Arts and Music in Healthcare:
An overview of the medical literature: 2004-2011
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I am very pleased to introduce this review of the medical literature on arts and health published since 2004.

The Hospital Arts programme of Chelsea and Westminster Health Charity helps to create a healing environment within Chelsea and Westminster Hospital, where visual and performing arts are combined to help relieve anxiety and assist in recovery. In 1995, the hospital was the first in Britain to provide weekly live performances for patients, staff and visitors, and the first to carry out any significant research on the impact that the arts can have on patient wellbeing.

This review is the second piece of research completed by Rosalia Staricoff on behalf of Chelsea and Westminster Health Charity. Between 1999 and 2002, Dr Staricoff conducted a pioneering research programme in Chelsea and Westminster Hospital, which provided evidence that the integration of performing and visual arts into the healthcare environment induce psychological, physical and biological outcomes which could have clinical significance. This research has provided, and will continue to provide, the basis of all the work that the Hospital Arts team carry out, from the maintenance of the art collection to the provision of music-based interactions with a huge range of patients.

I would like to thank Rosalia Staricoff and Stephen Clift for their committed and thorough work in preparing this review.

**Christian Brodie**

**Chairman, Chelsea and Westminster Health Charity**
SUMMARY

Introduction
This report is an update of the review of arts in health research conducted for Arts Council England which appeared in 2004 (Staricoff, 2004).

Method
A search strategy to identify relevant research reports was based upon Staricoff (2004). The vast majority of studies identified were concerned with music interventions, and this review focuses on these. The present review is not ‘systematic’ as it covers a wide range of health issues, and time and resources precluded the application of quality screens and data extraction.

Findings
One hundred and three studies were identified which offer evidence of the effect of music interventions on psychological and physiological outcomes of patients in a hospital environment. Studies are organised under the following headings:

Maternity
The intervention of music on prenatal care and childbirth has been studied with increasing interest in the last decade mainly addressing the state of anxiety and depression of the mothers-to-be. The beneficial effect achieved promotes early mother-child contact and reduces length of stay in hospital.

Neonatal and intensive care
The special care of premature infants is the subject of a number of research studies exploring the influence that music, mother singing and lullabies can have in their development. They have shown evidence of beneficial effect on weight gain, oxygen saturation improvements, feeding and crying. The intervention of music was well accepted by medical staff and supported by a positive attitude of the parents.

Children
The psychological and physiological responses of children to art interventions in hospital care have been addressed in many studies. Research has shown beneficial effects of music intervention on behaviour and clinical outcomes.

Cardiovascular conditions
Music interventions can have an important role during a number of procedures for screening and diagnosis, reducing significantly the level of stress and anxiety, blood pressure and heart rate. The use of music delivered by headphones or tapes has been shown to be very effective in reducing levels of anxiety and stabilizing vital signs.
**Surgery and pain management**
Music can have a positive role during the pre-operative stage, during surgery and for post-operative recovery. It significantly reduces anxiety and stress and helps to normalize vital signs. Of great importance are the findings on the significant reduction of anaesthetics, medication for sedation and analgesics. These results also showed that music interventions can contribute to achieve cost-benefits effects.

**Lung diseases**
Music and singing play an important role in the functional activities of the respiratory system, significantly benefiting patients with breathing problems.

**Oncology**
Music intervention in cancer care has been shown to have an effect of reducing the levels of high anxiety and depression, and it could also help to control some of the side effects of the treatment.
This report is an update of the review of arts in health research conducted for Arts Council England which appeared in 2004 (Staricoff, 2004). It was commissioned by Chelsea and Westminster Health Charity with two principal objectives:

a) To identify relevant literature published between 2004 and 2011 on the effects of arts interventions in the context of healthcare, and

b) To provide a basis for the Charity to plan further research to build upon the research programme conducted in Chelsea and Westminster Hospital between 1999-2002 (Staricoff, 2003).

