Abstract of thesis entitled

“An Evidence-based Guideline of Perioperative Music Therapy for Surgical Patients to Reduce Postoperative Pain and Anxiety”

Submitted by

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In Hong Kong Hospital Authority, there were over 440,000 operations done in 2013. It is reported that nearly 80% of patients experience pain and anxiety after surgery because they are inadequately treated postoperatively. If postoperative pain and anxiety is not managed effectively, patients’ recovery can be adversely affected, resulting in chronic post-surgical pain and even death. There are some studies shows that perioperative music therapy has played a prominent role in enhancing the sedative effect in a surgical patient. It can mitigate pain and anxiety. However,
published systematic review on this topic is rare. Also, perioperative music intervention is not a common practice in Hong Kong.

This dissertation describes a translation research on the innovation using perioperative music therapy in reducing postoperative pain and anxiety in surgical patients. The objectives of this study are to review the effect of music administrated during operation on postoperative pain and anxiety mitigation; develop an evidence-based guideline of administering music during operation for postoperative pain and anxiety mitigation for intervention consistency and standardization. Secondly, to assess its implementation potential and to develop implementation strategies and evaluation plan for the use of music therapy in a local public hospital in Hong Kong.

Systematic search was conducted from July 29 to Aug 4 2014 through PUBMED, CINAHL PLUS and COCHRANE. No language restrictions applied. Quality and risk of bias was assessed using an appraisal system developed by Scottish Intercollegiate Guidelines Network (2014a). We included all randomized controlled trials that administered music interventions during operations, and postoperative stress or pain levels of surgery patients measured as outcomes in the recovery room. Three studies were graded as high quality and four studies were graded acceptable level, which consistently demonstrated a statically significant more reduction in pain and anxiety
level of patients who received perioperative music therapy than those who had no music therapy.

An evidenced-based guideline was developed in this dissertation. A comprehensive implementation plan has been established with communication plan and pilot testing included. Systematic evaluation plans on patient, healthcare-providers, and system outcomes were developed. The total period from planning, pilot testing to evaluating will be about six months.
An Evidence-Based Guideline
of Perioperative Music Therapy for Surgical Patients to
Reduce Postoperative Pain and Anxiety

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Declaration

I declare that this thesis represents my own work, except where due acknowledgement is made, and that it has not been previously included in a thesis, dissertation or report submitted to this University or to any other institution for a degree, diploma or other qualifications.

Signed …………………………………………………………………………………………………………………

Kwong Man Chun
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CHAPTER 1 INTRODUCTION

1.1 Research Background

Postoperative anxiety is a negative emotional state common to surgery patients who are likely to perceive that undergoing an operation is threatening (Bae, Lim, Hur & Lee, 2012). It is because without perceived self-control over an operation, patients are likely to feel fear of unknowns about health conditions postoperatively and be susceptible to the hospital environment where they are temporarily separated from friends and family (Koch et al., 1998). Meanwhile, postoperative pain is defined as an acute or chronic pain after a surgical procedure; a common psychical sign because of a surgical wound on patients (Ikonomidou, Rehnström & Naesh, 2004). Postoperative pain is understood as danger by the brain; therefore, the spinal cord sends signals from the wound to the brain making patients feel painful (Ikonomidou, Rehnström & Naesh, 2004). It is reported that nearly 80% of patients experience pain and anxiety after surgery because they are inadequately treated postoperatively (Apfelbaum 2003).

An effective relief of pain and anxiety is one of the important goals of nursing care. If postoperative pain and anxiety is not managed effectively, patients’ recovery can be adversely affected, resulting in chronic post-surgical pain and even death (Apfelbaum, 2003). Postoperative nursing care to patients thus becomes challenging and important.

To mitigate postoperative anxiety and pain, a common practice is to administer sedative (e.g. Benzodiazepine) and analgesic medications (e.g. Equianalgesic, Acetaminophen and Ibuprofen) to alter the nerve perception within patients (Laurion & Fetzer, 2003; Simcock et al., 2008). However, pharmacological measure could have
been ineffective in some cases (Vachiramon et al., 2013). Arguably, pharmacological measure can negatively impose side effects (e.g. cardiovascular and blood pressure problems) on surgical patients (Simock et al., 2008).

There has been a growing interest in medical interventions that lead to better postoperative medical outcomes in patients (i.e. reducing pain and anxiety with fewer or no side effects) (Laurion & Fetzer, 2003). As such, the concept of holistic care can be realized (Nilsson, 2008). Holistic care, in short, is concerned with taking patients’ feelings, thoughts, beliefs and interests into account so that medical staff can help patients maintain a high level of satisfaction (Selimen & Andsoy, 2011). As a non-pharmacological holistic approach that can mitigate moderate postoperative pain, music has been recommended in acute pain management guidelines by the US Agency for Health Care Policy and Research (Nilsson et al., 2001).

1.2 Affirming Needs

Operating theatre in the hospital provides a sterile environment for the operation conduct. In Public Hospital A, there were 28,000 operations done in 2013, accounting for 6% of operations done in all public hospitals in Hong Kong (Hospital Authority 2013). On average, there are 80 patients undergoing different kinds of operations each day in the operation theatre of Hospital A. When an operation is completed, a patient is transferred to the recovery room where they need to wait for up to four hours to get their postoperative conditions stabilized before being transferred back to the ward. During the waiting, a Pain Team consisting of anaesthetists and pain nurses is stationed in the recovery room providing patients with postoperatively pharmacological pain and anxiety management. The nurses in the recovery room are
responsible for taking care of and monitoring up to six patients concurrently. In the meantime, the nurses must report patient conditions such as unrelieved pain to anaesthetists for further management.

It has been observed in the recovery room that the pharmacological approach has not been fully effective. Most of the patients show restlessness; they have mourned, cried or even screamed in the recovery room because of postoperative pain and anxiety. About 80% of patients in Hospital A have experienced a moderate to severe postoperative pain. Some patients even claimed that they still feel painful and anxious under the administration of sedative and analgesic meditations; about 42% of patients have had to request further pain management in Hospital A (e.g. additional analgesia). However, analgesia cannot be given immediately and patients have to wait approximately for 20 to 60 minutes because nurses working in the local public hospital do not have the autonomy to adjust the dosage of analgesic as in overseas’ situation. An analgesia prescription should be approved by the physician who needs approximately 10 to 40 minutes to assess and discuss the situation of each patient before a further analgesia prescription is given. (Eija, 2004)

Meanwhile, nausea, vomiting or blood pressure problems are common side effects caused by the pharmacological measure. Due to the side effects, some patients, especially the elderly, are likely to refuse to use. Allegedly, ineffectiveness of the pharmacological measure in the recovery room has hampered the concept of holistic care. It has also increase the workload of nurses in the recovery room because of most postoperative patients need extra nursing care for pain and anxiety management; and the duration of patients staying in recovery room is prolonged. All factors mentioned
above can increase total health care costs (Gan et al., 2003). Eventually, it can become an economic burden and increase workload of nurses (Hatfield & Tronson, 2009).

To realize the concept of holistic care, reduce total health care costs and reduce workload of nurses, frontline medical staffs are obligated to improve patient conditions by reducing their postoperative pain and anxiety (Simcock et al, 2008). Thus, a better intervention should be promoted and implemented.

Music, being inexpensive, safe and easily implemented by nurses, is claimed to have played a prominent role in enhancing the sedative effect in a surgical patient (Ikonomidou, Rehnström & Naesh, 2004). It can reduce stress hormones yet stimulate cingulo-frontal cortex that can mitigate pain and anxiety (Ikonomidou, Rehnström & Naesh, 2004). Music has the ability to decrease pain and anxiety by evoking the relaxation response through stimulation of the parasympathetic nervous system (Benson, 1977). Different types of music can influence the frequency and depth of breathing, heart rate, blood pressure, and the cardiac muscle’s need for oxygen (White et al, 1999).

Given the claimed advantages and effectiveness stated by Ikonomidou, Rehnström and Naesh (2004), Benson (1977) and White et al (1999), it is possible that administration of music during operation can be efficient and effective in mitigating postoperative pain and anxiety in patients in the recovery room. However, published systematic reviews on the research topic are rare.
It must be noted that administration of music during operation is not implemented in Hong Kong, including Hospital A. In Hospital A, there is no evidence-based guideline of administrating music during operation for managing postoperative pain and anxiety. Thus, the gap in the literature and the absence of an evidence-based guideline give rise to this translational research into the effect of music administered during operation on postoperative pain and anxiety migration in surgical patients.

1.3 Objectives and Significance

1.3.1 Aim

By using the translational research approach, the aim of this dissertation is to reduce postoperative pain and anxiety in surgical patients by administering music during operation, and to produce an evidence-based protocol intervention plan accordingly.

1.3.2 Objectives

To achieve the aim, the following objectives are set accordingly.

- to systematically and critically review the effect of music administrated during operation on postoperative pain and anxiety mitigation;
- to produce an evidence-based guideline of administering music during operation for postoperative pain and anxiety mitigation for intervention consistency and standardization;
- to assess transferability and feasibility of administering music during operation for postoperative pain and anxiety mitigation;
- to produce an implementation plan on to be used in the operation room; and
- to produce an evaluation plan for assessing effectiveness of the proposed intervention.
1.3.3. Significance

Postoperative surgical patients report moderate pain and anxiety level commonly, which may cause a series of negative impacts to patients and nurses. Therefore, Holland and Rees (2010) point out those improvements in medical interventions should be beneficial to four major stakeholders (i.e. patients, nursing staff, hospital management and the society). Thus, translation of evidence of music administered during surgical operation into practice is significance.

For patients and the society, they can benefit from this study because with a better intervention, patient conditions such as postoperative pain and anxiety level can be improved. At the same time, the use of analgesic medication can be reduced in order to minimize the adverse effect. Operation services in Hospital A is going to expand, thus the number of operations to be conducted will increase, to 32,000 operations in 2015, patients can benefit from this study (e.g. reduced postoperative pain). In addition, this study can help reduce adverse medical incidents yet improve patient conditions. In doing so, a high level of expectations from the public can be maintained.

For fellow nursing staff, when patient conditions are improved postoperatively, the duration of patient stay in recovery room can be shorten, thus nurses workload can be reduced. Also, the proposed intervention is new to Hospital A. The colleagues can continuously improve themselves in a professional manner by learning and adopting new knowledge through this translational research.
CHAPTER 2 CRITICAL APPRAISAL

2.1 Search and Appraisal Strategies

2.1.1 Search Keywords and Databases

The four individual groups of search keywords were 1) Music, 2) "Operating theatre" OR "Operation theatre" OR "Operation room" OR "Operation theatre" OR "Surgical theatre" OR "Surgical room" OR Surgery OR Operation, 3) Patient and 4) Pain OR Anxiety OR Stress OR Fear. The search was performed in three databases PUBMED, CINAHL PLUS and COCHRANE.

2.1.2 Inclusion and Exclusion Criteria

Search results were limited to the following criteria. Chosen studies had to be

1. Randomized Controlled Trial
2. Music of all sorts administrated during the operation
3. Postoperative stress or pain levels of surgery patients measured as outcomes in the recovery room

However, search results were excluded if any of them met the following exclusion criteria.

1. Patients with hearing problems
2. Patients with chronic pain, as the focus of the study is surgical pain, chronic pain could be a confounding factor, and should be excluded.
3. Surgical procedures for labouring
4. Minor surgical procedures were conduct in the ward
2.1.3 Data Extraction Strategies

A table of evidence was constructed using a template developed by The Scottish Intercollegiate Guidelines Network (SIGN) (2014c). A main purpose of the table was to systematically group and record evidence of relevant papers in terms of study design, evidence level, patient characteristics, intervention, comparison, length of follow up, outcome measures and effect size.

2.1.4 Appraisal Strategies

An appraisal system developed by SIGN (2014a) was used in this study to critically appraise internal validity of a paper in terms of research question, randomization, concealment, blinding, comparability between intervention and control groups and intention to treat analysis (SIGN, 2014a).

Alongside the SIGN framework, a categorizing system developed by SIGN (2014b) was used in this study to show levels of evidence of each chosen paper. Within the system, numbers 1 to 4 are used as the main categorizing points. The numbering mechanism is accompanied by the use of + and – signs to further differentiate levels of evidence. The ++ sign shows that a paper has fewest or no bias, the + sign means a study has few biases, while the – sign shows that a study is prone to research bias (SIGN, 2014b). In total, there is a total eight levels of evidence when the numbering mechanism is combined with the + and – signs. The rationale of using this was that it could further reflect quality of a research paper (Stephens, 2005). A table showing levels of evidence can be found in Appendix 1.
2.2 Results

2.2.1 Search Results

Systematic search was conducted from July 29 to Aug 4 2014 through PUBMED, CINAHL PLUS and COCHRANE. After keyword searches, there were 128 papers found from PUBMED, 0 from CINAHL PLUS and 103 from COCHRANE respectively. Title and abstract of each paper was screened, 31 papers from PUBMED and 27 papers from COCHRANE were retained accordingly. After this, full text of each paper was screened, 22 papers from PUBMED and 18 papers from COCHRANE were retained accordingly. Next, references of each paper were screened; however, no extra papers were extracted from the reference list and added. At this stage, 9 papers from PUBMED and 5 papers from COCHRANE were suitable. However, those 5 papers from COCHRANE were duplicated; therefore, they were removed. Finally, 9 papers were retained from PUBMED (Appendix 2 and Appendix 3).

