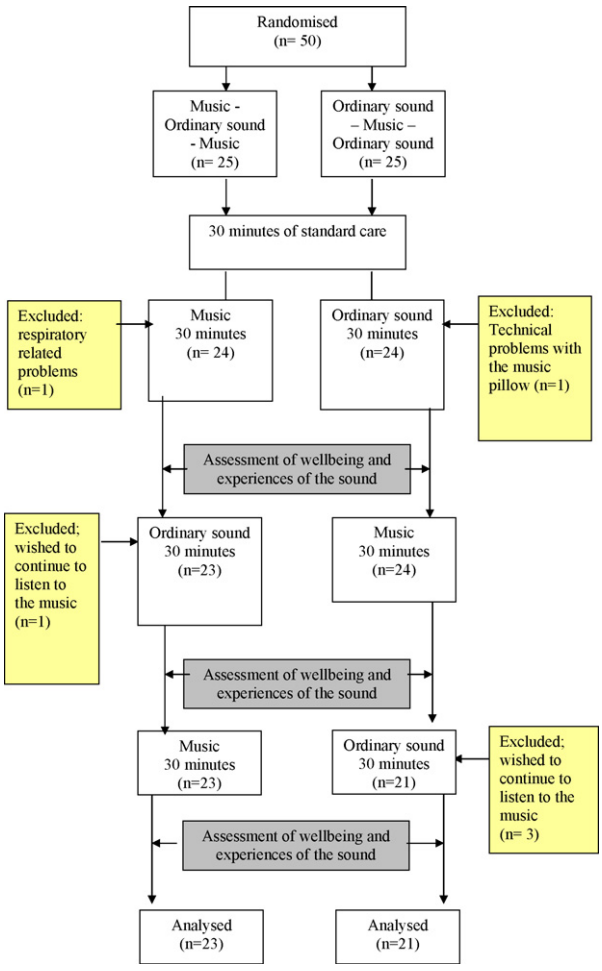

Figure 1 Study flowchart of the trial.

2. Patients opinion of the importance of the acoustic environment assessed by ''*great importance*'' or ''*no importance*''.
3. The patient's rating of the acoustic environment assessed by ''*like*'' or ''*dislike*''.
4. If the patient noticed any difference between the sounds during the PACU period, assessed by ''*yes*'' or ''*no*''.
5. Which intervention period the patient thought was the most pleasant, assessed by ''*music*'' or ''*ordinary sound*''.

Before commencing the study, we conducted a pilot study to test the face validity. Five patients answered the questionnaire to investigate whether they understood the questions. The results of the pilot study indicated that no modifications were necessary.

The first author measured the responses verbally after each period in the intervention. Issues one though to three were assessed for all three periods in the intervention while issues four and five were assessed for the third period only.

Ethical considerations

The study followed common ethical principles in clinical research and was approved by the regional Ethics Committee

Table 1 Comparison of patients' characteristics age, gender and analgesia technique.

	MOM ($n=23$)	OMO ($n=21$)
Age (years)	56 (20.1)[a]	58 (17.2)[a]
Gender, *n*		
Male	12	9
Female	11	12
Type of analgesia technique, *n*		
Spinal/local	5	5
General	18	16

MOM = music—ordinary sound—music; OMO = ordinary sound—music—ordinary sound.
[a] Mean (±SD).

in Lund, Sweden. All patients gave verbal and written informed consent and were notified in writing that they had the option to withdraw from the study after receiving the information. Participants were also entitled to make individual decisions regarding how long they wished to participate and under what conditions. Furthermore, the participants were informed that they could withdraw from the study at any time without any adverse effects to their care.

Data analysis

To identify changes over time in the two intervention groups, *MOM* and *OMO*, we used the Friedman and McNemar tests for related samples. To test differences between groups we used Mann—Whitney and chi-square tests for independent samples. A *p*-value below 0.05 was considered to indicate a statistically significant difference. All statistical analyses involved the use of the SPSS program for Mac OS, version 13.0 (SPSS Inc., Chicago, IL, USA).

Results

Six patients from the total group of 50 were excluded for the following reasons: four patients were excluded because they expressed a personal choice to listen to *music* even during the *ordinary sound* periods; one patient had respiratory related problems and one patient experienced technical problems with the music pillow. Consequently, 44 patients were enrolled in this study, 23 in the *MOM* group and 21 in the *OMO* group (Fig. 1). The two groups were comparable with respect to age, gender and type of anaesthesia (Table 1).

Regarding the design chosen for this study, there was two aspects of interest to identify; differences between groups and changes over time (within-group differences). These aspects are addressed below.

