Abstract of thesis entitled

“An evidence-based guideline of using multimedia distraction in reducing preoperative anxiety for paediatric patients undergo elective surgeries”

Submitted by

Wong Man Sheung

for the degree of Master of Nursing

at The University of Hong Kong

in August 2015

It was reported that above 40% of paediatric patients undergoing elective surgeries experienced preoperative anxiety. A high preoperative anxiety level not only leads to unpleasant experiences to paediatric patients, but also causes uncooperativeness and difficulty in induction of anaesthesia, increased postoperative pain and even poor postoperative behavioural recovery. Multimedia distraction, which can be carried out easily by nurses, has been found to be a safe and cost-effective method to lower the distress level in children in
medical procedures. However, there was no systemic review about using multimedia
distraction to relieve the preoperative anxiety of paediatric patients who were undergoing
elective surgeries. Therefore, the purpose of this dissertation is to develop an evidence based
protocol of the effectiveness of multimedia distraction in reducing preoperative anxiety level
of paediatric patients undergoing elective surgeries.

Four electronic databases, PubMed, CINAHL Plus, British Nursing Index, and
PsycINFO, were searched for literatures to evaluate the efficacy of multimedia distraction in
paediatric patients undergoing elective surgeries. Five articles were selected according to
inclusion and exclusion criteria. Quality assessment of the selected studies was performed
according to the guideline of the Scottish Intercollegiate Guidelines Network methodology
checklist for controlled trials. Two studies were graded as high quality while the others were
graded as acceptable. Four of the studies demonstrated that multimedia distraction can reduce
preoperative anxiety in paediatric patients.

Accordingly, an evidence-based guideline of using multimedia distraction in reducing
preoperative anxiety for paediatric patients undergoing elective surgeries was established. The
evidences suggested that multimedia distraction including using smartphone applications or
watching cartoon movies for twenty minutes before induction of anaesthesia can effectively
lower preoperative anxiety level among paediatric patients.
Besides, the implementation potentials including the transferability of the findings, feasibility and cost-benefit ratio in the target setting were assessed. A 12-month implementation programme was designed, which includes communication with stakeholders, staff training, pilot testing and clinical application of the proposed multimedia distraction.

Evaluation plans on patient outcomes, healthcare system outcomes and healthcare provider outcomes could be performed. The effectiveness of the guideline would be determined by its ability to reduce patients’ anxiety level reflected by modified Yale Preoperative Anxiety Scale (mYPAS). Healthcare provider outcomes would be assessed by annual competency audit while their satisfactory level would also be considered. Lastly, the running cost of the guideline would be monitored closely to keep the expenditure below $10000.
An evidence-based guideline of using multimedia distraction in reducing preoperative anxiety for paediatric patients undergo elective surgeries

by

Wong Man Sheung

BSN, RN

A thesis submitted in partial fulfilment of the requirement for

the Degree of Master of Nursing

at The University of Hong Kong

August 2015
Declaration

I declare that this thesis thereof represents my own work, except where due acknowledge 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.

Sign ________________________

Wong Man Sheung
Acknowledgements

I would like to express my deep gratitude to Dr. Polly Chan, my supervisor, for her patient guidance, enthusiastic encouragement and useful critiques of this dissertation. Her generous assistance enabled me to complete the thesis.

Lastly, I wish to thank my family and colleagues for their support and encouragement throughout my study.
# Table of Content

Declaration .......................................................................................................................... i
Acknowledgements ............................................................................................................. ii
Table of Content ................................................................................................................ iii

## CHAPTER 1: INTRODUCTION ................................................................................. 1

1.1 Background .................................................................................................................... 1
1.2 Affirming the Need ........................................................................................................ 3
1.2.1 Local Setting ............................................................................................................. 5
1.3 Objectives and Significance .......................................................................................... 7
1.3.1 Significance ............................................................................................................... 7
1.3.2 Research Question ................................................................................................... 8
1.3.3 Objectives ................................................................................................................ 9

## CHAPTER 2: CRITICAL APPRAISAL ............................................................... 10

2.1 Search and Appraisal Strategies .................................................................................. 10
2.1.1 Criteria for selecting literatures ............................................................................. 10
2.1.2 Methodology of the review .................................................................................... 11
2.2 Results .......................................................................................................................... 12
2.2.1 Search history ......................................................................................................... 12
2.2.2 Study characteristics ............................................................................................ 13
2.2.3 Methodology ......................................................................................................... 14
2.2.4 Effect size ............................................................................................................... 15
2.3 Summary and Synthesis ............................................................................................. 15
2.3.1 Instruments .......................................................................................................... 15
2.3.2 Interventions ................................................................. 16
2.3.3 Control groups .............................................................. 18
2.3.4 Effectiveness of interventions ....................................... 18
2.4 Synthesis of data ........................................................... 21

CHAPTER 3: TRANSLATION AND APPLICATION ............................................. 23
3.1 Implementation potential .................................................. 23
  3.1.1 Transferability of findings ........................................... 23
  3.1.2 Feasibility ................................................................. 27
  3.1.3 Cost-benefit ratio of the proposed innovation ................. 33
3.2 Evidence-based practice guideline ...................................... 36
3.2 Guideline recommendation ............................................... 38

CHAPTER 4: IMPLEMENTATION PLAN ......................................................... 43
4.1 Communication plan ........................................................ 43
  4.1.1 Stakeholders ............................................................... 43
  4.1.2 Communication strategies .......................................... 45
4.2 Pilot Test Plan ................................................................. 48
  4.2.1 Target setting and populations .................................... 48
  4.2.2 Staff training ............................................................. 49
  4.2.3 Design and data collection .......................................... 49
  4.2.4 Analysis and evaluation ............................................. 50
  4.2.5 Time frame for pilot study ......................................... 51
4.3 Evaluation plan .............................................................. 52
  4.3.1 Identifying outcomes .................................................. 52
  4.3.2 Nature and number of clients to be involved ................. 54
  4.3.3 Data analysis ........................................................... 55
4.3.4 Effectiveness of the guideline ................................................................. 55

4.3.5 Time frame for evaluation ................................................................... 56

CHAPTER 5: CONCLUSION ........................................................................ 57

REFERENCE ............................................................................................... 58

APPENDICES ............................................................................................. 62

   Appendix 1: Prisma 2009 Flow Diagram .................................................. 62
   Appendix 2: Table of Evidence ................................................................. 63
   Appendix 3: Scottish Intercollegiate Guidelines Network (SIGN) methodology checklist ................................................................. 68
   Appendix 4: Time frame for implementation ......................................... 73
   Appendix 5: Cost of the selected smartphone applications and cartoon movies .......... 74
   Appendix 6: Setup cost of the innovation ................................................ 75
   Appendix 7: The modified Yale Preoperative Anxiety Scale (mYPAS) ............... 76
   Appendix 8: Paediatric patients preoperative anxiety level assessment form .......... 78
   Appendix 9: Evaluation Questionnaire on Multimedia Distraction Intervention for Paediatric Patients Undergoing Elective Surgeries ................................................................. 80
   Appendix 10: Staff Compliance Audit Form for Multimedia Distraction Intervention for Paediatric Patients Undergoing Elective Surgeries ................................................................. 81
CHAPTER 1: INTRODUCTION

1.1 Background

It has been shown that 40% to 50% of paediatric patients undergoing elective surgeries experienced preoperative anxiety, which may cause the difficulty in the induction of anaesthesia and have adverse effect on recovery (Wollin, Plummer, Owen, Hawkins & Matarazzo, 2003). A local study done by Li & Lam (2003) showed that, the preoperative anxiety level for Hong Kong Chinese children was relatively high.

Anxiety is defined as “a negative emotional state arising from stressful or threatening circumstances” (Lee, Jung, Lee, Kim, Park & Woo, 2013). Children are more susceptible to preoperative anxiety than adult because of unfamiliar environment, separation from parents and lack of understanding about operations (Li & Lam, 2003). The emotional manifestations of preoperative anxiety and stress in children reported are crying, restlessness or agitation, strong verbal protest, withdrawal, disruptive reaction and being not cooperative to medical procedures (Li & Lam, 2003).

The anxiety level of paediatric children is high in the preoperative holding area, it further increases while the children separate with their parents before they are moved to the operating theatre (Kain, Mayes, O'Connor & Cicchetti, 1996). The preoperative anxiety
among children increases with increasing maternal anxiety level in the holding area, the lack of premedication, poor quality of previous medical experiences, and hospitalisation (Kain et al., 1996).

Preoperative anxiety leads to uncooperativeness and difficulty in the induction of anaesthesia (Li & Lam, 2003). In addition, it causes negative behavioural responses such as aggression towards authority, apathy, withdrawal, eating disturbances, sleep anxiety, separation anxiety and temper tantrums in paediatric patients (Kain et al., 1996). A longitudinal study done by Kain et al. (1996) showed that there were about 54% of the children developed the above negative behavioral changes in 2 weeks after operations, while there were 20% and 7.4% of the children continued to show these maladaptive behaviours in 6 months and 1 year respectively after operations. A larger scale cohort study reported that a high preoperative anxiety level is associated with increased postoperative pain and analgesic consumption in addition to poor postoperative behavioral recovery (Kain, Mayes, Caldwell-Andrews, Karas & McClain, 2006; Kain, Wang, Mayes, Caramico & Hofstadter, 1999; Viitanen, Annila, Viitanen & Tarkkila, 1999).
1.2 Affirming the Need

Sedative premedication and parental presence during anesthetic induction are the strategies commonly used to reduce the level of preoperative anxiety in children. Although preoperative administration of sedatives such as midazolam can reduce negative behavioral changes such as postoperative sleep disturbance, it has been found to be associated with delayed recovery (Kain, Mayes, Wang & Hofstadter, 1999; Lee et al., 2013). Studies also showed that parental presence during anaesthetic induction in reducing children’s preoperative anxiety was controversial. The preoperative anxiety level of children was reported to be increased with increasing maternal anxiety level, because parental stress can be transmitted to children indirectly (Kain et al., 1996; Li & Lam, 2003). Other strategies such as behavioural preparation programs, music therapy, hypnosis and acupuncture were not commonly used in clinical settings because of increased health care cost, time limitation, and training of techniques required (Lee et al., 2013; Patel et al., 2006).

Distraction has been found to be effective in reducing pain and distress in children in laboratory setting studies and medical procedures (Das, Grimmer, Sparnon, McRae & Thomas, 2005; Wohlheiter & Dahlquist, 2012; Weiss, Dahlquist & Wohlheiter, 2011). It is defined as a kind of cognitive coping strategy that draws attention from a stimulus through passively redirecting a person’s attention, i.e. passive distraction or active involvement of a
person to perform a distractor task, which is known as interactive distraction (Kleiber & Harper, 1999; Weiss, Dahlquist & Wohlheiter, 2011). Watching a cartoon movie is an example of passive distraction with visual and auditory stimuli while playing video game is an example of interactive distraction. By consuming a child’s attentional capacity, distraction was used as a non-pharmacological intervention to distract a child’s attention away from the medical procedures performing (Kleiber & Harper, 1999). Since both types of passive and interactive distraction have been found effective in reducing pain and distress in children, distraction interventions should be provided to children preoperatively to reduce their anxiety level.