The field of arts and health practice and research has expanded considerably over the last twenty years across the UK. There is also considerable interest in the value of the arts for health care and health promotion internationally. ‘Arts & Health: An international journal for research, policy and practice’ has published a series of articles on the state of arts and health in England, the US, Canada, Australia and Norway/Sweden. These papers highlight the creative vitality of this field and document a wide range of practical activities. They also emphasise the need for robust evaluation and research if the role of arts in health is to continue to develop and be mainstreamed in the context of health service delivery.

The development of Maggie’s Centres for cancer care has stimulated further debates about the importance of hospital architecture, and all aspects of interior space and design in promoting healing in a holistic sense. In their contributions to ‘Architecture of Hope’, Jencks and Heathcote (2010) write movingly about the personal circumstances of people with life-threatening illnesses, and the sometimes negative impacts of being cared for in soulless, dreary and noisy hospital environments. They remind us of the need to remember the patient’s perspective in any discussions of arts and health practice and the process of evaluation and research.

Chelsea and Westminster Hospital has been at the forefront of developments in arts and health in the UK, and particularly in pioneering an original programme of research to assess the clinical contributions of visual and performing arts in the context of on-going healthcare within the hospital. The research provided evidence from small controlled studies in a range of clinical settings in the hospital of positive benefits on clinical measures from visual art being displayed and music performed. The findings attracted considerable attention and are widely quoted by practitioners in the field of hospital arts. Nevertheless, the small-scale of the studies undertaken meant that the work could not achieve the recognition it deserved through publication in mainstream peer-reviewed medical journals, which have a bias towards publication of large-scale randomised controlled trials and epidemiological research.
The consequences of this lack of peer-reviewed publications are clearly revealed by a Google Scholar search based on the Arts Council England review and the Chelsea and Westminster research report. As of April 2011 these reports had been cited, respectively, in 78 and 16 subsequently published reports and papers.¹ Very few of the sources identified through these searches were reporting findings from subsequent research studies on arts in healthcare settings, and certainly none reported research which built upon and extended the nature of the work undertaken in Chelsea and Westminster.

A recent report from the British Medical Association (2011) on the ‘Psychological and Social Needs of Patients’ should also be mentioned. The aim of the report is to identify the key needs of patients and to explore ways in which they can be met in healthcare environments beyond the provision of appropriate clinical care. They draw upon the findings from Staricoff (2003) in the following passage:

Creating a therapeutic healthcare environment extends beyond the elimination of boredom. Arts and humanities programmes have been shown to have a positive effect on inpatients. The measured improvements include:

- inducing positive physiological and psychological changes in clinical outcomes
- reducing drug consumption
- shortening length of hospital stay
- promoting better doctor-patient relationships
- improving mental healthcare

(BMA, 2011, p.9)

The report goes on to identify the following range of activities which may contribute to meeting patients’ psychological and social needs: recreational activities; humour; creative writing, storytelling and poetry; music; visual art; dancing and singing (BMA, 2011, pp.9-11). None of the research sources drawn upon post-date the Staricoff review for Arts Council England.

The current review

The current review followed the procedures employed for the Arts Council England review, and searched for empirical studies of arts interventions in healthcare settings from 2004 onwards. The details of the method employed are given in the following section. It was clear from the results of the searches undertaken that the very large majority of studies identified were concerned with musical interventions in healthcare, and very few studies meeting the inclusion criteria were found concerned with the impact of visual arts in healthcare settings.

This is an area that deserves more research. A survey conducted in the waiting room of a follow-up renal clinic, showed that magazines, puzzle books, plasma screens and paintings on the walls were given higher scores than window views, computers or potted plants.

¹ These figures under-estimate the extent to which these reports have been cited as the search process relies upon the exact form of the citation given, and does not include grey literature which is not reflected in existing research databases.
Patients expressed their preference for landscapes, animals and birds, but very few wished abstract paintings or portraits (Cusack, 2010). Belver (2010) explore the value of arts in ‘humanising’ the environment in children’s hospitals.