Wellbeing

We found no differences between the groups regarding the distribution of patients' sense of wellbeing (Mann—Whitney, $p > 0.05$) after each intervention period (Fig. 2). Using the Friedman test for the two intervention groups, *MOM* and *OMO*, we noticed a significant change in wellbeing in the *OMO* group ($p > 0.01$) after the second intervention.

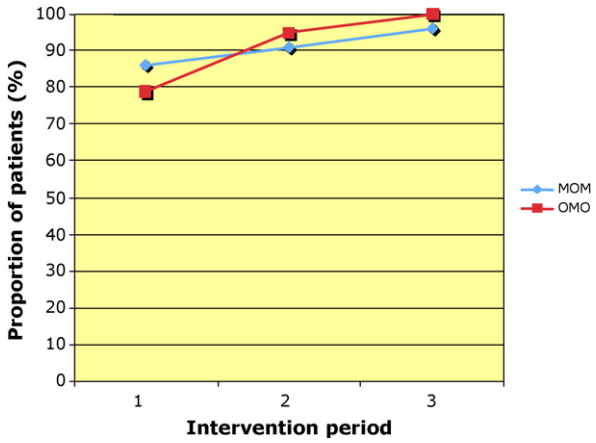

Figure 2 The distribution of patients' well being scores (excellent or good) after the three intervention periods. *Abbreviations*: MOM = music—ordinary sound—music; OMO = ordinary sound—music—ordinary sound.

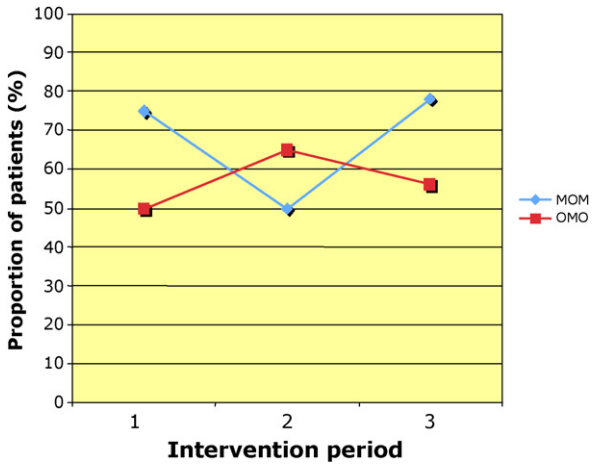

Figure 3 The proportions of patients reporting that the acoustic environment had *great importance* for their wellbeing during the three intervention periods. *Abbreviations*: MOM = music—ordinary sound—music; OMO = ordinary sound—music—ordinary sound.

None of the patients expressed *very poor* wellbeing during any of the three intervention periods.

Importance of the acoustic environment

We found a significant difference between the groups in the proportions of patients reporting that the acoustic environment had *great importance* for their wellbeing during the three intervention periods ($p < 0.001$). Hence, the periods of listening to music were viewed to have greater importance for the patients' wellbeing (Fig. 3).

Rating of sounds during the PACU stay

Although the McNemar test showed no significant changes over time within the intervention groups ($p > 0.05$), a significant difference between groups was found after the second intervention. In the *OMO* group, all patients reported that

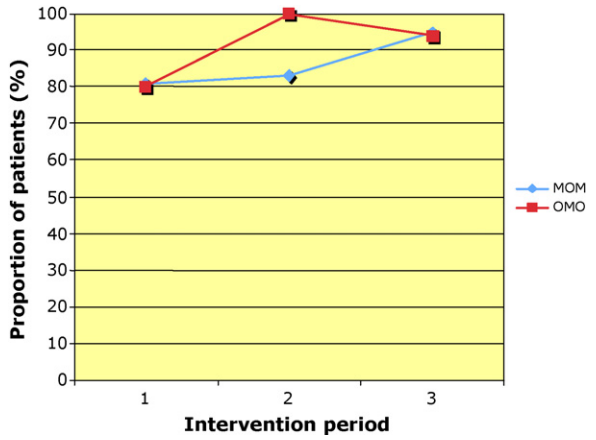

Figure 4 The proportion of patients reporting that they liked the sound during the three interventions. *Abbreviations*: MOM = music—ordinary sound—music; OMO = ordinary sound—music—ordinary sound.

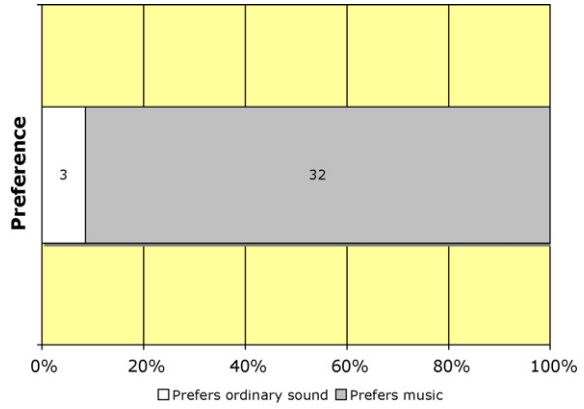

Figure 5 Distribution of patients' preferences: listening to music or to ordinary sound in the postanaesthesia care unit. The numbers in bars show number of patients.

they liked the sound after the second intervention. Hence, the transfer from listening to ordinary PACU sounds to listening to music appeared to be positive (Fig. 4).

