Abstract of thesis entitled

Evidence-based Guideline of
Using Aromatherapy in Relieving
Postoperative Nausea and Vomiting

Submitted by

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Postoperative nausea and vomiting (PONV) is a prevailing problem noted among surgical patients. It is noted that PONV induces a number of physical and psychological problems which increases patients' suffering and their stay in hospital. In order to prevent and relief PONV, most surgical patients in Hong Kong are prescribed with antiemetic mediation. However, these antiemetic mediations have some adverse effects and may not be able to relief PONV. Aromatherapy is an alternative possible strategy to manage patients with PONV.
Therefore, a comprehensive literature review is done on aromatherapy on surgical patients who encounter postoperative nausea and vomiting. Appropriate studies are found in 6 databases including Pubmed, Medline(1950-Aug 2013), Cochrane Library, CINAHL (1984-Aug 2013), British Nursing Index and Achieve (1985-Aug 2013) and EMBASE (1947-Aug 2013). A total of 7 randomized controlled trails are reviewed. Data are extracted from these articles and analyzed. An evidence-based guideline of aromatherapy on relieving postoperative nausea and vomiting is developed. The feasibility, transferability, implementation potential and strategies are discussed in this dissertation. Moreover, an evaluation plan is made to ensure the effective application of aromatherapy in adult surgical patients with PONV in a public hospital in Hong Kong. It is anticipated that aromatherapy can help to reduce psychological and physiological distress that induced by PONV of surgical patients. Also, by introducing an evidence-based guideline, the sense of autonomy of nurses is developed which facilitate nursing advancement.
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by

Yip Sau Chun

A thesis submitted in partial fulfillment of the requirements for
the degree of Master of Nursing
at The University of Hong Kong
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Declaration

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

Signed____________________________________

Yip Sau Chun
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Contents

Declaration .................................................................i

Acknowledgements ..........................................................ii

Table of Content ............................................................iii

List of Appendices ...........................................................vii

Chapter 1 - Introduction ......................................................1

1.1 Background

1.2 Affirming the Need

1.3 Significance and Objectives of the Study

1.3.1 Research Question

Chapter 2 - Critical Appraisal ...............................................8

2.1 Searching Strategies

2.1.1 Identification of Studies

2.1.2 Inclusion Criteria

2.1.3 Exclusion Criteria

2.1.4 Data Extraction

2.2 Appraisal Strategies

2.3 Summary and Synthesis of Results

2.3.1 Patient Characteristics
2.3.2 Intervention used

2.3.3 Length of Follow Up

2.3.4 Outcome Measure

2.4 Synthesis of Data

2.4.1 The Population

2.4.2 The Outcome Measures

2.4.3 The Effects of Intervention

2.4.4 Summary of Synthesis

2.5 Methodological Quality of the Studies

2.5.1 Studies' Characteristics

2.5.2 Allocation of Participants

2.5.3 Binding

2.5.4 Conclusion accounted from all Participants

2.5.5 Incomplete Outcome Data

2.5.6 Minimize the Play of Chance

2.5.7 Precision of the Results of Study

2.5.8 Applicability of Findings

2.5.9 Level of Evidence
Chapter 3 – Translation and Application

3.1 Implementation Potential

3.1.1 Target setting

3.1.2 Target Client

3.1.3 Transferability of the Findings

3.1.3.1 Target setting and client

3.1.3.2 Philosophy of care

3.1.3.3 Time frame

3.2 Feasibility

3.2.1 Freedom in the implementation

3.2.2 Interference of current staff function

3.2.3 Administrative support

3.2.4 Potential conflict or friction

3.2.5 Staff training

3.2.6 Equipment and facilities

3.2.7 Potential risk and benefits

3.3 Cost-benefit ratio of the innovation

3.3.1 Potential risks and benefits towards patients

3.3.2 Potential risks and benefits towards staff

3.3.3 Potential risks and benefits towards hospital
Chapter 4 – Evidenced-based Guideline .............................................. 30

4.1 Evidence-based guideline

4.2 Purpose of protocol

4.3 Target Client of protocol

4.4 Implementation of program

4.5 Clinical Guideline

4.6 Practice Recommendations

Chapter 5 – Implementation Plan ...................................................... 33

5.1 Communication Plan

5.1.1 Identification of stakeholders

5.1.2 Communication Process and Implementation Strategies

5.1.2.1 Advanced Practice Nurse in Surgical Units

5.1.2.2 Department Operating Manager and Ward Manager of Surgical Units

5.1.2.3 Continuous Quality Improvement Committee for management of postoperative nausea and vomiting

5.1.2.4 Nurses in Surgical Units

5.1.2.5 Resident Doctors

5.2 Pilot Testing Plan

5.2.1 Objectives
5.2.2 Time frame, target population, sample size and target setting

5.2.3 Outcome measures

5.2.4 Acceptability and feasibility assessment

5.2.5 Discussion about the data collected from the pilot study

Chapter 6 – Evaluation Plan ................................................................. 47

6.1 Outcome Identification

6.1.1 Patient Outcome

6.1.2 Staff and System Outcome

6.2 Design of Innovation

6.3 Outcome Measurement

6.4 Data Analysis

6.5 Effectiveness of Innovation

6.5.1 Patient clinical outcomes

6.5.2 Nursing compliance.

6.5.3 Patient and staff satisfactory level

6.5.4 Measures to sustain the change of practice

Chapter 7 - Conclusion ........................................................................ 47

Appendices .......................................................................................... 64

References ............................................................................................ 73
List of Appendixes

I. Appendix I: Summary of Searching Strategies and Results

II. Table of Evidence

III. Table of Quality Assessment of Studies

IV. Content of 1-hour Briefing Session for Nurses

V. Summary of Cost/Benefit Ratio

VI. Level of Evidence (SIGN, 2012)

VII. Grade of Recommendation (SIGN, 2012)

VIII. Questionnaire for Process Evaluation of Patients

IX. Questionnaire for Process Evaluation of Nurses
Chapter 1

Introduction

1.1 Background

Postoperative nausea and vomiting (PONV) is a prevailing problem and commonly complained by patients who undergo general, local or regional anesthesia (Watcha, 1992). As defined, nausea is a sense of abdominal discomfort or queasiness that causes people to have an urge to expel gastric contents while vomiting is the forced action of removing gastric contents (Teran, 2007). These postoperative complications increase distress and generate uncomfortable feeling of surgical patients.

According to a research done by the Centre for Advancing Health in 2009, almost 80% of patients after surgical procedures grumbled and complained about PONV. Statistics also showed that 20-30% of surgical patients even undergone severe PONV. Furthermore, there are a number of risk factors that further increase the chance of PONV. These predisposing factors can be related to patient's oneself, including female gender, overweight and medical history of PONV and motion sickness. Also, there are a number of factors related to the surgical procedures. For example the amount of perioperative and postoperative opioid used e.g. Nitrous oxide and Morphine. Length and type of surgery is another risk factor of PONV. Laparoscopic procedures can cause abdominal distension as surgeons need to influx carbon dioxide during procedure for visualization. This increases the chances of PONV. In addition, patients who undergo gynecological surgeries and
abdominal surgeries are prone to have PONV. General anesthesia and the degree of pain experienced by patients are also risk factors that increase chances of PONV (Cotton, 2007). A survey reported that a person with 3 risk factors has 54% to develop PONV, those with 4 risk factors accounts for 63% and those with 5 risk factors is 87% (Pellgrini, 2009).

PONV causes a number of serious problems including aspiration of stomach contents, dehydration, metabolic and electrolyte disturbances, disruption of surgical wound site. All these result in generating physical and psychological discomfort and distress which reduce patients' satisfaction. Moreover, cost of health care industry is driven up as increase stay of surgical patients in hospitals and more unplanned readmission due to the complications caused by PONV. Statistics show that a patient needs to stay 47-61mins more in the recovery center of operation if he or she suffers from PONV. This is actually an increase use of health care resources. In another study in which the study setting is a day center unit, it shows that an additional two patients cannot have their scheduled operation if one patient has PONV. This is due to the use of manpower and bedstead to manage the patient who has PONV. One more important thing is that all these delay the working manpower to return to society. Therefore, PONV is an important issue that is concerned by health care providers.

1.2 Affirming the Need

In order to prevent and relief PONV, most surgical units in hospitals in Hong Kong have an aggressive pharmacological treatment strategy. In the surgical unit of my hospital
Queen Mary, anesthetist will turn up in wards and assess surgical patients before surgery. Antiemetic agents such as Ondansetron, a serotonin antagonist, or Promethazine, a dopamine receptor blocking agent, are prescribed for patients to use after operation. These antiemetic medications not only can be in form of oral or suppository, but also in form of continuous intravenous infusion. For some high risk cases, prophylactic antiemetic medication is prescribed for preoperative use.

However, the pharmaceutical treatments have a number of side effects, mostly associated with sedation and extrapyramidal symptoms. The disadvantages of Ondansetron are headache, dizziness, drowsiness and sedation. Promethazine always causes dry mouth and prolong sedation, and sometimes even hypotension (Pellegrini, 2009). All these can increase the morbidity (Cotton, 2007). Additionally, some patients are quite reluctant to take oral antiemetic medication when they want to vomit. They also refuse suppository antiemetic drugs as they do not want to move too much after surgery and fear of the side effects of the antiemetic drugs.

Actually, some studies suggest that pharmaceutical treatments should not be the "golden standard" of treating PONV. Some reports illustrate that 45% of female patients who receive prophylactic Ondansetron to prevent PONV before laparoscopic surgery found no use of the medication and still feel ongoing nausea after operation (Ahmed, 2000). A meta-analysis done in 2013 shows that prophylactic use of maxalon, droperidol, and
ondansetron can only decrease the cases of PONV to around 40% (Domino et al, 2013). Also, antiemetic medication may not be effective in short-term nausea. Therefore, there is a drive for health care professionals to seek for other cost-effective, practical and non-harmful treatment that is with few or even no side effects.