The use of language, social interaction and adaptive play are different at different developmental stage of children. Infants who just learn to speak in two word sentences enjoy simple stories. Preschool children aged 2 to 5 can speak in sentences. They can initiate on their own playing activities and enjoy rhymes and songs. Children aged 6 to 12 can communicate very well. They show curiosity about things around them (Lee et al., 2012). Specifically, younger children is more appropriate for watching cartoons while playing video games may be more suitable for older children because of the hand skills required (Lee et al., 2012). In notifying the differences in different developmental stages of children, distraction interventions should be tailor-made accordingly.
1.2.1 Local Setting

I am working in an operating theatre in a private hospital. There are about three hundred paediatric surgical cases per year, which is about 10% of all the surgical cases. The common paediatric surgical procedures that are done in this operation theatre include suturing, circumcision, herniotomy, hydrocelectomy, tonsillectomy, incision and curettage of eye cysts, excision of skin lesions, gastroscopy and colonoscopy. All these operations are done under general anaesthesia.

In my hospital setting, there were no guidelines in assessing the preoperative anxiety level of paediatric patients who undergo elective surgeries. Both pharmacological and non-pharmacological interventions may be used to reduce the preoperative anxiety level of children. Some anaesthetists administer sedative premedication, usually midazolam, after preoperative assessment to reduce their anxiety level. Some anaesthetists and nurses tell the children jokes and hug them, so as to distract the children and give psychological support to them while some anaesthetists prefer the children undergoing induction of anesthesia as soon as possible, regardless of the anxiety level of the children.

From my observation, a majority of paediatric patients who underwent elective surgeries showed preoperative anxiety. Some of them started crying and wanted to escape from the transfer stretchers in the operating theatre, while some of them were withdrawal and refused
to answer our questions. Most of the children struggled during induction of anaesthesia, and about half of them started crying immediately after surgery in the recovery room. This phenomenon was consistent with the studies done by Li & Lam (2003) and Wollin et al. (2003). However, according to my informal interviews, few members of nursing staff were aware of the negative effect of preoperative anxiety in paediatric patients, and they did not know the effective methods to reduce their preoperative anxiety level.

In view of this, an evidence based guideline about effective and safe methods in reducing preoperative anxiety in the children undergoing elective surgeries should be established.
1.3 Objectives and Significance

1.3.1 Significance

The association between preoperative anxiety and negative postoperative outcomes of paediatric patients suggests that minimizing their preoperative anxiety would promote their cooperation in surgery as well as postoperative recovery. Compared with other pharmacological and non-pharmacological strategies mentioned above, multimedia distractions including cartoons, movies, video games and smartphone applications seem to be safe and low cost methods to reduce preoperative anxiety in children.

The paediatric patients can also be benefited from minimized unpleasant surgical experiences, improved recovery and reduced hospital stay because reducing preoperative anxiety of children can reduce the negative behavioral changes. In addition, the reduction of the use of premedication such as midazolam and analgesic consumption can minimize the possible side effects of the drugs to patients.

Since high preoperative anxiety level in children is found to be associated with lower level of cooperation during medical procedures (Li & Lam, 2003), an effective innovation in reducing preoperative anxiety of children can improve cooperation during induction of anaesthesia as well as postoperative periods. Hence, a good nurse-client therapeutic relationship can be established. An evidence based guideline in reducing preoperative anxiety
can improve the confidence of operating theatre nurses to implement the innovation to paediatric patients and also encourage the compliance of nursing staff.

High preoperative anxiety level is associated with prolonged recovery and hospital stay, which in turn increase hospital bed occupancy and medical expenses. In addition, the premedication used to reduce preoperative anxiety in children also increases pharmacological expenses. Therefore, an effective intervention that reduces preoperative anxiety level of children can decrease hospital bed occupancy, and lower hospital cost.

To sum up, an evidence-based guideline about using multimedia distraction should be established to reduce preoperative anxiety of paediatric patients undergoing elective surgeries in local settings.

1.3.2 Research Question

The research question in PICO format is “For paediatric patients undergoing elective surgeries (P), can multimedia distractions, (I) in comparison to current practice e.g. parental presence, sedatives, usual distracting talk (C), reduce the level preoperative anxiety level(O)?”
1.3.3 Objectives

The objectives of this translational research are:

- To review the current literature systematically on multimedia distraction among paediatric patients undergoing elective surgeries.
- To evaluate the effectiveness of multimedia distraction in reducing preoperative anxiety of paediatric patients.
- To assess the transferability and feasibility of multimedia distraction in reducing preoperative anxiety of paediatric patients undergoing elective surgeries in local settings.
- To develop an evidence-based guideline to assess the preoperative anxiety of paediatric patients undergoing elective surgeries, and minimize their anxiety with the use of multimedia distraction.
CHAPTER 2: CRITICAL APPRAISAL

2.1 Search and Appraisal Strategies

A systematic search of evidences was done from 20 May 2014 to 30 July 2014 with 4 electronic databases, including PubMed, CINAHL Plus, British Nursing Index, and PsycINFO. “Anxiety”, “preoperative anxiety”, “multimedia”, “interactive multimedia”, “multimedia intervention”, “video games”, “child” and “preschool child” were the keywords used in searching the relevant literatures, according the research question. The keywords were searched separately and then together. The abstracts of the literature found were reviewed. Afterwards, a manual search on the reference lists of the selected studies was done to prevent any missing of potential literatures.

Inclusion criteria and exclusion criteria were developed for a systematic search of relevant studies in electronic databases. Only literatures that fit all the inclusion criteria were selected, while the others which met any one of the exclusion criteria were excluded.

2.1.1 Criteria for selecting literatures

The inclusion criteria were:

1. Clinical trials

2. Articles written in English
3. Paediatric patients aged under 12

4. Patients undergoing elective surgeries

5. Preoperative anxiety as the outcome to be measured

6. Distraction strategies with the use of multimedia

The exclusion criteria were

1. Studies of which the decisions only made by physicians

2. Interventions not involving multimedia, such as clown intervention and music therapy

3. Patients older than 12 year-old

Summary of the search history was reported using the PRISMA flow diagram (Appendix 1)

2.1.2 Methodology of the review

All the selected studies were carefully read and a table of evidence was developed to summarize the studies. The modified table of evidence was developed according to the Scottish Intercollegiate Guidelines Network (SIGN, 2014), in which the study design, patient characteristics, intervention, comparison, length of follow up, outcome measures and results of the studies were described. The table of evidence was attached in Appendix 2.
Quality assessment of the selected studies was performed according to the guidelines of the Scottish Intercollegiate Guidelines Network methodology checklist for controlled trials (SIGN, 2014). In the SIGN methodology checklist for controlled trials, the selected studies were assessed according to a list of criteria if they have been addressed to deal with the risk of bias in their methods. The checklists were attached in Appendix 3. The level of evidence of each study was rated according to SIGN (2014) guidelines.

### 2.2 Results

#### 2.2.1 Search history

There were 55 articles identified using the keywords search. After removing the duplicated articles, five of them were selected after viewing the abstracts, based on the inclusion and exclusion criteria. The reference lists of the five articles were explored, no more relevant studies were found by manual search. All the five articles were selected. The searching result was presented by PRISMA flow diagram as in Appendix 1.

After assessing the level of evidence of the five studies above, two of them was found to be in high quality (1++) (Kerimoglu, Neuman, Paul, Stefanov & Twersky, 2013; Mifflin, Hackmann & Chorney, 2012) while the other three were acceptable (1+) (Lee et al., 2012; Lee et al., 2013; Patel et al., 2006).
2.2.2 Study characteristics

The selected studies were published between 2006 and 2013 (Kerimoglu et al., 2013; Lee et al., 2012; Lee et al., 2013; Mifflin et al., 2012; Patel et al., 2006). Two of them (Lee et al., 2012; Lee et al., 2013) were conducted in South Korea, while the other two were in America (Kerimoglu et al., 2013; Patel et al., 2006) and the other one in Canada (Mifflin et al., 2012). No local study could be found. The five studies included mixed gender children from 1 to 12 years old, the number of participants ranged from 89 to 130, who were undergoing elective surgeries. Three studies (Kerimoglu et al., 2013; Mifflin et al., 2012; Patel et al., 2006) recruited day surgery patients.

All the five studies clearly stated their aims of the studies in the introductions. They were all aimed at investigating if different kinds of preoperative multimedia distraction could effectively reduce preoperative anxiety level in children. The preoperative multimedia distractions used in the studies included watching television programmes with video glasses (Kerimoglu et al. 2013), watching animated cartoon movies (Lee et al., 2012), playing smartphone applications (Lee et al., 2013), watching video clips on YouTube (Mifflin et al., 2012), and playing hand held video games.
2.2.3 Methodology

All of the five studies are randomized controlled trials. They randomly allocated the participants into intervention groups and control groups. However, only three of them (Kerimoglu et al., 2013; Lee et al., 2012; Mifflin et al., 2012) clearly described randomization methods. Kerimoglu et al. (2013) used blocked randomization of multiples of three, while Lee et al. (2012) and Mifflin et al. (2012) used computer generated numbers for randomization. Kerimoglu et al. (2013), Mifflin et al. (2012) and Patel et al. (2006) used sealed envelopes for concealment for their studies. Yet, Lee et al. (2012) and Lee et al. (2013) did not mention any concealment methods in their studies to minimize allocation bias. All of the five studies could not blind the participants and assessors for participant allocation. It might be due to the nature of the studies that the interventions were too noticeable to hide from the participants. Therefore, observer bias would be one of the limitations of these studies.

All of the five studies compared the demographic data of the intervention groups with control groups. There were no significant differences in demographic characteristics in the five studies. Three of the studies (Kerimoglu et al., 2013; Lee et al., 2012; Lee et al., 2013) assessed the baseline anxiety of the children at the night before operations, the results showed that there were no significant differences in the baseline anxiety between the intervention and
control groups. In each of the five studies, the only differences between intervention groups and the control groups were the treatments under investigation.

2.2.4 Effect size

Only one of the studies (Lee et al., 2012) described the calculation of sample size and another one (Mifflin et al., 2012) stated the effect size was 0.61. All of the five studies stated the significance level was 0.05, and the p-value <0.05 was considered to be statistically significant, but only two of the studies (Kerimoglu et al., 2013; Lee et al., 2012) stated a power of 80%. Kerimoglu et al. (2013), Lee et al. (2012) and Mifflin et al. (2012) defined participants with mYPAS score more than 30 points had anxiety. Three studies (Kerimoglu et al., 2013; Lee et al., 2012; Mifflin et al., 2012) considered a change of 15 points in mYPAS scale to be clinically significant.