Colour and lighting in hospital environments also have an impact on patients and staff. A well designed hospital improves the quality of patient/staff/visitor experience and it could have an influence on time of recovery and sense of wellbeing (Dalke, 2006). A recent study on the effects of an improved primary care environment showed that an enhanced environment resulted in improvements in patients’ perception of patient-doctor communication, reduction in anxiety and patient and staff satisfaction (Rice, 2008).

Given the preponderance of studies concerned with music, the current review focuses on musical interventions in the context of healthcare. The importance of music in health interventions is increasingly widely recognized, and studies exploring the effects of music on cardiovascular and respiratory functions provide evidence for the importance of type of music, tempo, rhythm, and indeed pauses in music, in medical care (Larsen, 2011; Lippi, 2010).

A systematic review on the evidence of the effect of introducing music for hospital patients has been recently published (Evans, 2011). This study refers solely to recorded music, and excludes studies involving live music. The author found that music reduces anxiety, but its use is more controversial in the context of invasive procedures, and there is a need for further research on this issue.
This study focuses on studies published in peer-reviewed publications, covering randomized and non-randomized controlled trials and also systematic and non-systematic reviews. It is important to note that the current review was undertaken rapidly to gain an overview of developments since the 2004 review undertaken for Arts Council England. It is not a systematic review. Such reviews are more focused, time consuming and expensive and require a team of people to carry out. No independent quality screening and data extraction processes were carried out with respect to the studies reviewed. This would be an essential next step in the development of research protocols for further research in the hospital.

The initial strategy for identifying relevant research on arts in healthcare environments involved identifying citations for Staricoff (2004) and Staricoff (2003) in Google Scholar. The advantage of starting with Google Scholar is that it draws upon a comprehensive range of existing academic bibliographic databases, and also very rapidly identifies all sources citing papers and reports which are considered key publications in the field to be reviewed. The next step was to follow the search procedure originally adopted for the Arts Council review.

The following electronic databases were searched:

Medline: for papers on the effects of the arts on medical conditions treated within the healthcare environment
EMBASE: for arts and clinical outcomes
CINAHL: for studies on nursing and allied nursing literature
Cochrane Library: for reviews on subjects relevant to this review

The following internet sites, amongst many others, were consulted:
www.tandf.co.uk/journals
www.impact.arts.gla.ac.uk
www.biomedcentral.com/singing

A number of sources were identified from hand-searching of references of relevant publications.

Keywords

Arts and clinical outcomes, music and childbirth, arts and pregnancy, music and intensive care units, music and pain management, singing and health, dance and health, creativity and health, music and surgery, amongst many others.
Research studies included

The criteria followed in this study were:

- Randomized and non-randomized controlled trials
- Evaluation studies with data collected before and after an arts/music intervention
- Peer-reviewed studies and reports from other reputable sources
- Survey and qualitative studies on arts/music interventions carried out in hospital and healthcare settings
- Arts and music in healthcare settings and arts and music therapy interventions
- Studies published in English from 2004 onwards

In addition, systematic and non-systematic reviews of existing literature on arts and health which covered arts interventions in healthcare settings were drawn upon.

Studies concerned with the role of the arts in the treatment of mental health issues were not considered in this review.

One thousand and hundred and fifty references were identified, and one hundred and three were selected for inclusion in this review.
3 FINDINGS

The research studies identified are organised according to the principal focus of the research. The following headings were chosen as being most relevant to Chelsea and Westminster Health Charity in considering priorities for future research in the hospital: maternity, neonatal/intensive care, children, cardiovascular conditions, surgery and pain management, lung diseases, and oncology. Inevitably, there is some overlap in the issues addressed in these different sections. As noted earlier, this review is focused on musical interventions and provides an overview of principal findings as reported by the researchers. Further more detailed and critical reviews of specific bodies of literature would be needed in the development of research protocols.

3.1 Maternity

Maya Waldman leads a Womb Song workshop with pregnant women at Chelsea and Westminster Hospital, 2011.