Some studies in previous decade suggests a number of alternative approaches to prevent and relief PONV, such as acupressure, acupuncture, oral ginger, music therapy, increase administration of oxygen therapy and transcutaneous electrical stimulation (Anderson, 2004; Mamaril, 2006). However, researches on testing the effectiveness of these treatments are still minimal and no concrete evidence is available to prove that these therapies are effective.

Aromatherapy is proposed for relieving PONV. Aromatherapy is a treatment that applies essential oil of plant material or other substances to body in order to alleviate physical, mental or psychological symptoms (Springhouse, 2005). It can be used in the form of inhalation, topical application or diffusion. Among all of the aromas, isopropyl alcohol and peppermint are much more effective due to their analgesic and antiemetic effects (Springhouse, 2005). Aromatherapy has been traditionally used for relaxation by individuals. Indeed, aromatherapy was applied in the curriculum of nursing since the time of Florence Nightingale (Smith, 2010). Nightingale believed that healing was related to an environment that had “ventilation and cleanliness, rest and relaxation, and sensory variety”.
Apart from creating a clean and comfortable environment for soldiers to stay during the Crimean War, she applied lavender oil to injured soldiers for relaxation and tried to reduce the anxiety feeling of them. She provided the foundation of Holistic Care which is the ultimate responsibility and goal of nurses.

In recent decades, a number of studies showed that aromatherapy has its clinical values and is practical. Aromatherapy has been tested to be effective in relieving motion related nausea in children after operation (Wang et al, 1999). In a meta-analysis in 2004, Fellowes suggests that aromatherapy, accompanying with massage, also shows its effect of reducing level of pain, short-term nausea and anxiety level of cancer patients. Using peppermint aroma can help to relief morning sickness and dyspepsia (Anderson, 2004). Aromatherapy has applied in these areas. However, aromatherapy rarely uses for PONV of adults in most surgical ward in Hong Kong. This may be due to lack of a concrete guideline or protocol for this practice. There is still no standardized dosage and duration of applying aromatherapy. Hence, the frontline nurses do not apply aromatherapy in postoperative care practice. Therefore, in order to establish the confidence of nurses towards aromatherapy, a standardized, evidence-based protocol is needed to establish.

The advantages and clinical values of aromatherapy on relieving PONV will be discussed. By reviewing high quality studies, the benefits and disadvantages of aromatherapy in relieving and preventing PONV will be investigated.
1.3 **Significance and Objectives of the Study**

The objectives of this study are:

- To perform a review over current existing literature on the effect of aromatherapy to PONV.
- To make a summarization of the application of aromatherapy

By achieving the above objectives, an evidence-based protocol of using aromatherapy in relieving and preventing PONV can be developed and implemented. With an existing protocol, frontline staffs have more confidence in carrying out the treatment in an appropriate and proper technique. Patients can receive a better management.

1.3.1 **Research Question**

The clinical question of this proposed study is:

How does aromatherapy relief postoperative nausea and vomiting in adult surgical patients?

PICO is used as follow:

- Population - Adult surgical patients
- Intervention - Aromatherapy
- Comparison - Usual care
- Outcome
  - Primary Outcome
- Incidence of nausea and vomiting
- Severity of nausea
- Use of antiemetic medication

ii. Secondary Outcome
- Patient & Staff satisfaction level
- Nursing compliance
Chapter 2

Critical Appraisal

2.1 Searching Strategies

2.1.1 Identification of Studies

Six databases, that are found in the electronic resources in the website of the University of Hong Kong Libraries, are used in order to identify the appropriate journal articles, including Pubmed, Medline(1950-Aug 2013), Cochrane Library, CINAHL (1984-Aug 2013), British Nursing Index and Achieve (1985-Aug 2013) and EMBASE (1947-Aug 2013).

Keywords used to search for the paper are as followed, 'aromatherapy', 'peppermint', 'isopropyl alcohol', 'nausea', 'vomiting', 'surgery', 'surgical' and 'postoperative'. The keywords are combined by 'and' and 'or'.

Limitations are set in order to screen for the most appropriate papers. However, only Pubmed and Medline (1950-Aug 2013) has the icon of limiting to randomized controlled trial. Other databases can limit to clinical and researches. Therefore, manual screening for randomized controlled trial is needed. In addition, the reference lists of the selected paper are screened in case there are some useful articles. Details of the searching strategies and results are mentioned in appendix 1.
2.1.2 Inclusion Criteria

Journal articles that are related to using aromatherapy in relieving and preventing PONV are included. The studies can related to comparing aromatherapy with the use of antiemetic drugs for relieving PONV. Also, the target patients should be over age of 18, regardless of gender, any operation type. Outcomes measure should be related to nausea and vomiting. Studies should be randomized controlled trial and should be written in English. The studies should be limited from 2000 to 8/2013 which is in the 20th century.

2.1.3 Exclusion Criteria

Articles written in review, editorial and dissertations are excluded. The target group should not be paediatrics patients. Also, journals that are related to the use of aromatherapy but for the purpose other than relieving and preventing PONV should be excluded. Also, studies written other than English are excluded.

2.1.4 Data Extraction

After searching, limiting to the required criteria and removing the duplicated papers, seven articles were selected. A table of evidence is conducted with the following data provided, including bibliographic citation, amount of study participants, characteristics of participants, intervention, comparison, length of follow up outcome measures and effect size. For details can be referred to appendix II.
2.2 Appraisal Strategies

The Scottish Intercollegiate Guidelines Network (SIGN) was used to assess the quality of the studies. As the chosen studies are all randomized controlled trials, the methodology checklist 2: randomized control trial is used. As all the studies are well conducted randomized controlled trials with little bias, they scored 1+ to 1++. The critical appraisal table of all papers can referred to appendix III.

2.3 Summary and Synthesis of Results

2.3.1 Patient Characteristics

Among the seven studies, there were totally 702 surgical patients participated in the studies, in which 647 of them were females. As mentioned in all of the inclusion criteria of the seven studies, the recruited patients were all adults with no cognitive and olfactory problems or defects. They had no allergy towards the aromas like peppermint and isopropyl alcohol. Though some studies mentioned that they recruited nauseated patients regardless of types of operation, majority of the sample underwent gynaecological surgery (Anderson, 2004; Radford, 2011; Hunt, 2013). In total, 459 participants developed PONV after gynaecological surgery. Among all studies, all of them had evaluated the demographic data and characteristics of the participants. They all suggested that there were no majority or significant differences among the study groups in respective studies.
2.3.2 Intervention used

All of the studies used aromatherapy as the intervention. Four of the studies compared the chosen aromas (isopropyl alcohol and peppermint) with most commonly used dosage of anti-emetic medication, including Ondanserton and Promathezine (Winston, 2003; Cotton, 2005; Pellegrini, 2009; Lane, 2012). The other three studies compared groups that were given the aromas (isopropyl alcohol, peppermint and blend of different aromas) with placebo (Anderson, 2004; Cotton, 2007; Hunt, 2013). The placebo in these studies was normal saline with no smell.

The preparation of the aromas could be classified into 2 formats. Six of the studies used a half-folded 2-inch by 2-inch gauze pad that was soaked with different scents for the intervention (Winston, 2003; Anderson, 2004; Cotton, 2005; Pellegrini, 2009; Hunt, 2013). On the other hand, only Lane 2012 suggested putting a cotton wool ball that soaked with the studied aromas and placed it in a ziplock bag. Participants could open to ziplock bag for inhalation when administration of the aromatherapy. The methods of administration of the aromatherapy in seven studies were almost the same among all researches. They suggested letting the participants to hold the gauze or ziplock bag that filled with aromas under nostrils and deeply inhaled the scents via nose and exhaled via mouth 3 times slowly. Anderson 2004, Cotton 2007 and Pellegrini 2009 mentioned each incidence of nausea could administer up to 3 times of treatment.
All the studies did a pre-assessment of the degree of nausea by using verbal descriptive scale, verbal numeric scale or visual analog scale before the administration of the therapy. After performing the therapy, post assessment was performed. Other secondary outcome data were also collected in studies.

2.3.3 Length of Follow Up

As the episodes of PONV usually reached the peak in the first 24 hours after operation, all studies started once the participants arrived the recovery unit, surgical ward or post-anaesthesia care ward. One study even measured the episodes of PONV after patient discharged home by phone interview (Cotton, 2007). However, the length of follow up of the intervention after each episode of PONV varied, ranged from 2 minutes to 60 minutes after interventions. Though different studies had their own length of follow up, all studies took 2 minutes and 5 minutes for post-intervention assessment. Winston (2003) further even measures the efficacy of aromatherapy up to 30 minutes after administering aromatherapy. However, the effect of aromatherapy is less prominent.

2.3.4 Outcome Measure

All studies had pre-intervention assessment and post-intervention assessment for measuring the perception of participants towards their level and severity of nausea and vomiting. Among the seven studies, six of them used Verbal Numeric Rating Scale to assess the primary outcome that was the severity of nausea (Cotton, 2007; Pellegrini, 2009;
Radford, 2011). This scale range from 0-10, with 0 = no nausea and 10 = worst imaginable vomiting. Two of them used the self-modified 6-point verbal descriptive scale to assess the degree of nausea. (Lane, 2012; Hunt, 2013) The scale ranges from 0 - 6. (0 = no nausea, 1 = slightly nauseated, 2 = moderately nauseated, 3 = extremely nauseated, 4 = so nauseated, 5 = about to vomit, 6= vomited) Anderson 2004 used to 100mm visual analog scale with 0mm = no nausea and 100mm = extreme nausea. Indeed, all these three scales share similar concepts in assessing the degree of nausea. Three of the paper directly measured the percentage of sample reported improvement in post-intervention PONV score (Anderson, 2004; Lane, 2012; Hunt, 2013). The other four studies assessed the time required to 50\% decrease of post-intervention PONV score (Winston, 2003; Cotton, 2005; Pellegrini, 2009; Radford, 2011). Other outcome data collected including the incidence of vomiting, the amount of sample requesting rescue antiemetic medication, patient's satisfaction and adverse reaction of subjects.

