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# Essential Oil Therapy for Alleviation of Discomfort in Surgical Patients

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Essential Oil Therapy for Alleviation of Discomfort in Surgical Patients

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**Abstract**

**Practice Problem:** Post-surgical pain (PSP) has not been sufficiently managed despite routine opioid use. The adverse effects of opioids led to the search for non-pharmaceutical intervention.

**PICOT:** The PICOT question that guided this project was, "In an acute hospital surgical setting, does essential oil therapy complement pain and discomfort relief comparing to conventional pain management alone after 6 weeks?"

**Evidence:** Seven clinical studies, five systematic or integrative reviews, and four conference proceedings were reviewed. The evidence supported lavender essential oil for the alleviation of PSP and discomfort.

**Intervention**: Patients breathe through a personal lavender essential oil inhaler hourly or every 2 hours.

**Outcome:** The percentage means of pre and post-intervention pain score reduction were $39.51^{\pm}17.73$ and $45.77^{\pm}19.45$. The post-intervention group's mean pain score changed from 51.53 to 27.71 pre and post-opioids. Opioid usage per patient day in two groups was 26.2 mg and 48.6mg in morphine equivalent. Pain scores pre and post essential oil therapy were 6.13 and 2.7.

**Conclusion:** This project did not confirm the statistical significance of pain score reduction but a higher reduction in the post-intervention group. The results were clinically meaningful to offer lavender essential oil to alleviate PSP and discomfort.

**Essential Oil Therapy for Alleviation of Discomfort in Surgical Patients**

Post-surgical pain (PSP) has been a perennial challenge for healthcare providers. Various pharmaceutical drugs, including opioids, are prescribed and administered as a standard of care for PSP relief (Gan, 2017). The subsequent prolonged prescription opioid overuse or misuse has become a secondary concern (Stratton, Palombi, Blue, & Schneiderhan, 2018). The opioid crisis called for pain treatment options that have fewer side effects. As a result, complementary therapies have been advocated to be a part of individualized pain management strategies (Henningfield, Ashworth, Gerlach, Simore, & Schnoll, 2019). The Joint Commission (TJC) requires that at least one non-pharmaceutical therapy be offered for problematic symptoms and encourages the exploration of a variety of therapies. Aromatherapy is a significant complementary therapy because "it is easy to understand, as many of today's drugs originally came from plants" (Buckle, 2013, p. 564). The Massachusetts Board of Registration in Nursing was the first state board to accept complementary therapy as part of a "holistic model of nursing" and "within the scope" of nursing (Buckle, 1998, p.58). The California Board of Registered Nursing (2000) supports the registered nursing role in providing complementary, alternative therapies as nursing's holistic tradition. Lavender essential oil has been demonstrated in the literature as an effective complementary therapy for PSP (Gorji et al., 2015; Hasanzadeh et al., 2015; Kim et al., 2007; Yu & Seol, 2017).

This evidence-based practice (EBP) project was to assess the implementation of lavender essential oil therapy (interchangeable as aromatherapy) as a non-pharmaceutical therapy for alleviating discomfort in surgical patients. The EBP intervention included a training module for nurses working on a post-surgical floor and the implementation of an aromatherapy protocol. Evaluation of aromatherapy implementation was measured by auditing electronic health records

(EHR) to collect pain scores and opioid use per patient per day in morphine equivalents and collecting nurse self-efficacy surveys (paper based) pre, post, and 4 weeks after training. The project was conducted at an acute community hospital in Sacramento, California, on the Acute Surgical Unit (ASU).

The primary content areas discussed in this report are the significance of the practice problem, PICOT question, theoretical framework, synthesis of literature review, and practice recommendation. Additionally, the project implementation process is discussed, which include the project setting and overview, project plan, evaluation plan, discussion and implication for nursing and healthcare, dissemination, and conclusion.

## Significance of the Practice Problem

Pain is a significant symptom that hospitalized surgical patients experience despite routine pharmaceutical intervention. Johnson et al. (2016) noted that every group of hospitalized patients have a certain level of pain or risk for pain. Several studies nationally and globally reported a prevalence of PSP: 80% in the U.S., 30% in India, and 50% in Italy (Gan, 2017; Harsoor, 2011; Sansone et al., 2015). In the project hospital, Healthgrade's (2019) report showed that the hospital scored 3% lower than the 68% national average in providing adequate pain relief. Suboptimal or inadequate PSP relief may "result in clinical and psychological changes that increase morbidity and mortality," or cause "impaired quality of life, slowed recovery, prolonged opioid use, and increased cost of care," or "negative physiological and psychological outcomes" (Gan, 2017, p. 2288; Gorgi et al., 2015, Introduction section; Harsoor, 2011, p. 101; Sansone et al., 2015). While care providers are obligated to provide adequate pain relief, prescribing addictive opioids for pain relief should be weighed against the risk of abuse or misuse (Kotalik, 2012). The current opioid crisis has led to an ethical dilemma and inadequate pain control

(Stratton et al., 2018). Data from 2016 showed more than 42,249 overdose fatalities (The New Opioid Problem, 2018, The Scope and Response section). The TJC sets pain management as a standard of quality and requires hospitals to “provide at least one non-pharmacological pain treatment modality" (2018, para. 1). Therefore, healthcare providers' responsibility is not only to offer adequate pain control but also to limit the risk of overuse and addiction to opioids. Aromatherapy can be a safe addition to current pain management with no adverse effects (Lakhan, Sheafer, & Tepper, 2016).