2.2.2 Study Characteristics

The nine studies were published between 2003 and 2013. (Appendix 4) Of all the randomized controlled trial studies, seven studies were conducted in the US (Simcock et al., 2008; Laurion & Fetzer, 2003; Szmuk et al., 2008; Vachiramon et al., 2013; Johnson, Raymond & Goss, 2012; Wu et al., 2012; Twiss et al., 2006) while two studies were conducted in Sweden (Nilsson, Rawal & Unosson, 2003) and South Korea (Yeo et al., 2013) respectively.

Participants in all studies were older than 18 years old. The overall age range was between 21 and 90 years. Of all studies, seven studies had participants older than 45 years old while the rest of participants were younger than 45 years old (Lauron &
Regarding gender, there were three studies (Laurion & Fetzer, 2003; Johnson, Raymond & Goss, 2012; Wu et al., 2012) limited to female participants and one study limited to male participants (Yeo et al., 2013) while the rest of the five studies included both genders (Simcock et al., 2008; Szmuk et al., 2008; Nilsson, Rawal & Unosson, 2003; Vachiramon et al., 2013; Twiss et al., 2006).

Regarding type of surgical operation, 30 participants in Simcock et al. (2008) underwent total knee arthroplasty surgery; 84 participants in Laurion and Fetzer (2003) underwent gynaecologic laparoscopic surgery; 40 participants in Szmuk et al. (2008) underwent laparoscopic hernias or cholecystectomy surgery; 100 participants in Nilsson, Rawal and Unosson (2003) underwent varicose veins or inguinal hernia repair; 50 in Vachiramon et al. (2013) underwent mohs operation; 119 in Johnson, Raymond and Goss (2012) underwent gynaecologic surgery; 26 in Wu et al. (2012) underwent elective surgical abortion; 86 underwent cardiovascular surgery in Twiss et al. (2006); and 70 underwent cystoscopy in Yeo et al. (2013). The total combined number of patients in all studies was 605.

Of the nine studies, six studies used postoperative pain as outcome (Nilsson, Rawal & Unosson, 2003; Szmuk et al., 2008; Simcock et al., 2008; Wu et al., 2012; Laurion & Fetzer, 2003; Yeo et al., 2013) while five studies used a postoperative anxiety level as outcome (Nilsson, Rawal & Unosson, 2003; Vachiramon et al., 2013; Yeo et al., 2013; Wu et al., 2012; Johnson, Raymond & Goss, 2012). Notably, three studies reported both postoperative pain and anxiety as outcome (Nilsson, Rawal & Unosson, 2003; Wu et al., 2012; Yeo et al., 2013). In addition, there were seven studies (Simcock et al., 2008; Laurion & Fetzer, 2003; Szmuk et al., 2008; Nilsson, Rawal & Unosson,
that used general anesthesia while the remaining two used regional anesthesia (Wu et al., 2012; Yeo et al., 2013).

There were five studies (Laurion & Fetzer, 2003; Szmuk et al., 2008; Nilsson, Rawal & Unosson, 2003; Johnson, Raymond & Goss, 2012; Wu et al., 2012) covering findings beyond the scope of this translational research (i.e. preoperative music; postoperative music, operative pain and anxiety); therefore, these irrelevant findings were not included in this systematic review.

2.2.3 Methodological Quality of Studies

Based on the results derived from the quality of assessment and table of evidence, three studies have a 1++ (Szmuk et al., 2008; Nilsson, Rawal and Unosson, 2003; Vachiramon et al., 2013); four studies have a 1+ (Simcock et al, 2008; Wu et al., 2012; Twiss et al., 2006; Yeo et al., 2013) while two studies have a 1- (Laurion & Fetzer, 2003; Johnson, Raymond & Goss, 2012) (Appendix 5).

All studies adopted the randomized controlled trial (RCT) design clearly defining music as an intervention and the application of a control group.

For randomization, three studies used computer-generated numbers to randomly allocate participants into groups (Simcock et al., 2008; Szmuk et al., 2008; Wu et al., 2012). A study used randomization table to randomly allocate participants into groups (Vachiramon et al., 2013). Another study, randomization by picking a slip of paper from two boxes with all intervention, one box for male, and the others for female, so
the gender can matched (Twiss et al., 2006). While four studies claimed the use of randomization but without an explanation on how it was done (Laurion & Fetzer, 2003; Nilsson, Rawal & Unosson, 2003; Johnson, Raymond & Goss, 2012; Yeo et al., 2013).

For concealment during randomization, three studies used sealed envelopes as a concealment method (Simcock et al., 2008; Szmuk et al., 2008; Wu et al., 2012), and a study done by picking a slip of paper from two boxes for the randomization (Twiss et al., 2006). While five studies did not report concealment procedures (Laurion & Fetzer, 2003; Nilsson, Rawal & Unosson, 2003; Vachiramon et al., 2013; Johnson, Raymond & Goss, 2012; Yeo et al., 2013).

For blinding, one study had double-blinding (Simcock et al., 2008), five studies had single-blinding (Szmuk et al., 2008; Laurion & Fetzer, 2003; Nilsson, Rawal & Unosson, 2003; Vachiramon et al., 2013; Wu et al., 2012), while three studies did not report blinding procedures (Johnson, Raymond & Goss, 2012; Twiss et al., 2006; Yeo et al., 2013).

For sample size, three studies used power analysis to calculate the needed sample size (Nilsson, Rawal & Unosson, 2003; Vachiramon et al., 2013; Johnson, Raymond & Goss, 2012) while one study used ETSevo difference for sample size calculation (Szmuk et al., 2008). However, five studies did not explain sampling procedures (Simcock et al., 2008; Laurion & Fetzer, 2003; Wu et al., 2012; Twiss et al., 2006; Yeo et al., 2013). Regarding sample size, six studies had a small sample size ranging between 26 to 70 that could have hampered the statistical power (Simcock et al., 2008;
Szmuk et al., 2008; 2012; Wu et al., 2012; Vachiramon et al., 2013; Twiss et al., 2006; Yeo et al., 2013) while three studies had a relatively large sample size ranging from 84 to 119 (Laurion & Fetzer, 2003; Nilsson, Rawal & Unosson, 2003; Johnson, Raymond & Goss, 2012).

For dropout of participants, Johnson, Raymond and Goss (2012) had a 0.83% dropout rate and Twiss et al. (2006) had a 14% dropout rate because of complication from surgery such as infection and stroke. The remaining seven studies had a 0% drop out rate (Simcock et al., 2008; Szmuk et al., 2008; 2012; Laurion & Fetzer, 2003; Nilsson, Rawal & Unosson, 2003; Wu et al., 2012; Vachiramon et al., 2013; Yeo et al., 2013).

All studies had demographic similarities between groups at the start of trial and stated that the only difference between groups was the treatment rather than demographic ones.

Regarding outcome measures, all nine studies used a standard, valid and reliable instrument (Simcock et al., 2008; Laurion & Fetzer, 2003; Szmuk et al., 2008; Nilsson, Rawal & Unosson, 2003; Vachiramon et al., 2013; Johnson, Raymond & Goss, 2012; Wu et al., 2012; Twiss et al., 2006).

2.3 Summary and Synthesis

2.3.1 Summary of findings

Intervention

Of all the studies, seven had a two-group design (i.e. one intervention group and one control group) (Simcock et al., 2008; Szmuk et al., 2008; Nilsson, Rawal & Unosson,
2003; Vachiramon et al., 2013; Wu et al., 2012; Twiss et al., 2006; Yeo et al., 2013) while two studies used a three-group design (i.e. two intervention groups and one control group) (Laurion & Fetzer, 2003; Johnson, Raymond & Goss, 2012). The comparison group was surgical patients without listening music during operations in all studies.

Regarding the method of music administration, seven of the studies (Simcock et al., 2008; Szmuk et al., 2008; Nilsson, Rawal & Unosson, 2003; Johnson, Raymond & Goss, 2012; Wu et al., 2012; Twiss et al., 2006; Yeo et al., 2013) examined the effect of music through headphones while one study played music through an open speaker (Vachiramon et al., 2013). The remaining studies reported the administration of music through audiotape, but the details were not reported (Laurion & Fetzer, 2003).

Regarding the choice and the type of music, five studies allowed participants to choose their favourite music (Simock et al., 2008; Szmuk et al., 2008; Vachiramo et al., 2013; Wu et al., 2012; Twiss et al., 2006) while the other four studies did not allow a choice (Laurion & Fetzer, 2003; Nilsson, Rawal & Unosson, 2003; Johnson, Raymond & Goss, 2012; Yeo et al., 2013).

There were seven studies stating the type of music used (Johnson, Raymond & Goss, 2012; Nilsson, Rawal & Unosson, 2003; Wu et al., 2012; Laurion & Fetzer, 2003; Szmuk et al., 2008; Laurion & Fetzer, 2003; Yeo et al. 2013). New-age (Johnson, Raymond & Goss, 2012; Wu et al., 2012), Country (Johnson, Raymond & Goss, 2012), Pop-rock (Szmuk et al., 2008; Wu et al., 2012), Rap (Wu et al., 2012), Piano (Laurion & Fetzer, 2003), Classical (Johnson, Raymond & Goss, 2012; Szmuk et al.,
2008; Wu et al., 2012; Yeo et al. 2013), Israeli music (Szmuk et al., 2008) or music with slow flowing rhythms (Nilsson, Rawal & Unosson, 2003) was used in these seven studies. The remaining two studies merely reported the use of music as an intervention, but the details such as the type of music were not reported (Simcok et al. 2008; Vachiramon et al., 2013).

**Outcome Measures**

While all studies assessed outcome measures in the recovery room ranging from immediately after operation until patient discharge from the recovery room.

For outcome measures of pain, four studies (Simcock et al., 2008; Szmuk et al., 2008; Nilsson, Rawal & Unosson, 2003; Yeo et al., 2013) used the Visual Analog Scale (VAS) to measure postoperative pain while Laurion and Fetzer (2003) used the Verbal Pain Score (VPS). Nilsson, Rawal and Unosson (2003) used the Numerical Rating Scale (NRS). Wu et al. (2012) used the Verbal Numerical Scales (VNS). Notably, Simcock et al. (2008) supplemented the VAS with Wong-Baker Verbal Descriptor Scales. The above-mentioned scales are similar, which is a 10 point of scale, 0 represents no pain, 10 represents the worst pain.

For outcome measures of anxiety, Vachiramon et al. (2013), Twiss et al. (2006) and Yeo et al. (2013) used the Spielberger State-Trait Anxiety Inventory (STAI) to measure postoperative anxiety. The STAI is a 4-pointed scale with 20 questions for measuring anxiety levels ranging of score from 20 to 80, 20 represents that patients have no anxiety, and 80 represents that patients are extremely anxious. Wu et al. (2012) used the Verbal Numerical scales (VNS) for anxiety measurement. While Johnson, Raymond and Goss (2012) used The Rapid Assessment Anxiety Tool
(RAAT). VNS and RAAT are a similar measurement tools, the higher the score, the worst the anxiety level.

In addition to assessing pain and anxiety, Laurion and Fetzer (2003) and Nilsson, Rawal and Unosson (2003) measured dosage of counter-pain medications. Szmuk et al. (2008) measured blood pressure and heart rate for postoperative pain and Yeo et al. (2013) measured blood pressure, heart rate and systolic pressure for postoperative pain and anxiety.

**Effect Size**

For pain, there were four studies showing a statistically significant effect of music administered during operation on postoperative pain mitigation in the recovery room (Simcock et al., 2008; Nilsson, Rawal & Unosson, 2003; Yeo et al., 2013). A study showed music administrated during operation could not significantly reduce postoperative pain in the recovery room, but significantly reduce postoperative pain when patients were discharged from the recovery room (Laurion & Fetzer, 2003). Another study reported that patients who heard music during operation could reduce postoperative pain, but marginally statistically insignificant (p=0.054) (Szmuk et al., 2008). Only one study showed a non-significant result in postoperative pain mitigation (Wu et al., 2012).

For anxiety, there were three studies showing a statistically significant effect of music during operation on postoperative anxiety mitigation (Vachiramon et al., 2013; Twiss et al., 2006; Yeo et al., 2013). A study showed an insignificant result of postoperative anxiety mitigation for all subjects; however, when the researchers excluded those with
low levels of anxiety (<=4.0) (yet without solid justification for why these participants were removed and why those below 4.0 were not considered anxious), they found a statistically significant effect of music during operation on postoperative anxiety mitigation among those with high levels of anxiety (>=4.0) (Johnson, Raymond & Goss, 2012). There were two studies showing that music could not reach statistically significance for postoperative anxiety mitigation (Nilsson, Rawal & Unosson, 2003; Wu et al., 2012).