2.4 Synthesis of Data

Key Components of Effective Intervention

All participants in the seven studies obtained the level of nausea before administering any intervention. It shows that the baseline degree of nausea level is important in order to show the changes of administering the therapy. A measuring scale is needed.

The method of administration of aromatherapy was almost the same in all studies. It is
recommended that to put the scent-soaked gauze or ziplock bag that filled with aromas under nostrils. The action of deeply inhale the scents via nose and exhaled via mouth slowly for 3 times is important.

2.4.1 The Population

The sample in the seven studies had various types of surgery and undergone different kinds of anaesthesia. All studies analysed the demographic data of all the participants and declared that these data had no influence on the result of the interventions. In addition, those who had olfactory and cognitive problem were ruled out from the studies as mentioned in the part of inclusion and exclusion criteria in the papers. Therefore, it is suggested that assessment should be done about the sense of smelling of participants and make sure that they can follow instructions. Moreover, those who had allergy to the specific aromas that used in the aromatherapy were excluded. Hence, it is recommended that assessment of allergy status is needed. Also, all seven studies suggested that female patients were more prone to PONV and more willing to use aromatherapy.

2.4.2 The Outcome Measures

The severity of nausea is the primary outcome of the intervention. Verbal Numeric Scale is actually recommended for assessing the nausea level. As commented by Hunt 2012 that this instrument has sufficient validity to ensure the consistency of results. Also, Verbal Numeric Scale is easily understood by patients. Although all three scales used in the
seven researches has rapid completion and good construct validity, visual analog scale has the weakness of noncompliant of some proportions of respondents, such as elderly, and is conceptually complex.

2.4.3 The Effects of Intervention

All studies show that the use of aromatherapy is effective in relieving and preventing PONV. The use of peppermint and isopropyl alcohol especially has their effects in several studies. Therefore, peppermint and isopropyl alcohol are recommended to be the first choices for aromatherapy. Although some study showed that there were some effect of the placebo, the p-value of the result >0.05 and some even reached 1.00 (Lane, 2012; Hunt, 2013). This means that the result has a low level of significance.

Also, as noted in the researches, aromatherapy is much fast-acting than anti-emetic medication. They start to show their effect on PONV at around 6.3-15 minutes which is much faster than the emetic medication (Winston, 2003; Cotton, 2007; Pellegrini, 2009). The level of significance of these finding are high as p-value is less than 0.05. However, it is noted that the effects of aromatherapy in long term is less effective than anti-emetic medication in the studies of Winston 2003 and Cotton 2007. With the above findings, it is suggested that aromatherapy can be used for as the first line medication for short-term PONV as it has a fast acting effect.
The measurement of the secondary outcome including incidence of vomiting, patient's satisfaction and the amount of sample requesting rescue antiemetic medication can shows the effective of aromatherapy. Reduction in the use of antiemetic medication indicates that aromatherapy can be used as a substitute or adjuvant therapy for relieving and preventing PONV. Moreover, patient's satisfaction score illustrates the acceptance of aromatherapy.

Moreover, among all studies, none of the studies mentioned that aromatherapy had any harmful effects to patient and staff. Lane 2002 even showed that aromatherapy was not harmful to mother and babies. This can prove that aromatherapy is a safe treatment.

2.4.4 Summary of Synthesis

By reviewing the selected studies, aromatherapy is proved to be an effective and safe measure in relieving and preventing PONV. In conclusion, it is recommended that assessment is necessary including obtaining the degree of nausea before any intervention and participant's ability to engage in the therapy. Also, peppermint and isopropyl alcohol are recommended. It is also suggested that to review patient's 2 minutes and 5 minutes after administering the aromatherapy.

2.5 Methodological Quality of the Studies

2.5.1 Studies' Characteristics

All the studies are randomized controlled trials which have a higher level of
significance. The author clearly stated that they have randomization, control and intervention.

2.5.2 Allocation of Participants

Although all articles stated that they had randomization done, only five of them clearly mentioned the allocation method of sample to control, intervention or comparison groups. Both Lane 2012 and Winston 2003 did not state the allocation method but repeated statements that they had randomization done. Four of the articles used computerized randomization (Cotton, 2007; Pellegrini, 2009; Radford, 2011; Hunt, 2013). Anderson 2004 mentioned that he used a number generating machine to allocate participants. However, Anderson (2004) and Cotton (2007) had allocation concealment in their studies. Anderson claimed “the data were analysed by the investigator unaware of treatment allocation” while Cotton claimed that he did not involve in data collection but only processing of data.

2.5.3 Binding

Among all papers, only the one done by Anderson in 2004 had blinding the assessors. He clearly stated that when offering the treatment to participants, the staffs were given "lightly scented" surgical masks in order to blind assessors. Two of the studies clearly stated that no blinding was performed in their studies (Cotton, 2007; Pellegrini, 2009). The other four articles did not provide any details or mentioned whether they had any blinding to assessors or participants. Therefore, there are some bias existed.
2.5.4 Conclusion accounted from all Participants

As all of the studies are short term studies, the dropout rate is very low. All the patients who entered the study could finish the study. This was probably because even the intervention (aromatherapy) had no effect on them. They were allowed to have rescue treatment (antiemetic medication).

2.5.5 Incomplete Outcome Data

There was no incomplete outcome and missing data as all the subjects entered the conclusion of the studies. All the data were gathered during the short-term intervention period by the assessors who were also the ones administering the interventions. All the studies suggested measuring the effect of the intervention 5 minutes after administering the intervention.

2.5.6 Minimize the Play of Chance

The sample size among the seven studies varies, ranging from 33 to 301. Among all the researches, Winston 2003, Pellegrini 2009 and Hunt 2013 did the power analysis and were able to meet the required amount of sample size. However, two studies declared that they failed to meet the required amount of sample size (Radford, 2011; Lane, 2012). In Radford's study, the required amount of patient is 111 but the study only recruited 76 participants. Lane 2012 commented that due to the difficulty of recruiting nauseated postoperative patients, the study failed to meet the target amount of participants with 28
participants less in each groups. Other two researches did not mention the calculation of power analysis in their studies and we have no idea on whether the samples were enough.

2.5.7 Precision of the Results of Study

The measured outcome fits well with the research questions, focusing on the effect of aromatherapy on PONV when comparing with placebo or other pharmacological interventions. The gathered data of the results in the seven studies were expressed in terms of mean, p-values and standard deviation.

The primary outcome is the severity of nausea level after administering any treatment. It is measured by the percentage of patients reported improvement in PONV score. All studies with result shows that aromas such as isopropyl alcohol, ginger and peppermint have their effect on relieving and preventing PONV. The level of significance shows by p-value ranged from p<0.001 to p=0.58. Majority of the results, especially the finding of using peppermint and isopropyl alcohol, have the p-value of <0.05 which represent that the evidence is reliable and precise.

The time of the action of aromatherapy is found faster than the action of antiemetic medication (Winston, 2003; Cotton, 2007; Pellegrini, 2009). According to the studies, the application of isopropyl alcohol took 6.3 - 15 minutes to have its effect in relieving PONV. On the other hand, anti-emetic medication required 20 - 34 minutes to have action. The
p-value of these findings in three studies were all <0.05 which means that the results are significant.

In some researches, it showed that the placebo group that used Normal Saline gauze had the effect in relieving PONV as isopropyl alcohol, though the later one had greater effect (Anderson, 2004; Radford, 2011). However, the p-value of this result was > 0.05. This may be due to the small sample size of researches. Anderson 2004 suggested that the effectiveness of the intervention might not be related to the placebo but the act of consciously controlling one's breathing pattern.

The secondary finding also includes the measurement of overall satisfaction score of the intervention. Both Anderson 2004 and Radford 2011 found that participants were more satisfied with the use of aromatherapy to treat PONV than anti-emetic medication. The p-value in Anderson's study was 0.0006 while the one in Radford was 0.809. This finding is probably related to the small sample size of Radford's study which could not meet the target amount.

2.5.8 Applicability of Findings

As limited by the inclusion and exclusion criteria, the characteristics of the study subjects in all the seven studies were adult patients who undergone surgical procedures and encountered the problem of PONV. Moreover, all the studies focused on the application of
aromatherapy on relieving PONV which was concerned and the main focus of this paper. Therefore, there was no doubt that the findings of these seven papers could be applied.

2.5.9 Level of Evidence

Randomized controlled trials were always considered to have the highest level of evidence among various types of research studies. As all the chosen articles are randomized controlled trials, they were all rated 1 for the level of significance with reference to the Scottish Intercollegiate Guidelines Network 2012 (SIGN). Applying the critical appraisal checklist for randomized controlled trial, the 7 articles were further rated. Four of the articles rated 1++ (Winston, 2003, Anderson, 2004, Cotton, 2007, Hunt, 2013). The other three articles rated 1+ (Radford, 2011, Pellegrini, 2009, Lane, 2012).
Chapter 3

Translation and Application

Postoperative nausea and vomiting is doubtlessly an important problem that encounters by patients who undergo surgeries. However, there is no standard guideline or protocol.

From the selected studies, it is shown that aromatherapy has an effective effect in relieving postoperative nausea and vomiting (PONV) among surgical patients in surgical units. After performing the critical appraisal of the articles in the previous chapter, the implementation potential of aromatherapy on surgical patients in local setting will be discussed in the aspect of the transferability of findings, feasibility, potential risks and benefits, and cost-benefit ratio.

3.1 Implementation Potential

3.1.1 Target setting

The application of aromatherapy was proposed in seven adult surgical wards in an acute hospital managed by the Hospital Authority in Hong Kong.

3.1.2 Target Client

The target clients of the proposed innovation are surgical patients with age 18 or above, conscious and have surgeries that need general anaesthesia. They do not have any olfactory
problem and no allergy to aromas such as peppermint and isopropyl alcohol etc.