## PICOT Question

The PICOT question was "In an acute hospital surgical setting, does essential oil therapy complement pain and discomfort relief comparing to conventional pain management alone after 6 weeks?”

In this project, the population (P) was adults among all types of surgical patients aged 18-85 years. The intervention (I) was essential oil therapy using lavender inhalation. Patients were given a personal inhaler pre-filled with lavender essential oil and instructed to use every hour or 2 hours when they felt pain. The comparison (C) was made to a baseline of 35 patients who had conventional pain management regimen only. The outcomes (O) measured were the means of pain score pre and post-intervention, opioid usage in pre and post-intervention groups, and nurse self-efficacy pre, post-training, and 4 weeks post-training. The timeframe (T) was modified from 6 to 3 weeks to meet the course deadline. The modification was also a response to the COVID-19 pandemic holding of elective surgery cases.

## The Framework of the Problem

This project's nursing framework was Modeling and Role-Modeling theory (MRM) by Erickson, Tomlin, and Swain (Erickson, 2014). MRM includes the major concepts of modeling,

role-modeling, nursing, nurturance, unconditional acceptance, and individual uniqueness (Erickson, 2014). With the MRM, nurses assessed the patients and developed a modeling of patients' conditions and needs from the patients' perspectives. In this project, nurses built the image of the surgical patients who were in demand for adequate pain relief intervention with less adverse effect. This demand had encouraged patients' autonomy to seek resources that address their physical and psychological needs, as evidenced that "30 to 62% of adults in the United States use complementary and alternative medicine" (Institute of Medicine of the National Academies, 2004, p.10). In response to patients' searching, nurses assisted patients in integrating complementary therapy into patients' post-surgical care. Using essential oil therapy within the MRM theory framework, nurses accepted patients "as a unique, worthwhile, important individual with no strings attached" (Erickson, 2014, p. 500).

As a part of the training of essential oil therapy, nurses were taught to prepare themselves for healing by taking a few deep breaths and centering before interacting with their patients. Nurses applied their presence, empathy, and empowerment into the relationship to become a healing instrument. The essential oil therapy process was interactive and interpersonal. This process mirrored the MRM theory's nurturance, that "fuses and integrates cognitive, physiological, and affective processes, to assist a client in moving toward holistic health" (Erickson, 2014, p. 500). MRM theory proposes that each individual knows what interferes with their health and well-being and what is needed to restore balance and harmony to their life (Acton, Irvin, Jensen, Hopkins, & Miller, 1997). As a self-care method, essential oil therapy provided patients with the opportunity to seek their paths for healing. The implementation of the project within the MRM theory framework nurtured patients' and nurses' strengths, so a state of modeled optimum health and contentment was achieved.

## Evidence Search Strategies

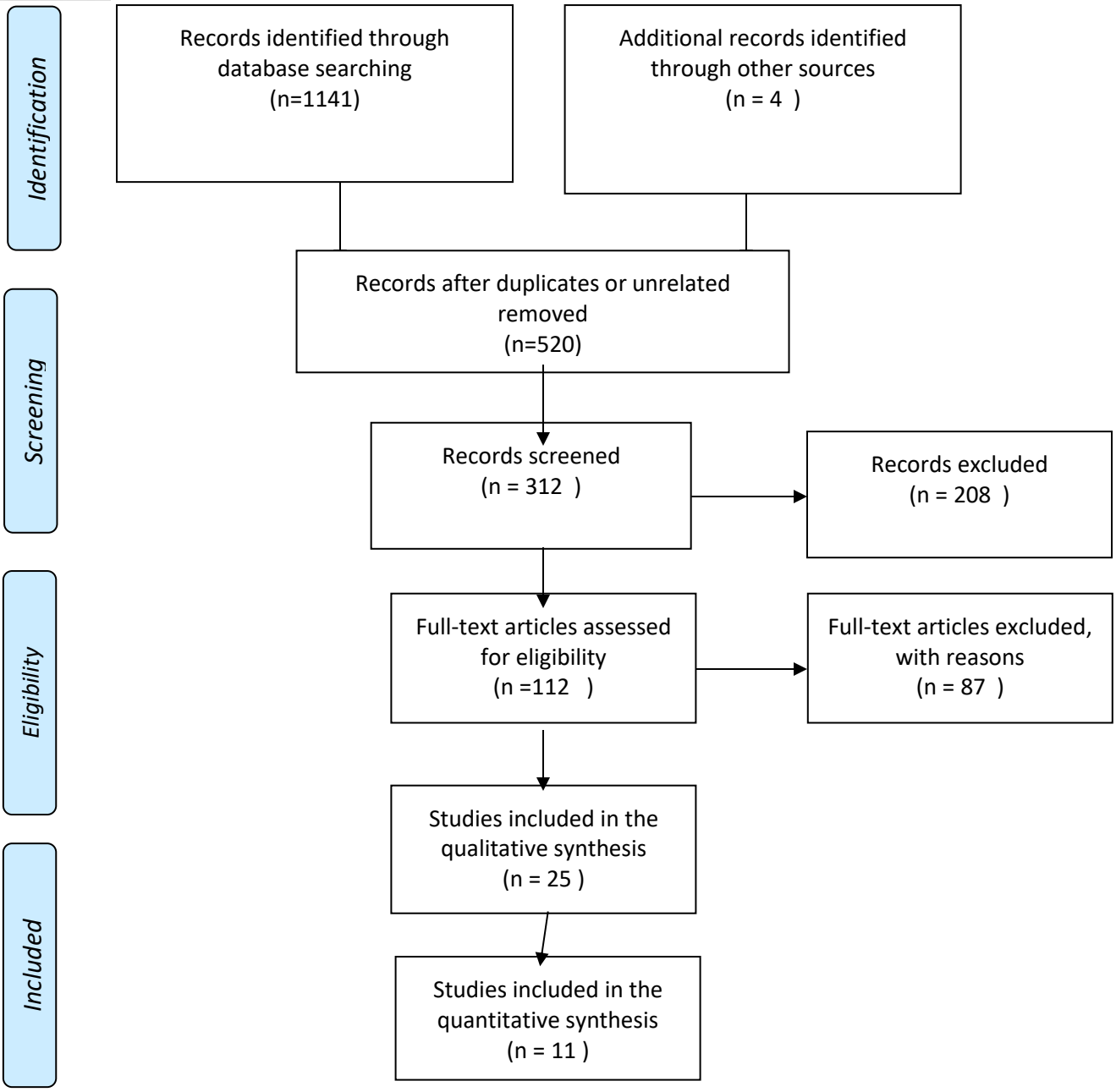
To search for evidence to support the implementation of the project, ProQuest, EBSCOHost, Science Direct, and PubMed databases were selected. The keywords used included "aromatherapy" or "essential oils," and "pain," "discomfort," and "hospitalized patient or surgical patients." Research articles included aromatherapy or essential oil therapy used for adult surgical patients. The surgical type was not limited to one or a few but all types of surgeries. The intervention used lavender inhalation with or without supplemental oxygen and compared it to a control group within an evaluation time frame of 2 to 4 months. Studies that were from different settings, measures, and non-English full text were excluded. The measure of pain utilized a visual analog scale or a numeric scale. The search was limited to English from 1990 to 2020. MeSH headings using "aromatherapy or essential oils," "pain," did not generate relevant results. However, the searched keywords were also in MeSH terms.