2.3 Summary and Synthesis

2.3.1 Instruments

All the five studies used the modified Yale Preoperative Anxiety Scale (mYPAS) as the instrument to measure preoperative anxiety of the paediatric patients. The mYPAS is an observational instrument developed to assess the anxiety level in children aged 2 – 12 in an operating room setting. There are 22 items in five categories including (i) activity, (ii) vocalizations, (iii) emotional expressivity, (iv) state of apparent arousal, and (v) use of parents.
Some of the categories contain 4 items while the others contain 6 items. Therefore, the mYPAS score is calculated by a formula \((i/4 + ii/6 + iii/4 + iv/4 + v/4) \times 100/5\), resulting in a total score range from 0 to 100. It has high construct validity and observer reliability (Kain et al., 1997). Since the assessment could be completed in less than one minute, mYPAS is suitable for accessing the preoperative anxiety level of children and is an effective preoperative intervention in a busy operating theatre.

In addition to mYPAS, a 10cm visual analog scale (VAS) was used in one study (Lee et al., 2012) that allowed parents to rate the anxiety level of children, while heart rate of children was assessed to measure anxiety level in another study (Kerimoglu et al., 2013). VAS is a subjective measurement tool. It was used in the study done by Lee et al. (2012) but the reliability and validity of VAS scale was not mentioned in the study. Therefore, the reliability of the parent recorded VAS scores was questionable. Besides, heart rate is not a suitable biomarker in measuring preoperative anxiety in children since it can be influenced by other factors such as physical movements.

2.3.2 Interventions

Two studies (Lee et al., 2012; Lee et al., 2013) assessed the anxiety level of children in a holding area before interventions. The score obtained could be used to assess if the child required the intervention as well as to compare the effectiveness of the interventions.
Therefore, the children should be assessed for their anxiety level with mYPAS scale when they arrive operating theatres. Four studies (Kerimoglu et al., 2013; Lee et al., 2012; Lee et al., 2013; Patel et al., 2006) began the interventions in a preoperative holding area while one study (Mifflin et al., 2012) started the interventions during induction of anaesthesia. In local setting, patients will get induction of anesthesia as soon as possible when they enter operating rooms. Hence, it may not be possible for nurses to start the interventions during induction of anaesthesia. Instead, there will be enough time to implement the innovations in the holding area. In view of this, the interventions should be started when the children arrive the holding area of the operating room if their mYPAS score greater than 30.

The implementation of interventions lasts for 20 minutes in two studies (Kerimoglu et al., 2013; Patel et al., 2006) and 5 minutes in one study (Lee et al., 2013). The other two studies (Lee et al., 2012; Mifflin et al., 2012) did not provide information about the duration of the interventions. On one hand, five minutes of multimedia intervention is not enough to allow the implementation of intervention and consume the attentional capacity of children. On the other hand, since the innovation will be implemented on children undergoing elective surgeries, who are normally sent to operating room 20 to 30 minutes before scheduled operation time. Therefore, 20 minutes of multimedia interventions should be appropriate.
2.3.3 Control groups

Due to the standard care practice of the studying hospitals, instead of comparing the intervention groups with true control groups, two studies (Kerimoglu et al., 2013; Lee et al., 2013) compared the intervention groups with children having premedication and one study compared the intervention groups with children with parental presence. Similarly, premedication of midazolam and parental presence is routine practice in some hospitals in Hong Kong. Therefore, if the intervention groups were found to be more effective in reducing anxiety level of children when compared to the control groups, the result can also be applied to the situation in Hong Kong.

2.3.4 Effectiveness of interventions

All five studies reported lower anxiety level in the intervention groups when compared with the control groups during anaesthesia induction and four of them (Lee et al., 2012; Lee et al., 2013; Mifflin et al., 2012; Patel et al., 2006) were statistically significant. The mYPAS score was 11.7 lower in the video glasses group than that in the medication group although the difference was not statistically significant (Kerimoglu et al., 2013). However, there was a significant increase in heart rate in all the study groups, which indicated that the effect of the treatment on heart rate was not significant. Kerimoglu et al. (2013) explained that although heart rate was correlated with anxiety, there were other factors such as physical movements
influencing heart rate of participants. In view of this, heart rate may not be an accurate measurement of anxiety level of paediatric patients in preoperative setting.

The children in the animated cartoon movies group showed lower mYPAS score (-25.6, p<0.05) and parent recorded VAS score (-2.9, p<0.05) than the control groups (Lee et al., 2012). The children in the smartphone application group had lower anxiety level (-0.6, p<0.01) than that in the midazolam group (Lee et al., 2013). The children who watched streamed video clips on YouTube in the study done by Mifflin et al. (2012) had much lower level of anxiety (-31.2, p<0.001) than those in the control group. The patients in the video game group also had lower mYPAS score (-.8, p<0.01) than the control parental presence group (Patel et al., 2006).

Two studies (Lee et al., 2013; Patel et al., 2006) showed a decrease in anxiety level in intervention groups when compared with baseline level. Smartphone applications (Lee et al., 2013) can be both clinically and statistically significant in decreasing anxiety level when compared with the anxiety level during induction (-20.6, p<0.05). As to the study done by Patel et al. (2006), the anxiety level of the children in video game with parental presence group decreased by 3 mYPAS score (p<0.05) during induction of anaesthesia when compared to their baseline anxiety level.
The combination of smartphone application intervention with low dose IV midazolam (-28.1, p<0.05) had greater effect in reducing anxiety level of children than using smartphone application alone (-20.6, p<0.05) (Lee et al., 2013). In the study done by Patel et al. (2006), the percentage of patients with decreased or unchanged mYPAS score was much greater in combination of video games intervention with parental presence (63%, p<0.01) when compared to the combination of oral midazolam with parental presence (26%, p<0.01) and parental presence alone (28%, p<0.01). The results indicated the additional effect of premedication and parental presence on reducing preoperative anxiety. However, the dosage of the premedication of the control groups varies among different studies, and the sedative effect of the premedication differs among different individuals. Moreover, there may be confounding effects due to the effects of premedication. Therefore, premedication will not be included in the innovation. In addition, although parental presence during induction is a common practice in the hospitals in Hong Kong, studies showed that the practice was controversial. The study done by Patel et al (2006) showed that the anxiety level of paediatric patients with only parental presence increases (+17.2, p<0.05) more than the video game group during induction of anesthesia. For this reason, parental presence will not be included in the innovation either.
2.4 Synthesis of data

There were four out of five studies (Lee et al., 2012; Lee et al., 2013; Mufflin et al., 2012; Patel et al., 2006) support using multimedia distraction to reduce preoperative anxiety in children aged 2 – 12. Another study (Kerimoglu et al., 2013) showed that video glasses distraction can prevent increasing in preoperative anxiety level though it cannot reduce the level. Three studies (Kerimoglu et al., 2013; Lee et al., 2012; Mifflin et al., 2012) investigated the effectiveness of passive distraction strategies including video glasses, animated cartoon movies and streamed video clips. Two other studies (Lee et al., 2013; Patel et al., 2006) examined the effectiveness of interactive distraction methods, that were smartphone applications and hand held video games. Since the aim of this innovation is to reduce preoperative anxiety of children, the multimedia distraction should only include watching cartoon movies, streamed video clips, playing hand held video games and smartphone applications. The children should be assessed for their anxiety level using the mYPAS scale once they arrive the holding area of the operating theatre. If their anxiety level is higher than 30 mYPAS points, the innovations should be started immediately. The intervention will be given for at least 20 minutes until the children enter operating room for induction of anaesthesia. Premedication and parental presence will not be included into the innovation.
None of the studies reported negative impact on the distraction interventions. This indicated that multimedia distraction interventions had no harmful effects and were safe to paediatric patients. No training of nursing staff is required for them to implement these interventions.

To conclude, preoperative multimedia distractions including watching animated cartoon movies, playing smartphone applications, watching video clips on YouTube, and playing hand held video games are effective, easy and safe interventions in reducing preoperative anxiety of children. The selected studies provided evidence of high quality for developing an evidence-based guideline to reduce preoperative anxiety in paediatric patients with multimedia distraction. The evidences will be translated into implementation in local settings.
CHAPTER 3: TRANSLATION AND APPLICATION

3.1 Implementation potential

In the previous study, the problem of preoperative anxiety among paediatric patients was described. From the reviewed studies, there was adequate evidence showing that multimedia distraction interventions were effective in reducing the preoperative anxiety level of children. To assess the implementation potential of the innovation, the transferability of findings, feasibility and cost benefit ratio of the proposed innovation were considered.

3.1.1 Transferability of findings

Transferability of the findings could be determined by comparing the target population, setting, and philosophy of care of the target setting with those in the selected studies. In addition, the number of patients that could be benefited from the innovations and the time frame of implementation were also considered.

3.1.1.1 Target setting and audience

The preoperative multimedia distraction intervention was proposed to be implemented in an operating theatre of a local private hospital in Hong Kong. According to the statistics of the operating theatre, there were about three thousand operations performed in the operating theatre in 2012 - 2013, in which one tenth of which was paediatric cases, with patients aged 12 or below. Suturing, circumcision, herniotomy, hydrocelectomy, tonsillectomy, incision and
curettage of eye cysts, excision of skin lesions, gastroscopy and colonoscopy were the paediatric surgical procedures performed in this operating theatre. The proposed innovation was targeted at the paediatric patients aged 12 or below, undergoing elective surgeries in the operating theatre. The paediatric patients usually underwent general anesthesia or monitored anaesthetic care for the above mentioned surgical procedures.

The multimedia distraction interventions of the reviewed studies were conducted in the operating theatres (Lee et al., 2012; Lee et al., 2013) and the day surgery centers in the hospital setting (Kerimoglu et al., 2013; Mifflin et al., 2012; Patel et al., 2006). The operations done in the reviewed studies included general surgeries, tonsillectomy, herniorrhaphy, eye surgeries, urology surgeries, ENT surgeries and dental surgeries (Lee et al., 2012; Mifflin et al., 2012). The population of the reviewed studies was children aged from 1 to 12 years undergoing elective surgeries. The studied population was undergoing general anaesthesia in four out of the five studies (Kermoglu et al., 2013; Lee et al., 2012; Lee et al., 2013; Patel et al., 2006). In view of these, the setting and the characteristics of the population of the reviewed studies were similar to the target setting and the target patients.
3.1.1.2 Philosophy of care

The motto of the target hospital is “to provide health care services with love and hope”. Its core values are safety, patient centeredness, effectiveness, trust, accountability and teamwork. The mission is to provide safe, quality procedures and patient centered care to patients undergoing surgeries, and to promote recovery after surgeries. Relieving patient’s preoperative anxiety level not only lessens the negative physical impacts caused by stress and anxiety, but also helps patients to cope with the stress and anxiety in preoperative period. Multimedia distraction interventions showed their effectiveness in minimizing preoperative anxiety with no adverse effects on children. The philosophy of care of the proposed multimedia distraction interventions was to prepare children psychologically before operation, and reduce the negative emotional effects due to preoperative anxiety, thus it coincided with the mission of the operating theater of the hospital.