3.1.3 Transferability of the Findings

3.1.3.1 Target setting and client

The settings in the selected studies are similar to the target setting proposed in the program. All the selected studies were conducted in ward settings that care postoperative cases. Aromatherapy has been found effective in relieving PONV in the above studies.

The chosen group is actually similar to the participants in the selected studies. The studies were carried out mainly in US and Australia which were developed countries. Although different countries may have different nursing practices, the target group of the studies, the studies method and measuring method used in the reviewed studies are similar. Moreover, the economic backgrounds of the selected countries are similar to Hong Kong. Therefore, this program is highly transferable.

The target clients may have various surgical problems in the proposed settings. However, all reviewed studies find that different types of surgeries had no significant effect on the effectiveness of aromatherapy in relieving postoperative nausea and vomiting. Therefore, the proposed target group is similar to the reviewed studies.
3.1.3.2 Philosophy of care

In the selected studies, the philosophy of care of aromatherapy was holistic care. These articles mentioned that postoperative nausea and vomiting creates a lot of physical and psychological distress to patients that would develop postoperative complications and hinder patient's recovery. Although health care professionals strive to use medication to relieve this problem, complications of the medications still arise which cause other problems and distress to patients. The selected articles, therefore, pointed out why it was essential to develop other treatment in order to improve the current practice.

The proposed settings of this innovation are surgical wards of an acute public hospital that is managed by the Hospital Authority. The corporate vision and vision of the Hospital Authority are 'Helping People Stay Healthy' and 'Healthy People, Happy Staff, and Trusted by the Community' respectively. In other words, health care professionals should strive to provide high quality services to help patients to restore physical and psychological health. This aims at preventing them from readmission and enabling our clients to enjoy the best-possible health and quality of life outside hospitals. The philosophy of care of the innovation is actually the same as the one reviewed in the studies that focused on holistic care. Apart from relieving the symptoms and physical discomfort of postoperative nausea and vomiting, aromatherapy can also minimize emotional distress related to complications caused by postoperative nausea and vomiting. This intervention can promote a high quality, patient-centered nursing care.
3.1.3.3 Time frame

With reference to all reviewed studies, aromatherapy is agreed to carry out with deep breathing of aroma three times each round of treatment. The maximum round is three in case the first two rounds have no effects on PONV. In the proposed innovation, the practice will be the same as this practice is found to be effective. Aromatherapy will be started once patient complains of PONV in the surgical units.

3.2 Feasibility

3.2.1 Freedom in the implementation

Researches review that aromatherapy can relief PONV among patients who undergo surgical procedures. Therefore, frontline staffs are encouraged to implement this program to those surgical patients who develop PONV and have no olfactory problems and allergy to the aromas. Patients are allowed to withdraw the program when they think the program is of little use. Yet, frontline nurses are suggested to give advices and comments in order to refine the program.

3.2.2 Interference of current staff function

The practice currently used of managing patient with PONV is to administer antiemetic medication such as Odanserton and Promathezine etc. Some of the antiemetic medication are prescribed as regular medication and are given round the clock. Otherwise, nurses can administer the medication according to patient's condition when it is prescribed
in prn format (i.e. whenever necessary). The administration of these medications requires
the prescription from doctors and porters to get the medication from pharmacy. It usually
takes hours to get the medication. Patients need to experience nausea and vomiting for
hours while waiting for the medication.

In the proposed program, aromatherapy will be regarded as the first line treatment of
PONV of surgical patients. Nurses can apply aromatherapy once patients feel nauseous
before administering antiemetic medication. This reduces the consumption of antiemetic
medications. Therefore, aromatherapy can be considered as the first line and alternative
treatment of PONV. Moreover, the reviewed studies suggested that there was a place for
aromatherapy to be an adjuvant therapy of managing PONV in the context of current
postoperative practice. This is mainly because aromatherapy is found to be more effective
than placebo in relieving PONV. Also, it is a simple and cost-effective treatment.

3.2.3 Administrative support

Before implementing the program, the program will be first approved by the
department operation manager and ward managers of the surgical departments. They will
provide administrative support, such as encouraging staff to update the clinical nursing
practice by reviewing protocols and guidelines for the department. This allows the staff to
understand the importance of evidence-based practice.
3.2.4 Potential conflict or friction

The main potential friction against the implementation of this program is the reluctant of the frontline nurses to have changes from current practice to new practice. It is probably because the old practice has been used for years and nurses are used to and have confidence in the old practice. This can be solved by the following strategies. Firstly, briefing sessions and training can be held in which the advantages of aromatherapy over antiemetic medication can be emphasised. Guideline and protocols are issued to each ward. This allows frontline staff to refer when there is any misunderstanding. Besides, nurses are encouraged to seek help and raise difficulties when implementing the program. All these help to increase the level of confidence and sense of autonomy of frontline staff when implementing the program. Therefore, with the concerted efforts of the whole unit, there is no strong potential or friction against the implementation of aromatherapy program.

3.2.5 Staff training

Frontline nursing staffs in the surgical units of the acute hospital are trained to perform aromatherapy. A 1-hour briefing session about aromatherapy will be organized by a well-trained nurse. The session will introduce the background, needs, clinical guideline to frontline nurses. No other special training is needed on caring postoperative patients as nurses in surgical units receive related training and knowledge during their nursing school or University training.
3.2.6 Equipment and facilities

The facilities required include assessment forms, aromas (isopropyl alcohol and peppermint), gauze and bag. Also, leaflets of aromatherapy will be given to nurses. Lectures theatres are needed for providing briefing session and training.

3.2.7 Potential risk and benefits

Regarding the risk of aromatherapy, all studies pointed out that no adverse reaction or side effects noted of patients who had aromatherapy. One study even mentioned that aromatherapy had no side effects to pregnant staff. Instead, aromatherapy can relieve postoperative nauseous and reduce incidence of vomiting. Moreover, aromatherapy can act as a cheaper substitute for treating PONV when comparing with antiemetic medication. The cost and resources of treating complications caused by PONV can be less. Nurses can pay more concern on patient's other physical and psychological needs which promotes patients to recover. Better recovery of surgical patients can shortens the length of stay of patients in hospital which actually reduces the medical expenses. The level of satisfaction of patients towards hospital also rises as the quality of nursing services improve.

3.3 Cost-benefit ratio of the innovation

The cost-benefit ratio of implementing the innovation will be analysed by balancing the benefits and risks of the innovation towards patients staff and organization.
3.3.1 Potential risks and benefits towards patients

According to the reviewed studies, it is shown that aromatherapy has fast-acting effect to relief PONV which can reduce the physical and psychological distress caused by PONV. Moreover, no data of adverse effect of aromatherapy noted among the studied subjects. Researches proposed that the inhalation of aromatherapy should be 3 inhalations at 3 times and under the supervision of nurses. One of the reviewed articles even found that aromatherapy did not have adverse effects on breast-feeding mother. Dr. Thomas Hale (2006), who is the author of Medications and Mothers Milk, found that adults can metabolize 1 ounce of alcohol in 3 hours.

3.3.2 Potential risks and benefits towards staff

The cost of the aromatherapy program mainly attribute in the aspect of manpower, staffs training and material for aromatherapy. However, the application of aromatherapy does not require extra manpower as the staff can offer aromatherapy to patients during their duty. Therefore, the manpower cost will not be elevated even aromatherapy is in practice.

The tutorial and briefing sessions will be held in the lecture theatres in the hospital. These lecture theatres are free of charge once getting the hospital permission. Also, these lecture theatres have adequate equipment for presentation, including computers, screen, projector and seats. The assessment forms, stationeries and photocopying services are provided by the surgical department.
3.3.3 Potential risks and benefits towards hospital

Indeed, money can be saved for hospital from the aspects of reducing the cost of medication, nursing care and administration. The aromas and bags for holding the aromas can be purchased in the market. According to current studies available, these equipment cost around dollars. Aromatherapy can be used as a substitution of antiemetic medication can reduce the huge cost of medication. Also, the length of stay in the hospital can be shortened and medical expenses can reduced as less complications caused by PONV. In long term, it reduces the medical burden on the hospital. Moreover, better hospital stay experience increases patient satisfaction and can promote the image of hospital.
Chapter 4
Evidence-based guideline

4.1 Evidence-based guideline

According to the data retrieved from the selected studies, an evidence-based guideline of using aromatherapy in relieving postoperative nausea and vomiting is developed. Nursing practice of using aromatherapy can be standardized and maintain a high standard of nursing care.

The title of the evidence-based clinical guideline is

'Evidence-based Guideline of Using Aromatherapy in Relieving Postoperative Nausea and Vomiting.'

4.2 Purpose of protocol

The objectives of this clinical guideline are to:

• provide an evidence-based guideline of best practice on aromatherapy in the relieving postoperative nausea and vomiting for surgical patients.

• maintain a standardized, consistent and evidence-based nursing care.

• increase patient satisfaction towards nursing services
4.3 Target Client of protocol

The guideline will be used by frontline nurses in surgical units of an acute hospital.
The target clients of group of the guidelines include all postoperative patients who age over 18, do not have any olfactory problem and no allergy to the aromas (such as peppermint and isopropyl alcohol).

4.4 Implementation of program

The program is implemented to individual patient by a well-trained nurse. The program can be stopped once the patient refuses to continue the program.

4.5 Clinical Guideline

The Grade of recommendations and the level of evidence are suggested by the Scottish Intercollegiate Guidelines Network (SIGN) and rated with scores from 1++ to 4 and grades of recommendations with grading A, B, C, and D respectively.

4.6 Practice Recommendations

Recommendation 1.0 (A)

Patients who are eligible to receive aromatherapy should be assessed.