## Evidence Search Results and Evaluation

One thousand, one hundred and forty-five articles were generated from the search. One thousand one hundred and forty-one from PubMed, ProQuest, EBSCOHost and Science Direct, and four from conference proceedings. There was a variance of hits among searches at different times. After removing duplicates, abstract only entries, studies using essential oils other than lavender, other measurement tools, or other procedures than surgeries, 25 clinical trials were included in the analysis. Seven clinical studies using lavender for PSP and four clinical experiences shared in a conference proceeding were synthesized for the recommendation. Five systematic or integrative reviews were included in the synthesis, as well. See Figure 1 for detail of the PRISMA flow.

*Figure 1.*

PRISMA Flow Diagram for Aromatherapy




The articles' quality was evaluated using the Johns Hopkins Level and Quality of Research and Non-Research Evidence (Dang & Dearholt, 2018). Experimental studies and randomized controlled trials (RCT) were included in level I evidence. Quasi-Experimental

research was included in level II. Nonexperimental studies were in level III (Dang & Dearholt, 2018). High-quality grade A research evidence is defined as "consistent, generalizable results, sufficient sample size for study design, adequate control, definitive conclusion, consistent recommendations based on comprehensive literature review…" (Dang & Dearholt, 2018, p. 131). Good and low-quality research (grades B and C) have less than defined contents, or a lack of consistent results or a "conclusion cannot be drawn" (Dang & Dearholt, 2018, p. 131).

Four level-I evidence with grade B, good-quality clinical trials examined lavender inhalation for PSP. These studies concluded that lavender essential oil demonstrated a significant reduction of PSP (Gorji et al., 2015; Hasanzadeh et al., 2015; Kim et al., 2007; Yu & Seol, 2017). In addition, Kim et al. (2007) reported that the participants demanded fewer opioids when lavender oil was used. One level I triple blinded low-quality RCT showed affirmative pain relief with the lavender intervention (Olapour et al., 2013). One single-blind level II trial with the low quality found no statistical difference between the intervention and control groups in pain reduction (Salamati, Mashouf, Sahbaci & Mojab, 2014). When this trial was reevaluated for the lavender's effect on vital signs in open-heart surgery, the authors found that lavender significantly lowered blood pressure and heart rates (Salamati, Mashouf, & Mojab, 2017). One level III high-quality retrospective study reported affirmative pain relief with lavender and other essential oil inhalation (or topical application) (Johnson et al., 2016). Clinician-experiences, classified as level V evidence, was presented in conference proceedings that confirmed the pain relief function of lavender and other essential oils. (Baglien, 2019; Natschke & Boyce, 2019; Scheidel & Brown, 2019). Dusek (2019) presented a study with his colleagues that integrative modalities offered in their hospital was associated with a reduction in pain and a reduction in total costs of care with cost-savings of $898 per hospital admission (Dusek, Griffin, Finch,

Rivard, & Watson, 2019). Aromatherapy administrated by holistic nurses was one of these integrative modalities (Dusek et al., 2019).

One grade A systematic review and one grade A integrative review supported the use of aromatherapy for pain and recommended the therapy (Lakhan et al., 2016; Meghani, Tracy, Hadidi, & Lindquist, 2017). Another grade A synthesis review partially supported the claim that lavender was useful for pain but stated there was an inconsistency of findings in other primary studies they reviewed (Dimitriou, Mavridou, Manataki, & Damigos, 2017). One grade B synthesis review identified the effective results for pain and anxiety relief in the studies but did not recommend aromatherapy (Lederer, Schmucker, Kousoulas, Fichtner-Feigl, & Huber, 2018). One grade C review found lavender to be useful for anxiety and pain relief and recommended for further research (Stevensen, 1995). A summary of primary research and systematic reviews can be found in Appendices A and B.