3.1.1.3 Number of the patients benefited from the innovation

There are about 300 paediatric surgical cases in the operating theatre every year. Previous studies showed that there are about half of paediatric patients experience preoperative anxiety (Kain et al., 2007). Therefore, in total, there will be about 150 children who can be benefited from the innovation annually.
3.1.1.4 Time frame for implementation

The development and implementation of the proposed innovation will take 12 months. It will take one month to communicate with stakeholders and obtain hospital approval. It will then take another one month to prepare equipment and review guidelines. Also, another one month will be required for four training sessions for frontline staff. After that, it will take two more months for a pilot study and process evaluation to revise the guideline. In total, all this preparation work will take around six months. After the pilot test, the innovation will be implemented for six months. Afterwards, one month will be needed for the evaluation of the outcome (Appendix 4).
3.1.2 Feasibility

3.1.2.1 Freedom to implement

In the current practice, nurses are empowered to decrease the anxiety level of the patients undergoing surgeries. The nurses in the target operating theatre have the autonomy to implement non-pharmacological interventions on paediatric patients to reduce their anxiety. Besides, the nurses also have the freedom to terminate the innovation if its impact is found to be undesirable.

3.1.2.2 Support from the administrators

The proposed innovation required manpower and resources support from the administrators. Therefore, in order to get support from the administrators, a proposal with adequate evidence support, resources and budget planning, and the needs and benefits of the innovations will be written. Studies showed that about half of the children undergoing surgeries in the target operating theatre had preoperative anxiety. Not only did they show negative emotional behavior in the holding area, but they were also uncooperative during induction of anaesthesia, which thus prolonged induction time. In addition, studies showed that children with high preoperative anxiety level required longer time to be discharged from recovery. If the proposed innovation lowers the anxiety level of children, the length of induction of anaesthesia and recovery time will be reduced (Kain et al., 2007). Thus, the
efficiency of paediatric surgeries can be improved, the unnecessary occupation of operating rooms can be minimized, and hospital bed turnover rate can be increased. In addition, reducing preoperative anxiety of children can reduce the use of sedatives and analgesics (Kain et al., 2006; Kain et al., 1999; Viitanen et al., 1999). In turn, the possible side effects caused by medications and pharmacological cost can be reduced, which can get supported by the anaesthesiologist department. Moreover, parents feel stress when their children undergo surgeries. They feel helpless and despaired if their children have high preoperative anxiety level and negative emotional behavior. Therefore, the innovation that can reduce the anxiety level of paediatric patients can increase the satisfactory level of their parents.

3.1.2.3 Friction within the target setting

Frontline staff may concern about the fact that the innovation might disturb their routine. In the current practice, the operating theatre nurses perform preoperative assessment and complete a checklist when patients are transferred from wards to the operating theatre 20 to 30 minutes before operations. For paediatric cases, parents are allowed to accompany their children in the holding area before the children are transferred to the operating rooms. During this period, no health care staff supervision is required. After the implementation of the innovation, the nurses have to assess the children’s anxiety level after the preoperative assessment. If the children fulfill the criteria for the innovation, the nurses have to spend 20
minutes to implement the intervention on them, help them to choose the suitable smartphone applications or movies, and teach them how to use them. This extra 20 minutes innovation for anxiety children may disturb the routine of the theatre nurses, and give more workload to them. Therefore, the benefits of the innovation should be explained to the frontline staff. Less anxious children are more cooperative in medical procedures and under anaesthesia induction. In addition, they are less vulnerable to postoperative negative emotions. In turn the recovery nurses would be less stressful in monitoring the children in the recovery room.

In current practice, the anaesthetists play an important role in reducing the preoperative anxiety of the paediatric patients. Some of the anaesthetists prescribe sedatives such as midazolam preoperatively to reduce the anxiety level of children, whereas some of the others use distraction strategies including storytelling, making jokes or nonprocedural talk. Since the innovation will be implemented by the nurses, the anaesthetists may think the nursing discipline is taking over their duty to distract paediatric patients from fear. Yet, on the contrary, this change can allow the anaesthetists to be more focusing on their anaesthetic preparation before induction of anaesthesia.

In addition, since the innovation takes about 20 minutes, in case the surgeons arrive the operating theatre earlier than the scheduled operation time and want to start the operation
earlier, they may think the innovation is wasting their time. Hence, conflicts between the surgeons and the nurses may arise.

In order to have a smooth implementation of the innovation, consensus must be obtained from different parties, including the administrators, the department head, the nursing staff of the operating theatre, as well as the surgical teams and the anaesthetists. They will be reassured the innovation will just minimally interfere with the current practice.

3.1.2.4 Staff development

A four hour training workshop will be held for all the operating theatre nurses. In the training workshop, the innovation will be introduced. The nursing staff will learn how to assess paediatric preoperative anxiety level with the assessment tool, mYPAS scale. They will also have chances to try the smartphone applications that are installed on iPad minis, so that they can introduce them to the paediatric patients according to their needs.

In addition, nursing staff should be equipped with the knowledge of different child developmental stages. A clinical psychologist will be invited to give a four hour lecture on child development and preoperative anxiety of children. The nurses are recommended to enroll in a certificate course in child psychology organized by a university in Hong Kong, so that they will have more in depth understanding about child development.
3.1.2.5 New equipment

iPad minis, small tablet computers with multi-touch screens, are suitable for the multimedia distraction interventions. The paediatric patients can watch cartoon videos, streamed video clips and play smartphone applications in iPad minis. Since there are three operating rooms in the operating theatre, at most three paediatric patients having surgeries at the same time. Therefore, three iPad minis are required for the innovation. In addition, 15 smartphone applications will be installed on the iPad minis (Appendix 5). These applications are selected for children in different developmental stages. According Hockenberry & Wilson (2013), preschool children can understand simple commands, like to talk incessantly, sing simple songs and listen to stories. Therefore, “Mega sticker book for kid”, “Lego Duplo Train”, “Animal Funny Voice Piano”, “Disney Storytime” and “Talking Tom Cat”, which are some simple applications involving sound-touch interactions, are installed for them. Other applications that involve more complicated skills are suitable for school-age children because children’s vision reaches maturity and can use their hands more efficiently at 6 years of age (Hockenberry & Wilson, 2013). In addition, school-age children are more aware of gender differences (Hockenberry & Wilson, 2013). For that reason, there are applications that are suitable for boys, e.g. “Cars 2 World Grand Prix Read & Race”, while some are suitable for girls e.g. “Barbie Fashionistas”. The smartphone applications are suitable for both Cantonese
speaking and English speaking children. Apart from the smartphone applications, five cartoon movies which are famous among children will be downloaded to the iPad minis.
3.1.3 Cost-benefit ratio of the proposed innovation

3.1.3.1 Potential benefits of the innovation

One of the potential benefits of implementing the proposed innovation is to facilitate induction of anaesthesia in paediatric surgeries. It improves the children’s experiences in surgical procedures and promotes their recovery, as well as comforts their parents. Hence, the relationship between nurses, clients and significant others of the children can be improved. Furthermore, it helps the hospital management in terms of paediatric surgery schedule planning and hospital beds management because the innovation reduces preoperative anxiety of the children and thus improves their postoperative recovery (Kain et al., 2006; Kain et al., 1999; Viitanen et al., 1999).

3.1.3.2 Potential risks of the innovation

All the five reviewed articles reported no negative effects of the multimedia distractions. Kerimoglu et al. (2013) mentioned that although children younger than age 7 are developing their gaze abilities, the participants in that study did not report any complaints like headache, vision change and blurred vision. Patel et al. (2006) pointed out that the patients with photosensitive epilepsy are more vulnerable to seizures while their playing video games. Therefore, the proposed innovation is safe and of low risk but should be used with caution when it is applied on a patient with epilepsy.
3.1.3.3 Cost of implementation

The cost of implementation of the innovation can be divided into setup cost and operational cost. The details of the setup cost of the innovation are listed in Appendix 6.

Three iPad minis 3 64 GB will be purchased, which cost $11664. 15 selected smartphone applications and 5 carton movies, which cost $59 and $580 respectively, will be downloaded with one iTunes account. The applications and the movies in turn can be installed on the three iPad minis. Apart from these, printing protocol and photocopying handouts for training cost about $1000. In all, the material cost is about $12781. In order to calculate the personal expenses, the mid-point and the maximum point of the hourly wage of a registered nurse (RN) will be used for estimation. A senior RN will be responsible for preparing the innovation which requires about 40 hours, includes having meetings with the administrators and the other health care disciplines, developing guidelines and communicating. All these cost about $7880. In addition, the senior RN is also required to spend 4 hours ($788) to hold a staff training workshop. The cost of inviting a clinical psychologist to give a 4-hour lecture is about $4000. Also, 4 working hours of 15 RNs’ attending the training workshop needs $9420. In total personnel expenses cost $22088. In sum, the total setup cost of the innovation is $34869. Since there will be about 150 children benefited from the innovation per year, the cost of implementation is about $219 per child. Nevertheless, it is expected that the children
with low anxiety level are more cooperative during anaesthesia induction, thus the innovation can shorten the induction time for 2 minutes (operating theatre room charge is $3900 per hour, i.e. $3900 ÷ 60 × 2 = $130) and the discharge time from the operation theatre for 20 minutes (recovery room charge is $750 per hour, i.e. $ 750 ÷ 60 × 20 = $250), saving $380 of the operating room cost in total (Kain et al, 2007).

For long term operation, the main operational cost is updating the multimedia. Since the smartphone applications and cartoon movies have to be reviewed regularly, new and popular smartphone applications and cartoon movies will be downloaded to replace the unpopular ones, which will cost about $300 annually.

For nonmaterial costs, although the innovation increases the burden of the frontline staff in the preoperative holding area, it can enhance their job satisfaction at the same time because the innovation promotes the autonomy of the nurses in the operating theatre.

To sum up, the evidence from the reviewed studies is transferable to local settings. The proposed innovation is feasible and of low risk. In addition, the benefits of the innovation outweigh its cost. Therefore, a guideline for the innovation is developed.
3.2 Evidence-based practice guideline

Background

Preoperative anxiety is a common problem among paediatric patients who are undergoing elective surgeries. High level of preoperative anxiety leads to difficulty in induction of anaesthesia and poor postoperative recovery. Multimedia distraction is found to be a safe and effective method to lower the anxiety level of children. Based on the literatures reviewed, a guideline of multimedia distraction for paediatric patients undergoing elective surgeries is developed.

Title

Multimedia distraction for paediatric patients undergoing elective surgeries.

Aim

To reduce the anxiety level in paediatric patients undergoing elective surgeries.

Objectives

The objectives of this evidence-based practice guideline are:

1. To summarize clinical evidence of multimedia distraction for paediatric patients undergoing elective surgeries in reducing preoperative anxiety.
2. To formulate instructions for multimedia distraction in reducing preoperative anxiety of paediatric patients based on the evidence available.

3. To standardize nursing care in providing multimedia distraction interventions for paediatric patients undergoing elective surgeries in operating theatres.

**Target group**

The evidence based practice guideline will be provided to both male and female paediatric patients undergoing elective surgeries in an operating theatre.

The inclusion criteria are:

1. Age 2 to 12

2. Cantonese or English -speaking patients

3. Free from visual impairment

4. Free from cognitive impairment

5. The American Society of Anesthesiologists (ASA) Physical Status I or II

6. Free from chronic illnesses
3.2 Guideline recommendation

Recommendation 1

Multimedia distraction involves the use of smartphone applications, cartoon, streamed video clips and hand held video game. (Grade A)

Smartphone applications and hand held video game are active distractions that occupy the cognitive and motor capacity of children, while cartoon and streamed video clips are passive distractions that redirect the attention of children by visual and audio attraction. All these four distractions media were found to be effective and safe in reducing the anxiety level of children before operation (Lee et al., 2012; Lee et al., 2013; Mifflin et al., 2012; Patel et al., 2006) (Level of evidence: 1+; 1+; 1++; 1+).