Evidence:

- Eligible patients should be recruited into the aromatherapy program after the assessment of allergy history, conscious level and olfactory ability. All studies
suggest the same inclusion criteria of patients receiving aromatherapy (Winston et al., 2003; Anderson & Gross, 2004; Cotton et al., 2007; Pellegrini et al., 2009; Radford et al., 2011; Lane, 2012; Hunt et al., 2013). (1++)

Recommendation 2.0 (A)

Demographic information of eligible patients should be obtained.

Evidence:

- Patients were asked to provide information about their gender, age, race and history of morning sickness. Studies show female are more prone to PONV and have higher therapeutic effects on aromatherapy (Winston et al., 2003; Anderson & Gross, 2004; Cotton et al., 2007; Pellegrini et al., 2009; Radford et al., 2011; Lane, 2012; Hunt et al., 2013). (1++)

Recommendation 3.0 (A)

Inform consent of patients for performing aromatherapy should be obtained.

Evidence:

- Informed consent is obtained before administering the treatment. Patients are not forced to participate the treatment (Winston et al., 2003; Anderson & Gross, 2004; Cotton et al., 2007; Pellegrini et al., 2009; Radford et al., 2011; Lane, 2012; Hunt et al., 2013). (1++)
Recommendation 4.0 (A)

_Aromatherapy should be started once the patient arrives the surgical wards and complains of nausea._

Evidence:

- The settings of all studies are postoperative wards and units and aromatherapy is found to have effect on managing PONV patients (Winston et al., 2003; Anderson & Gross, 2004; Cotton et al., 2007; Pellegrini et al., 2009; Radford et al., 2011; Lane, 2012; Hunt et al., 2013). (1++)

- Aromatherapy can be used when patients complain PONV during their stays in the surgical wards. (1++)

Recommendation 5.0 (A)

_Assess patient's nausea level whenever the patient first feels nauseated._

Evidence:

- Pre-treatment nausea level provides a baseline of managing the effect of aromatherapy on individual patient (Cotton et al., 2007; Radford et al., 2011; Lane, 2012; Hunt et al., 2013). (1++)

Recommendation 6.0 (A)

_Nausea level should be assessed by 0 - 10 verbal numeric scale and charted on designated assessment form._
Evidence:

- Severity of nausea can be assessed by verbal numeric scale. This scale ranges from 0-10, with 0 = no nausea and 10 = worst imaginable vomiting (Cotton et al., 2007; Pellegrini et al., 2009; Radford et al., 2011). (1++)

- A study shows that 86% agreement between a 10-point numeric scale and a 4-point verbal descriptive scale. The instrument used has sufficient validity to measure the outcome (Anderson & Gross, 2004). (1+)

Recommendation 7.0 (A)

_**Nurses should shake the aroma liquid bottle at each use before getting the liquid inside.**_

Evidence:

- Shaking the aroma liquid bottle at each use can prevent the layering of the oil liquid and thoroughly mixed the substance inside (Hunt et al., 2013). (1++)

Recommendation 8.0 (A)

_**Nurses should secure the lid of the aroma liquid bottle after each use.**_

Evidence:

- Chances of oxidation and evaporation can be reduced by securing the lid of the bottle (Hunt et al., 2013). (1++)
Recommendation 9.0 (A)

Nurses should prepare a 2inch by 2-inch impermeable, backed gauze pad that holds enough amount of 70% isopropyl alcohol or peppermint for the administration of aromatherapy.

Evidence:

- 70% isopropyl alcohol and peppermint have been mostly used in studies and found to be effective in the reviewed 7studies (Winston et al., 2003; Anderson & Gross, 2004; Cotton et al., 2007; Pellegrini et al., 2009; Radford et al., 2011; Lane, 2012; Hunt et al., 2013). (1++)

- A 2inch by 2-inch impermeable, backed gauze pad has been used to hold the scent liquid as it is easily assessable in ward settings (Winston et al., 2003; Anderson & Gross, 2004; Cotton et al., 2007; Pellegrini et al., 2009; Radford et al., 2011; Hunt et al., 2013). (1++)

- The gauze should hold enough aroma liquid. The suggested amount is of 70% isopropyl alcohol is 1mL. The amount of peppermint oil is 0.2ml and mix with 2ml Normal Saline (Winston et al., 2003; Anderson & Gross, 2004). (1++)

Recommendation 10.0 (A)

Patients are instructed to hold the gauze pad 1/2 inches under his/her nose when administering the treatment.

Evidence:
- Place the scent-soaked gauze 1/2 inches under nostril when applying aromatherapy (Winston et al., 2003; Cotton et al., 2007; Pellegrini et al., 2009; Radford et al., 2011). (1++)

Recommendation 11.0 (A)

*Patients are instructed to inhale the scent through nose and exhale through mouth 3 times slowly.*

Evidence:

- This deeply breathing method is proposed in all the reviewed studies and found to be effective in helping the administration of aromatherapy (Winston et al., 2003; Anderson & Gross, 2004; Cotton et al., 2007; Pellegrini et al., 2009; Radford et al., 2011; Lane, 2012; Hunt et al., 2013). (1++)

- 

Recommendation 12.0 (A)

*Nurses should assess patients 2 minutes and 5 minutes after each round of the administration of aromatherapy.*

Evidence:

- Evidence shows that aromatherapy is a fast acting treatment and the optimal time to see the effect is 2 minutes to 5 minutes later (Winston et al., 2003; Anderson & Gross, 2004; Cotton et al., 2007; Pellegrini et al., 2009; Radford et al., 2011; Lane, 2012; Hunt et al., 2013). (1++)
Recommendation 13.0 (A)

Antiemetic medication should be provided in case patient requests or nausea fails to resolve after 3 rounds of treatment.

Evidence:

- Although no evidence shows that aromatherapy have any risks to patients, researches propose to stop the aromatherapy if nausea fails to resolve after 3 round and administer antiemetic medication (Anderson & Gross, 2004; Cotton et al., 2007; Pellegrini et al., 2009). (1++)

- Patients are allowed to withdraw from treatment and ask for antiemetic medication in case they feel any 'unpleasant' against the aroma (Winston et al., 2003; Anderson & Gross, 2004; Cotton et al., 2007; Pellegrini et al., 2009; Radförd et al., 2011; Lane, 2012; Hunt et al., 2013). (1++)
Chapter 5

Implementation Plan

In the previous chapter, an evidence-based clinical guideline of using aromatherapy for surgical patients who undergo postoperative nausea and vomiting is developed. An implementation plan and evaluation plan will be discussed in the following. The implementation plan consists of a communication plan and a pilot study to test the guideline.

5.1 Communication Plan

The main goal of developing a communication plan is to obtain a joint understanding and cooperation of the parties who have a stake in the new intervention.

5.1.1 Identification of stakeholders

Stakeholders are persons or a group of people who have a stake in the intervention. In this proposal of aromatherapy on postoperative nausea and vomiting patients in surgical wards, the stakeholders involved are the Department Operating Manger, Ward Managers and Chief of this service. The chief of this service is Advanced Practice Nurse who attended training on aromatherapy. The importance of these stakeholders and details of the communication and implementation strategies will be discussed in the following.
5.1.2 Communication Process and Implementation Strategies

5.1.2.1 Advanced Practice Nurse in Surgical Units

The researcher will first contact the Advanced Practice Nurse in the surgical units who is interested in the proposed programme. The Advanced Practice Nurse presides over both the administrative and clinical aspects of the programme. Also, he/she is responsible for providing expert opinions and solving any problems. He/She will develop a new, feasible evidence-based clinical guideline into surgical ward settings and to practice the innovation in clinical setting. In order to facilitate the implementation of the innovation, a formal meeting will be held with the advanced practice nurse. In the meeting, it will focus on introducing the guideline, explaining the significance of the proposed innovation of improving postoperative nausea and vomiting. The details of the guideline and the implementation plan will be clarified. Moreover, barriers identified and some possible solutions will be discussed in the meeting. Furthermore, the feasibility and cost-effectiveness of the programme will be highlighted in order to gain the support from the advanced practice nurse to the innovation.

5.1.2.2 Department Operating Manager and Ward Manager of Surgical Units

Then, the researcher will contact the management level, including the Department Operating Manager and Ward Managers of surgical wards. The presence of these administrative level officers is important as they have power to approve the innovation and direct the staff to implement the programme. A well-prepared written proposal will be
prepared and a 30-minutes powerpoint presentation will be delivered during the weekly
department meeting. The content of the proposal and presentation include a detailed
explanation about the proposed innovation, consisting the objectives, evidence-based
guideline of aromatherapy, the implementation potential analysis, cost-benefit ratio, a time
schedule of implementing the innovation and the budget plan. The advices and feedbacks
from Department Operating Manager and Ward Managers facilitate the refinement and
modification of evidence-based guideline and implementation plan.

5.1.2.3 Continuous Quality Improvement Committee for management of
postoperative nausea and vomiting

After getting the permission for implementing the innovation by the Department
Operating Manager and Ward Managers of surgical units, the Continuous Quality
Improvement Committee for management of postoperative nausea and vomiting will be
formed. The aim of this committee is to facilitate planning and launching of aromatherapy
on postoperative nausea and vomiting patient which ensure a high quality of nursing care
service is delivered to patients. A Ward Manager and two Advanced Practice Nurses will
be recruited to the Committee. In order to ensure the quality of the innovation, the
Committee members will organize training and assessment for the frontline staff to
implement the innovation.
5.1.2.4 Nurses in Surgical Units

The next step is to introduce the innovation to the frontline staff. They will be informed for the planning of the innovation as they are the main users for the innovation. The innovation will be introduced to the frontline nurses by internal electronic mail and training sessions. A one-hour training session about aromatherapy will be organized, introducing the background, needs, clinical guideline to frontline nurses. Pamphlets will be given to those who attend the training. Nurses need to re-demonstrate skills at the end of the training.

In order to guide the frontline nurse to have a proper and high standard nursing care, the protocol of aromatherapy, consisting the procedure manual and some problem-shotings, is given to each surgical ward as reference. Frontline nurses are encouraged to raise questions in case they have any misunderstandings or questions towards the innovation.