## Themes from the Literature

Common themes from the literature were the effectiveness and safe use of lavender essential oil for pain and anxiety relief. First, lavender essential oil was used as a CAM in reducing pain (Gorji et al., 2015; Kim et al., 2007; Yu & Seol, 2017). The second theme was the clinical experience of aromatherapy. The clinical use of aromatherapy as a nursing intervention in the United States, beginning in the late 1980s, has demonstrated effectiveness and safety through promotion and experience sharing (Baglien, 2019; Dusek et al., 2019; Scheidel & Brown, 2019). The use of aromatherapy has created a valuable opportunity for nurses to "share with the patient a glimpse of a multidimensional world" and to offer this non-pharmacologic therapy complementary to relieve their patients' pain (Buckle, 2013, p.572). The third theme was a variety of other uses for aromatherapy.

**The Pain Relief of Lavender Essential Oil**

The studies that used inhalation of the essential oil lavender with or without supplemental oxygen resulted in less pain severity or more significant pain relief (Gorji et al., 2015; Hasanzadeh et al., 2015; Kim et al., 2007; Yu & Seol, 2017). Headaches during hemodialysis and labor pain were relieved by aromatherapy (Bicer et al., 2015; Tanvisut, Traisrisilp, & Tongsong, 2018).

**Clinical Experience of Aromatherapy**

Non-research organizational experience and field experts supported aromatherapy for pain relief (Baglien, 2019; Dusek et al., 2019; Johnson et al., 2016; Scheidel & Brown, 2019). A study with a sample size of 25 patients also supported aromatherapy for pain relief (Coles, 2019). Evidence also found that aromatherapy was recommended by dentistry for "the significant impact on wellness" (Pierce, 2019, p. 56). Aromatherapy, when used in midwifery, is "a skill that midwives may benefit from having an understanding of, …and in supporting their patients in the use of aromatherapy oils" (Royal Cornwall Hospital Trust, 2018, p. 3). Lavender inhalation was used in a dental office waiting area for anxiety before treatment leading to a positive outcome (Pierce, 2019).

**Other Uses and Safety**

Not only was lavender used in surgery, but it also provided benefits to patients for pain and anxiety relief in procedures, such as implanted port access and colonoscopy, and patients with burns (Hozumi et al., 2017; Ilter, Ovayolu & Ovayolu, 2019; Seyyed-Rasooli et al., 2016; Yayla & Ozdemir, 2019; ). Aromatherapy was safely applied to children (Kallush, Riley & Kacker, 2018; Soltani et al., 2013;). A quasi-experimental study identified aromatherapy as one of the effective pain relief holistic care interventions (Rice et al., 2019).

## Practice Recommendations

The recommendation of aromatherapy for pain and discomfort relief in surgical patients was generated by applying the process of the Johns Hopkins Nursing Evidence-Based Practice Model (JHNEBP). The JHNEBP model process covers three phases. The three phases are the practice question, evidence, and translation (Dang & Dearholt, 2018). The practice question was raised from critical thinking in clinical experience and the statistics that 80% of patients experience PSP, with half of them not well managed (Dang & Dearholt, 2018; Gan, 2017). The adverse effects of opioid use, abuse, and addiction motivated the public to seek an alternative or complementary way for pain management. The promotion of evidence-based practice has helped the public and care providers find innovative interventions for the problem of pain and discomfort. The National Center for Complementary and Integrative Health set its strategic plan to improve the care for hard-to-manage symptoms to "develop and improve complementary health and integrative strategies for managing symptoms such as pain, anxiety, and depression" (2016, p. 3).

The next phase was to search for evidence. Research studies and clinical application projects have supported the effective use of aromatherapy for pain relief (Baglien, 2019; Dusek et al., 2019; Gorji et al., 2015; Hasanzadeh et al., 2015; Kim et al., 2007; Natschke & Boyce, 2019; Olapour et al., 2013; Scheidel & Brown, 2019; Yu & Seol, 2017). Two examples of the successful utilization of aromatherapy in clinical practice were evidenced within the Alina Healthcare System in Minnesota and Ascension St. John Hospital in Michigan. Alina launched its aromatherapy program in 2010 and demonstrated statistically significant changes in patient outcomes of pain, anxiety, and nausea (Johnson et al., 2016). The Ascension St. John Hospital utilized a “train the trainer” approach through professional certification programs. As a result,

these trainers trained and validated other nurses to use aromatherapy as a complement to standard practice. Outcomes demonstrated that "aromatherapy is a safe, cost-effective and non-pharmacologic, evidence-based nursing intervention in conjunction with other medications for relief of pain and anxiety" (Boyce & Natschke, 2019, p. 540). Both patients and nurses experienced the benefit of aromatherapy (Boyce & Natschke, 2019). In a third example, an aromatherapy certificate program instructor worked with nurses from 15 healthcare systems and trained nurses throughout the country (Cooksley, 2018, personal communication). Clinical aromatherapy was promoted by a Ph.D. prepared nurse, educator and practitioner, Dr. Jane Buckle. The project hospital defined in its guideline that essential oil therapy is within the registered nurse's scope of practice to promote the patient's comfort and well-being.

The third phase was translation. The translation process included creating the action plan, securing support and resources to implement the action plan, evaluating outcomes, reporting outcomes to stakeholders, identifying next steps, and disseminating findings that are ongoing and to be fulfilled when opportunity allows (Dang & Dearholt, 2018).