2.3.2 Synthesis of Data
The findings of Laurion and Fetzer (2003) and Johnson, Raymond and Goss (2012) are highly questionable because randomization and blinding method were not reported properly which may prone to bias. Furthermore, Laurion and Fetzer (2003) did not clearly and thoroughly report the research design nor did they report the P value when analysing the dosage of postoperative pain medications and the postoperative pain scores at the arrival of the recovery room. Thus, these two studies should be excluded from the guideline given their weak internal validity.

Regarding the intervention, the administration of music during operation is suitable for operations of all kinds in the guideline because music was administered during operation in the operation theatre for postoperative pain and anxiety mitigation in adult participants undergoing different minor to major operations e.g. total knee arthroplasty (Simcock et al, 2008), gynaecologic laparoscopic surgery (Laurion & Fetzer, 2003), laparoscopic hernias or cholecystectomy surgery (Szmuk et al., 2008), varicose veins or inguinal hernia repair (Rawal & Unosson, 2003), mohs operation
Regarding the differences in effect size, this could be attributable to different measurement time and differing demographic and clinical characteristics. Therefore, despite the use of same outcome measures, results could be differing.

Regarding the type of music, classical, pop-rock, piano, clam, new age, or inspirational music can be incorporated into the guideline. Although most studies were conducted in the US, to a certain degree, demographic differences among patients were not an issue across the studies because preferences of music were similar (i.e. classical, pop-rock or Israeli music, piano, soft music with Naparstek narrative or classical, clam or classical, soft country, classical/New age, or inspirational music) (Laurion & Fetzer, 2003; Twiss et al. 2006; Yeo et al., 2013; Johnson, Raymond & Goss, 2012).

Overall, the studies revealed that there was no standardized music administration method. Music could either be provided and chosen by patients (Vachiramon et al., 2013), provided by medical staff and chosen by patients (Szmuk et al., 2008; Nilsson, Rawal & Unosson, 2003; Johnson, Raymond & Goss, 2012) or merely provided and chosen by medical staff (Laurion & Fetzer, 2003; Twiss et al. 2006; Yeo et al. 2013).

In addition, music had to be administered through headphones (Simcok et al. 2008; Szmuk et al., 2008; Nilsson, Rawal & Unosson, 2003; Twiss et al., 2006; Yeo et al., 2013) on the Ipod (Simcok et al. 2008; Wu et al., 2012) rather than other devices (i.e.
Walkman (Laurion & Fetzer, 2003) or CD player (Nilsson, Rawal & Unosson, 2003; Twiss et al., 2006)) and an open speaker (Vachiramon et al., 2013) because an open speaker could disturb medical staff in the operating theatre (Vachiramon et al., 2013). Furthermore, the volume of music had to be adjusted to a comfort level (Szmuk et al., 2008) so that patients could still hear what medical staff say and communicate with them if necessary (Szmuk et al., 2008). Meanwhile, music had to be played repetitively and continuously at the time of anaesthetic until the operation is completed (Simcock et al., 2008; Laurion & Fetzer, 2003; Szmuk et al., 2008; Vachiramon et al., 2013; Johnson, Raymond & Goss, 2012; Wu et al., 2012; Twiss et al., 2006; Nilsson, Rawal & Unosson, 2003; Yeo et al., 2013) while the length of music administration was subject to the type of operation and complexity (Simcock et al., 2008; Laurion & Fetzer, 2003; Szmuk et al., 2008; Vachiramon et al., 2013; Johnson, Raymond & Goss, 2012; Wu et al., 2012; Twiss et al., 2006; Nilsson, Rawal & Unosson, 2003; Yeo et al., 2013).

To summarize, classical, pop-rock, piano, clam, new age, or inspirational music can be provided by researchers and chosen by patients in the guideline. Also, in the guideline, music must be administered repetitively and continuously at the time of anaesthetic until the operation is completed on the Ipod through headphones with volume adjusted to a comfort level.

Last but not least, the VAS (Simcock et al., 2008; Szmuk et al., 2008; Nilsson, Rawal & Unosson, 2003; Yeo et al., 2013) and STAI (Vachiramon et al., 2013; Twiss et al., 2006; Yeo et al., 2013) were used for postoperative pain and anxiety measures.
respectively. Therefore, the VAS and STAI can be used for postoperative pain and anxiety measures in the evaluation.
CHAPTER 3 Translation and Application

3.1 Implementation Potential

3.1.1 Target Setting

The proposed music intervention is to be implemented in the 12 operation theaters in the Hospital A that is under management of the Hospital Authority. The operation theaters are managed by the nursing manager and run by an in-house team of nurses providing surgeons and anesthetists with all intraoperative medical assistance.

Except for some emergency operations, all operations must be performed at the designated booking time. Regardless of operation types, there were 80 daily operations on average in Hospital A in 2013. Compared with all other public hospitals, Hospital A had the largest number of patients (i.e. 28,000) using the operation theater in 2013. The number is expected to increase to 32,000 in 2015.

To date, sedative (e.g. Benzodiazepine) and analgesic meditations (e.g. Morphine, Acetaminophen and Ibuprofen) are administered to post-operative patients in the recovery room under the supervision of anesthetists for postoperative pain management. The music intervention has not been implemented as a pain management protocol in the operation theater in Hospital A.

3.1.2 Target Audience

The clinical setting is generally concerned with the operation theater instead of a particular medical department, a surgical procedure or a particular group of patients. Therefore, the target audience is made of adult non-emergent operative patients, with local or general anesthesia, in the Hospital A’s operation theatre. Usual operations
conducted in Hospital A are orthopedics, obstetrics, gastroenterology, cardiology operations, which are similar to those found in the reviewed studies. However, since the operating theatre is run by nurses, the protocol is targeted for nurses, which is similar to five of the reviewed studies (John, Raymond & Goss, 2012; Simcock et al., 2008; Laurion & Fetzer, 2003; Nilsson Rawal & Unosson, 2003; Twiss et al., 2006). While the music intervention in Szmuk et al. (2008), Vachiramon et al. (2013), Yeo et al. (2013) and Wu et al. (2012) was administered by surgeons.

3.1.3 Transferability of Findings

Transferability is defined as how well the medical evidence can be clinically applied to the local setting (Hulley et al., 2013). To determine transferability, target population, philosophy of care, number of patients benefiting from the intervention, and time for implementation and evaluation are to be assessed.

3.1.3.1 Target Population

Of the reviewed studies, there were male and female patients aged over 18 without hearing or mental problems. Operations conducted were knee arthroplasty surgery (Simcock et al., 2008), gynecologic surgery (Laurion & Fetzer, 2003; John, Raymond & Goss, 2012), laparoscopic hernias or cholecystectomy surgery (Szmuk et al., 2008), varicose veins or inguinal hernia repair (Nilsson Rawal & Unosson, 2003), mohs surgery (Vachiramon et al., 2013), elective surgical abortion (Wu et al., 2012), CABG or valve replacement surgery (Twiss et al., 2006) and rigid cystoscopy (Yeo et al., 2013). These operations are non-emergent and require either general or local anesthesia. According to internal records, these indeed are common operations in Hospital A. Hence the findings can fit into the proposed setting.
There are no restrictions on the age and gender of the patients. However, patients with hearing problems, mental disorder are excluded because music is not likely to make a positive influence on these patients (Nilsson, Rawal & Unosson, 2003).

3.1.3.2 Philosophy of Care

The contemporary concept of healthcare is to create a holistic and patient-centered healthcare environment where mental and physical health of patients can be well taken care of and improved by medical professionals, particularly nurses. It is because nurses are at the forefront spending much of the time with patients delivering holistic and patient-centered healthcare (Hospital Authority, 2014).

In this case, the purposes of the music intervention are to reduce the level of postoperative pain and anxiety in postoperative patients, meaning that physical (i.e. pain) and mental (i.e. anxiety) conditions can be improved by the music intervention. When it is capable of improving postoperatively physical and mental conditions, this is in line with the holistic patient-centered concept underpinning today’s healthcare. Hence, the findings can fit into the philosophy of care.

3.1.3.3 Number of Patients Benefiting from the Intervention

It must be noted that the music intervention only include adult patients without hearing and mental problems. According to internal records, the number of patients with hearing and mental problems is small in Hospital A. It is expected that 40% of surgical patients in Hospital A, i.e. 28,800 operations estimated in 2015, can benefit from the music intervention.
3.1.3.4 Time for Implementation and Evaluation

Planning is essential to implementation success (Forsberg, Mooz & Cotterman, 2005). The preparation stage is going to last for about three months including preparing a proposal based on the evidence of the reviewed studies, preparing a budget plan, preparing an assessment plan, designing an implementation protocol, designing posters, seeking an implementation approval and funding, and purchasing required equipment.

After the preparation, there will be two weeks for promoting the music intervention. It is important to let all medical professionals aware of the music intervention, its advantages and procedures. The emphasis will be on ease of use and medical effectiveness in order to persuade fellow staff into supporting and using the intervention.

A week of pilot test will follow in order to test suitability and actual use of the intervention. After that, a two weeks assessment will be made towards nurses, physicians and patients respectively.

The total period from planning, pilot testing to evaluating will be about six months. (Appendix 6). It is believed that transferability in terms of timing is high because reasonable time is allocated to each implementation step. Forsberg, Mooz and Cotterman (2005) assert effective implementation is dependent on a logical flow of tasks and reasonable time management, which are two major building blocks of project management.
3.1.4 Feasibility

Feasibility means whether it is financially and organizationally justifiable to apply the medical evidence (Hulley et al., 2013). It is assessed in terms of organizational climate, availability of equipment and training and evaluation tools.

3.1.4.1 Organizational Climate

In general, the climate of improving physical and mental conditions of patients is thought to be positive because the concept of holistic patient-centered healthcare has been widely and heavily promoted and embraced throughout Hospital A. Many medical staff has been aware of the importance of holistic patient-centered healthcare.

In particular, nurses or physicians indeed have freedom to determine if they want to use or terminate an intervention when there is an emergency situation or the music intervention cannot improve mental and physical health conditions. A previous example is that tooth brushing was introduced by an advanced practice nurse to reduce ventilator-associated pneumonia among ICU patients as a pilot test, and it was terminated by the nursing manager given its medical inefficiency and ineffectiveness.

It is expected that a minority of nurses or physicians will resist the music intervention because it is not a standard or mainstream medical intervention. As surgical and pharmacological methods are dominated in medical practices, some nurses or physicians might perceive the music intervention to be a pseudo-medical intervention against the rational sciences behind mainstream medical knowledge. Thus, it might be hard to gain their support. In the meantime, some nurses or physicians might perceive that the music intervention might be problematic because they may be skeptical about
effectiveness and feasibility of the music intervention. This can discourage them. Resistance to the music intervention is thought to be medium to high since it is not about persuading a single department into the implementation but all medical departments in Hospital A that need to use the operation theater. Nursing managers of each department will discuss the intervention and finally the nursing manager in charge of the operation theater will approve it. To deal with likely resistance, training and an evidence-based protocol, supported by empirical evidence from the reviewed studies, can be effective in persuading all fellow staff that the music intervention is a supplement to mainstream interventions bringing no harms to either medical staff or patients. It is hoped that the resistance level will be reduced with the help of the research evidence. In other words, medical staff will apply the music intervention.

Certainly, the intervention will interfere nurses in the operation theater because they will need extra time to administer the equipment, explain procedures to patients, perform tasks required by the protocol and assess effectiveness of the intervention. However, the interference is acceptable and controllable as there are some benefits to nurses and patients (e.g. pharmacological side effect can be reduced), which will discuss in the paragraph of Cost-Benefit Analysis.

3.1.4.2 Availability of Equipment and Training

The equipment consisting of headphones, Ipods and digital music files is not available now; however, it is easy to acquire the equipment.

It is believed that listening to music on a mobile device through headphones and charging such a mobile device are not alien to medical staff since most people in Hong Kong are familiar with and used to mobile music (Euromonitor, 2014).
Nevertheless, prior to the intervention, training sessions about how to use and manage the equipment, explain procedures to patients, and assess effectiveness of the intervention will be given to nurses stationed in the operation theater because they will be in charge of the music intervention.

3.1.4.3 Evaluation Tools

Postoperative pain and anxiety will be measured using the VAS (Simcock et al., 2008; Szmuk et al., 2008; Nilsson, Rawal & Unosson, 2003; Yeo et al., 2013) and STAI (Vachiramon et al., 2013; Twiss et al., 2006; Yeo et al., 2013) respectively.

The VAS, developed by Aitken (1969), is a linear scale (0 = no pain while 10 = extreme pain) measuring pain. It has been widely used in Hospital A in different medical departments to measure pain so that respective pain mitigation measures can be administered. It has a high level of internal consistency (.87 ~ .97) (Bijur, Silver & Gallagher, 2001). The scale has no copyright obligations that can be obtained at no cost. A Chinese version of the scale is available (Aun, Lam & Collett, 1986).