The influence of music in childbirth has been the subject of interest for decades, however, there are few well designed studies showing the physiological and psychological nature of its effects. The use of headphones providing previously selected music by a group of women during caesarean delivery showed a significant decrease in the level of anxiety, and a higher level of satisfaction regarding the procedure experience than the control group having no music intervention (Chang, 2005). A review evaluating the benefits of listening to music during caesarean section under regional anaesthesia (Laopaiboon, 2009) showed an improvement on pulse rate and birth satisfaction, however other parameters like respiration rates and anxiety levels were not different between the groups receiving or not preferred music by earphones.

Another study explored the use of music sessions over three consecutive days for mothers hospitalized at the end of a high-risk pregnancy (Yang, 2009) compared to those in similar situations but not exposed to music. The authors reported a significant decrease in the levels of anxiety which was reflected in reduced heart rates and stable respiratory rates.
The effect of patient-selected music was investigated on early postoperative pain, anxiety, blood pressure or heart rate (Ebneshahidi, 2008; Liu, 2010) and showed that pain score and consumption of analgesics were significantly lower among patients in the music group, whereas no differences were found on anxiety scores, blood pressure or heart rate. These findings are relevant in terms of improving recovery and allowing early contact between mother and child during the time in hospital, but it appears that the effects become non-significant in the post-partum period at home (Tseng, 2010).

3.2 Neonatal / Intensive Care

There are different opinions of whether the perception and ability to respond to music is innate or learned; studies performed in a number of healthy neonates (Winkler, 2009) strongly support the view that an interest in music is an innate ability of the newborn infant. This understanding has motivated a number of investigations on the value of music stimulation for preterm infants in the neonatal intensive care unit environment. A study of the effects of live music, recorded music or no music therapy over three consecutive days, with strict control of environmental noise level (Arnon, 2006), showed that no physiological and behavioural parameters were modified during the 30 minutes of music intervention; however, measurements taken at intervals after the therapy ended showed a significant decrease in heart rate, and improved behavioural score. Interestingly, these positive results were only found after the intervention of live music. Recorded music and no music had no significant effect in those parameters (Arnon, 2006).

Exposure to music over a range of decibels levels (Dureau, 2005) on one-day-old infants showed no significant differences in heart rate or behavioural state during three loudness levels. An analysis of clinical records after discharging pre-term infants from a unit that provided a program of multi-modal stimulation, pacifier-activated- lullaby treatment and parents trained stimulation of the infants, showed that those infants included in the program gained more weight/day and were discharged earlier than those not included in it (Standley, 2010). The effect of music in growing pre-term infants showed improved weight gain. A potential mechanism could be an increased metabolic efficiency which the authors related mainly to the exposure of music by Mozart (Lubetzky, 2010).
Another aspect to consider is the management of pain in neonatology. Non-pharmacological methods are increasingly discussed with regard to pain prevention and relief either alone or in combination with pharmacological treatment. A review was carried out studying 13 randomised controlled studies and two meta-analyses (Cignacco, 2007). Among different types of non-pharmacological interventions, the study examined the effects of different forms of music, such as music with intrauterine sounds, instrumental music or a capella singing. These two last interventions were effective only in preterm infants older than 31 weeks, and the authors recommended that music should not be provided for more than 15 minutes due to the risk of sensory overload. A more recent review (Hartling, 2009) of randomised controlled trials on the effects of music for medical procedures in neonates showed preliminary evidence of some therapeutic benefit of music intervention for specific medical indications. Those trials measured pain scores, physiological and behavioural parameters following the use of classical music, lullabies, intra-uterine music, and compared the results with similar groups not receiving this type of intervention.

A pilot study designed to understand whether music enhances weight gain in premature infants on fixed feeding regimens assessed the levels of salivary cortisol and heart variability, in groups exposed or not to live harp music (Kemper, Hamilton, 2008). The authors reported preliminary encouraging results which deserve a larger study.

It has been found that neonates responded to music with a preference for lullabies over adult songs, and harmonic music over dissonant music. It is also interesting to explore their preference for instrumental and/or instrumental plus vocal music. The response of the newborn to music is evident by changes in heart rate, and it has different effects on neonates of depressed mothers versus non-depressed mothers (Hernandez-Reif, 2006). Neonates of depressed mothers showed slower processing and delayed attention compared to neonates of non-depressed mothers.