Research and non-research evidence backed the recommendation. Pain is medically defined as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage" (Anselmo, 2013, p. 328). Surgical pain that is caused by actual tissue damage should be addressed sufficiently in addition to a conventional regimen. Lavender essential oil has analgesic and sedative therapeutic actions for pain and related discomfort relief (Battaglia, 2003). The outcomes from this project suggested that further use and study of essential oil therapy was implicated. Therefore, the recommendation of an aromatherapy program for surgical patients was generated based on a thorough and rigorous search and evaluation of current evidence, as discussed earlier in the JHNEBP model process. The findings from the literature review were

consistent with this recommendation. Organizational context and infrastructure were evaluated, and it was deemed feasible to implement this project of aromatherapy for pain and discomfort relief in a surgical unit (Dang & Dearholt, 2018).

## Project Setting

This scholarly project was implemented in an acute care community hospital in Sacramento, California. The hospital is a tertiary healthcare facility. It is a nationally recognized cardiac referral center, admitting patients from the local and distant community for their cardiac needs. The hospital has service areas of critical care, medical-surgical, acute surgical unit, neurology, cardiac support unit, oncology, cardiac, woman's health, family birth center, and an emergency department. The clients vary in age group, socioeconomics, ethnic background, and educational level. The organizational structure is set up as a hierarchy, from the president (chief executive officer), vice presidents, senior directors for each service area, unit managers, shift managers, R.N. staff, and supporting departments. A system-wide medical group manages many of the physicians. Physicians are not considered hospital employees but belong to the group. There are additional private practice physicians who practice at the hospital. The hospital applies the vision and mission of its corporation.

A strength, weakness, opportunity, and threats (SWOT) analysis was performed (see Appendix C). The strengths of this project were the strong collaborative team and the members' enthusiasm. The team members included five persons from different specialties: a certified aromatherapy nurse who was working on her doctorate; a senior director of nursing working as a preceptor, with experience implementing a doctorate level EBP project; a clinical nurse specialist (CNS) who could develop the training curriculum and provide the training; a surgery program coordinator who was trained and available to obtain patient consent; and a pharmacist with a

doctoral degree on the pain team who was able to collect the opioid data. All of the team members were motivated to implement the project for quality improvement in patient care. The "opportunities" were represented by the hospital's interest in providing aromatherapy to patients. The hospital has been adding to the list of available non-pharmaceutical modalities for symptom relief, a TJC requirement. Additionally, research and non-research evidence supported the implementation of aromatherapy. Patients, in general, were requesting care that was cost-effective and with fewer side effects. A "weakness" was that several surgeons decided to "opt-out" or not have their patients participate in the study due to concerns about essential oil therapy. "Threats" included time constraints for the study, the occurring pandemic, nurse training using a remote video platform versus in-person training, untrained float nurses assigned to study patients, and failure to document correctly or lack of motivation to complete the requested nurse self-efficacy surveys.

## Project Overview

This project's vision was to promote the health of the population and support patients' healing through a holistic modality. This vision was congruent with that of the hospital: "to improve the health of all communities served" (Dignity Health, n.d. Our Organization section). The mission was to utilize the holistic principle and aromatherapy to provide quality health service for people at all levels of societal and economic backgrounds, to alleviate patients' pain and discomfort and improve their health and well-being. The project's mission was the same as that of the hospital to "deliver compassionate, high-quality care" (Dignity Health, n.d. Our Organization section). The project's objectives were the promotion of pain control, the reduction of opioids usage, and improved nurse self-efficacy in managing patients' pain with a complementary modality. The evidence search strategy was to locate research and non-research

evidence to support the implementation of complementary therapy in the management of PSP. Aromatherapy was selected based on the hospital's interest in searching for a non-pharmaceutical modality for PSP and discomfort. The addition of aromatherapy enhanced the strength of the hospital's multimodal pain management strategies. As a result of the hold on elective surgery cases during the COVID-19 pandemic, patient enrollment and nurse self-efficacy responses were less than anticipated. Thus, the unintended consequence of the project was the suboptimal statistical significance for the therapy.

## Project Plan-Change Model

This project was an organizational change based on John Kotter's eight-stage process change model. The selection of this model was because the model has been testified across time through a variety of industries (Kotter, 2012). The model is considered a contemporary change theory, stressing the importance of the people involved in the change (White, 2016). The people and their collaboration within and outside of the team were the keys to project success. The eight stages of the model were followed, as described next.

### Establishing a Sense of Urgency

An urgency to offer a complementary care modality had been established. The hospital was in the process of researching aromatherapy implementation when this project was initiated. The hospital and the student had a similar vision to offer complementary modalities for patients' holistic health. A collaborative relationship was initiated within the preceptorship. A sense of urgency for change was communicated among participants and stakeholders at the beginning of this project.

### Creating the Guiding Coalition

A guiding coalition was built when the team worked on creating a guideline for the

project. The coalition members were from the hospital's education and surgical department, pharmacy, the senior director of nursing, and this doctorate student from another hospital within the corporation. A research nurse scientist and a research coordinator were involved in team activities to provide expertise on research project content and process. Weekly progress meetings (in person and virtually) were conducted to monitor the process and correct the issues when they arose.

**Developing a Vision and Strategy**

Vision and implementation strategies were generated after discussion within the group.