The STAI, developed by Spielberger et al. (1983), has 20 four-point scale items assessing the level of anxiety in a patient. The scale is mainly used by the department of psychiatry in Hospital A. It has a high level of internal consistency (.86 ~ .95) and test-retest reliability coefficients (.65 ~ .75) (APA, 2014). It can be acquired through purchasing a license. A Chinese version of the scale is available (Shek, 1993).
3.1.5 Cost-Benefit Analysis

If the music intervention will not be implemented, a major risk in patients is that patients are more prone to side effects of pharmacological approaches (e.g. nausea, vomiting, cardiovascular and blood pressure problems) (Simock et al., 2008; Gan et al., 2003). These side effects can add extra workload to nurses and hampering the concept of holistic patient-centered healthcare. Medically, the music intervention has no known harmful side effects on patients and it can improve mental and physical conditions postoperatively, according to the reviewed studies. In other words, pharmacological side effects and use of pharmacological can be reduced to a certain degree. Therefore, in terms of clinical outcomes, benefits should outweigh risks of the implementation.

Financial costs are as follows. Each Ipod touch with headphones costs HKD 1,588. The total one-off cost of the player for 12 operation theaters is HKD 14,256. For digital music files, they will be provided by Hospital A because it is not easy for patients to load their songs onto the Ipod touch. Music files can be acquired from Itunes with each album costs around than HKD 100. The files can be shared; thus, only one soft copy will be required for 12 operation theaters. Two albums will be acquired for each music category (i.e. classical, pop-rock, piano, clam, new age, or inspirational), the total one-off cost will be HKD 1,200. Given that the Ipod touch allows users to directly manage its own music library; therefore, there is no need to buy any laptop computer for this purpose. For training preparation, a registered nurse (i.e. HKD 200 hourly salary) will spend about 10 hours on preparing the materials costing HKD 2,000. For training delivery, there will be one advanced practice nurse (i.e. HKD 400 hourly salary) and one registered nurse (i.e. HKD 200 hourly salary) to
hold the training. There will be four training sessions, each of which will last for one hour. The training delivery cost for training is HKD 2,400. For audiences, there will be 48 nurses. Of the nurses, four are nursing managers, fifteen are advanced practice nurses and twenty-nine are registered nurses. The attendance cost will be HKD 19,400. The combined training cost (i.e. preparation, delivery and attendance) is HKD 23,800. The total set up cost for the 1st year will be HKD 39,256. The long term maintenance cost for music administration which included the cost of STAI and the nurses’ salary. The cost of each STAI administration is HKD 3.5; and the time spent for operating Ipod is 5 minutes per administration. Assume that there will be 28,800 operations per year, the cost of STAI administration is HKD 100,800 and the salary for nurse to operate Ipod is HKD 480,960; the long term maintenance cost for music administration will be HKD 581,760 in total (Appendix 7).

A non-financial cost will be resistance among medical staff. Resistance can result in low staff morale and low performance. This is harmful to patients that can demolish the holistic patient-centered healthcare.

In terms of financial benefits, the use of sedative and analgesic meditations can be reduced. On average, each post-operative patient is administered appropriately HKD 100 worth of medications. With the expected 28,800 operations, the total pharmacological cost is HKD 2,880,000 (Appendix 8). It is expected that the music intervention can reduce the pharmacological cost by 30% (Szmuk et al., 2008), equivalent to a saving of HKD 864,000 in Hospital A. In addition, psychical and mental health as a non-financial benefit can greatly improve which cannot be
measured and assessed in financial terms. Nevertheless, benefits (i.e. HKD864,000 to be saved) outweigh the set-up and maintenance costs in the first year.

3.2 Evidence-based Practice Guideline

To develop the evidence-based practice guideline, recommendations to be made are based on a grading system developed by SIGN (2011). The system, with grades from A to D, indicates strengths of each recommendation (Appendix 9). Grade A means the evidence is most credible while Grade D evidence should be treated with caution (SIGN, 2011).

The EBP guideline targets all nurses, who care patients during the operation in operating theatre. There are six recommendations derived from the reviewed studies; all of which are grade A. The EBP guideline and recommendations are shown in Appendix 10.
CHAPTER 4 Implementation Plan

4.1 Communication Plan

The communication plan is to systematically develop a strategy through which to persuade major stakeholders into embracing and adhering to the proposed intervention (Lewis, 2011). First step is to identify those major stakeholders who can influence the proposed intervention and can also be influenced by the proposed intervention, (Jones & Recardo, 2013). It is important to communicate with them and get their support for the proposed intervention.

4.1.1 Identification of the Major Stakeholders

The major stakeholders are

1. Cluster Chief Executive (CCE)
2. General Manager (Nursing)(GM(N))
3. Department Operating Manager (DOM) of Anaesthesia Department
4. Ward Manager
5. Advanced Practice Nurses (APN)
6. Registered Nurses
7. Surgeons
8. Anaesthesiologists

CCE, GM(N) and DOM are at the pinnacle where they have the power to make all final clinical and managerial decisions. Three Ward Managers and fifteen APN are at the clinical forefront establishing, coordinating and supervising nursing interventions in the operation theatre. Twenty-nine Registered Nurses are users who follow implementation guidelines established by the Ward Manager and APN. Twenty-five
anaesthesiologist and fifty surgeons will know the key point of the guidelines only, as they will not implement the guideline.

4.1.2 Communication Strategies

Medical sciences in general and nursing practices in specific are grounded in tangible evidence (Bhandari & Joensson, 2011; Brockopp & Hastings-Tolsma, 2003). This means that medical people believe in and act on credible evidence from which patients can benefit (Bhandari & Joensson, 2011; Bullock et al., 2012). A communication approach proposed by Newton (2013) is used because it is easy to use and systemically split into phases (appendix 6).

4.1.2.1 Initiating the Change

To persuade the stakeholders into embracing and adhering to the proposed intervention, evidence, based on the critical appraisal, cost analysis and implementation protocol, will be prepared and presented by the innovation proposer to fellow Ward Managers, APN and Registered nurses in week 1 when three one-hour presentation sessions will be conducted with about fifteen nurses in each session. Through discussions and sharing, the proposed intervention can be promoted candidly to frontline nurses in order for them to understand why, what and how about the proposed intervention and clear doubts. The rationale for talking to the frontline nurses at the outset is that they are the frontline people administering the proposed intervention and maintaining the equipment. They must feel comfortable with and have confidence in administering the proposed intervention and maintaining the equipment (Campbell, 2009; Lentz, 2009).
When frontline fellow support is sought, which can be used as bargaining power shown to the DOM that the proposed intervention is embraced by the frontline nursing staff, support will be sought from the DOM in week 3. An official proposal will be submitted by one of the Ward Manager for consideration at the second phase. This is to gain high-level nursing managerial support (Lentz, 2009).

When the DOM has approved the plan showing that nursing support from all levels has been sought, the official proposal will be submitted in week 6 to the CCE and GM(N) by the DOM through an internally established channel for a final approval and allocation of resources (Solomon, 2013).

When the proposed intervention is finally approved by the CCE, official implementation characterized by the implementation protocol, will be announced by the DOM in week 11 to Ward Managers, APN, Registered Nurses, anaesthesiologists and surgeons through email.

4.1.2.2

Guiding the Change

All the Anaesthesiologists and surgeons will not implement the innovations. But they should well know the details of the operation, so they could answer patient question while their clinical assessment in Outpatient Department, so there will be two separate one hour information session to be held in week 12 with anaesthesiologists and surgeons respectively and they can ask all kinds of questions related to the intervention (Lentz, 2009). The two sessions for anaesthesiologists and surgeons will be held by their Chief of Service. In the meantime, a protocol manual will be placed
in the operation theatre and sent to all relevant medical departments in order for the medical staff concerned to read, as suggested by Law and MacDermid (2008).

To help the nursing staff concerned fully familiar with the protocol, two trainers including the innovation proposer himself are needed to host training sessions for the nurses. There will be two one-hour workshops for the two trainers (registered nurses) to be conducted in week 13 by an APN.

When all trainers have become competent, they can conduct training sessions in week 14 for other nurses using the same training approach (i.e. presentation and role-playing in a one-hour session) in order for them to be experienced in and familiar with the protocol.

### 4.1.2.3 Sustaining the Change

Sustaining is about keeping track of implementation effectiveness and making revisions to the proposed intervention if necessary. This can be achieved by a pilot test (Nelson et al., 1998).

### 4.2 Pilot Study Plan

A pilot test is small-scale implementation allowing the person in charge to identify problems, and propose improvements accordingly (Nelson et al., 1998).
4.2.1 Aim and Objectives

The aim is to try out the proposed intervention and enhance it if necessary in order to produce a finalized protocol.

The objectives of the pilot test are to observe usage of equipment and implementation flow and to collect feedback data from the nurses, surgeons, anaesthesiologists and patients.

4.2.2 Participants and Setting

The pilot test will be implemented in an operation theatre of Hospital A. The target patients must meet the following criteria:

1. older than 18 years old
2. non-emergent operative patients
3. local or general anaesthesia
4. be conscious before anaesthesia
5. understand instructions given by the medical staff
6. without hearing problems
7. without mental problems
8. without chronic pain
9. non-labouring

The target medical staff will be all registered nurses currently working in the operation theatre. They will administer the intervention, and explain it to the eligible patients, and maintain the equipment.
4.2.3 Target Sample Size & Duration of Pilot Test

The sample size in pilot study will be equal to the number of registered nurses working in operating theatre; it can ensure all registered nurses involved would have a chance to implement the intervention once. There are 44 frontline nurses working in operating theatre, the target sample size should be 44. There are usually about 250 surgical patients during one week and about 40% of them can meet the inclusion criteria so that the expected response rate is about 70% because this is considered an acceptable response rate for most research projects (Lohr, 2009). The pilot test will be implemented in week 15 which sample recruitment; intervention piloting and assessments of the intervention will be done. The data will be analysis and guideline will be review in week 16 and week 18.

4.2.4 Pilot Test Procedure

Prior to the pilot test, equipment will be purchased by the innovation proposer. Registered nurses will administer the procedures and maintain the equipment during the whole process.

Patients will be screened and asked for consent with explanations given by registered nurse. Eligible patients can choose the music genre the like (i.e. Classical, Pop-rock, Piano, Clam, New age or Inspirational). Music is available through a mobile MP3 player and headphones. Before the administration of anaesthesia, headphones are put on the patient. Music is looped and played continuously under the chosen music genre during the operation. The headphones are taken off and music is stopped at the moment the physician completes all procedures.
4.2.5 Data Collection

For the patients, postoperative pain and anxiety will be measured using the VAS and STAI. The patients, after anaesthesia, will complete the VAS and STAI in the recovery room. In addition, they will be invited to complete a questionnaire asking their experience about the music intervention (Appendix 11).

For the registered nurses, two two-hour focus groups, allowing a certain degree of flexibility, will be conducted to collect in-depth opinions on the intervention (Appendix 12).

4.2.6 Data Evaluation

Data collected will be analysed by the innovation proposer. If there will be problems identified from the pilot test, the guideline will be revised accordingly. Otherwise, the intervention will be put to full implementation in all operation theatres of Hospital A.

4.3 Evaluation Plan

After the pilot test, the intervention will be put to full implementation in all operation theatres of Hospital A. Evaluation details are stated as follows.

4.3.1 Aim

Aim of the evaluation is to determine if the implementation of the intervention in the local setting is effective in reducing postoperative pain and anxiety in surgical patients by music during operation in the operation theatre of Hospital A.
4.3.2 Patient Outcomes
First, post-operative pain and anxiety will be assessed using the VAS and STAI. VAS is a linear scale (0= no pain while 10 = extreme pain) measuring pain and anxiety. STAI has forty questions on a Likert scale which has a range of 20-80. A VAS mean score 5 or below is ideal; the lower the VAS mean score, the less pain the patient bears. STAI has a mean score range of 20–80. A STAI mean score 30 or below is ideal; the higher the STAI score, the greater the anxiety intensity.

Second, patient’s satisfaction about the music intervention will be assessed using a structured self-report questionnaire. It has five questions on a 5-point Likert scale which range from 1-5; a mean score between 4 and 5 means a patient is satisfied. A score between 3 and 3.9 is neutral while a mean score between 1 and 2.9 is dissatisfied. The higher the mean score, the higher the satisfaction. The questionnaire is akin to that of the pilot test (Appendix 11).

4.3.3 Health Care Provider Outcomes
For the medical staff concerned, they will be invited to complete a structured self-report questionnaire (Appendix 13) where questions of satisfaction, skills, workload, confidence, knowledge and personal experience will be asked. It has nine questions on a 5-point Likert scale. A mean score between 4 and 5 means a staff is satisfied. A score between 3 and 3.9 is neutral while a mean score between 1 and 2.9 is dissatisfied. The higher the mean score, the higher the satisfaction.
4.3.4 System Outcomes

For Hospital A, costs spent such as set up cost, manpower cost and equipment maintenance cost and number of sedative and analgesic meditations to be used in the recovery room will be measured as system outcomes.

4.3.5 Sample Size & Recruitment Duration

The evaluation will be implemented in all 12 operation theatres of Hospital A. The inclusion criteria for the target person are same as pilot study as mention.