Recommendation 2

The anxiety level of children should be assessed by mYPAS (Appendix 7), children with mYPAS score over 30 are considered to be anxious. (Grade A)

The mYPAS is an observational instrument that assesses the preoperative anxiety level in five categories of children aged 2 to 12, including assessing the children’s activity, vocalizations, emotional expressivity, state of apparent arousal and use of parents. It has good inter-observer and intra-observer reliability and validity (Kerimoglu et al., 2013; Lee et al.,
2012; Lee et al., 2013; Mifflin et al., 2012; Patel et al., 2006) (Level of evidence: 1++; 1+; 1++; 1+).

A mYPAS score over 30 reflected that the participants suffer from anxiety (Kerimoglu et al., 2013; Lee et al., 2012; Mifflin et al., 2012) (Level of evidence: 1++; 1+; 1++). 

**Recommendation 3**

**If the children have a mYPAS score higher than or equal to 70 after the intervention, their anaesthetists should be informed.** (Grade B).

The children with high mYPAS score at or over 70 may have the difficulty in entering the operating room (Lee et al., 2013). Therefore, it is important to inform their anaesthetists of the anxiety level of the anxious children, so that medication such as intravenous injection of midazolam can be given if necessary. (Level of evidence: 1+)

**Recommendation 4**

**The anxiety level of children should be assessed in the preoperative holding areas before interventions, before entering operating room and during induction of anaesthesia.** (Grade A)
Assessing the anxiety level of children at preoperative holding areas allows nurses to identify the anxious children who require multimedia distraction interventions. Moreover, assessing the anxiety level of children before transferring the children to operating rooms and during induction of anaesthesia is to assess the effectiveness of the interventions. Further preoperative sedatives are required if the anxiety level is still very high (Kerimoglu, et al., 2013; Lee et al., 2012; Lee et al., 2013; Mufflin et al., 2012). (Level of evidence: 1++; 1++; 1++)

Recommendation 4

Multimedia distraction should be implemented in preoperative holding areas before patients’ entering operating rooms. (Grade B)

When the children arrive at a holding area of an operating theatre, they are facing the unfamiliar environment with strangers. A preoperative holding area is suitable for implementing the multimedia distraction interventions (Kerimoglu et al., 2013; Lee et al., 2012; Lee et al., 2013). (Level of evidence: 1++; 1++; 1+)

Recommendation 5

The children are allowed to choose their favorite smartphone applications or cartoon movies. (Grade B).
The study done by Lee et al. (2013) reported that children at different development stages had different preferences in choosing smartphone applications. Children under age 4 are more interested in sound-touch smartphone applications such as sticker book games and listening to simple stories. Children of older ages are more interested in more complicated smartphone games. In addition, children of younger ages may not have the hand skills required to play video games (Patel et al., 2006). (Level of evidence: 1++; 1+)

**Recommendation 6**

**Multimedia distraction should be delivered for at least 20 minutes before induction of anaesthesia.** (Grade B).

The children in the study of Kerimoglu et al. (2013) and Patel et al. (2006) played video games for about 20 minutes before operations, the results showed that 20 minutes of preoperative multimedia distraction preoperatively was effective in decreasing the anxiety level of children. (Level of evidence: 1++; 1+).

**Recommendation 7**

Parents are allowed to accompany their children in preoperative holding areas during implementing the intervention. (Grade B).
Although parental presence did not have significant effect on decreasing the anxiety level of children, parents believed they were helpful to their children and allowing them to accompany their children increased their satisfactory level (Patel et al., 2006). (Level of evidence: 1+)
4.1 Communication plan

4.1.1 Stakeholders

In order to have a successful implementation of the evidence-based guideline, it is important to have a good communication and support from the stakeholders. The stakeholders identified are a nursing officer of the operating theatre, a nursing director, the nurses in the operating theatre, the surgeons and the anaesthetists.

The nursing officer (NO) is the person in charge of the operating theatre. She is responsible for the smooth running of the operating theatre, managing the manpower, and ensuring effective and efficient delivery of nursing care. If the anxiety level of the paediatric patients can be reduced before operations, the turnover time for operations can be shortened, and the efficiency of the operation theatre can be improved. She is also responsible for coordinating and communicating with other units, and communicating with the nursing staff in the department when there are new policies. Discussing the innovation with the NO is important because she can comment on the feasibility of the innovation. In addition, the purchase of iPad minis and the invitation of the clinical psychologists for the staff training require financial support from the NO, who is in-charge of managing the budgets of the operating theatre.
The nursing director (ND) is the one who approves all the nursing guidelines and clinical protocols in the hospital. She also plays an important role in communicating with the other health care professionals, in this case, the surgeons and anaesthetists, and getting support from them. Moreover, according to the set up expenses estimation in Chapter 3, which costs about $34869. According to the hospital policy, an approval from ND is required for expenses under $50000. For the above reasons, the innovation must get support from the ND.

Surgeons are the professionals who are in-charge of surgical cases in operating theatres while anaesthetists are the ones who take care of patients during operations. They concern about the effectiveness of the innovation to patients and the time consumed. In the private setting, extra operation time requires overtime charges. If paediatric patients are benefited from the innovation, they will be less anxious and more cooperative during induction of anaesthesia, thus the total operation time can be save. Therefore, surgeons and anaesthetists are also the stakeholders. In the private hospital setting, the visiting surgeons and anaesthetists are formally informed via email and during monthly meetings about any new policies held by the medical superintendent. Therefore, gaining support from the medical superintendent about the new innovation is also essential.
Last but not least, the frontline nurses in the operation theatre are the most important stakeholders because they are the ones who put the guideline into practice. They have to spend extra 20 minutes before every paediatric surgical case to provide the multimedia distractions to the paediatric cases. Besides, they have to learn new knowledge and skills related to the innovation. In sum, their workload will increase after the implementation of the innovation.

4.1.2 Communication strategies

In order to get the support from the stakeholders identified above, the communication strategies are important. Since the nursing department of the target hospital supports evidence based practices as well as researches in clinical practice, the process of communication will be started from the nursing department to other health care professionals involved and from the administrators to the frontline staff. The communication process will take about one month.

The first step is to propose the innovation to the NO of the operating theatre, because she supports evidence based nursing interventions in the operating theatre. She will be convinced to support the innovation by emphasizing the needs of addressing the preoperative anxiety among paediatric patients, and the supportive evidence of multimedia distraction interventions. In addition, the cost effectiveness of the innovation will be presented to her.
The idea of multimedia distraction intervention to reduce the preoperative anxiety level of paediatric patients will also be shared in biweekly meetings in the operating theatre, so that the frontline staff will have the basic concepts of the new innovation. Meanwhile, their attitudes toward the innovation will be known and their concerns will be addressed.

After getting support from the NO of the operating theatre, a communication team will be formed, which includes the NO of the operating theatre and two RNs who support the innovation. The details and the feasibility of the multimedia distraction intervention will be discussed with the communication team. After that, a modification of the proposal will be made.

The proposal will then be presented to the hospital administrators including the nursing director and the medical superintendent for final approval for the innovation. The evidence that supports the change and the cost benefit ratio will be presented to them in detail. After receiving comments from the administrators, the proposal will be amended according to their suggestions. When the proposal is approved by the administrators, a circular notice about the new guideline will be sent to the operating theatre, paediatric wards and all surgical wards to inform all the nursing staffs about the new innovation. In addition, notices will be sent to all the visiting surgeons and anaesthetists via email by the medical superintendent. Last but not least, the new guideline will be filed to the operation manual in the operating theatre.
To facilitate the change process, the compliance of the frontline users and the support from the administrators are essential. A project committee comprising the nursing officers, two of the anaesthetists, two of the registered nurses of the operating theatre and the proposer will be formed. The committee members will have regular meetings to discuss the feasibility of the proposal, solving the problems related to the implementation and updating the guideline of the innovation. The compliance of the operating theatre nurses with the guideline will be audited annually and their knowledge and skills will be assessed. In addition, the percentage of the paediatric patients who are benefited from the new guideline, that is reduced preoperative anxiety level, will be shared with the stakeholders in monthly meetings, so that the administrators will keep supporting the new guideline and the frontline staff will have the motivation to sustain the change. Lastly, the new guideline should be revised regularly based on the evidence collected.
4.2 Pilot Test Plan

A pilot test will be carried out to test the feasibility of the proposed intervention in a real situation. It allows preliminary data collection and analysis of the study before actual implementation of the innovation, so the potential problems expected in the implementation can be identified and modification of the innovation can be made (Rothgeb, 2008).

4.2.1 Target setting and populations

The pilot test for the preoperative multimedia intervention will be carried out in the operating theatre. The target population includes patients who are aged from 2 to 12 undergoing elective surgeries. They are able to understand Chinese or English, and without visual and cognitive impairment. Their ASA physical status should be class I or II, which means they are healthy or with a mild, well-controlled systemic disease, that does not limit normal activities (Wheeler, Wong & Shanley, 2014).

Since there are 15 RNs in the operating theatre, it is expected that every nurse can implement the preoperative multimedia intervention at least once. In other words, every one of the nurses will have the experience about the innovation. It will take one month to get a sample size of 30 with convenient sampling. All of the paediatric patients who are aged from 2 to 12 undergoing elective surgeries will be approached by one of the anaesthetists of the project committee at the night before operations. The health status assessed during
preoperative assessments will be considered to see whether the patients meet the criteria.

Explanation of the pilot study will be given to the parents or their guardians. Verbal consent will be obtained from them if they agree to join the pilot study.

4.2.2 Staff training

Before recruiting the patients for the pilot study, the registered nurses of the project committee will hold two 4-hour-training sessions for the nursing staff in the operating theatre. Each of the nurses should attend one of the training sessions. The training sessions includes a lecture from a clinical psychologist about children psychology, and the implementation technique such as using the equipment iPad minis and the measuring instrument mYPAS. Demonstration and return demonstration technique will be used to assess the competence of the nursing staff in the implementation of the innovation.

4.2.3 Design and data collection

On admission, apart from baseline physical assessments, the anxiety level of the participants will be recorded as a baseline anxiety level using mYPAS scale (Appendix 8). The patients will be sent to the operating theatre 20 minutes before the scheduled operation time. When they arrive at the operating theatre, the preoperative anxiety level of the children will be assessed using mYPAS scale. The multimedia distraction using the smartphone applications on iPad minis will be given to the anxious children, whose mYPAS scale is
higher than 30, for 20 minutes. Immediately after the intervention, the patients will be sent to the operating theatre for induction of anaesthesia. At that time, the patients will be assessed for post intervention anxiety level using mYPAS. At the same time, the feedback about the interventions will be collected from the accompanying parents (Appendix 8) to see if they consider the intervention is effective or not in reducing the anxiety level of their children.