The psychotherapeutic influence of infant-directed singing by parents promotes and support demonstrations of empathy facilitating development and bonding in the parent-infant relationship (O’Gorman, 2006; Neal, 2008). The effect of mother’s singing was studied in a trial using pre-recorded singing songs by the mothers of full-term and preterm infants (Cevasco, 2008). Although the results did not reach significant difference, it is interesting that the preterm infants who listened to the CD recording of their mothers’ singing left hospital an average of two days earlier than those in the control group.

A pilot study (Blumenfeld, 2006; Austin, 2010) on the effects of mother’s singing during feeding, did not find significant benefits, but the overall impact of music in premature neonates was shown in reduced symptoms of stress, faster weight gain, and shorter stays in the neonatal intensive care unit. The intervention of music and the use of pacifier-activated-lullaby has shown a maximum benefit when applied 30 minutes before feeding (Cevasco, 2005; Whipple, 2008; Standley, 2010) resulting in a definite trend of greater weight gain.

Another aspect in which the intervention of music and maternal voice has produced significant benefits is on inconsolable crying of premature babies (Keith, 2009). This study showed a significant reduction in the frequency and duration of this episode, and also had
significant effect on improving heart and respiratory rate, oxygen saturation and blood pressure.

The attitude of medical and nursing staff in a neonatal care unit towards the introduction of live/recorded music was very favourable, recorded music was preferred to live music and its value was recognised regarding the reduction of stress, crying and improved sleep in premature babies (Kemper, 2004). Similar results were found by other authors (Bouhairie, 2006) when they investigated staff attitudes and expectations towards music in a paediatric oncology unit versus a neonatal intensive care unit. They were strongly associated with prior musical training and experience. Staff attitudes are not barriers to providing music therapy in neonate intensive care units.

3.3 Children

Art plays a very important role in creating a humanized hospital environment, especially in children’s hospitals where the relationship between art and artists with patients, parents, carers and medical staff leads to improvements in children’s management and beneficial clinical and emotional outcomes (Belver, 2010; Belver, 2011). The authors of these papers emphasized the importance of paying attention to the diversity of cultures, parent’s opinions and patients and staff participation in the creative processes.

Music interventions, as a listener or as an active music making, have been the subject of extensive work. However, the heterogeneity of interventions, measurements applied and outcomes found, make it difficult to reach definite conclusions. A recent review (Naylor, 2011) of seventeen studies showed the impact of music intervention on clinical outcomes such as reduction in migraine frequency, motor impulsivity, and decreased levels of salivary cortisol. A most significant effect is reported with respect to coping behaviours, especially those related to grief and distress. The authors concluded that there is an urgent need of high quality research, consensus on priorities and standardized interventions.

Practice guidelines for music interventions in children’s hospitals have been attempted before (Stouffer, 2007). They recommended identifying the intent of music intervention, for
example: on analgesia, distraction, relaxation or sensory stimulation. It is also important that realistic therapeutic goals and clear outcomes are specified. Music selection and methods of delivery are essential, and the responsibilities of medical staff in recording the physiological and psychological effects should be outlined.

A review of twenty-two studies on the intervention of music in paediatrics (Robb, 2009) has identified gaps in planning and reporting and the need for improving the evidence-based practice. A systematic review for pain and anxiety in children undergoing medical procedures and the efficacy of music therapy found that this intervention was effective and promising, but concluded that it should be taken as provisional due to the poor quality of the studies analysed (Klassen, 2008).

More recently (Irons, 2010a) explored the issue of research on singing intervention for children and adults with bronchiectasis. This is a common respiratory disease with a lung function that may decline with time. Singing may support lung function and enhance quality of life, but controlled-randomized studies have not been undertaken as yet and are necessary to establish the value of this intervention. The same methodology was followed and similar conclusions reached from a search for research on the influence of singing on lung function and quality of life for children and adults with cystic fibrosis (Irons, 2010b).