Sample size calculation will be based on the primary outcome: VAS and STAI. According to the post-intervention VAS scores and standard deviations extracted from the reviewed studies, the most conservative mean score and standard deviation was used. As such, the mean score 4.14 from Yeo et al. (2013) and standard deviation 2.7 from Szmuk et al., (2008) are chosen. With the current mean score of 5, the Cohen’s $d$ is 0.32. The sample size for a one-tailed t-test is 62 to ensure a power of 80% and a significance level of 0.05 (Marsden & Wright, 2010).

According to the post-intervention STAI scores extracted from the reviewed studies, the most conservative score and standard deviation was used. Therefore, 37.4 from Yeo et al. (2013) and 9.53 Twiss et al. (2006) are chosen respectively. With the current mean score 40, the Cohen’s $d$ is 0.27. The sample size for a one-tailed t-test is 87 to ensure a power of 80% and a significance level of 0.05 (Marsden & Wright, 2010).
From the above two separate sample size calculations, it is obvious that STAI has the largest sample size 87. Thus, it is taken as the sample size for the evaluation plan.

### 4.3.6 Data Collection

To recruit 87 patients, two weeks of recruitment are suggested. According to internal records, Hospital A has 12 operation theatres and each of which averagely has three operations daily. The hospital can manage about 1,000 operations each month. Of the operations, 40% of patients (about 400 surgical patients) can meet the patient criteria. The expected response rate is about 70% because this is considered an acceptable response rate for most research projects (Lohr, 2009).

For patient outcomes, post-operative VAS and STAI data will be collected. Eligible surgical patients after the effect of anaesthetic and conscious regain, will be asked to complete the VAS and STAI in the recovery room. Alongside, the patients will be asked to complete the structured self-report and questionnaire (Appendix 11) for data of patient satisfactory.

For healthcare providers’ outcome, data will be collected using the structured self-report questionnaire (Appendix 13) at the end of the evaluation period.

For system outcomes, the number of sedative and analgesic meditations will be collected from internal pain management records and the cost of music therapy will be obtained from administrative records at the end of the evaluation period.
4.3.7 Data Analysis

Data will be analysed using SPSS version 21. Descriptive statistics will be used to describe the participant characteristics.

For patient outcomes, mean values of VAS and STAI of the patients will be computed. The objective is to compare if the mean values are lower than the mean values of VAS and STAI of the current clinical record (i.e. VAS and STAI are regularly measured in the recovery room of the hospital A). A one-tailed t-test will be performed for each outcome at 0.05 significance level. Regarding the patient satisfaction, mean values and the 95% confidence intervals will be computed with the aid of five structured self-report questions on a 5-point Likert scale.

For healthcare providers’ outcome, mean values of medical staff satisfaction will be computed with the aid of nine structured self-report questions on a 5-point Likert scale. The proportion of nursing staff with a mean score between 4 and 5 will be calculated, one-tailed z-test for testing one proportion will be used to test if there will be more than 70% of nursing staff feeling satisfied with the intervention at 0.05 significance level.

For system outcomes, descriptive statistics will be used to summarize the number of sedative and analgesic meditations used in the recovery room and compare if the usage is less than the usage prior to the implementation of the innovation. Also all expense such as the training expenditures, manpower required, set-up and running cost will be calculated and summarized in a report. The report is used to monitor the total expense after the implementation of the innovation.
4.3.8 Basis for adopting the guideline

The evaluation result will be summarized in a formal written report and presented to all administrators in order to justify long-term implementation of the proposed guideline.

The basis will be determined by the following conditions. First, from a patients’ point of view, a post-implementation mean score of 5 and 40 or below in VAS and STAI respectively is considered satisfactory, since these are the pre-implementation mean scores of VAS and STAI respectively. There must be a significant improvement in VAS and STAI to justify long-term implementation. Second, a mean score of above 3.9 regarding patient satisfaction must present to further justify long-term implementation.

Second, considering health care provider outcomes, from a medical staff’s point of view, there must be at least 70% of positive satisfaction among the end-users as justification. For the system outcome, the intervention should allow the management to reduce the use of excessive sedative medications by 30% in order to reduce medication costs; also the total expense for the innovation should be kept below HKD 150,000 per annum.
CHAPTER 5 Conclusion

Nearly 80% of patients experience pain and anxiety after surgery because they are inadequately treated postoperatively. Nurses in operating theatre play an important role. Pharmacological measure is a common practise to mitigate postoperative anxiety and pain; however, it can negatively impose side effects (e.g. cardiovascular and blood pressure problems) on surgical patients. A review of the literature reveals that postoperative anxiety and pain can be effectively reduced by perioperative music intervention. Translational nursing research has been developed on the evidence-based guideline for surgical patients to reduced postoperative pain and anxiety. It aim to emphasise music intervention consistency and standardization. The potential benefit and costs of the implementation have been assessed. Implementation and evaluation plans have been designed to assess the feasibility of the protocol. The dissemination of this guideline can guide healthcare worker in music administering during operation for postoperative pain and anxiety mitigation; the level of pain can anxiety will be improved.
## Appendix 1 – Levels of Evidence

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>1++</td>
<td>High quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias</td>
</tr>
<tr>
<td>1+</td>
<td>Well-conducted meta-analyses, systematic reviews, or RCTs with a low risk of bias</td>
</tr>
<tr>
<td>1-</td>
<td>Meta-analyses, systematic reviews, or RCTs with a high risk of bias</td>
</tr>
</tbody>
</table>
| 2++   | High quality systematic reviews of case control or cohort or studies  
High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal |
| 2+    | Well-conducted case control or cohort studies with a low risk of confounding or bias  
and a moderate probability that the relationship is causal |
| 2-    | Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal |
| 3     | Non-analytic studies, e.g. case reports, case series |
| 4     | Expert opinion |
## Appendix 2 – Search History

<table>
<thead>
<tr>
<th>Keyword search</th>
<th>Electronic database</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pubmed</td>
</tr>
<tr>
<td>1. Music</td>
<td>1087</td>
</tr>
<tr>
<td>2. Operating theatre OR Operation theatre OR Operation room OR Operation theatre OR Surgical theatre OR Surgical room OR Surgery OR Operation</td>
<td>144,830</td>
</tr>
<tr>
<td>3. Patient</td>
<td>81,969</td>
</tr>
<tr>
<td>4. Pain OR Anxiety OR Stress OR Fear</td>
<td>81,969</td>
</tr>
<tr>
<td>5. 1 and 2 and 3 and 4</td>
<td>128</td>
</tr>
<tr>
<td>After reviewing title</td>
<td>34</td>
</tr>
<tr>
<td>After reviewing abstract</td>
<td>22</td>
</tr>
<tr>
<td>After reviewing full paper</td>
<td>9</td>
</tr>
<tr>
<td>After reviewing reference lists</td>
<td>9</td>
</tr>
<tr>
<td>Total articles after remove of duplicates</td>
<td>9</td>
</tr>
</tbody>
</table>
Appendix 3: Flow Diagram of the Systematic Search

Literature search
Database: PubMed, CINAHL Plus, and Cochrane Library

Search results combined (n=231)

Articles screened on basis of title and abstract (n=39)

Full-text reviewed (n=13)

Excluded (n=26)
Intervention not perioperative music: 18
Other interventions were used: 8

Included in qualitative synthesis (n=9)

Excluded (n=4)
Duplication: 5
Other interventions were used: 4
### Appendix 4 – Table of Evidence

| Citation | Patient characteristics | Intervention(s) | Comparison | Length of follow up | Outcome measures | Effect size – Mean  
(Intervention – control) |
|----------|-------------------------|-----------------|------------|---------------------|-----------------|------------------|
| - Simcock et al., 2008  
- RCT  
- 1+ | - Total knee arthroplasty surgery under general anaesthesia with diagnosis:  
Osteoarthritis (87%)  
Traumatic arthritis (7%)  
Rheumatic arthritis (3%)  
Lupus (3%)  
- Most African American, 70%  
- Mean age: Music: 67.9  
Control: 66.5  
- N=30 | Music Group:  
- Wore noise-cancelling headphones listening to music of their choices on the Ipod during the operation outpatient  
- Music was off when the surgery was completed  
- n=15 | - Heard white noise with noise-cancelling headphones  
- n=15 | - Measured pain 24 hours after operations in the recovery room  
- a. At 3 hours  
b. At 6 hours  
c. At 24 hours | - Pain:  
1. Visual Analog Scale (scales 0-10, 0= no pain, 10= extreme pain)  
  a. At 3 hours  
b. At 6 hours  
c. At 24 hours | - Postoperative Pain:  
Pretest: No statistical differences (p=0.17)  
Posttest:  
(a) -2.4  p=0.01  
(b) -1.88  p=0.075  
(c) -1.62  p=0.04 |
<table>
<thead>
<tr>
<th>Citation</th>
<th>Patient characteristics</th>
<th>Intervention(s)</th>
<th>Comparison</th>
<th>Length of follow up</th>
<th>Outcome measures</th>
<th>Effect size – Mean (Intervention – control)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laurion &amp; Fetzer, 2003 - RCT - (1-)</td>
<td>- Gynecologic laparoscopic surgery under general anesthesia - 100% White Women, married, high school education. - Most had 2nd or 3rd surgery - Mean age = 34.5 - n = 84</td>
<td>- Music (MU): - Heard piano music chosen by researchers - Music played repetitively on the Walkman during the operation - n= unknown - Guided imagery(GI): - Heard music and narrative by Naparstek, chosen by researchers - Music played repetitively on the Walkman during the operation - n=unknown - Both GI and MU group were asked to hear a tape at least 2 times a day before surgery.</td>
<td>- Standard care, - No music, no Walkman - n=unknown</td>
<td>- Measured pain - a. at arrival of recovery room - b. one hour after arrival - c. discharge from recovery room</td>
<td>- Pain - 1. Verbal Pain Score (0 = No pain, 10 = Extreme Pain) - 2. Equianalgesic narcotic dosage - 3. Acetaminophen dosage (mg) - 4. Ibuprofen dosage (mg)</td>
<td>- Pain: Pretest: - No differences among group on preoperative pain. (p=unknown) Posttest: - No statistically difference in pain at arrival of recovery room and one hour after arrival (p = unknown) - At discharge: i.MU: -1.3 (P=.002) ii.GI: -0.9 (P=.002) 2-4 Not significant (p= unknown)</td>
</tr>
<tr>
<td>Citation</td>
<td>Patient characteristics</td>
<td>Intervention(s)</td>
<td>Comparison</td>
<td>Length of follow up</td>
<td>Outcome measures</td>
<td>Effect size – Mean (Intervention – control)</td>
</tr>
<tr>
<td>----------</td>
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<td>-----------------------------------------</td>
</tr>
</tbody>
</table>
| Szmuk et al., 2008 - RCT - (1++) | - Laparoscopic hernias or cholecystectomy surgery under general anaesthesia  
- Age: 40-60 years old  
- Gender: (M/F)  
  - Music: 10/10  
  - Control: 9/11  
- Mean age  
  - Music: 52  
  - Control: 51  
- ASA Physical Status  
  1 and 2  
- n = 40 | Music:  
  - Listen music 5 minutes after general anaesthesia  
  - Patient can choose heard classical, pop-rock, or Israeli music which were provided by researchers through headphone  
  - Volume adjusted to comfort level  
  - Music played repetitively until anaesthesia was stopped  
  - n=20 | - No music played during operation  
  - Given headphones and with them on throughout surgery  
  - n = 20 | - 15 minutes after surgery | - Pain  
  1. Visual Analog Scale (0-10, 0= no pain, 10= worst imaginable pain)  
  2. Heart rate(beats / min)  
  3. Arterial Blood Pressure (mmhg) | - Pain:  
  1. VAS: -1.7 (p= 0.054)  
  - Not significant  
  2. Heart Rate: -3 (p=0.471)  
  - Not significant  
  3. Arterial Blood Pressure: 7 (p = 0.04)  
  - Significant |
<table>
<thead>
<tr>
<th>Citation</th>
<th>Patient characteristics</th>
<th>Intervention(s)</th>
<th>Comparison</th>
<th>Length of follow up</th>
<th>Outcome measures</th>
<th>Effect size – Mean (Intervention – control)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nilsson, Rawal and Unosson, 2003</td>
<td>- Varicose veins or inguinal hernia repair under general anaesthesia</td>
<td>Intraoperative music (IM): - Patient listen to music supplied by researchers with headphones - Patient expose to a blank compact disk postoperatively.</td>
<td>- No music - Patient expose to a blank compact disk intra-operatively and postoperatively - n = 49</td>
<td>- 3 days</td>
<td>- Pain 1. Numerical rating scale (NRS 11-point scales (0-10, 0 = no pain, 10 = maximal possible pain) 2. Morphine dosage (mg) (a) At 1 hour after surgery (b) At 2 hour after surgery</td>
<td>- Pain Posttest: No significant differences (p=unknown)</td>
</tr>
<tr>
<td></td>
<td>- 21-85 years old</td>
<td></td>
<td></td>
<td></td>
<td>- Anxiety: 1. Numerical rating scale (NRS 11-point scales (0-10, 0 = complete relaxation, 10 = worst feeling of anxiety) 2. Morphine dosage after 1 hour (a) IM: -0.9 (SD=0.7) p&lt;0.05 (b) PM =-0.9(SD=1.1) p=0.019 - Significant less morphine request after 1 hour in PACU (c) Not significant in total amount of morphine dosage. (p = unknown)</td>
<td></td>
</tr>
<tr>
<td>Citation</td>
<td>Patient characteristics</td>
<td>Intervention(s)</td>
<td>Comparison</td>
<td>Length of follow up</td>
<td>Outcome measures</td>
<td>Effect size – Mean (Intervention – control)</td>
</tr>
<tr>
<td>----------</td>
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</tr>
</tbody>
</table>
| Vachiramon et al., 2013  
- RCT  
- (1++) |  
- Mohs surgery under local anaesthesia  
- Overall, 21-90 years old  
- With previous Mohs surgery:  
  Music: 27  
  Control: 23  
- Mean age:  
  Music: 62.6  
  Control: 66.0  
- Gender: (M/F)  
  Music: 34/16  
  Control: 33/17  
- n = 100 |  
- Music:  
  - Music played between 15 to 60 minute  
  - Listened to their favourite music through an open speaker while waiting for the physician and during the first stage of mohs surgery  
- n = 50 |  
- No music at all  
- Not given any listening device  
- n = 50 |  
- Right after the surgery |  
- Anxiety:  
1. VAS scales, 0-10, 0= no pain, 10= extreme pain  
2. STAI questionnaire  
  (scales, 20-80, 20 = no anxiety, 80 = extremely anxious) |  
- Anxiety  
1. VAS Scale  
  Preoperative: 0.67 (p=0.22)  
  No statistically significant difference.  
  Postoperative: -1.9 (p<0.001)  
2. STAI:  
  Preoperative: 0 (p=0.99)  
  Postoperative: -6.5 (p < 0.001) |  
- Anxiety  
Not significant (p = unknown)  
Time point not reported |
### Citation
- Johnson, Raymond & Goss, 2012 - RCT - (1-)