Besides, the comments of the nursing staff about the multimedia distraction interventions will be collected with a questionnaire (Appendix 9). The questionnaire consists of questions asking the frontline staff about their level of understanding of the innovation, their confidence level and satisfaction level related to the implementation of the innovation, and their feeling about workload and resources. Furthermore, the compliance with the guideline of the nursing staff will be audited. All of the nursing staff in the operating theatre will be audited by the nursing officer of the operating theatre with an audit form (Appendix 10).

4.2.4 Analysis and evaluation

After the data collection from pilot study, it will take about two weeks for data analysis. After that, the results will be discussed and evaluated by the committee members. The feasibility of the guideline and the concerns raised by the staff will be clarified. It takes
around two weeks to revise the guideline of the innovation. A report with the relevant solutions and suggestions will be submitted to the administrators for comments.

4.2.5 Time frame for pilot study

The pilot study will take two months. It will take one month for staff training and another month for data collection. After that, it will take two weeks for data analysis and another two weeks for revising the guideline (Appendix 4).
4.3 Evaluation plan

4.3.1 Identifying outcomes

To evaluate the effectiveness of the innovation, patient outcome, healthcare provider outcome and system outcome should be identified and measured. Each outcome will be measured by relevant tools and questionnaires.

4.3.1.1 Patient outcome

Preoperative anxiety level is the primary patient outcome to determine the effectiveness of the multimedia distraction interventions. In all the five reviewed studies (Kerimoglu et al., 2013; Lee et al., 2012; Lee et al., 2013; Mifflin et al., 2012; Patel et al., 2006), the preoperative anxiety level of the participants was assessed by mYPAS scale. Thus, in the new guideline, the preoperative anxiety level of the paediatric patients will also be assessed by the operating theatre nurses with mYPAS scale, which can be used to assess anxiety level of children aged from 2 to 12 in an operating theatre setting. The operating theatre nurse can assess the anxiety level of the paediatric patients by observing their activity, vocalizations, emotional expressivity, state of apparent arousal and the use of parents. It has high construct validity and observer reliability (Kain et al., 1997). A “Paediatric patients preoperative anxiety level assessment form” is developed according to mYPAS scale for operating theatre nurse to
assess the pre- and post- intervention anxiety level of the participants (Appendix 8). The change in anxiety level after the intervention will be calculated.

The second patient outcome is to find out the patients’ satisfactory level about the smartphone applications used in the intervention. The nurses are required to record the smartphone applications selected for the multimedia distraction intervention. The data collected will be displayed in statistical charts monthly. The results can be important referencing information for the committee members to install popular and effective smartphone applications and at the same time uninstall the unpopular ones. In addition, smartphone applications can thus be classified by gender and age. Hence, the nurses can select suitable smartphone applications for the multimedia distraction intervention for the patients accordingly.

4.3.1.2 Healthcare provider outcomes

The staff competency, satisfaction and compliance are important healthcare provider outcomes to be measured. The staff satisfactory level will be measured with a self-reported questionnaire every time after implementing the innovation (Appendix 9) to collect comments about their satisfactory level, knowledge about the innovation, skills and level of confidence in the implementation. The staff competency and compliance will be audited annually to
ensure their skills and knowledge is within the standard, and they follow the protocol when they implementing the innovation.

4.3.1.3 System outcomes

The cost effectiveness of implementing the multimedia distraction intervention will be analysed to evaluate its effect on healthcare system. It can be an index for the administrator to determine the effectiveness of the innovation. Cost effectiveness analysis will be done semiannually, in terms of manpower allocation, utilization of materials, management of the operating theatre schedule, patients’ comfort, parents’ and visiting doctors’ satisfaction, and the hospital reputation.

4.3.2 Nature and number of clients to be involved

As mentioned in the target population, the nature of the clients are paediatric patients aged from 2 to 12 who are going to have elective surgeries in the operating theatre. The patients with visual or cognitive impairment, or suffering from chronic illness will be excluded. The clients will be selected by convenience sampling.

The sample size was calculated with a free online programme of Lenth (2015). The power was taken as 80% and level of significant was 5%. By referencing the reviewed studies, Kerimoglu et al. (2013), Lee et al. (2012) and Mifflin et al. (2012) considered not less than 15 points change in mYPAS to be clinically significant difference. Therefore, in order to detect a
mean difference of 15 points in mYPAS, with standard deviation of 20, a sample size of 35 was calculated. For a 10% attrition rate, 39 participants will be required.

4.3.3 Data analysis

Data analysis will be performed by Statistical Package for the Social Sciences (SPSS) (version 22). Demographic data of the participants such as age, gender will be summarized as descriptive statistics and expressed in terms of means and standard deviation. For the primary patient outcome, the change in the anxiety level of the patients after the multimedia intervention will be analyzed by a two tailed paired t-test. Pearson’s chi-square test will be used to analyze the data obtained from the staff satisfaction survey. The data obtained from the parents’ satisfaction, staff compliance and competence audit will be described in percentage points. Cost-effectiveness analysis will be conducted to analyze the system outcome and to find out the ratio of the saving of the innovation to the cost of it.

4.3.4 Effectiveness of the guideline

The effectiveness of the new guideline is determined by various aspects. Since the aim of the new guideline is to reduce the anxiety level of the paediatric patients undergoing elective surgeries, the rate in reducing the anxiety level of these patients determines the effectiveness of the guideline. According to the reviewed studies, Kerimoglu et al. (2013), Lee et al. (2012) and Mifflin et al. (2012) considered the participants with mYPAS score
more than 30 out of 100 had anxiety. These three studies defined a change in 15 points of mYPAS score as clinically significant. With reference to these studies, the intervention is considered as effective if the patients’ anxiety level decreases by 15 points or mYPAS score is lower than 30 after the intervention. By referring to the literature, 43% of the patients had no anxiety level (mYPAS≤ 30) after cartoon distraction and smartphone application program intervention (Lee et al., 2012; Le et al., 2013). Therefore, the guideline is considered to be effective if 43% of the participants have no anxiety (mYPAS≤ 30) after the multimedia distraction intervention.

Furthermore, all of the operating theatre nurses should score over 75% in the competency audit, while 80% of them are satisfied with the new guideline. For the system outcome, the new guideline is considered to be effective if the financial cost of the use of excessive sedatives and induction time can be reduced, and the cost for running the new guideline can be kept below $10000 annually.

4.3.5 Time frame for evaluation

The process of evaluation will start one month after actual implementation of the guideline. It will take six months for data analysis. After that, it will take one month to prepare an evaluation report (Appendix 4).
CHAPTER 5: CONCLUSION

Preoperative anxiety is a common problem among paediatric patients undergoing surgeries. Studies pointed out that high level of preoperative anxiety delays physical and behavioral recovery in children. Multimedia distraction is found to be effective in reducing preoperative anxiety in children undergoing elective surgeries. Based on the findings of the reviewed studies, a guideline about using multimedia distraction was established to reduce preoperative anxiety for paediatric patients undergoing elective surgeries in a local setting. To affirm the implementation potential in the target setting, transferability, feasibility and cost-benefit ratio of the guideline were examined. To implement the guideline successfully, a good implementation plan was needed. A communication plan was developed to get support from the stakeholders. A pilot test will be done to test the feasibility of the guideline in local setting. The guideline will be revised and modified if needed before the actual implementation. Lastly, the results of the guideline implementation will be evaluated. The proposed guideline will be considered to be effective if the patients’ anxiety levels decrease 15 mYPAS points or their mYPAS scores are lower than 30 after the intervention.
REFERENCE:


*Journal of paediatric psychology, 38*(2). 202–212.

APPENDICES

Appendix 1 : Prisma 2009 Flow Diagram

(Moher, Liberati, Tetzlaff & Altman, 2009).
## Appendix 2: Table of Evidence

<table>
<thead>
<tr>
<th>Citation</th>
<th>Study Design (level of evidence)</th>
<th>Patient Characteristics</th>
<th>Intervention</th>
<th>Comparison</th>
<th>Length of Follow up</th>
<th>Outcome Measures</th>
<th>Effect size</th>
</tr>
</thead>
</table>
| Kerimoglu et al (2013). | RCT (+++) | ● In the USA  
● Age: 4 – 9  
● GA  
● Day surgery  
● (n=96) | Video glasses (VG): Children chose their age-appropriate TV program to watch (n=32)  
Video glasses with Medication (M+VG): Children chose their age-appropriate TV program to watch with Midazolam HCL syrup 0.3mg/kg (n=32) | Medication (M): Midazolam HCL syrup 0.3mg/kg (n=32) | (1) the evening before surgery (Baseline)  
(2) 20 minutes after intervention  
(3) During mask induction in OT | 1. Anxiety (mYPAS)  
2. Heart Rate (ECG or pulse oximeter) | 1. Anxiety:  
*Induction - baseline:*  
VG: decreased anxiety level -0.83 (95%CI, -7.5 to 14.17, p=0.39)  
VG + M: decreased anxiety level -3.33 (95%CI, -5 to 17.5, p=0.39)  
*During induction:*  
VG – M: lower anxiety level (-11.7, p=0.11)  
2. Heart rate:  
*From baseline to induction:*  
Increased in all group (p<0.001)  
No significant differences among groups |
<table>
<thead>
<tr>
<th>Citation</th>
<th>Study Design (level of evidence)</th>
<th>Patient Characteristics</th>
<th>Intervention</th>
<th>Comparison</th>
<th>Length of Follow up</th>
<th>Outcome Measures</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lee et al (2012)</td>
<td>RCT (+)</td>
<td>● In South Korea</td>
<td>Animated Cartoon: Watch selected movie in preoperative holding area using notebook or tablet until induction (n=42)</td>
<td>Toy: Children bring their own favorite toy to induction (n=44) Control: details not mentioned (n=44)</td>
<td>(1) the evening before surgery (Baseline) (2) in preanesthetic holding room before intervention (3) before anesthetic induction</td>
<td>Anxiety:</td>
<td>1.mYPAS: Animated cartoon – Control: Lower anxiety level -25.6 (p&lt;0.05) 2. Parent recorded VAS: Animated cartoon – Control: Lower anxiety level -2.9 (p&lt;0.05)</td>
</tr>
<tr>
<td>Citation</td>
<td>Study Design (level of evidence)</td>
<td>Patient Characteristics</td>
<td>Intervention</td>
<td>Comparison</td>
<td>Length of Follow up</td>
<td>Outcome Measures</td>
<td>Effect sizes</td>
</tr>
<tr>
<td>----------</td>
<td>----------------------------------</td>
<td>-------------------------</td>
<td>--------------</td>
<td>------------</td>
<td>---------------------</td>
<td>-----------------</td>
<td>--------------</td>
</tr>
</tbody>
</table>
| Lee et al (2013) | RCT (+) | • In South Korea  
• Age: 1-9  
• GA  
• (n=120) | Smartphone application:  
(n=40)  
Children played with their preferred smartphone application for 5 minutes in preoperative holding area  
Smartphone application with low dose midazolam IVI:  
Children played with their preferred smartphone application for 5 minutes in preoperative holding area and low dose midazolam IVI 0.05mg/kg was administered before operation (n=40) | Midazolam IVI 0.15mg/kg:  
Premedication of midazolam 0.15mg/kg IVI was administered before operation (n=40) | (1) Holding area before intervention  
(2) 5 minutes after intervention  
(3) in operating room | Anxiety (mYPAS) | Induction – preoperative holding area:  
Smartphone application:  
Decreased anxiety level -20.6 (p<0.05)  
Smartphone application with low dose Midazolam IV:  
Decreased anxiety level -28.1 (p<0.05) | During induction:  
Smartphone application – Midazolam:  
Lower anxiety level -0.6 (p<0.01)  
Smartphone application with low dose Midazolam IV – Midazolam:  
Lower anxiety level -14.6 (p<0.01) |
<table>
<thead>
<tr>
<th>Citation</th>
<th>Study Design (level of evidence)</th>
<th>Patient Characteristics</th>
<th>Intervention</th>
<th>Comparison</th>
<th>Length of Follow up</th>
<th>Outcome Measures</th>
<th>Effect sizes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mifflin et al (2012)</td>
<td>RCT (+++)</td>
<td>• In Canada</td>
<td>Video distraction: children watch video clips in YouTube during induction (n=42)</td>
<td>Control: (n=47) Usual distraction such as imagery, storytelling, game-playing, nonprocedural talk, humor by anaesthetists during induction</td>
<td>(1) Before randomization (baseline)</td>
<td>Anxiety mYPAS</td>
<td>Video distraction - Control: Lower anxiety level -31.2 (95% CI, 27.1 – 33.3, p&lt;0.001)</td>
</tr>
<tr>
<td>Citation</td>
<td>Study Design</td>
<td>Patient Characteristics</td>
<td>Intervention</td>
<td>Comparison</td>
<td>Length of Follow up</td>
<td>Outcome Measures</td>
<td>Effect sizes</td>
</tr>
<tr>
<td>--------------</td>
<td>---------------</td>
<td>--------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------------------</td>
<td>-------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Patel et al (2006)</td>
<td>RCT (+)</td>
<td>In the USA Age: 4-12 GA In day centre (n=112)</td>
<td>Video games with parental presence: Play video games for 20 minutes and parental presence during anesthesia induction (n=38)</td>
<td>Parental presence: Parental presence during anesthesia induction was standard practice of the study hospital (n=36) Parental presence with Midazolam 0.5mg/kg PO: Premedication of midazolam 0.5mg/kg PO was administered 20 minutes before operation and parental presence during anesthesia induction (n=38)</td>
<td>(1) Before randomization (Baseline) (2) At mask induction after at least 20 minutes of intervention</td>
<td>Anxiety (mYPAS)</td>
<td><strong>Induction - baseline</strong> Video game: Decrease anxiety level -3 (p=0.04) <strong>During induction</strong> Video game – Parental presence: Lower anxiety level -9.8 (p&lt;0.01)</td>
</tr>
</tbody>
</table>
### Appendix 3: Scottish Intercollegiate Guidelines Network (SIGN) methodology checklist