Furthermore, most participants ($n = 36$ versus $n = 8$) noticed that they were exposed to different sounds, i.e. *music* and *no music* during the PACU period. The results also showed that most participants ($n = 32$) preferred listening to *music* versus listening to *ordinary sound* ($n = 3$) during their postanaesthesia care ($p < 0.001$) (Fig. 5).

Discussion

The first major finding of this study is that music appeared to increase the patients' opinion of the importance of the acoustic environment during their early postoperative care period at the PACU. Secondly, listening to music appeared to play an important role for patients' wellbeing during their early postoperative care period at the PACU. Thirdly, the majority of participants preferred listening to *music* instead of *ordinary sound*. This is highlighted by the fact that four patients were excluded, as they did not want to stop listening to the music after the 30-min intervention and chose to continue with the music. The critical moments in this study occurred when the acoustic environment changed. This is illustrated by the fact that when the *OMO* group was exposed to music (intervention two) they found this to be a positive change. Furthermore, when the *MOM* group was exposed to music for the second time (intervention three) the patients reported that the acoustic environment (e.g. listening to music) played an important role for their well-being. It seems that the music refocuses attention towards pleasing, soothing, and preferred stimuli rather than the unfamiliar ambient sounds of a PACU. Patients are clearly aware of the multitude of sounds, e.g. from machines and alarms, in the PACU environment.

Our findings in this study are consistent with the study by McCaffrey and Good (2000) that showed music has a comforting effect giving patients a sense of familiarity with sounds in a hospital setting. It has also been shown that patients' experience of listening to music postoperatively is positive, aids distraction and increases comfort (Dunn, 2004; Heiser et al., 1997; McCaffrey, 2008; Shertzer and Keck, 2001). Establishing a familiar environment for the patient is of considerable importance and a part of holistic patient care (McCaffrey, 2008; Nilsson, 2008).

In the present study we used music specially composed for relaxation, MusiCure. Previous studies have highlighted the importance of the music genre, but no clear picture has emerged regarding which genre is most beneficial (Nilsson, 2008). Some music therapists suggest that classical music is the best music for relaxation because the musical pieces are consistent (Bunt, 1994). They also suggest that the music should be familiar, desirable and meaningful to the listener (Cunningham et al., 1997). Researchers in some studies have allowed the patients to select the genre of music from a list of approximately five different types, i.e. patient-selected music, whereas other studies have used same type of music, i.e. researcher-selected music, for all participants. The results of these studies are not strictly comparable, as different methods of investigation were used, i.e. length of intervention, volume, time period and choice of sound source (Nilsson, 2008). Yet, the results from a meta-analysis (Dileo and Bradt, 2005) and a systematic review (Nilsson, 2008) have not shown any differences in the effects of researcher-selected versus patient-selected music.

Limitations

Methodological concerns exist with this study and are acknowledged. Firstly, the questionnaire did not undergo psychometric testing, such as internal consistency, homogeneity or content validity and some of the answers were dichotomous. Secondly, the intervention was not strictly blinded to the participants, i.e. the participants were aware of the music but not of their assigned group and the purpose of comparing music with ordinary sound. Thirdly, the sample size in this study was small. However, the crossover design used in this study has not been found in other studies measuring music in perioperative settings. This design enables the researcher to compare individual preferences for music intervention versus no music. We also used two different crossover designs to compare if there were any difference

regarding the number of musical periods that the patients had listened to. We therefore suggest that further research with larger sample sizes is needed to examine music interventions in postoperative care using crossover design and psychometrically tested outcomes. Studies also need to test different genres of music and their effects on postoperative recovery.

Conclusions and practice implications

The present study contributes to the knowledge of music's importance for patients' experience of environmental sounds. It also shows that patients prefer to listen to music instead of ordinary ''hospital sounds''. The findings presented in this study lend support to nurses using music interventions in establishing a healing environment for patients at a postanaesthesia care unit. Music enhances the environment of patients recovering from surgery by providing them with an environment of reassuring sounds to help them awake from anaesthesia in a calm and comforting manner. As a nursing intervention, playing recorded music can be a helpful therapeutic tool to facilitate healing in patients. The ability of nurses to use music listening as an intervention for patients undergoing postoperative care promotes nursing autonomy and the notion that nurses can influence the patient's environment.