### Patient characteristics
- Gynaecologic surgery under general anaesthesia
- Gender: woman (100%)
- Mean age: Music: 40.91, Headphones: 36.83, Control: 38.44
- Preoperative anxiety level:
  - Low anxiety level (0-3): 51%
  - High anxiety level(>=4): 49%
- n=119

### Intervention(s)
- Music:
  - Listened to either soft country, classical/new age, or inspiration music, provided by researchers, through noise cancelling headphones at constant volume before preoperative medications, throughout surgery and removed when Aldrete LOC = 2.
- n = 43

- Headphones:
  - Noise-cancelling headphones on but without music, before preoperative medications, throughout surgery and removed when Aldrete LOC = 2.
- n=35

### Comparison
- no headphones no music
- Received usual routine care.
- n=41

### Length of follow up
- Measured at patient was awake at a level of consciousnes of 2 on the Aldrete score.

### Outcome measures
- Anxiety
  1. Rapid assessment anxiety tool (Scales 0-10, 0 = no anxiety, 10 = most anxiety possible).

### Effect size – Mean (Intervention – control)
- Anxiety:
  1. Comparison of all subjects’ anxiety scores:
     - Pretest: No statistically significant differences (p=0.244)
     - Posttest:
       - Music :0.99 (p=unknown)
       - Headphones : 0.69 ( p= unknown)
     - Not significant in all subjects.
  2. Comparisons of subjects with preoperative anxiety score >= 4
     - Pretest: Statistically significant differences (p=0.04)
     - Posttest:
       - Music: -1.88 (p = unknown)
       - Headphones: -1.66 (p=unknown)
     - Statistically significant (p=unknown)
<table>
<thead>
<tr>
<th>Citation</th>
<th>Patient characteristics</th>
<th>Intervention(s)</th>
<th>Comparison</th>
<th>Length of follow up</th>
<th>Outcome measures</th>
<th>Effect size – Mean (Intervention – control)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wu et al., 2012</td>
<td>Elective surgical abortion under regional anaesthesia</td>
<td>Music:</td>
<td>No music</td>
<td>30 minutes after the surgery</td>
<td>Pain&lt;br&gt;1. 11 point Verbal Numerical Scales (0-10, 0 = no pain, 10 = extreme pain)</td>
<td>Pain: At 30 min after the procedure : -1.3 (p=unknown) -Not significant</td>
</tr>
<tr>
<td></td>
<td>Gender: woman (100%)</td>
<td>- Listened to preloaded music of their choice repetitively (classical, pop, jazz, new age, rap) on the Ipod through earphones during surgery</td>
<td>- No headphones on&lt;br&gt;- Received all usual routine care&lt;br&gt;- n = 13</td>
<td></td>
<td>Anxiety&lt;br&gt;1. 11 point Verbal Numerical Scales (0-10, 0 = no anxiety, 10 = extreme anxiety)</td>
<td>Anxiety: At 30 min after the procedure: -1.7 (p=0.065) -Not significant</td>
</tr>
<tr>
<td></td>
<td>Mostly African American, 77% overall</td>
<td>- Volume preset so that participants could hear instructions&lt;br&gt;- n = 13</td>
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<tr>
<td></td>
<td>18 to 50 years old</td>
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<tr>
<td></td>
<td>Mean age&lt;br&gt;Music: 26.0 Control: 24.3</td>
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<tr>
<td></td>
<td>n=26</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Intraoperative Music group: (IM)</td>
<td>Received standard postoperative care in surgical ICU.</td>
<td>3 days</td>
<td>Anxiety&lt;br&gt;1. State-Trait anxiety Inventory with two Subscales of 20 MCQ, sum to score of 20-80</td>
<td>Anxiety: Music&lt;br&gt;Preoperative: No statistically significantly differences (p=0.911) Postoperative: Significantly lower anxiety (p=0.022)</td>
</tr>
<tr>
<td></td>
<td>CABG or valve replacement surgery under general anaesthesia</td>
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<td></td>
<td>Same surgeon perform all operation</td>
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<tr>
<td></td>
<td>Mean age: Music: 72.6 Control: 75.1</td>
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<td></td>
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<tr>
<td></td>
<td>n=86</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intraoperative Music group: (IM)</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Patients listened to music throughout the surgery and while in the surgical intensive care area.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>- Patients selected music from six musical CDs provided by researcher and tried on the headphones to ensure they fit comfortably the night before surgery.</td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>- n=42</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Citation</td>
<td>Patient characteristics</td>
<td>Intervention(s)</td>
<td>Comparison</td>
<td>Length of follow up</td>
<td>Outcome measures</td>
<td>Effect size – Mean (Intervention – control)</td>
</tr>
<tr>
<td>----------</td>
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<td>------------------------------------------</td>
</tr>
</tbody>
</table>
| Yeo et al., 2013 - RCT - (1+) | - Rigid cystoscopy under local anaesthesia  
- Gender: Male (100%)  
- Mean age: Music: 47.3  
Control: 49.1  
- All patients viewed their procedures on a video monitor during procedure.  
- n=70 | Music:  
- Patients listen to classical music via headset began before disinfection and throughout the procedure.  
- n=35 | - Patient wears a headset without music during procedure.  
- n=35 | - Right after the surgery | Pain:  
1. Visual analog scale (0-10, 0= no pain, 10=worst imaginable pain)  
- Anxiety  
1. State-Trait anxiety inventory with two subscales of 20 MCQ ,sum to score of 20-80 | The baseline difference of pain and anxiety has not reported.  
Pain  
1. -3.2 (p<0.001) Significant lower pain  
Anxiety  
2. -10.8 (p<0.001) Significant lower anxiety |
Appendix 5 – Appraisal Checklist

1.


<table>
<thead>
<tr>
<th>Section 1: Internal validity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 The study addresses an appropriate and clearly focused question.</td>
<td>Yes, the RQ was to see if patients hear music of their choices using noise-cancelling headphones during a total knee arthroplasty surgery can bear less postoperative pain than those without hearing music.</td>
</tr>
<tr>
<td>1.2 The assignment of subjects to treatment groups is randomised.</td>
<td>Yes. Randomization was performed by 3rd-party RA</td>
</tr>
<tr>
<td>1.3 An adequate concealment method is used.</td>
<td>Yes. Randomization envelopes were dispatched by a 3rd-party RA via sealed envelopes.</td>
</tr>
<tr>
<td>1.4 Subjects and investigators are kept ‘blind’ about treatment allocation.</td>
<td>Yes, double-blind from randomization to data collection</td>
</tr>
<tr>
<td>1.5 The treatment and control groups are similar at the start of the trial.</td>
<td>Yes, characteristic of participants were similar</td>
</tr>
<tr>
<td>1.6 The only difference between groups is the treatment under investigation.</td>
<td>Yes.</td>
</tr>
<tr>
<td>1.7 All relevant outcomes are measured in a standard, valid and reliable way.</td>
<td>Yes, VAS was used.</td>
</tr>
<tr>
<td>1.8 What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?</td>
<td>0%</td>
</tr>
<tr>
<td>1.9 All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis).</td>
<td>Yes.</td>
</tr>
</tbody>
</table>
1.10 Where the study is carried out at more than one site, results are comparable for all sites. N/A

### SECTION 2: OVERALL ASSESSMENT OF THE STUDY

<table>
<thead>
<tr>
<th></th>
<th>How well was the study done to minimise bias? Code as follows:</th>
<th>Acceptable + Sample size is small N=30, so acceptable only.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td><strong>How well was the study done to minimise bias?</strong> Code as follows:</td>
<td><strong>Acceptable</strong> + Sample size is small N=30, so acceptable only.</td>
</tr>
<tr>
<td>2.2</td>
<td>Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention?</td>
<td>Yes, it is asserted that the results were not prone to much bias.</td>
</tr>
<tr>
<td>2.3</td>
<td>Are the results of this study directly applicable to the patient group targeted by this guideline?</td>
<td>Yes.</td>
</tr>
</tbody>
</table>
| 2.4 | **Notes.** Summarise the authors’ conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above. | **Music is an inexpensive nonpharmacological approach to pain reduction without side effects. Patients were interested to hear music during operation.**  
**The research indicates the usefulness of music dealing with short-term postoperative pain.** |

Music is an inexpensive nonpharmacological approach to pain reduction without side effects. Patients were interested to hear music during operation.

The research indicates the usefulness of music dealing with short-term postoperative pain.

### Section 1: Internal validity

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>The study addresses an appropriate and clearly focused question.</td>
<td>Yes, part of the RQ was examine if music played during operation could reduce postoperative pain. They also examined effectiveness of postoperative music, nausea and vomiting.</td>
</tr>
<tr>
<td>1.2</td>
<td>The assignment of subjects to treatment groups is randomised.</td>
<td>Can’t say, method not reported</td>
</tr>
<tr>
<td>1.3</td>
<td>An adequate concealment method is used.</td>
<td>No. Not reported</td>
</tr>
<tr>
<td>1.4</td>
<td>Subjects and investigators are kept ‘blind’ about treatment allocation.</td>
<td>Yes. Only blind the perioperative nurse and anaesthesia providers</td>
</tr>
<tr>
<td>1.5</td>
<td>The treatment and control groups are similar at the start of the trial.</td>
<td>Yes.</td>
</tr>
<tr>
<td>1.6</td>
<td>The only difference between groups is the treatment under investigation.</td>
<td>Yes.</td>
</tr>
<tr>
<td>1.7</td>
<td>All relevant outcomes are measured in a standard, valid and reliable way.</td>
<td>Yes, measured in Verbal Pain Score, Equianalgesic narcotic dosage, Acetaminophen dosage (mg) and Ibuprofen dosage (mg)</td>
</tr>
<tr>
<td>1.8</td>
<td>What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?</td>
<td>0%</td>
</tr>
<tr>
<td>1.9</td>
<td>All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis).</td>
<td>Yes.</td>
</tr>
<tr>
<td>1.10</td>
<td>Where the study is carried out at more than one site, results are comparable for all sites.</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### SECTION 2: OVERALL ASSESSMENT OF THE STUDY

| 2.1 | How well was the study done to minimise bias?  
*Code as follows:* | Unacceptable (-) |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention?</td>
<td>This research can be prone to bias.</td>
</tr>
<tr>
<td>2.3</td>
<td>Are the results of this study directly applicable to the patient group targeted by this guideline?</td>
<td>Yes.</td>
</tr>
<tr>
<td>2.4</td>
<td><strong>Notes.</strong> Summarise the authors’ conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above.</td>
<td>Researchers found the intervention to be statistically effective in reducing postoperative pain on patient discharge from PACU.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Section 1: Internal validity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 The study addresses an appropriate and clearly focused question.</td>
<td>Yes. Main part of the purpose was to examine if music played during operation could reduce the amount of operative anesthesia. Small part of the research was to examine if music during operation could reduce postoperative pain.</td>
</tr>
<tr>
<td>1.2 The assignment of subjects to treatment groups is randomised.</td>
<td>Yes. Subjects are randomly allocated to group based on computer-generated codes.</td>
</tr>
<tr>
<td>1.3 An adequate concealment method is used.</td>
<td>Yes, randomization opaque envelopes were used at the moment before operation.</td>
</tr>
<tr>
<td>1.4 Subjects and investigators are kept ‘blind’ about treatment allocation.</td>
<td>Yes, blind to patients and surgical medical staff but not blind to the researchers.</td>
</tr>
<tr>
<td>1.5 The treatment and control groups are similar at the start of the trial.</td>
<td>Yes, there was no statistical significance in demographics</td>
</tr>
<tr>
<td>1.6 The only difference between groups is the treatment under investigation.</td>
<td>Yes</td>
</tr>
<tr>
<td>1.7 All relevant outcomes are measured in a standard, valid and reliable way.</td>
<td>Yes. Postoperative pain was measured using VAS. Heart rate and Arterial Blood Pressure</td>
</tr>
<tr>
<td>1.8 What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?</td>
<td>0%</td>
</tr>
<tr>
<td>1.9 All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis).</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>1.10</td>
<td>Where the study is carried out at more than one site, results are comparable for all sites.</td>
</tr>
</tbody>
</table>

**SECTION 2: OVERALL ASSESSMENT OF THE STUDY**

2.1 **How well was the study done to minimise bias?**

*Code as follows:*

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High quality ++</td>
</tr>
</tbody>
</table>

2.2 **Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention?**

|   | Certain that the intervention was not prone to bias |

2.3 **Are the results of this study directly applicable to the patient group targeted by this guideline?**

|   | Yes. |

2.4 **Notes.** Summarise the authors’ conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above.