Authors studying the effect of music on pain, distress and anxiety after day-surgery found that children exposed to soft and relaxing music delivered by headphones consumed fewer analgesics than the group of children on similar circumstances but with their headphones turned off (Nilsson, S., 2009). They also reported less distress, but there were not changes on other aspects of the post-operative process. A randomized trial studied the effect of music on children with cancer undergoing lumbar puncture (Nguyen, 2010). The measurements included pain scores, heart rate, blood pressure, respiratory rate and oxygen saturation taken before, during and after the procedure. The results showed that listening to music through earphones reduced pain scores, heart and respiratory rates and levels of anxiety when compared to the control group. A previous randomized controlled trial of the active music engagement on children with cancer (Robb, 2008) found that this intervention significantly improved coping-related behaviours in hospitalized children receiving cancer treatment. An interesting initiative (Barry, 2010) involved children creating a music CD prior to their first radiation treatment for cancer, and then listening during treatment. The control group received standard care. The authors showed that this intervention was engaging and appropriate and the trend for effective coping strategy approached significant result. The intervention of music was also effective in controlling anxiety in mechanically ventilated patients (Han, 2010) and in children following cardiac surgery (Hatem, 2006). Music therapy was also beneficial for the sedation of children undergoing different medical procedures (Loewy, 2006).
3.4 Cardiovascular conditions

A recent study addresses the subject of the effect of music on clinical outcomes (Bernardi, 2011). The authors aimed to assess the potential clinical intervention of different types of music on the cardiovascular, cerebrovascular and respiratory systems, as well as in the modulation of stress. They have found that music produced an increase in focused attention of the listener, and it was proportional to the speed of the music and rhythm. Pauses or slower rhythms induced a relaxing effect. Measurements of ventilation, blood pressure and heart rate showed an increase with faster tempi, while pauses induced a decrease of heart rate and blood pressure. The choice of the right type of music could be useful in the management of cardiovascular diseases.

A study found the greatest benefit on health with classical and meditation music (Trappe, 2010) whereas heavy metal or techno music could even be dangerous leading to stress and arrhythmias. They identified the music by Bach, Mozart and some Italian composers as the more beneficial. A previous review (Bradt, 2009) concluded that listening to music may have a beneficial effect on blood pressure, heart rate, respiratory rate, anxiety and pain in individuals with coronary heart disease, but more research is needed in order to improve the evidence.

The use of music-assisted relaxation was shown to be effective (Niet, 2011) in its capacity of inducing and improving quality of sleep in patients with various conditions. The physiological responses of patients listening to music in the intensive care unit (Chan, 2009) showed that preferred music selected by the patient, induces beneficial physiological outcomes mostly in female groups and those using a ventilator. This effect of music therapy was investigated in palliative care (Horne-Thompson, 2008). The authors found a significant reduction of anxiety, pain, tiredness and drowsiness measurements.

A number of studies focused their aims in evaluating the effects of music listening and music therapy as a useful intervention to provide stress and pain relief during different medical procedures. Providing patients with headphones and their preferred choice of music in the endoscopy suite has resulted in a reduction of sedation amounts compared to control groups, with results approaching significance, and a 29.7% decrease in analgesia requirements. The authors (Rudin, 2007) also found a 21% reduction in procedure time for
those patients receiving the intervention of music. Two meta-analysis studies followed the last paper (Wilson, 2008; Bechtold, 2009). The authors were able to confirm that listening to music during a colonoscopy procedure is effective in reducing the time and amount of sedation, and its use should be promoted. The intervention of listening to music during colposcopy reduced significantly the levels of anxiety of women undergoing this procedure (Galaal, 2009). As a result of a review of randomised and quasi randomised controlled trials they concluded that the intervention of music also induced a significant reduction in pain scores (Cepeda, 2010).

3.5 Surgery and pain management

The intervention of music in surgery has been addressed by a number of authors who have evaluated the benefits during day surgery, anaesthesia requirements, pre-operative and post-operative measurements (Leardi, 2007). Patients selected music delivered through headphones during surgery for skin cancer (Perischetti, 2009; Shenefelt, 2010) resulted in a very positive response of first time patients, with increased willingness of using music in repeated surgical procedures.