Frequent assessment and auditing is essential in order to improve the practice. It helps to check the compliance of the innovation that enhances the sustainability of the practice of the new innovation. Also, feedbacks will be collected from the nursing staff. The protocol will be reviewed regarding the feedbacks during the weekly department meeting from time to time.
5.1.2.5 Resident Doctors

A newsletter will be sent to resident doctors introducing the new innovation with evidence and literature supported. Details of evidence-based guideline and the benefits for the innovation will be mentioned in order to convince them and gain their support of aromatherapy on surgical patients who undergo postoperative nausea and vomiting. The nurses from the Committee will communicate with the resident doctors in case they have any opinions or concerns.

5.2 Pilot Testing Plan

A pilot study will be discussed in the implementation plan. A pilot study is a smaller-scale experiment designed to test logistics and gather information prior to an actual full-scaled. All these help to refine the programme and develop a comprehensive planning for a larger-scale implementation.

5.2.1 Objectives

The objectives of the pilot study are

i. to verify the feasibility of aromatherapy

ii. to appraise the cost and clinical effectiveness of the implementation of aromatherapy

iii. to reveal deficiencies and problems that arise when implementing the intervention
iv. to assess the compliance of frontline staff

5.2.2 Time frame, target population, sample size and target setting

A Quasi-experimental study design is applied for this pilot study. The duration of the study is one month and the study can stop once the target sample size is enough. The setting of the study is a mixed surgical ward which contains different team of postoperative surgical cases. The target sample is one hundred, with fifty of them in control group and fifty of them in intervention group. According to the literature, the target population of this pilot study should be conscious surgical patient who develop postoperative nausea and vomiting after surgery, aged above 18, with no cognitive and olfactory problems or defects and no allergy towards the aromas like peppermint and isopropyl alcohol. The researcher will use convenience sampling for this pilot study. The estimated sample size for the study is fifty with twenty-five in control group and intervention group respectively. The study will compare the outcome of patients in control group (patients who receive standard treatment without extra intervention) and intervention group (patients who receive aromatherapy in adjacent to the standard treatment).

5.2.3 Outcome measures

The study will have pre-intervention assessment and post-intervention assessment for measuring the perception of participants towards their level and severity of nausea and vomiting. According to the reviewed literature, Verbal Numeric Rating Scale is mostly
used to assess the primary outcome, which was the severity of nausea. The scale ranges from 0 – 6 (0 - no nausea, 1 - slightly nauseated, 2 - moderately nauseated, 3 - extremely nauseated, 4 - so nauseated, 5 - about to vomit, 6 - vomited) (Lane, 2012; Hunt, 2013). Besides, other information such as incidence of vomiting, patient's satisfaction, adverse reaction of subjects and the amount of sample requesting rescue antiemetic medication will be collected. All these can indicate the effectiveness of the treatment.

5.2.4 Acceptability and feasibility assessment

Customer Satisfaction Survey towards aromatherapy will be performed on postoperative day 2. A 5-point scale rating will be used on the experience of having aromatherapy. Questionnaires (referred to the Appendix VII) will be given to the conscious patients for comments on aromatherapy for evaluating the acceptability and feasibility of the innovation. Questions will explore patient's experience of aromatherapy, anything they appreciate and dislike comments and recommendations improvement of the innovation.

Evaluation will also be conducted on nursing staff. It aims at evaluating the nurse compliance to the guideline and identifying difficulties when carrying out the innovation. Questionnaires (referred to the Appendix VIII) will be delivered to nursing staff. Questions including problems when implementing aromatherapy, reasons for compliance and non-compliance of nurses and any interferences or increase of workload to daily practice will be raised out. Moreover, the Committee members will visit the unit randomly once a
week during the pilot study period to observe the change in the practice and audit the compliance of this guideline among the nurses. All the data will be analyzed by the Committee for refinement of guideline on using aromatherapy to relief postoperative nausea and vomiting.

Apart from the above assessment, the actual cost used for the innovation should be assessed as there may be some unexpected expenditure when carrying out the innovation. All these information are useful to evaluate the cost-benefit ratio of the new innovation and allow a more accurate estimation of the feasibility for a larger-scale implementation in future.

5.2.5 Discussion about the data collected from the pilot study

The collected data will be analyzed by the Continuous Quality Improvement Committee. A formal written report will be generated with charts and figures to illustrate the results of the findings. The report will be sent to the management and administrative staff including department operating manager and ward manager of the surgical unit. The modification and recommendation of guideline as reference to the result of the pilot study will be discussed during the weekly department meeting and this facilitate the innovation to proceed to a full-scale implementation.
Chapter 6
Evaluation Plan

Developing an evaluation plan is an important step as this can ensure continuous improvement of the quality of the innovation. It is used to illustrate the value of the guideline. The evaluation plan will include according to the patient outcomes, staff outcomes and hospital outcomes.

6.1 Outcome Identification

6.1.1 Patient Outcome

The patient outcome can show the clinical benefits of the innovation. According to the guideline, the primary outcome is the severity of postoperative nausea. The primary outcome is measured by Verbal Numeric Rating Scale. Also, patient's satisfaction level, incidence of vomiting and the amount of sample requesting rescue antiemetic medication are the secondary outcomes that can illustrate the effectiveness of the guideline of aromatherapy as the evidences on the reviewed studies shown a direct relationship between aromatherapy and postoperative nausea and vomiting status. The results of the assessment will be documented by frontline nurses in surgical units while the nurses in the Committee will evaluate the data.
6.1.2 Staff and System Outcome

The staff satisfactory level towards the innovation will be assessed to determine the acceptability of the guideline. The successfulness of innovation can be affected by the appropriate implementation of guideline and thus, the Committee members need to have regular audit of nursing compliance.

As mentioned before, the actual cost will be assessed as it shows the cost-benefit ratio to the system. Besides, the benefit gained to the system can be the indicator for effective use of the hospital resources. Moreover, the reduction of usage of anti-emetic medication and length of hospital stay can be indicator of favors due to aromatherapy.

6.2 Design of Innovation

According to the reviewed literature, the inclusion criteria of aromatherapy are conscious patients in the surgical units who aged above 18, develop postoperative nausea and vomiting after surgery, no cognitive and olfactory problems or defects and no allergy towards the aromas like peppermint and isopropyl alcohol. Others who cannot fulfil these criteria will not be recruited into the innovation.

Based on the reviewed study, the attribution rate is 10-15%. By using the electronic sample size calculator, the desired amount of sample recruited for the evaluation plan is at least eighty.
6.3 Outcome Measurement

The measurement of the innovation will be done by frontline nurses. The measurement of the incidence and severity of postoperative nausea and vomiting will take place once patient arrive the surgical ward, before the innovation, two and five minutes after each implementation of intervention. Besides, the accumulative incidences of vomiting and usage of antiemetic medication during hospital stay will be recorded by the nurses.

Furthermore, questionnaire is used to measure the satisfactory level towards the innovation. Questionnaires will be collected by the Committee members. Questionnaires about comments and perceptions towards the new innovation guideline will also be distributed to nurses. Nursing competency and compliance to the guideline will be assessed randomly during the implementation period by the Committee member when they visit the surgical unit.

During the implementation period, the Committee members will evaluate the cost of carrying out the innovation. Besides, the information of manpower and resources used will be included in the evaluation process. The clinical and operational data will be gathered and analyzed by the Continuous Quality Improvement Committee members.
6.4 Data Analysis

The incidence of postoperative vomiting, the nausea level, and the use of antiemetic medication will be measured during the period of hospitalization. The number of episodes of vomiting will be measured in first 24 hours after operation. The patients with vomiting episodes will be categorized into the following groups: none (0 episode), mild (1-3 episodes), moderate (4-6 episodes), or severe (more than 6 episodes). The percentage of patients that fall in different categories will be calculated and used to compare with the ones who receive usual management of PONV. The nausea level will also be measured by verbal numeric scale. The pre and post treatment score of implementing aromatherapy and usual therapy will be compared. Moreover, the percentage of patients who request for antiemetic medication will be calculated.

6.5 Effectiveness of Innovation

The effectiveness of the innovation can be justified by the outcome achieved. The guideline of aromatherapy on postoperative nausea and vomiting of surgical patients will be considered to be effective with the following evidence.

6.5.1 Patient clinical outcomes

The primary outcome of the guideline is to relieve the severity of nausea. The effectiveness of the guideline is justified by constituting the findings between various studies. According to literature, less
than 30% of patients will report of postoperative vomiting after the administration of aromatherapy (Winston, 2003; Pellegrini, 2009 Radford, 2011). More than 65% of patients shows improvement in the nausea score after aromatherapy (Winston,2003; Anderson, 2004; Pellegrini,2009 Radford, 2011; Hunt, 2013). Also, less than 30% of patients request antiemetic medication after aromatherapy (Cotton, 2007; Hunt, 2013). Achievement of any two indicates the effectiveness of the intervention.

6.5.2 Nursing compliance

The nursing compliance rate of aromatherapy should be 100%. Training should be provided and audit should be performed to ensure the quality of service. Non-compliance staff will be provided with further training.

6.5.3 Patient and staff satisfactory level

Mean score of satisfaction level above 3, with 70% of participants should rank 3 or above for the satisfactory level among patients and nurses toward aromatherapy in managing postoperative nausea and vomiting.

6.5.4 Measures to sustain the change of practice

In order to sustain the change of the aromatherapy innovation, a formal written report will be sent to the administrative and management level of the hospital including the department operating manager and ward managers of surgical unit. They are the final decision maker
and will justify whether the guideline can really put in practice. The message of approval of guideline will be disseminated via weekly department meeting, ward meetings and internal email. The recognition of the guideline appreciates the effort of the stakeholders and is a continuous encouragement for nursing compliance the guideline. All these promote a high standard, patient centered nursing care. The Continuous Quality Improvement Committee for management of postoperative nausea and vomiting will review and update the guideline every year.
Chapter 7

Conclusion

In conclusion, postoperative nausea and vomiting is commonly seen on surgical patients. Although antiemetic medication is currently used for these patients, a number of side effects are noted. Therefore, there is a need to new innovation for relieving postoperative nausea and vomiting.