*Music reported slightly less pain, but it is not statically significant. (p=0.054)*
4.


### Section 1: Internal validity

<table>
<thead>
<tr>
<th></th>
<th>The study addresses an appropriate and clearly focused question.</th>
<th>Yes. Overall, the researchers examined the effect of music played during operation and played postoperatively on postoperative pain. Only music played during operation is related to this translational research.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2</td>
<td>The assignment of subjects to treatment groups is randomised.</td>
<td>Yes. Subjects are randomly allocated to group by using a computer-generated list.</td>
</tr>
<tr>
<td>1.3</td>
<td>An adequate concealment method is used.</td>
<td>No. Not reported.</td>
</tr>
<tr>
<td>1.4</td>
<td>Subjects and investigators are kept ‘blind’ about treatment allocation.</td>
<td>Yes, Single blind.</td>
</tr>
<tr>
<td>1.5</td>
<td>The treatment and control groups are similar at the start of the trial.</td>
<td>Yes, there was no statistical significance in demographics</td>
</tr>
<tr>
<td>1.6</td>
<td>The only difference between groups is the treatment under investigation.</td>
<td>Yes</td>
</tr>
<tr>
<td>1.7</td>
<td>All relevant outcomes are measured in a standard, valid and reliable way.</td>
<td>Yes. Postoperative pain was measured using NRS scales and Morphine dosage (mg).</td>
</tr>
<tr>
<td>1.8</td>
<td>What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?</td>
<td>0%</td>
</tr>
<tr>
<td>1.9</td>
<td>All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis).</td>
<td>Yes.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>1.10</td>
<td>Where the study is carried out at more than one site, results are comparable for all sites.</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**SECTION 2: OVERALL ASSESSMENT OF THE STUDY**

| 2.1 | How well was the study done to minimise bias?  
*Code as follows:* | High quality (++)
Sample size = 151 |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2</td>
<td>Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention?</td>
<td>Certain that the intervention was not prone to bias</td>
</tr>
<tr>
<td>2.3</td>
<td>Are the results of this study directly applicable to the patient group targeted by this guideline?</td>
<td>Yes.</td>
</tr>
</tbody>
</table>
| 2.4 | **Notes.** Summarise the authors’ conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above. | Music therapy is significantly lower pain score at 1h (p<0.01) and 2 h (p<0.01) after operation.  
But insignificantly in lower anxiety level. |

<table>
<thead>
<tr>
<th>Section 1: Internal validity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.1</strong> The study addresses an appropriate and clearly focused question.</td>
<td>Yes, the researchers examined the effect of music during operation on postoperative pain and anxiety.</td>
</tr>
<tr>
<td><strong>1.2</strong> The assignment of subjects to treatment groups is randomised.</td>
<td>Yes, participants were randomized into two groups by a randomization table.</td>
</tr>
<tr>
<td><strong>1.3</strong> An adequate concealment method is used.</td>
<td>No. Not reported</td>
</tr>
<tr>
<td><strong>1.4</strong> Subjects and investigators are kept ‘blind’ about treatment allocation.</td>
<td>Yes, single blind to patients</td>
</tr>
<tr>
<td><strong>1.5</strong> The treatment and control groups are similar at the start of the trial.</td>
<td>Yes, there was no statistical significance in demographics</td>
</tr>
<tr>
<td><strong>1.6</strong> The only difference between groups is the treatment under investigation.</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>1.7</strong> All relevant outcomes are measured in a standard, valid and reliable way.</td>
<td>Yes. Postoperative anxiety was measured using VAS and STAI</td>
</tr>
<tr>
<td><strong>1.8</strong> What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?</td>
<td>0%</td>
</tr>
<tr>
<td><strong>1.9</strong> All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis).</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Where the study is carried out at more than one site, results are comparable for all sites.

<table>
<thead>
<tr>
<th>SECTION 2: OVERALL ASSESSMENT OF THE STUDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>2.2</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>2.3</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>2.4</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
### Section 1: Internal validity

| 1.1 | The study addresses an appropriate and clearly focused question. | Yes, the researchers examined the effect of music during operation on postoperative anxiety. |
| 1.2 | The assignment of subjects to treatment groups is randomised. | Can’t say. Method not reported. |
| 1.3 | An adequate concealment method is used. | No. Not reported. |
| 1.4 | Subjects and investigators are kept ‘blind’ about treatment allocation. | No. Not reported. |
| 1.5 | The treatment and control groups are similar at the start of the trial. | Yes, the researchers claimed there was no difference in demographics. |
| 1.6 | The only difference between groups is the treatment under investigation. | Yes. |
| 1.7 | All relevant outcomes are measured in a standard, valid and reliable way. | Yes. Postoperative anxiety was measured using The Rapid Assessment Anxiety Tool |
| 1.8 | What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed? | 0.83% |
| 1.9 | All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis). | Yes. |
| 1.10 | Where the study is carried out at more than one site, results are comparable for all sites. | N/A |

**SECTION 2: OVERALL ASSESSMENT OF THE STUDY**

<table>
<thead>
<tr>
<th>2.1</th>
<th>How well was the study done to minimise bias? <em>Code as follows:</em></th>
<th>Unacceptable (-) Randomization and blinding method is unknown may prone to bias.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2</td>
<td>Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention?</td>
<td>Cannot be certain that the intervention was not prone to bias</td>
</tr>
<tr>
<td>2.3</td>
<td>Are the results of this study directly applicable to the patient group targeted by this guideline?</td>
<td>Yes.</td>
</tr>
<tr>
<td>2.4</td>
<td><strong>Notes.</strong> Summarise the authors’ conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above.</td>
<td>No significant effect of music on postoperative anxiety for all subjects in the study. But music therapy is found significant effect on postoperative anxiety for subjects with high preoperative anxiety level (≥4). <em>(p=0.04)</em></td>
</tr>
</tbody>
</table>

### Section 1: Internal validity

| 1.1 | The study addresses an appropriate and clearly focused question. | Yes, the researchers examined the effect of music during operation on operative and postoperative pain and anxiety. Only postoperative pain and anxiety is relevant. |
| 1.2 | The assignment of subjects to treatment groups is randomised. | Yes, randomization sequence using a computer random number generator. |
| 1.3 | An adequate concealment method is used. | Yes. Sufficient concealment by opaque envelopes. |
| 1.4 | Subjects and investigators are kept ‘blind’ about treatment allocation. | Yes. Single blind. Because participants were through the regional anaesthesia, they knew which groups they belonged to. However, the researchers and medical staff did not involve and know the randomization nor did the researchers were involved in data collection. |
| 1.5 | The treatment and control groups are similar at the start of the trial. | Yes, the researchers claimed there was no difference in demographics. |
| 1.6 | The only difference between groups is the treatment under investigation. | Yes. |
| 1.7 | All relevant outcomes are measured in a standard, valid and reliable way. | Yes. Postoperative pain and anxiety was measured using Verbal Numerical Scales. |
| 1.8 | What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed? | 0% |
| 1.9 | All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis). | Yes. |
Where the study is carried out at more than one site, results are comparable for all sites.

### SECTION 2: OVERALL ASSESSMENT OF THE STUDY

| 2.1 | How well was the study done to minimise bias?  
*Code as follows:* | Acceptable (+)  
Sample size is small due to pilot study. So acceptable only. (N=26) |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2</td>
<td>Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention?</td>
<td>Quite certain that the intervention was not prone to bias</td>
</tr>
<tr>
<td>2.3</td>
<td>Are the results of this study directly applicable to the patient group targeted by this guideline?</td>
<td>Yes.</td>
</tr>
<tr>
<td>2.4</td>
<td>Notes. Summarise the authors’ conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above.</td>
<td>Music played during operation had no significant effect on postoperative pain and anxiety; the researchers did not object the use of music, but its full effectiveness in easing abortion pain was called into question.</td>
</tr>
</tbody>
</table>

**Section 1: Internal validity**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>The study addresses an appropriate and clearly focused question.</td>
<td>Yes, the RQ was to see if patients hear music during and after heart surgery can bear less postoperative pain than those without hearing music.</td>
</tr>
<tr>
<td>1.2</td>
<td>The assignment of subjects to treatment groups is randomised.</td>
<td>Yes. Randomization by picking a slip of paper from two boxes with all intervention. One box for male, and the others for female. So the gender can matched</td>
</tr>
<tr>
<td>1.3</td>
<td>An adequate concealment method is used.</td>
<td>Yes. Randomization by picking a slip of paper from two boxes. So the picking slip is unknown.</td>
</tr>
<tr>
<td>1.4</td>
<td>Subjects and investigators are kept ‘blind’ about treatment allocation.</td>
<td>No. Not reported.</td>
</tr>
<tr>
<td>1.5</td>
<td>The treatment and control groups are similar at the start of the trial.</td>
<td>Yes</td>
</tr>
<tr>
<td>1.6</td>
<td>The only difference between groups is the treatment under investigation.</td>
<td>Yes.</td>
</tr>
<tr>
<td>1.7</td>
<td>All relevant outcomes are measured in a standard, valid and reliable way.</td>
<td>Yes, STAI are widely used.</td>
</tr>
<tr>
<td>1.8</td>
<td>What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?</td>
<td>14%</td>
</tr>
<tr>
<td>1.9</td>
<td>All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis).</td>
<td>Yes.</td>
</tr>
<tr>
<td></td>
<td>Where the study is carried out at more than one site, results are comparable for all sites.</td>
<td>N/A</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

**SECTION 2: OVERALL ASSESSMENT OF THE STUDY**

|   | How well was the study done to minimise bias?  
*Code as follows:* | Acceptable +  
Blinding is unknown |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention?</td>
<td>Yes, it is asserted that the results were not prone to much bias.</td>
</tr>
<tr>
<td>2.2</td>
<td>Are the results of this study directly applicable to the patient group targeted by this guideline?</td>
<td>Yes.</td>
</tr>
<tr>
<td>2.3</td>
<td><strong>Notes.</strong> Summarise the authors’ conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above.</td>
<td>Music played during cardiovascular surgery had significant effect on postoperative anxiety and reduce intubation time.</td>
</tr>
</tbody>
</table>
9.