The impact of music on anxiety levels during short waiting periods in day surgery (Cooke, 2005) was reviewed, showing cost-effective benefits after implementation, although more research is needed.

The use of music during paediatric laceration repair did not increase the proportion of parents who were involved in this strategy of distraction (Sobieraj, 2009).

Another type of surgery, which mainly affects elderly people, is total knee replacement. These patients have a slow and painful time of recovery which induces anxiety and depression. Music therapy and singing, as a non-pharmacological intervention have significantly improved the psychological distress of these patients (Giaquinto, 2006; McCaffrey, 2006) and induced a reduction of perceived pain (Simcock, 2008).

The use of music in operating theatres has taken place for decades; however, the understanding of its effects on sedation and amounts or anaesthesia required is a more recent development. A study to determine whether the decrease in sedative requirements...
was the result of music or the elimination of operating room noise (Ayoub, 2005) concluded that when controlling for room-noise, the use of a favourite CD by the patient resulted in almost significantly less requirement of sedative, such as propofol. Other studies (Zhang, 2005; Bringman, 2009) have not only confirmed the results, but found a significant reduction in mean induction of sedation and amount of intraoperative propofol during combined spinal-epidural anaesthesia in the group that listen to music compared to control.

Ten journal articles were reviewed regarding the use of music in the operating theatre during monitored anaesthesia care (Newman, 2010). The conclusions of this review showed that the intervention of music is highly beneficial; significantly reducing the amount of sedation required, reduces recovery time, and prevents in many cases the need for converting to general anaesthesia.

A protocol for evaluating the use of music for pre-operative anxiety identifies the main points to take into consideration, such as: the effects of music therapy versus patient selected music; the efficacy of patient-preferred music versus researcher-selected music, and the overall effect of music on pre-operative anxiety (Dileo, 2010b; Ganidagli, 2005). The intervention of music has been shown to be very effective in the post-operative management of pain (Tse, 2005; Good, 2005; Good, 2010). This strategy induced significant decreases in pain intensity over time; patients had a lower systolic blood pressure and heart rate, and needed fewer doses of analgesics.

A randomized clinical trial was conducted to analyse the effect of music in stress response to cardiac surgery (Nilsson, 2009a; Hatem, 2006) on the first post-operative day after cardiac surgery. Measurements of vital signs and cortisol levels have indicated the clinical value of listening to music while resting in bed after open heart-surgery. In the same type of patients the introduction of soothing music increased oxytocin (a hormone with anti-stress effects) levels, as demonstrated by another randomized controlled trial (Nilsson, 2005; Nilsson, 2009b). Older people undergoing cardiovascular surgery who listen to music showed less anxiety and shorter time of intubation (Twiss, 2006; Chan, 2006).

A study exploring a different type of surgery such as solid organ transplant (Madson, 2010) found that music therapy is a valuable psychosocial intervention indicating significant improvements in self-reporting levels of anxiety, pain, and nausea. In a study regarding post-operative pain after different types of surgery, the inclusion of music as a nursing intervention showed a lower use of analgesics (Engwall, 2009; Camara, 2008). The requirement of morphine consumption after surgery in school-aged children (Nilsson, S., 2009) was reduced in the music group compared to the control group. However, another study does not support the use of music during surgery due to the lack of conclusive results (Szmuk, 2008). An exploratory study (Sand-Jecklin, 2010) has found a positive impact of live music on patients admitted to hospital. The therapeutic effect of this intervention showed a reduction on the level of pain, anxiety scores and muscle tension levels. The post-operative analysis in the quality of indicators, such as length of stay and level of medication on patients after brain surgery (Walworth, 2008) showed a clear improvement after live music intervention.
A systematic review on the anxiety and pain-reducing effects of music interventions (Nilsson, 2008) included 42 randomized controlled trials in perioperative settings. More than half of the reviewed studies showed a positive, low cost potential of implementation of this intervention addressing patients’ distress. Another review (Cepeda, 2010) on the effect of music on acute, chronic or cancer pain relief concluded that listening to music reduces pain intensity levels and opioid requirements, but the effects were not always significant, and its use in clinical practice remains unclear. The need for more research on the clinical effects of music intervention is emphasized in a review (Bradt, 2010) of studies on mechanically ventilated patients. The findings suggested that music listening may have a beneficial effect on heart and respiratory rates and anxiety levels.