In this thesis, an evidence-based guideline on aromatherapy on relieving postoperative nausea and vomiting is introduced with reference to seven randomized controlled trial studies. The transferability, feasibility and cost-benefit ratio are investigated. A plan for implementation is prepared and evaluated.
## Appendix I: Summary of Searching Strategies and Results

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<td>7. Surgical</td>
<td>2671011</td>
<td>884069</td>
<td>38061</td>
<td>184633</td>
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<td>8. Postoperative</td>
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<td>2471</td>
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<td>3951</td>
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<td>1630753</td>
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</tr>
<tr>
<td>11. 4 and 5 and 9</td>
<td>24</td>
<td>21</td>
<td>11</td>
<td>24</td>
<td>5</td>
<td>47</td>
</tr>
<tr>
<td>12. Limited to RCT</td>
<td>11</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>13. Limited to clinical trial</td>
<td>-</td>
<td>-</td>
<td>8</td>
<td>-</td>
<td>-</td>
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<tr>
<td>14. Limited to research</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
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<td>15. Number of RCT citation included</td>
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<td>6</td>
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<td>7</td>
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<td>16. Total number of citation retrieved without overlapping</td>
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<td>17. Articles retrieved from reference</td>
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</table>
### Appendix II: Appendix I: Summary of Searching Strategies and Results

**Bibliographic Citation:**


<table>
<thead>
<tr>
<th>Study Types</th>
<th>Number of Patients</th>
<th>Patient Characteristics</th>
<th>Intervention</th>
<th>Comparison</th>
<th>Length of Follow Up</th>
<th>Outcome Measures</th>
<th>Result</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCT</td>
<td>N = 301</td>
<td>Postanesthesia care ward at an ambulatory surgical site in US</td>
<td>Aromatherapy was placed on 2 2-inch by 2-inch impermeable gauze. Inhaled scent via nose and exhale via mouth 3 times.</td>
<td>Verbal Descriptive Scale</td>
<td>5 mins</td>
<td>1. % of patient reported improvement in post PONV score</td>
<td>1. Control - 39.7% IPA - 51.3% Ginger - 67.1% Blend - 82.4%</td>
<td>P = 0.76 p = 0.31 p = 0.002 p &lt; 0.001</td>
</tr>
<tr>
<td></td>
<td>4 Groups</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2. % of patient requesting anti-nausea medication</td>
<td>2. Control - 80.8% IPA - 71.8% Ginger - 55.3% Blend - 40.5%</td>
<td>p = 0.55 p = 0.58 p = 0.002 p ≤ 0.001</td>
</tr>
<tr>
<td>1. Control - 73</td>
<td>IPA - 78</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Ginger - 76</td>
<td>Blend - 74</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Remark:**

- Randomization, randomized by a computerized listing assignment for randomization assignment
- Allocation concealment did not mentioned
- Low risk of attrition bias (outcome report for all participants)
- Low risk of reporting bias (results are reported for all stated outcomes)
### Bibliographic Citation:


<table>
<thead>
<tr>
<th>Study Types</th>
<th>Number of Patients</th>
<th>Patient Characteristics</th>
<th>Intervention</th>
<th>Comparison</th>
<th>Length of Follow Up</th>
<th>Outcome Measures</th>
<th>Result</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCT</td>
<td>N = 35</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 Groups</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Control - 8</td>
<td>Female for scheduled</td>
<td>Scents put in a small bag.</td>
<td>6-point Verbal Descriptive Scale</td>
<td>2 mins</td>
<td>1. % of patient reported with improvement in VDS at 2-mins and 5 mins after</td>
<td>1. Control - 25%, 25%</td>
<td>P = 1.000, p = 1.000</td>
</tr>
<tr>
<td></td>
<td>2. Peppermint - 22</td>
<td>non-urgent C section</td>
<td>Inhaled scent via nose and exhale via mouth 3 times.</td>
<td></td>
<td>5 mins</td>
<td></td>
<td>Peppermint - 59%, 72%</td>
<td>p = 0.002, p = 0.002</td>
</tr>
<tr>
<td></td>
<td>3. Anti-e - 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Anti-e - 0%, 20%</td>
<td>p = 0.001, p = 0.003</td>
</tr>
</tbody>
</table>

### Remark:

- Randomization, randomized by blocked systematic random assignment method
- Allocation concealment did not mentioned
- Low risk of attrition bias (outcome report for all participants)
- Low risk of reporting bias (results are reported for all stated outcomes)
Bibliographic Citation:

<table>
<thead>
<tr>
<th>Study Types</th>
<th>Number of Patients</th>
<th>Patient Characteristics</th>
<th>Intervention</th>
<th>Comparison</th>
<th>Length of Follow Up</th>
<th>Outcome Measures</th>
<th>Result</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCT</td>
<td>N = 76</td>
<td>Male and female patients who are high risk for PONV with surgery done under general anesthesia or regional anesthesia</td>
<td>IPA group inhaled IPA via nose and exhale via mouth 3 times.</td>
<td>Verbal Numeric Rating Scale</td>
<td>When patient arrive at ward (PACU) 20 - 60mins after OT</td>
<td>1. % of nausea event noted 2. Mean VNRS Nausea Score 3. Mean of patient's overall satisfaction score (Total: 5)</td>
<td>1. Control - 25%, 25% IPA - 39%, 33% 2. Control - 6.5, 4.5 IPA - 4.0, 3.8 3. Control - 4.76, 4.79</td>
<td>p = 0.175</td>
</tr>
</tbody>
</table>

Remark:
✓ Randomization, randomized by computer-generated number
✓ Allocation concealment did not mentioned
- Low risk of attrition bias (outcome report for all participants)
- Low risk of reporting bias (results are reported for all stated outcomes)
**Bibliographic Citation:**


<table>
<thead>
<tr>
<th>Study Types</th>
<th>Number of Patients</th>
<th>Patient Characteristics</th>
<th>Intervention</th>
<th>Comparison</th>
<th>Length of Follow Up</th>
<th>Outcome Measures</th>
<th>Result</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCT</td>
<td>N = 85</td>
<td></td>
<td>IPA gauze pad to experimental gp, 12.5mg-25mg Promethazine to another gp</td>
<td>Verbal Numeric Rating Scale</td>
<td>5 mins</td>
<td>1. IPA - 17% Promethazine - 23%</td>
<td>1. Control - 25%, 25% IPA - 39%, 33%</td>
<td>P = 0.448</td>
</tr>
<tr>
<td></td>
<td>2 Group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. IPA - 42</td>
<td>Female with 2-4 risk factors of PNOV, scheduled for general anesthesia for more than 60min duration, in a day hospital in US</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>2. Anti-e - 43</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**Remark:**

√ Randomization, “test agents were administered in randomized sequences”

√ Allocation concealment did not mentioned

- unclear risk of attrition bias (original study protocol not available)

- Low risk of reporting bias (data reported for all subjects, no apparent losses to follow-up)

<table>
<thead>
<tr>
<th>Study Types</th>
<th>Number of Patients</th>
<th>Patient Characteristics</th>
<th>Intervention</th>
<th>Comparison</th>
<th>Length of Follow Up</th>
<th>Outcome Measures</th>
<th>Result</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCT N = 72</td>
<td>2 Groups</td>
<td>Female patients who are scheduled for laparoscopic day surgery in a US surgery unit</td>
<td>IPA gauze pad for IPA group. Anti-emetic with Ondarstron 4mg IV every 15mins</td>
<td>Verbal Numeric Rating Scale</td>
<td>1. Time to 50% reduction of nausea score (mins)</td>
<td>1. IPA - 17% Promathzine - 23%</td>
<td>1. IPA - 15 mins Ondansetron - 34min</td>
<td>P = 0.011</td>
</tr>
<tr>
<td></td>
<td>1. IPA - 38</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2. IPA - 0 Promathezine - 12.5</td>
<td>2. IPA - 5.3% Ondansetron - 5.9%</td>
<td>P = 0.013</td>
</tr>
<tr>
<td></td>
<td>2. Ant - e - 34</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3. IPA - 8mins Promathezine - 20mins</td>
<td></td>
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</tr>
</tbody>
</table>

Remark:
- Randomization, randomized by a computer-generated random numbers program
- Allocation concealment, randomization done by author who did not involve in process of data collection
- Low risk of attrition bias (outcome report for all participants)
- Low risk of reporting bias (results are reported for all stated outcomes)
### Bibliographic Citation:


<table>
<thead>
<tr>
<th>Study Types</th>
<th>Number of Patients</th>
<th>Patient Characteristics</th>
<th>Intervention</th>
<th>Comparison</th>
<th>Length of Follow Up</th>
<th>Outcome Measures</th>
<th>Result</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCT</td>
<td>N = 33</td>
<td>Patients with PONV, regardless of operation under general, regional or deep anesthesia in a surgical unit</td>
<td>Aromatherapy groups with IPA and peppermint respectively, while the Placebo group is given Normal Saline</td>
<td>Visual Analog Scale</td>
<td>2 mins 5 mins</td>
<td>1. Improvement in post PON score in 2 mins and 5 mins</td>
<td>1. Placebo - 58 to 43 to 28 IPA - 61 to 42 to 26 Peppermint - 62 to 42 to 28</td>
<td>p = 0.005</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2. % of patient requesting anti-nausea medication at any time</td>
<td>2. Placebo - 50% IPA - 45% Peppermint - 60% <em>Only 52% of these patients ultimately required anti-nausea med</em></td>
<td>p = 0.028</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>3. Patient's overall satisfaction VAS (mm ± SE)</td>
<td>3. Placebo - 83.7 ± 7.4 IPA - 90.3 ± 4.5 Peppermint - 86.3 ± 10.2</td>
<td>p = 0.0006</td>
</tr>
</tbody>
</table>
Remark:
√ Randomization, nurses who administer the treatment are unaware of the content of aromas
√ Allocation concealment, data “…prepared by an individual not otherwise involved in the study”
√ Blinding
- Low risk of attrition bias (outcome report for all participants)
- Low risk of reporting bias (results are reported for all stated outcomes)
### Bibliographic Citation:


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<th>Length of Follow Up</th>
<th>Outcome Measures</th>
<th>Result</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCT</td>
<td>N = 100</td>
<td>Gynecologic outpatient aged 18-65 who undergone diagnostic laparoscopy or laparoscopic operation for</td>
<td>IPA gauze pad for IPA group. Anti-emetic with</td>
<td>Verbal Numeric Rating Scale</td>
<td>5 min 10min 15min 30min</td>
<td>1. Median verbal numeric rating scale scores (0-10) at 5 min 10min 15min 30min</td>
<td></td>
<td>IPA</td>
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<tr>
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<td>2. Time to 50% reduction of nausea score (mins)</td>
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<td>1.50</td>
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<td>2. IPA - 6.3 mins</td>
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### Remark:


## Appendix III: Quality Assessment of Studies

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</thead>
<tbody>
<tr>
<td>1. Did the study address an appropriate and clearly focus question?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>2. Did the assignment of subjects to treatment groups randomize?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>3. Did adequate concealment use?</td>
<td>Not mentioned</td>
<td>Not mentioned</td>
<td>Not mentioned</td>
<td>Not mentioned</td>
<td>Yes</td>
<td>Yes</td>
<td>Not mentioned</td>
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<tr>
<td>4. Did the subjects and investigators keep “blind” about treatment allocation?</td>
<td>Not mentioned</td>
<td>Not mentioned</td>
<td>Not mentioned</td>
<td>No</td>
<td>No</td>
<td>Yes, blinding is done to assessors.</td>
<td>Not mentioned</td>
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</tr>
<tr>
<td>5.</td>
<td>Were the treatment and control groups similar at the start of the trial?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>6.</td>
<td>Were the participants in all groups followed up and data collected in the same way?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>7.</td>
<td>Did the study have enough participants to minimize the chance of play?</td>
<td>Yes</td>
<td>No</td>
<td>No, the required amount of patient is 111 but the study only recruited 76 participants.</td>
<td>No, the study failed to meet the target amount of participants with 28 participants less in each groups</td>
<td>Not mentioned</td>
<td>Not mentioned</td>
</tr>
<tr>
<td>8.</td>
<td>How are the results presented?</td>
<td>Clear presentation, with mean, P-value, main result.</td>
<td>Clear presentation, with mean, P-value, main result.</td>
<td>Clear presentation, with mean, P-value, main result.</td>
<td>Clear presentation, with mean, P-value, main result.</td>
<td>Clear presentation, with mean, P-value, main result.</td>
<td>Clear presentation, with mean, P-value, main result.</td>
</tr>
<tr>
<td>9.</td>
<td>How precise were the results?</td>
<td>P-value explained.</td>
<td>P-value explained.</td>
<td>P-value explained.</td>
<td>P-value explained.</td>
<td>P-value explained.</td>
<td>P-value explained.</td>
</tr>
<tr>
<td>10. Were all important outcomes considered so the results can be applied?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>---</td>
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<tr>
<td>Overall Score</td>
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<td>7/10</td>
<td>7/10</td>
<td>8/10</td>
<td>9/10</td>
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</tr>
<tr>
<td>Level of Evidence</td>
<td>1++</td>
<td>1+</td>
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</tbody>
</table>
Appendix IV: Content of 1-hour briefing session for nurses

Content:
1. Background of postoperative nausea and vomiting
2. Aromatherapy (principle, mechanism and history)
3. Statistics and research findings of aromatherapy on postoperative nausea and vomiting
4. Clinical Guideline of implementing aromatherapy on surgical patients who encounter postoperative nausea and vomiting
5. Demonstration of applying aromatherapy
6. Return demonstration of aromatherapy by nurses
7. Problemshooting
8. Question and answer session
## Appendix V: Summary of Cost/Benefit Ratio

<table>
<thead>
<tr>
<th>Cost of program</th>
<th>Money saved</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Running cost</strong></td>
<td><strong>In Medications</strong>#</td>
</tr>
<tr>
<td>1. Staff cost</td>
<td>1. Antiemetics * (for PONV)</td>
</tr>
<tr>
<td></td>
<td>1. $1.0 x 3 x 365 = $1095/case</td>
</tr>
<tr>
<td></td>
<td>2. Analgesics * *</td>
</tr>
<tr>
<td></td>
<td>2. $1.3 x 3 x 15 x 365 = $1423.5/case</td>
</tr>
<tr>
<td><strong>Miscellaneous</strong></td>
<td><strong>In nursing care &amp; administration</strong>##</td>
</tr>
<tr>
<td>1. Gauze</td>
<td>1. Surgical unit</td>
</tr>
<tr>
<td>2. Aroma liquid%</td>
<td>1. $5610 x 365 = $2,047,650/bedstead</td>
</tr>
<tr>
<td>3. Stationeries</td>
<td></td>
</tr>
<tr>
<td>4. Assessment forms, photocopying and printing service</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Top-up items in ward</td>
</tr>
<tr>
<td></td>
<td>1. $25 x 24 (estimated use) = $600</td>
</tr>
<tr>
<td></td>
<td>2. Available in wads</td>
</tr>
<tr>
<td></td>
<td>3. Available in wads</td>
</tr>
<tr>
<td><strong>Hidden Cost</strong></td>
<td><strong>Hidden Benefit</strong></td>
</tr>
<tr>
<td>1. Cost of Venue for holding briefing sessions and tutorials</td>
<td>1. Lecture theatres of hospital</td>
</tr>
<tr>
<td>2. Cost of computer ad accessories for presentation during briefing</td>
<td>1. Other complications</td>
</tr>
<tr>
<td></td>
<td>2. ↑ in patient's satisfaction level</td>
</tr>
<tr>
<td></td>
<td>1. Cannot be estimated</td>
</tr>
<tr>
<td></td>
<td>2. Cannot be calculated</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>Total</strong></td>
</tr>
<tr>
<td>$600/year</td>
<td>$2,050,168.5/year</td>
</tr>
</tbody>
</table>

**Remark:**

# The price of medication is according to the Drug Formulary (6th ed.), QMH

## Administration fee and nursing care is calculated by using information of private bed in general adult surgical ward.

* Maxolon 10mg t.d.s is used for calculation. (dosage that usually use)

** Tramadol 50mg t.d.s. is used for calculation (dosage that usually use)

% Price of aroma liquid is found in one of the manufacturing website. 70% Isopropyl alcohol 400ml solution costs $25 HKD/bottle
### Appendix V: Level of Evidence (SIGN, 2012)

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

* RCT: randomized, controlled trial.

** Studies with a level of evidence – should not be used as a basis for making an instruction.
## Appendix VI: Grade of recommendations (SIGN, 2012)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>At least one meta-analysis, systematic review, or RCT rated as 1++, and directly applicable to the target population; or A systematic review of RCTs or a body of evidence consisting principally of studies rated as 1+, directly applicable to the target population, and demonstrating overall consistency of results</td>
</tr>
<tr>
<td>B</td>
<td>A body of evidence including studies rated as 2++, directly applicable to the target population, and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 1++ or 1+</td>
</tr>
<tr>
<td>C</td>
<td>A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 2++</td>
</tr>
<tr>
<td>D</td>
<td>Evidence level 3 or 4; or Extrapolated evidence from studies rated as 2+</td>
</tr>
<tr>
<td>D(GPP)*</td>
<td>Recommended best practice based on the clinical experience of the guideline development group</td>
</tr>
</tbody>
</table>

* GPP: good practice points.
Dear Patients,
Thank you for your participation in using aromatherapy for postoperative nausea and vomiting.
Your comments are valuable to us in improving the quality of our services.

Please put a “✓” to the box below to rate for your satisfaction level.

Remark:
(5 = totally agree; 4 = fairly agree; 3 = neutral; 2 = fairly disagree; 1 = totally disagree)

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>
| 1. | I am satisfied with aromatherapy that I received.  
   Reasons: | 5 | 4 | 3 | 2 | 1 |
| 2. | Aromatherapy is effective in relieving postoperative nausea and vomiting.  
   Reasons: | 5 | 4 | 3 | 2 | 1 |
| 3. | I comply with the intervention easily.  
   Reasons: | 5 | 4 | 3 | 2 | 1 |
| 4. | Minimal side effects are noted during or after aromatherapy.  
   Side effects: | 5 | 4 | 3 | 2 | 1 |
| 5. | I prefer to have aromatherapy if I have any postoperative nausea and vomiting in future. | 5 | 4 | 3 | 2 | 1 |
| 6. | I will recommend others if they encounter postoperative nausea and vomiting. | 5 | 4 | 3 | 2 | 1 |

Recommendation:
Appendix VIII: Questionnaire for process evaluation of nurses

Questionnaire on feedback of staff on guideline
Staff survey on using aromatherapy guideline

Dear Colleges,
Thank you for your participation in using aromatherapy for postoperative nausea and vomiting.
Your comments are valuable to us in improving the quality of our services.

Please put a “✓” to the box below to rate for your satisfaction level.

Remark:
(5 = totally agree; 4 = fairly agree; 3 = neutral; 2 = fairly disagree; 1 = totally disagree)

<table>
<thead>
<tr>
<th></th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I am satisfied with the new guideline.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reasons:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. The new guideline is clear, easy to understand and concise.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>3. I have no difficulties to perform aromatherapy with the reference of guideline.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>4. There are enough training and support for implementing the new guideline</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>5. Successful implementation of the guideline increases my job satisfaction and sense of achievement.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Implementation of new guideline does not increase my workload.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Recommendation:
Reference List