<table>
<thead>
<tr>
<th>Section 1: Internal validity</th>
<th>1.1 The study addresses an appropriate and clearly focused question.</th>
<th>Yes, the RQ was to see if patients hear classical music during rigid cystoscopy can bear less postoperative pain and anxiety than those without hearing music.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.2 The assignment of subjects to treatment groups is randomised.</td>
<td>Yes. Randomization by block randomized only.</td>
</tr>
<tr>
<td></td>
<td>1.3 An adequate concealment method is used.</td>
<td>No. Not reported.</td>
</tr>
<tr>
<td></td>
<td>1.4 Subjects and investigators are kept ‘blind’ about treatment allocation.</td>
<td>No. Not reported.</td>
</tr>
<tr>
<td></td>
<td>1.5 The treatment and control groups are similar at the start of the trial.</td>
<td>Yes.</td>
</tr>
<tr>
<td></td>
<td>1.6 The only difference between groups is the treatment under investigation.</td>
<td>Yes.</td>
</tr>
<tr>
<td></td>
<td>1.7 All relevant outcomes are measured in a standard, valid and reliable way.</td>
<td>Yes, VAS and STAI are widely used.</td>
</tr>
<tr>
<td></td>
<td>1.8 What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>1.9 All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis).</td>
<td>Yes.</td>
</tr>
</tbody>
</table>
Where the study is carried out at more than one site, results are comparable for all sites.

| 1.10 | N/A |

### SECTION 2: OVERALL ASSESSMENT OF THE STUDY

| 2.1 | How well was the study done to minimise bias?  
*Code as follows:* | Acceptable +  
No blinding and randomization details is unknown |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2</td>
<td>Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention?</td>
<td>Yes, it is asserted that the results were not prone to much bias.</td>
</tr>
<tr>
<td>2.3</td>
<td>Are the results of this study directly applicable to the patient group targeted by this guideline?</td>
<td>Yes.</td>
</tr>
<tr>
<td>2.4</td>
<td><strong>Notes.</strong> Summarise the authors’ conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your question and mention any areas of uncertainty raised above.</td>
<td>Music played during rigid cystoscopy had significant effect on postoperative pain and anxiety.</td>
</tr>
</tbody>
</table>
### Appendix 6: Gantt chart for implementation of music intervention protocol in a 6-month period

<table>
<thead>
<tr>
<th>Week</th>
<th>1-2</th>
<th>3-5</th>
<th>6-10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17-18</th>
<th>19-20</th>
<th>21-23</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Poster presentation to Ward Managers, APN and Registered nurses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Seek approval from DOM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Seek approval from CCE and GMN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Funding</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- announcement to all staff by DOM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Information session for anaesthesiologists and surgeons</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Workshop for trainers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Training sessions for all nurses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Pilot test</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Analysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Review and refine the guideline</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Implementation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Evaluation</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix 7 – Estimated Cost for music intervention:

Set up Cost:

**Equipment Cost (one-off)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit cost</th>
<th>Qty</th>
<th>Total cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ipod touch with headphones</td>
<td>HKD 1,588</td>
<td>12</td>
<td>HKD 14,256</td>
</tr>
<tr>
<td>Music files</td>
<td>HKD 100 per album</td>
<td>12</td>
<td>HKD 1,200</td>
</tr>
</tbody>
</table>

**Total Equipment Cost: HKD 15,456**

**Training Cost**

<table>
<thead>
<tr>
<th>Nurses</th>
<th>Unit cost</th>
<th>Unit of Nurses</th>
<th>No. of Hours</th>
<th>Total cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation of material</td>
<td>RN</td>
<td>HKD 200</td>
<td>1</td>
<td>10</td>
</tr>
</tbody>
</table>

**Total Preparation Cost: HKD 2000**

<table>
<thead>
<tr>
<th>Nurses</th>
<th>Unit cost</th>
<th>Unit of Nurses</th>
<th>No. of Hours</th>
<th>Total cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>APN</td>
<td>HKD 400</td>
<td>1</td>
<td>4</td>
<td>HKD 1600</td>
</tr>
<tr>
<td>RN</td>
<td>HKD 200</td>
<td>1</td>
<td>4</td>
<td>HKD 800</td>
</tr>
</tbody>
</table>

**Total Delivery Cost: HKD 2400**

<table>
<thead>
<tr>
<th>Nurses</th>
<th>Unit cost</th>
<th>Unit of Nurses</th>
<th>No. of Hours</th>
<th>Total cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing Manager</td>
<td>HKD 800</td>
<td>4</td>
<td>1</td>
<td>HKD 3200</td>
</tr>
<tr>
<td>APN</td>
<td>HKD 400</td>
<td>15</td>
<td>1</td>
<td>HKD 6000</td>
</tr>
<tr>
<td>RN</td>
<td>HKD 200</td>
<td>29</td>
<td>1</td>
<td>HKD 5800</td>
</tr>
</tbody>
</table>

**Total Attendance Cost: HKD 19,400**

**Total Training Cost for the 1st year: HKD 23,800**

**Total set up cost estimated for the innovation for the 1st year: HKD 39,256**
## Appendix 7 – Estimated Cost for music intervention: (Con’d)

### Maintenance Cost

<table>
<thead>
<tr>
<th>Expense</th>
<th>Qty</th>
<th>Total cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STAI</strong></td>
<td>HKD 3.5 per administration</td>
<td>HKD 100,800 assuming 28,800 operations</td>
</tr>
<tr>
<td><strong>Manpower</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Registered Nurses for music administration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Time for Registered nurses to operate the Ipod for music administration: 5 min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Hourly salary: 200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Estimated salary for music administration: HKD 16.7 per patient</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HKD 16.7 per patient</td>
<td>HKD 480,960 assuming 28,800 operations</td>
</tr>
</tbody>
</table>

**Total maintenance cost : 581,760**
Appendix 8: Potential Benefit

<table>
<thead>
<tr>
<th>Possible Medication for Post-operative Patients</th>
<th>Cost Per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzodiazepine</td>
<td>HKD 10</td>
</tr>
<tr>
<td>Morphine</td>
<td>HKD 7</td>
</tr>
<tr>
<td>Acetaminophen</td>
<td>HKD 4</td>
</tr>
<tr>
<td>Ibuprofen</td>
<td>HKD 3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No. of Patients in a year</th>
<th>Average Medication Cost per patient</th>
<th>Total Medication Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>28,800</td>
<td>HKD 100</td>
<td>HKD 2,880,000</td>
</tr>
</tbody>
</table>

Assume music intervention can reduce the pharmacological cost by 30%:
= saving 864,000
Appendix 9: Grade of Recommendations (Scottish Intercollegiate Guideline Network, 2014)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Evidence Level</th>
</tr>
</thead>
</table>
| **A** | At least one meta-analysis, systematic review, or RCT rated as 1++, and directly applicable to the target population; *or*  
- A body of evidence consisting principally of studies rated as 1+, directly applicable to the target population, and demonstrating overall consistency of results  |
| **B** | A body of evidence including studies rated as 2++, directly applicable to the target population, and demonstrating overall consistency of results; *or*  
- Extrapolated evidence from studies rated as 1++ or 1+  |
| **C** | A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; *or*  
- Extrapolated evidence from studies rated as 2++  |
| **D** | Evidence level 3 or 4; *or*  
- Extrapolated evidence from studies rated as 2+  |
Appendix 10: Evidence-based practice guideline

Evidence-based Guideline of Administering Music Intervention for Adult Patients during Operation in the Operation Theatre

For the Evidence-based guideline (EBP) for the use of music during operation to minimize postoperative pain. The grade of recommendation used in these guideline are graded according to SIGN (2014a).

The capital alphabets A, B, C, D, represent the grade of recommendation. The grade of recommendation Grade A means the evidence is most credible while Grade D evidence should be treated with caution (SIGN, 2014a). The numbering 1++, 1+, 1-, 2++, 2+, 2-, 3, 4 which represent the level of evidence. The ++ sign shows that a paper has fewest or no bias, the + sign means a study has few biases, while the – sign shows that a study is prone to research bias (SIGN, 2014b).

Aim

To uphold the concept of holistic patient-centered healthcare by reducing levels of postoperative pain and anxiety in adult patients through administration music during operation.

Objectives:

- To define operational procedures of the music intervention during non-emergent operation in Hospital A based on the best available evidence
- To facilitate nurses to implement music intervention for patient during operation based on evidence from the literature.
Target Users

This (EBP) guideline is used by nurses stationed in the operation theatre.

Target group

This EBP guideline aimed at provide to adult patients who are undergoing non-emergent operations in operation theatre.

The inclusion criteria include:

1. Aged 18 or above;
2. non-emergent operative patients
3. local or general anaesthesia
4. be conscious before anaesthesia
5. understand instructions given by the medical staff
6. without hearing problems
7. without mental problems
8. without chronic pain
9. non-labouring

Recommendations

1. Adult patients undergoing non-emergent operations without hearing or mental problems can be administered the music intervention (Grade A)

The reviewed studies showed that adult patients with hearing (Simcock et al., 2008 (1+); Johnson, Raymond & Goss, 2012 (1-); Szmuk et al., 2008 (1++)) or mental (Laurion & Fetzer, 2003 (1-); Simcock et al., 2008 (1+); Szmuk et al., 2008 (1++)) problems are excluded from the music intervention.
2. Adult patients undergoing non-emergent operations under local or general anesthesia are eligible. (Grade A)

The reviewed studies showed that music is administrated during operation where local or general anesthesia is chosen (Simcock et al., 2008 (1+); Laurion & Fetzer, 2003 (1-); Szmuk et al., 2008 (1++); Nilsson, Rawal & Unosson, 2003 (1++); Vachiramon et al., 2013 (1++); Johnson, Raymond & Goss, 2012 (1-); Wu et al., 2012 (1+); Twiss et al., 2006 (1+); Yeo et al., 2013 (1+)). Particularly, music administrated under general anesthesia can expedite postoperative recovery (Szmuk et al., 2008 (1++)).

3. Patients should have the freedom to choose their favorite music (Grade A)

When letting the patient to choose what music to hear, nurses should respect patients and give them freedom to choose music they like. Nurses must ask their preference within the predefined music genres (Johnson, Raymond & Goss, 2012 (1-); Vachiramon et al., 2013 (1++); Szmuk et al., 2008 (1++));. When listening to their favorite music, patients can reduce pain and anxiety (Johnson, Raymond & Goss, 2012 (1-)).

4. The type of music to be administered could be Classical, Pop-rock, Piano, Clam, New age, or Inspirational Music (Grade A)

Most of the reviewed studies showed that Classical, Pop-rock, Piano, Clam, New age or inspirational music can decrease patients’ postoperative pain and anxiety. (Laurion & Fetzer, 2003 (1- ); Twiss et al., 2006 (1+); Yeo et al., 2013 (1+); Johnson, Raymond & Goss, 2012 (1-))
5. **Music can be delivered via headphone through MP3 player (Grade A)**

Music is available through a mobile MP3 player (Simcock et al., 2008 (1+); Johnson, Raymond & Goss, 2012 (1-); Wu et al., 2012 (1+)) and headphones (Simcock et al., 2008 (1+); Johnson, Raymond & Goss, 2012 (1-); Nilsson, Rawal & Unosson, 2003 (1++); Wu et al., 2012 (1+); Yeo et al. (2012) (1+) because it is the safest device combination.

Before the administration of anesthesia, headphones are put on the patient (Simcock et al., 2008 (1+)). The use of headphones is not to distract the nurse and surgeon during operation (Nilsson, Rawal & Unosson, 2003 (1++)).

6. **Music intervention should be implemented throughout the operation. (Grade A)**

The reviewed studies showed that music is looped and played continuously under the chosen music genre during the operation (Szmuk et al., 2008 (1++); Nilsson, Rawal & Unosson, 2003 (1++); Wu et al., 2012 (1+)).

The headphones are taken off and music is stopped at the moment the physician completes all procedures (Simcock et al., 2008 (1+); Szmuk et al., 2008 (1++); Nilsson, Rawal & Unosson, 2003 (1++); Wu et al., 2012 (1+)).
References:


Appendix 11: Evaluation – Questionnaire for Patient Satisfaction

Please share your opinions on the music intervention by expressing the degree of satisfaction:

<table>
<thead>
<tr>
<th></th>
<th>Extremely disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Extremely agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Music chosen was suitable for me to hear</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Music choices were wide for me to choose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The music intervention process throughout was smooth</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Music intervention can help you cope with post-operative pain</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Music intervention can help you cope with post-operative anxiety</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
Appendix 12: Evaluation Guided Questions for Focus Groups for the Nurses

1. What do you think about the length of music playing?
2. What do you think about ease of use of the intervention?
3. What do you think about adherence to the guidelines?
4. Do you think the training can give you sufficient knowledge and skills to use the intervention?
5. Do you think you have confidence in using the intervention?
6. What do you think about benefits brought to you and other colleagues by the intervention?
7. What do you think about reaction of surgeons?
8. What do you think about post-operative pain and anxiety of the patients?
9. What do you think about satisfaction of patients?
10. Do you think the patients were fearful of the intervention?
11. Any other comments?
Appendix 13: Evaluation – Questionnaire for Medical Staff Satisfaction

Please share your opinions on the music intervention by expressing the degree of satisfaction

<table>
<thead>
<tr>
<th></th>
<th>Extremely disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Extremely agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you think you can do your postoperative work better because of patient improved post-operative pain and anxiety?</td>
<td></td>
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</tr>
<tr>
<td>Do you think the player and headphones were effective as equipment?</td>
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<tr>
<td>Do you think post-operative pain and anxiety of the patients are improved?</td>
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</tr>
<tr>
<td>Do you think the intervention is easy to use?</td>
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<tr>
<td>Do you think the medical staff involved adhered to the guidelines?</td>
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</tr>
<tr>
<td>Do you think the patients were not fearful of the intervention?</td>
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</tr>
<tr>
<td>Do you think you have confidence in using the intervention?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you think the training can give you sufficient knowledge and skills to use the intervention?</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Are you satisfied with the music intervention as a means to reduce post-operative pain and anxiety of the patient?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
References


Koch ME, Kain ZN, Ayoub C, Rosenbaum SH. The sedative and analgesic sparing effect of music. Anesthesiology 1998;89:300 – 6