<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 aim of the study was clearly stated in the introduction.</td>
</tr>
<tr>
<td>1.2 The assignment of subjects to treatment groups is randomised.</td>
<td>Yes. Blocked randomization with multiples of 3</td>
</tr>
<tr>
<td>1.3 An adequate concealment method is used.</td>
<td>Yes. By sealed envelopes.</td>
</tr>
<tr>
<td>1.4 Subjects and investigators are kept ‘blind’ about treatment allocation.</td>
<td>No. Both the patients and observers cannot be blinded due to nature of the study.</td>
</tr>
<tr>
<td>1.5 The treatment and control groups are similar at the start of the trial.</td>
<td>Yes. No significant differences in demographic characteristics and baseline anxiety.</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. The instrument used was mYPAS.</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>6.25%</td>
</tr>
<tr>
<td>1.9 All the subjects are analysed in the groups to which they were randomly allocated.</td>
<td>No. Intention to treat analysis was not used.</td>
</tr>
<tr>
<td>1.10 Where the study is carried out at more than one site, results are comparable for all sites</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SECTION 2: OVERALL ASSESSMENT OF THE STUDY</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1 How well was the study done to minimise bias?</td>
<td>1++ (High quality). The study was performed properly in all steps.</td>
</tr>
<tr>
<td>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?</td>
<td>Yes, although intention to treat analysis was not used, the dropped out rate was not significant to the study result.</td>
</tr>
<tr>
<td>2.3 Are the results of this study directly applicable to the patient group targeted by this guideline?</td>
<td>Yes. The patients in this study and in my proposed guideline were similar.</td>
</tr>
</tbody>
</table>

**SECTION 1: INTERNAL VALIDITY**

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>The study addresses an appropriate and clearly focused question</td>
<td>Yes. The aim of the study was clearly stated in the introduction.</td>
</tr>
<tr>
<td>1.2</td>
<td>The assignment of subjects to treatment groups is randomised.</td>
<td>Yes. Randomization was done by computer-generated random number.</td>
</tr>
<tr>
<td>1.3</td>
<td>An adequate concealment method is used.</td>
<td>Not mentioned.</td>
</tr>
<tr>
<td>1.4</td>
<td>Subjects and investigators are kept ‘blind’ about treatment allocation.</td>
<td>No. Both the patients and observers cannot be blinded due to nature of the study.</td>
</tr>
<tr>
<td>1.5</td>
<td>The treatment and control groups are similar at the start of the trial.</td>
<td>Yes. Yes. No significant differences in demographic characteristics and baseline anxiety.</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. The instrument used was mYPAS and parent recorded VAS.</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>3% 4/44 in toy group.</td>
</tr>
<tr>
<td>1.9</td>
<td>All the subjects are analysed in the groups to which they were randomly allocated.</td>
<td>No. Intention to treat analysis was not used.</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>Not applicable</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>How well was the study done to minimise bias?</td>
<td>1+ (acceptable). There was no concealment method used.</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, although intention to treat analysis was not used, the dropped out rate was not significant to the study result.</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. The patients in this study and in my proposed guideline were similar.</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 aim of the study was clearly stated in the introduction.</td>
</tr>
<tr>
<td>1.2</td>
<td>The assignment of subjects to treatment groups is randomised.</td>
<td>Yes, but the method of randomization was not mentioned.</td>
</tr>
<tr>
<td>1.3</td>
<td>An adequate concealment method is used.</td>
<td>Not mentioned.</td>
</tr>
<tr>
<td>1.4</td>
<td>Subjects and investigators are kept ‘blind’ about treatment allocation.</td>
<td>The rating assessors were blinded.</td>
</tr>
<tr>
<td>1.5</td>
<td>The treatment and control groups are similar at the start of the trial.</td>
<td>Yes. No significant differences in demographic characteristics and baseline anxiety.</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. The instrument used was mYPAS.</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.</td>
<td>Not applicable.</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>Not applicable.</td>
</tr>
</tbody>
</table>

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

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>How well was the study done to minimise bias?</td>
<td>1+ (acceptable). There was no concealment method used</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, the study was in moderate methodological quality.</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. The patients in this study and in my proposed guideline were similar.</td>
</tr>
</tbody>
</table>

### SECTION 1: INTERNAL VALIDITY

<table>
<thead>
<tr>
<th>1.1</th>
<th>The study addresses an appropriate and clearly focused question</th>
<th>Yes. The aim of the study was clearly stated in the introduction.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2</td>
<td>The assignment of subjects to treatment groups is randomised.</td>
<td>Yes, randomization was done by random number generator.</td>
</tr>
<tr>
<td>1.3</td>
<td>An adequate concealment method is used.</td>
<td>Yes, by sealed envelopes.</td>
</tr>
<tr>
<td>1.4</td>
<td>Subjects and investigators are kept ‘blind’ about treatment allocation.</td>
<td>No. Both the patients and observers cannot be blinded due to nature of the study.</td>
</tr>
<tr>
<td>1.5</td>
<td>The treatment and control groups are similar at the start of the trial.</td>
<td>No significant differences in demographic characteristics.</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. The instrument used was mYPAS.</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>1% 2/44 in video distraction group</td>
</tr>
<tr>
<td>1.9</td>
<td>All the subjects are analysed in the groups to which they were randomly allocated.</td>
<td>No. Intention to treat analysis was not used.</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>Not applicable.</td>
</tr>
</tbody>
</table>

### SECTION 2: OVERALL ASSESSMENT OF THE STUDY

<table>
<thead>
<tr>
<th>2.1</th>
<th>How well was the study done to minimise bias?</th>
<th>1++ (High quality). The study was performed properly in all steps.</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, although intention to treat analysis was not used, the dropped out rate was not significant to the study result.</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. The patients in this study and in my proposed guideline were similar.</td>
</tr>
</tbody>
</table>

**SECTION 1: INTERNAL VALIDITY**

<table>
<thead>
<tr>
<th>1.1</th>
<th>The study addresses an appropriate and clearly focused question</th>
<th>Yes. The aim of the study was clearly stated in the introduction.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2</td>
<td>The assignment of subjects to treatment groups is randomised.</td>
<td>Yes, but the details were not mentioned.</td>
</tr>
<tr>
<td>1.3</td>
<td>An adequate concealment method is used.</td>
<td>Yes, by sealed enveloped.</td>
</tr>
<tr>
<td>1.4</td>
<td>Subjects and investigators are kept ‘blind’ about treatment allocation.</td>
<td>No. Both the patients and observers cannot be blinded due to nature of the study.</td>
</tr>
<tr>
<td>1.5</td>
<td>The treatment and control groups are similar at the start of the trial.</td>
<td>Yes. No significant differences in demographic characteristics.</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. The instrument used was mYPAS.</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.</td>
<td>Not applicable.</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>Not applicable.</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>2.1</th>
<th>How well was the study done to minimise bias?</th>
<th>1+ (acceptable). The randomization method was not reported.</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, the study was in moderate methodological quality.</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. The patients in this study and in my proposed guideline were similar.</td>
</tr>
</tbody>
</table>
### Appendix 4: Time frame for implementation

<table>
<thead>
<tr>
<th>Task</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communicate with stakeholders</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>Obtain hospital approval</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>Prepare equipment</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 guidelines</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>Staff training</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 study</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>Data analysis of pilot study</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>Revise 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>Actual implementation of 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>Data analysis of actual study</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>Report</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>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix 5: Cost of the selected smartphone applications and cartoon movies