Conflicts of interest

The authors have no conflicts of interest.

References

Allvin R, Berg K, Idvall E, Nilsson U. Postoperative recovery: a concept analysis. J Adv Nurs 2007;57:552—8.

Bernardi L, Porta C, Sleight P. Cardiovascular, cerebrovascular, and respiratory changes induced by different types of music in musicians and non-musicians: the importance of silence. Heart 2006;92:445—52.

Bunt L. Music therapy: an art beyond words. London: Routledge; 1994.

Cepeda MS, Carr DB, Lau J, Alvarez H. Music for pain relief. Cochrane Database Syst Rev 2006:CD004843.

Cunningham MF, Monson B, Bookbinder M. Introducing a music program in the perioperative area. AORN J 1997;66:674—82.

Dileo C, Bradt J. Medical music therapy: a meta-analysis and agenda for future research. Cherry Hill, NJ: Jeffrey Books; 2005.

Dunn K. Music and the reduction of post-operative pain. Nurs Stand 2004;18:33—9.

Ebneshahidi A, Mohseni M. The effect of patient-selected music on early postoperative pain, anxiety, and hemodynamic profile in cesarean section surgery. J Altern Complement Med 2008;14:827—31.

Good M, Stanton-Hicks M, Grass JA, Anderson GC, Lai HL, Roykulcharoen V, et al. Relaxation and music to reduce postsurgical pain. J Adv Nurs 2001;33:208—15.

Good M, Ahn S. Korean and American music reduces pain in Korean women after gynecologic surgery. Pain Manage Nurs 2008;9:96—103.

Heiser RM, Chiles K, Fudge M, Gray SE. The use of music during the immediate postoperative recovery period. AORN J 1997;65:777—85.

Leardi S, Pietroletti R, Angeloni G, Necozione S, Ranalletta G, Del Gusto B. Randomized clinical trial examining the effect of music therapy in stress response to day surgery. Br J Surg 2007;94:943—7.

McCaffrey R. Music listening: its effects in creating a healing environment. J Psychosoc Nurs Ment Health Serv 2008;46:39—44.

McCaffrey RG, Good M. The lived experience of listening to music while recovering from surgery. J Holist Nurs 2000;18:378—90.

MusiCure. Gefion Records, Copenhagen, Denmark; 2009. Available from: http://www.musicure.com/ [cited November 9, 2008].

Nikolajsen L, Lyndgaard K, Schriver NB, Moller JF. Does audiovisual stimulation with music and nature sights (MuViCure) reduce pain and discomfort during placement of a femoral nerve block? J Perianesth Nurs 2009;24(1):14—8.

Nilsson U. The anxiety- and pain-reducing effects of music interventions: a systematic review. AORN J 2008;87, 780, 2, 5—94, 97—807.

Nilsson U. Soothing music can increase oxytocin levels during bed rest after open-heart surgery: a randomized control trial. J Clin Nurs, in press-a.

Nilsson U. The effect of music intervention in stress response to cardiac surgery: a randomized clinical trial. Heart Lung, in press-b, doi:10.1016/j.hrtlng.2008.07.008.

Nilsson U, Lindell L, Eriksson A, Kellerth T. The effect of music intervention in relation to gender during coronary angiographic procedures: a randomized clinical trial. Eur J Cardiovascular Nurs, in press, doi:10.1016//j.ejcnurse.2009.01.001.

Nilsson U, Unosson M, Rawal N. Stress reduction and analgesia in patients exposed to calming music postoperatively: a randomized controlled trial. Eur J Anaesthesiol 2005;22:96—102.

Reza N, Ali SM, Saeed K, Abul-Qasim A, Reza TH. The impact of music on postoperative pain and anxiety following cesarean section. Middle East J Anesthesiol 2007;19:573—86.

Ruth M, Locsin R. The effect of music listening on acute confusion and delirium in elders undergoing elective hip and knee surgery. J Clin Nurs 2004;13:91—6.

Shertzer KE, Keck JF. Music and the PACU environment. J PeriAnest Nurs 2001;16:90—102.

Thorgaard P, Ertmann E, Hansen V, Noerregaard A, Spanggaard L. Designed sound and music environment in postanaesthesia care units—a multicentre study of patients and staff. Intensive Crit Care Nurs 2005;21:220—5.

Twiss E, Seaver J, McCaffrey R. The effect of music listening on older adults undergoing cardiovascular surgery. Nurs Crit Care 2006;11:224—31.

Wellness Musicpillow. Sleep-Well-Ness; 2009. Available from: http://www.sleep-well-ness.dk/ [cited November 9, 2008].