**Communicating the Change Vision and Empowering Broad-Based Action**

The change vision was initiated in the group. An essential oil therapy protocol/policy was established. Another hospital within the corporation also was interested in implementing and studying aromatherapy. At an appropriate time, the hospital will apply for approval from the institutional review board (IRB) and implement the project.

**Generating Short-Term Wins**

A short-term win was nurses receiving training and practicing on themselves. They started to feel empowered with the new therapy available to them. The new approach and knowledge provided to patients created a short-term win for patients and their family members with the new results immediately available**.**

**Consolidating Gains and Producing More Change and Anchoring New Approaches in the Culture**

Short-term wins for nurses and patients were transferred to more patients until enough patients for the study's purpose were provided with the essential oil therapy. When the project is

disseminated to other units within the hospital or to other hospitals, a new culture will be generated. At the time of this report, the process is on hold due to the COVID-19 pandemic.

During this change process, the doctoral student worked as the project manager with the preceptor's guidance. The leadership quality learned was leading the people and managing the process through listening empathetically and being persistent. The skills gained were mastering four foundational behaviors: "Demonstrate respect, listen first, clarify expectations, and practice accountability" (Kogan, Blakemore, & Wood, 2015, p. 23).

## Project Plan-Method

The project design was a pre-post comparison of outcomes of opioid usage, pain scores, and nurses' self-efficacy after nurse training and implementation of aromatherapy. A nurse self-efficacy survey was delivered to nurses as paper forms before and after aromatherapy training and approximately 4 weeks after the training. Electronic health records were examined before and after the implementation of aromatherapy, including demographics, pain scores, and average opioid use per patient per day in morphine equivalents. The implementation of aromatherapy started from the establishment of practice guidelines setting the new standard of care, describing the process for nurses in offering personal aroma inhalers to patients in the post-surgery unit as part of complementary pain relief care to patients who consented. The aromatherapy inhalers are sealed, small, plastic tubes pre-infused with essential oils on a cotton wick. Once the sealed tube is opened, the patient can inhale the essential oil lavender without the scent diffusing broadly around them. Nurses taught patients to breathe through the inhaler for 10 minutes when they felt discomfort or pain. The therapy can occur as often as every hour or 2 hours (see Appendix D).

The General Self-Efficacy (GSE) scale compares nurses' self-efficacy before and after their essential oil therapy training and 4 weeks after completing the training. The GSE score 4

weeks after training helps evaluate the nurses' continued comfort level with essential oil therapy. The GSE was developed by Schwarzer and Jerusalem in 1979, with a translated English version available in 1995. The GSE measures nurses perceived self-efficacy in performing tasks at various levels of difficulty and while coping with adversity (Schwarzer & Jerusalem, 1995). With 10 items measured on a 4-point Likert scale, nurses respond to each survey question and generate a final score of 10-40. The score reflects their comfort and confidence in applying essential oil therapy and actualizing its pain/discomfort management feature (see Appendix E).

Numeric pain scores were collected from the EHR. Patients rated their pain during standard of care using a scale of 0-10 with 10 as the “worst” pain. The numeric rating scale is commonly used and easy to document (Karcioglu, Topacoglu, Dikme, & Dikme, 2018). It is broadly validated across patient types and considered as “intuitively interpretable and meet regulatory requirements for pain assessment and documentation” (Karcioglu et al., 2018, p. 708). Patients’ pain scores were assessed in clinical practice before and after opioid administration and before and daily while using lavender essential oil therapy. Documentation of pain scores related to aromatherapy was created explicitly by nurses only for this project (see Appendix F).

Opioid usage data were collected from the EHR and converted to morphine equivalents by a pharmacist. The study site pharmacist/project team member withdrew the opioid utilization for all pre and post-implementation from EHR records through the Omnicell dispensing system and calculated an average per patient per day in morphine equivalents.

Demographics collected from the EHR included medical record number, age, gender, race, marital status, and surgical type. A list of patient medical record numbers was sent via encrypted email to the pharmacist/study team member for those EHR included in the project.

After the project completes, this list was deleted by the pharmacist. All study variables are described in Appendix G.

The implementation timeline was planned and finalized with the preceptor and other team members in the first week. Roles and responsibilities were assigned to each study team member. There were some modifications to the timeline. The training was completed using a web-based application, which made it possible for nurses to attend the training for one of the four classes offered within 1week. Baseline sample selection and data collection took only 1 week instead of 3 weeks. The shortened time for training and baseline data collection resulted in an extra 2 weeks for nurses to practice with the essential oil administration. The original planned 35 patients were not able to be recruited because of surgery cancellations, study time constraints, and patients' ineligibility for individual surgeons. The cut-off time was based on the course deadline for the final report (see Appendix H).

The financial measure was the cost of the therapy. This project was carried out within the ASU nursing budget. The hospital purchasing department made the purchase of essential oil and supplies for 200 dollars. The nurse training cost is estimated as follows:

1. Two educators at 10 hours each at $100 per hour=$1,000
2. 38 staff nurses at 1hour education time at $60 per hour=$2280
3. Hand-out costs for surveys and consents=$86.70

The total cost was approximately $3566.70. The cost was included in the nursing department's budget as a nursing EBP project. There was no charge to patients (see Appendix I).

**Barriers and Facilitators**

The notable barriers this project encountered included the delay of the Institutional Review Board (IRB) approval;

IRB approval of research determination required patient informed consent. Nurses who took care of the patients were not eligible to have patients signed consent.