<table>
<thead>
<tr>
<th>Smartphone applications</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mega sticker book for kid</td>
<td>$0</td>
</tr>
<tr>
<td>Lego Duplo Train</td>
<td>$0</td>
</tr>
<tr>
<td>Animal Funny Voice Piano</td>
<td>$23</td>
</tr>
<tr>
<td>Disney Storytime</td>
<td>$0</td>
</tr>
<tr>
<td>Talking Tom Cat</td>
<td>$0</td>
</tr>
<tr>
<td>Barbie Fashionistas</td>
<td>$0</td>
</tr>
<tr>
<td>My first find the differences game: Pirate</td>
<td>$0</td>
</tr>
<tr>
<td>Plane: Fire &amp; Rescue</td>
<td>$0</td>
</tr>
<tr>
<td>Cars 2 World Grand Prix Read &amp; Race</td>
<td>$28</td>
</tr>
<tr>
<td>Ariel’s Musical Surprise</td>
<td>$0</td>
</tr>
<tr>
<td>Baby Care &amp; Baby Hospital</td>
<td>$0</td>
</tr>
<tr>
<td>Angry Bird</td>
<td>$0</td>
</tr>
<tr>
<td>Fruit Ninja</td>
<td>$8</td>
</tr>
<tr>
<td>Lego Ninjago Rebooted</td>
<td>$0</td>
</tr>
<tr>
<td>Cupcake Mania</td>
<td>$0</td>
</tr>
<tr>
<td><strong>Total cost of smartphone applications</strong></td>
<td><strong>$59</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cartoon movies</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Lego Movie</td>
<td>$158</td>
</tr>
<tr>
<td>Frozen</td>
<td>$158</td>
</tr>
<tr>
<td>Monsters University</td>
<td>$158</td>
</tr>
<tr>
<td>Toy Story 3</td>
<td>$68</td>
</tr>
<tr>
<td>Despicable Me 2: 3 Mini-Movie Collection</td>
<td>$38</td>
</tr>
<tr>
<td><strong>Total cost of cartoon movies</strong></td>
<td><strong>$580</strong></td>
</tr>
</tbody>
</table>
### Appendix 6: Setup cost of the innovation

<table>
<thead>
<tr>
<th>Personnel Expenses</th>
<th>Items</th>
<th>Total Cost (HKD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RN Mid-Point salary (Point 20): $31200/month ÷ 200 hours</td>
<td>= $156/hour</td>
<td></td>
</tr>
<tr>
<td>Senior RN salary (Point 25): $39345/month ÷ 200 hours</td>
<td>= $197/hour</td>
<td></td>
</tr>
<tr>
<td>Preparation hour</td>
<td>1 Senior RN × 20 hours</td>
<td>$197 × 40 hours</td>
</tr>
<tr>
<td>Staff/Training</td>
<td>1 Clinical psychologist</td>
<td>4-hour lecture</td>
</tr>
<tr>
<td></td>
<td>1 Senior RN × 4 hours</td>
<td>$197 × 4 hours</td>
</tr>
<tr>
<td></td>
<td>15 RN × 4 hours</td>
<td>$157 × 15 × 4 hours</td>
</tr>
<tr>
<td><strong>Total personnel expenses</strong></td>
<td><strong>$22088</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Material costs</th>
<th>Items</th>
<th>Total Cost (HKD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment</td>
<td>iPad mini 3 64GB wifi × 3</td>
<td>$3888 × 3</td>
</tr>
<tr>
<td>Smartphone applications</td>
<td>15 applications (Appendix )</td>
<td>$59</td>
</tr>
<tr>
<td>Cartoon movies</td>
<td>5 movies (Appendix )</td>
<td>$580</td>
</tr>
<tr>
<td>Printing &amp; Photocopy</td>
<td>Protocol &amp; handouts</td>
<td>$1000</td>
</tr>
<tr>
<td><strong>Total material cost</strong></td>
<td><strong>$12781</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Total set up cost</strong></td>
<td><strong>$34869</strong></td>
<td></td>
</tr>
</tbody>
</table>
Appendix 7: The modified Yale Preoperative Anxiety Scale (mYPAS)

Activity

1. Looking around, curious, playing with toys, reading (or other age-appropriate behavior); moves around holding area/treatment room to get toys or to go to parent; may move toward operating room equipment
2. Not exploring or playing, may look down, fidget with hands, or suck thumb (blanket); may sit close to parent while waiting, or play has a definite manic quality
3. Moving from toy to parent in unfocused manner, non-activity-derived movements; frenetic/frenzied movement or play; squirming, moving on table; may push mask away or cling to parent
4. Actively trying to get away, pushes with feet and arms, may move whole body; in waiting room, running around unfocused, not looking at toys, will not separate from parent, desperate clinging

Vocalizations

1. Reading (nonvocalizing appropriate to activity), asking questions, making comments, babbling, laughing, readily answers questions but may be generally quiet; child too young to talk in social situations or too engrossed in play to respond
2. Responding to adults but whispers, “baby talk,” only head nodding
3. Quiet, no sounds or responses to adults
4. Whimpering, moaning, groaning, silently crying
5. Crying or may be screaming “no”
6. Crying, screaming loudly, sustained (audible through mask)

Emotional expressivity

1. Manifestly happy, smiling, or concentrating on play
2. Neutral, no visible expression on face
3. Worried (sad) to frightened, sad, worried, or tearful eyes
4. Distressed, crying, extreme upset, may have wide eyes

**State of apparent arousal**
1. Alert, looks around occasionally, notices or watches what anesthesiologist does (could be relaxed)
2. Withdrawn, sitting still and quiet, may be sucking on thumb or have face turned into adult
3. Vigilant, looking quickly all around, may startle to sounds, eyes wide, body tense
4. Panicked whimpering, may be crying or pushing others away, turns away

**Use of parents**
1. Busy playing, sitting idle, or engaged in age appropriate behavior and doesn’t need parent; may interact with parent if parent initiates the interaction
2. Reaches out to parent (approaches parent and speaks to otherwise silent parent), seeks and accepts comfort, may lean against parent
3. Looks to parent quietly, apparently watches actions, doesn’t seek contact or comfort, accepts it if offered or clings to parent
4. Keeps parent at distance or may actively withdraw from parent, may push parent away or desperately clinging to parent and not let parent go

**Reference:**

Appendix 8: Paediatric patients preoperative anxiety level assessment form

Patient Particulars:  Age _____________  Sex _______________
Smartphone application selected: ____________________

Part I: Pre intervention & Post intervention anxiety level (mYPAS)*

<table>
<thead>
<tr>
<th></th>
<th>Pre intervention</th>
<th>Post intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) Activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(B) Vocalizations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(C) Emotional Expressivity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(D) State of apparent arousal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(E) Use of parents</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total score =</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(A/4 + B/6 + C/4 + D/4 + E/4) X 100/5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in anxiety level:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post intervention mYPAS score – Pre intervention mYPAS score</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Part II: Feedback from accompanying parents

The intervention is effective/ ineffective to reduce the anxiety level of the child.
Other comments:

______________________________

The modified Yale Preoperative Anxiety Scale (mYPAS)

Activity
1. Looking around, curious, playing with toys, reading (or other age-appropriate behavior); moves around holding area/treatment room to get toys or to go to parent; may move toward operating room equipment
2. Not exploring or playing, may look down, fidget with hands, or suck thumb (blanket); may sit close to parent while waiting, or play has a definite manic quality
3. Moving from toy to parent in unfocused manner, non-activity-derived movements; frenetic/frenzied movement or play; squirming, moving on table; may push mask away or cling to parent
4. Actively trying to get away, pushes with feet and arms, may move whole body; in waiting room, running around unfocused, not looking at toys, will not separate from parent, desperate clinging
Vocalizations
1. Reading (nonvocalizing appropriate to activity), asking questions, making comments, babbling, laughing, readily answers questions but may be generally quiet; child too young to talk in social situations or too engrossed in play to respond
2. Responding to adults but whispers, “baby talk,” only head nodding
3. Quiet, no sounds or responses to adults
4. Whimpering, moaning, groaning, silently crying
5. Crying or may be screaming “no”
6. Crying, screaming loudly, sustained (audible through mask)

Emotional expressivity
1. Manifestly happy, smiling, or concentrating on play
2. Neutral, no visible expression on face
3. Worried (sad) to frightened, sad, worried, or tearful eyes
4. Distressed, crying, extreme upset, may have wide eyes

State of apparent arousal
1. Alert, looks around occasionally, notices or watches what anesthesiologist does (could be relaxed)
2. Withdrawn, sitting still and quiet, may be sucking on thumb or have face turned into adult
3. Vigilant, looking quickly all around, may startle to sounds, eyes wide, body tense
4. Panicked whimpering, may be crying or pushing others away, turns away

Use of parents
1. Busy playing, sitting idle, or engaged in age appropriate behavior and doesn’t need parent; may interact with parent if parent initiates the interaction
2. Reaches out to parent (approaches parent and speaks to otherwise silent parent), seeks and accepts comfort, may lean against parent
3. Looks to parent quietly, apparently watches actions, doesn’t seek contact or comfort, accepts it if offered or clings to parent
4. Keeps parent at distance or may actively withdraw from parent, may push parent away or desperately clinging to parent and not let parent go

Reference:
Appendix 9: Evaluation Questionnaire on Multimedia Distraction Intervention for Paediatric Patients Undergoing Elective Surgeries

Please circle the appropriate number to indicate your attitudes towards the innovation

<table>
<thead>
<tr>
<th></th>
<th>Statement</th>
<th>Totally disagree</th>
<th>Partially disagree</th>
<th>Neutral</th>
<th>Partially agree</th>
<th>Totally agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The innovation is well organized</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>The objectives of the innovation is achieved</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>The amount of resources needed is reasonable</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>The guideline is useful to reduce patients’ anxiety</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>The guideline is clearly guided for implementation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>I feel confident to implement multimedia distraction intervention</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>I feel confident to use mYPAS to evaluate patients’ anxiety level</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>Programme committee members are supportive</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9</td>
<td>Patients are satisfied with the innovation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>The innovation enhance quality of patient care</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>11</td>
<td>I agree to continue this innovation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>12</td>
<td>In general, I am satisfied with the innovation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

Other comments:
Appendix 10: Staff Compliance Audit Form for Multimedia Distraction Intervention for Paediatric Patients Undergoing Elective Surgeries

<table>
<thead>
<tr>
<th>Preoperative visit in ward</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Patient was assessed if they are eligible for the intervention.</td>
<td>Y</td>
<td>N</td>
<td>N/A</td>
</tr>
<tr>
<td>2. Explained the intervention to parents.</td>
<td>Y</td>
<td>N</td>
<td>N/A</td>
</tr>
<tr>
<td>3. Consent from parents obtained.</td>
<td>Y</td>
<td>N</td>
<td>N/A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>In operating theatre</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Pre intervention anxiety level assessed using mYPAS.</td>
<td>Y</td>
<td>N</td>
<td>N/A</td>
</tr>
<tr>
<td>5. Introduced the smartphone applications to patients.</td>
<td>Y</td>
<td>N</td>
<td>N/A</td>
</tr>
<tr>
<td>6. Allowed 20 minutes of intervention.</td>
<td>Y</td>
<td>N</td>
<td>N/A</td>
</tr>
<tr>
<td>7. Post intervention level assessed using mYPAS.</td>
<td>Y</td>
<td>N</td>
<td>N/A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Documentation</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Properly assessed each part of mYPAS.</td>
<td>Y</td>
<td>N</td>
<td>N/A</td>
</tr>
<tr>
<td>9. Correctly calculated mYPAS score using the formula provided.</td>
<td>Y</td>
<td>N</td>
<td>N/A</td>
</tr>
<tr>
<td>10. Documented the smartphone applications used.</td>
<td>Y</td>
<td>N</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Total Score: _____________/10  Percentage: ___________%

Name of staff: ________________  Date: ________________