### 3.6 Lung diseases

Non-pharmacological interventions for alleviating shortness of breath due to terminal cancer or respiratory diseases were reviewed (Bausewein, 2010). Among others, music induced breathing training appear to be effective, but there is currently not enough data to judge the evidence and its benefits. Singing classes as a therapy for chronic respiratory disease (Lord, 2010) have shown to have a beneficial effect in reducing anxiety and had no adverse consequences. Measurements of pulmonary function and quality of life were conducted after weekly classes of singing practice (Bonilha, 2009). The authors found a significant difference on changes of one of the functional respiratory tests, maximal expiratory pressures contributing to a better quality of life and respiratory improvement. A very interesting study on the mechanisms of breathing patterns and respiratory muscle used by subjects with spinal cord injury (Tamplin, 2011) found that the application of therapeutic singing training resulted in functional improvements in those patients. The evidence base to support the inclusion of music and singing in treatments and care of older people is increasing (Skingley, 2010) but more research is needed to support the findings and elaborate a strategy for implementation.

### 3.7 Oncology
A protocol for investigating the effects of music intervention on psychological and physiological outcomes on patients with cancer (Dileo, Bradt, Grocke, et al., 2010) has been outlined. Their objectives include the identification of randomised controlled trials, the comparison between music therapy and standard care and music therapy versus other types of music delivery. A review will follow to address these objectives. Previous reviews and studies on the subject (Pothoulaki, 2006; Hanser, 2006; O’Callaghan, 2006) concluded that more evidence is needed to validate the benefits of music intervention in cancer care. A group of patients who listened to music during bone marrow biopsy aspiration (Shabanloei, 2010) had lower anxiety and pain levels than those who did not have music. A cross-sectional survey was carried out during two years in a paediatric oncology clinic (Kemper, 2008) in order to understand parents’ attitudes and expectations about music intervention on paediatric leukaemia patients. The results showed that parents and clinicians have positive attitudes and posed no barriers for the use of music in children units.
This review of the literature on arts in health has identified one hundred and three studies offering strong evidence of the effect of music interventions on psychological and physiological outcomes of patients in healthcare environments. This positive contribution is described for a number of different areas within the healthcare setting, but also discusses studies which found controversial or unclear results. The findings of this review show that the contribution of music to healthcare is of a great importance in creating a humanized environment, decreasing levels of stress, anxiety and depression, reducing drugs consumption, and shortening length of stay in hospital.

Future research should incorporate and analyse rigorously the contribution of a wider spectrum of arts intervention. Visual art: landscapes, portraits or abstract paintings? A research project considering which type of paintings/photographs are the most appropriate for different areas of the hospital evaluating the emotional and physiological response on patients is important. There are few studies, however the confirmation of their contribution to a reduction on drugs consumption and length of stay in hospital requires further research. It is accepted that patients with neurological diseases are benefited by the contribution of literature, poetry and singing. A research showing conclusive clinical outcomes should provide valuable evidence, beyond anecdotal information. The contribution of creative writing, dance and drama/theatre is still waiting to be evaluated in relation to the psychological and physiological responses of patients in a hospital environment. The evaluation of the effect of integrating different art forms into the healthcare culture requires new and challenging ideas which could induce unforeseen benefits for patients and the National Health Service.

Finally, an important aspect to be considered when establishing a research project in a hospital environment is the strategy for recruiting patients and staff. It is important to tailor the objectives and measurements to each participating unit, considering the diversity of gender and cultures in the development of strategies (Chlan, 2009).
REFERENCES