To overcome the barriers, the study team members scheduled a weekly meeting to discuss and update the study protocol and implementation plan. While waiting for the COVID-19 hold on elective surgeries to be lifted, study team members prepared nurse training curriculum and purchased required project supplies. The team recruited a pre-op educator to consent to patients. Other team members presented to the unit and obtained consent.

## Project Evaluation

Project evaluation is equally as critical as the implementation. Thomas and Bleich (2020) explained that "project evaluation is an effort to measure the impact of project-based change" (p. 227). This project was planned to evaluate the effect of lavender essential oil on pain or discomfort relief in surgical patients and possible opioid use reduction. The nurse self-efficacy evaluation pre, post, and 4-week post-training were added to examine the impact of this project on nurses' self-efficacy.

### Evaluation Tools

The tools to evaluate the pain score and nurse self-efficacy were the numeric rate scale and the GSE scale (Schwarzer & Jerusalem, 1995; Yu & Seol, 2017). The numeric rate scale was selected because it was easy to use and has high compliance (Hjermstad et al., 2011). The GSE scale was reliable with Cronbach's alpha results at high 0.80s, and it has been validated and "documented in numerous correlation studies" (Schwarzer & Jerusalem, 1995, Reliability & Validity sections).

### Sample Population

The project population was selected among adult post-surgery patients in ASU. Patients

were given information on the project and asked to consent for participation if they agreed. The informed consent was obtained in pre-op classes by a research assistant and upon arrival of the floor by other team members. All patients who signed consent and accepted the therapy were included in the project.

Demographic characteristics in pre and post-intervention groups had no statistical difference ($p>0.05$). A significant level of p value was set at <0.05 (see Table 1).

Table 1
*Demographic Characteristics of Participants*

| | Baseline group 100% (n=35) | Intervention group 100% (n=17) | *P* value |
|---|---|---|---|
| Age (group) % (n) | | | 0.9222 |
| 18-35 | 5 (2) | 11.7 (2) | |
| 36-55 | 22.9 (8) | 17.6 (3) | |
| 56-75 | 57.1 (20) | 58.8 (10) | |
| >=76 | 14.3 (5) | 11.7 (2) | |
| Age (median) | 60 | 62.5 | |
| Gender % (n) | | | 0.2225 |
| Male | 37.1 (13) | 35.3 (6) | |
| Female | 62.9 (22) | 64.7 (11) | |
| Race % (n) | | | 0.4702 |
| White | 71.4 (25) | 52.9 (9) | |
| Hispanic | 8.6 (3) | 17.6 (3) | |
| Black | 11.4 (4) | 11.7 (2) | |
| Asia | 5.7 (2) | 11.7 (2) | |
| Others | 2.9 (1) | 5.8 (1) | |
| Marital status % (n) | | | 0.2105 |
| Single | 29 (10) | 29.4 (5) | |
| Married | 54.3 (19) | 47.1 (8) | |
| Divorced/Widowed | 17.2 (6) | 23.5 (4) | |
| Surgery type % (n) | | | 0.463 |
| Orthopedic | 62.9 (22) | 82.4 (14) | |
| Thoracic/CVS | 5.7 (2) | 5.8 (1) | |
| Abdomen | 17.1 (6) | 0 | |
| Pelvic/urology | 11.4 (4) | 5.8 (1) | |
| Others | 2.9 (1) | 5.8 (1) | |

The pre-intervention group consisted of 35 patients. These 35 charts were reviewed, and demographic information collected, including age, gender, race, marital status, and surgical type. There were 63% of females and 37% males. Among the race groups, the majority of participants were White (71.4%). The remainder were distributed between Hispanic (8.6%), Black (11.4%), Asian (5.7%), and one other race (2.9%). More than half the patients (54.3%) were married, 29% were single, and 17.2% were divorced or widowed. Regarding surgical types, patients with orthopedic surgery covered 63% of the analyzed population. The rest were 17% with abdominal surgery, 20% of pelvic/urology, 10% of thoracic or vascular surgery, and 2.9% other surgery. The post-intervention group had similar demographic characteristics with more females than males (64.7% vs. 35.3%), the majority of the White race at 52.9%, and orthopedic surgery at 82.4%.

The project included adult patients at the age of 18-85, admitted to ASU after surgery. These patients required pain medication, accepted aromatherapy, and consented.

The project excluded those patients who are sensitive to scent or denied aromatherapy. Patients who needed pain medication on post-op day 3 and beyond were excluded. The exclusion was also applied to patients whose surgeon opted out of the project or did not want to participate.

Based on sample size estimation from previous literature, the goal of this project was to audit 35 EHR records for pre and 35 EHR records for post-implementation of essential oil therapy (70 records total). In earlier studies measuring the implementation of aromatherapy lavender inhalation for the procedure and surgical pain, two groups of authors calculated the minimal sample size as 17 and 21 using a power of 0.08 and significance level of 0.05 for their research (Ilter, Ovayolu, & Ovayolu, 2019; Yu and Soel, 2017). When increasing the power to

0.09, the sample size calculation resulted in 41 for a three-group study applying lavender or eucalyptus compared to a control group (Yayla & Ozdemir, 2019).

To create the pre-implementation patient group, a patient discharge list from January 1, 2020, to February 15, 2020, was created from Discern Analytics 2.0 (report from the hospital EHR application-Cerner). A randomized sample of 35 EHR records that met inclusion criteria were selected using a web-based random number generator tool. The selected records were audited for data collection of baseline demographic information, pain scores, and opioid usage. MRNs of the 35 selected records were sent to the site pharmacist/study team member via encrypted email. After calculating opioid usage, the list was deleted to maintain patient confidentiality.

**Summative Evaluation**

The evaluation was implemented to measure whether or not the individual patient outcome, numeral overall outcome measure, and qualitative outcome are demonstrated as expected. Nurse self-efficacy evaluation was added to the project in response to the hospital's intention to improve nurses' efficacy in taking care of patients using complementary modalities. The evaluation of the project outcome of pain and discomfort relief was a comparison between the baseline and the intervention group. The endpoint for data collection was modified to meet the course deadline and the lack of possible patients' enrollment when many surgeries were canceled due to the current pandemic. Patient enrollment was 3 weeks in duration. The final sample of study patients consisted of 17 patients who were compared with the baseline 35 patients.

The project closure meeting was conducted among the team members to evaluate the project's quality, share what has been learned, and which step of the process needs to improve.

Barriers to the implementation were discussed during and after the project conclusion. The harmonization between the project outcome and the hospital's strategic goal was evaluated to determine its clinical significance for the organization.

**Formative Evaluation**

The project protocol was approved by the facility's IRB on April 17, 2020 (see Appendix J-1). The administrative approval for the project implementation was obtained on April 23, 2020 (see Appendix J-2). The approval included data collection when the project determined appropriate. The suspension of elective surgery in response to the COVID-19 delayed patient enrollment. The required materials and supplies were purchased from identified manufacturers by hospital purchasing personnel.

A baseline group of 35 patients was selected, and data was collected. Demographic information and pre- and post-opioid pain scores for these 35 patients were collected. The patients' MRNs were sent to the site pharmacist to collect and calculate the total opioid usage per day for each patient.

Scheduled nurse training in April was postponed due to the delay in IRB approval. The spreading COVID-19 pandemic forced the nursing training from a classroom setting to web-based formats conducted in June through four visual meetings. All nurses assigned to the unit were invited to participate in the implementation of aromatherapy training and application of the essential oil to eligible patients. Nurses were asked to complete a self-efficacy survey three times: pre-training, post-training, and 4 weeks after the training. The survey was voluntary and anonymous. A CNS nurse educator provided the training with a content contribution of a certified aromatherapy nurse. At the training classes, nurses were invited by the class instructors

to voluntarily complete a GSE survey in a paper form immediately before and at the end of the training session (see Appendix E).

The survey's specific details are outlined in the Nurse Survey Information Sheet (see Appendix B). The nurses generated a unique identification code each time they took the survey to link their anonymity responses. The forms were placed in the CNS' dropbox by her office to protect the participants' confidentiality.

Four weeks after completion of the training, nurses who attended the class were requested to complete a third GSE survey in paper form (see Appendix E). The survey was collected from CNS's dropbox for analysis.

Two weeks after nurses completed the training, aromatherapy was offered to patients who met the inclusion criteria and signed consent. The original plan was to offer aromatherapy to all patients as a new evidence-based program. However, the IRB determined that this study protocol was research, and therefore required informed consent. Additionally, several surgeons requested not to have their patients included in the study. The trained nurses followed the aromatherapy practice guidelines and offered aromatherapy to consenting patients. The post-implementation data collection began concurrently after the implementation of aromatherapy. The principal investigator audited 22 EHR records in sequential order from the list of patients who used aromatherapy. Five of these patients were excluded from the analysis per study protocol. The collection of opioid use data followed the same procedure as the pre-implementation group. At its completion, a team evaluation of the project process confirmed the fidelity and expanded scope to measure nurse self-efficacy. The formative evaluation included weekly process monitoring and reporting. The project's performance was measured "against a planned schedule" and reached the final milestone despite barriers during the process (Meredith,

Mantel, Jr., & Shafer, 2017, p.271). Valuable lessons on project management and how to respond to unintended circumstances were learned from the project. Initial professional and personal development goals were met.

**Evaluation Results**

The results of 17 post-intervention patients were compared with 35 patients' chart review at the baseline (pre-intervention) group (see Table 2).

Table 2
*Pre- and Post-Intervention Group Pain Scores Reduction and Opioid Usage*

| | Pre-intervention Group (n=35) | | Post-intervention Group (n=17) | | |
|---|---|---|---|---|---|
| | Means | SD | Means | SD | *P*-value |
| Pre-opioids Pain Score | 33.37 | 26.20 | 51.53 | 36.73 | 0.0457 |
| Post-opioids Pain Score | 21.21 | 19.02 | 27.71 | 20.91 | 0.2711 |
| Pain score reduction % | 39.51 | 17.73 | 45.77 | 19.45 | 0.2529 |
| Opioids usage (mg) | 26.2 | 26.99 | 48.66 | 37.54 | 0.017 |

Pain score pre- and post-opioid administration, pain score reduction percentage, and opioid usage data were collected and calculated at baseline and project completion (see Table 2). On average, pain score changes in pre- and post-intervention groups amounted to a 39.51% reduction in the pre-group and a 45.77% reduction in the post-group. There was no statistically significant difference in pain reduction between the groups. However, when the pre-opioid pain scores in two groups were compared, the result showed a significant difference with a mean of 33.37 at pre- and 51.53 at the post-intervention group. With a higher pre-opioid and an equivalent post-opioid pain score, the result could be interpreted as a positive change with the intervention. The opioid usage results were 26.2mg and 48.66mg morphine equivalents per day per patient in two groups, which showed a statistically significant difference (see Table 2).

Nurse self-efficacy at three time points were evaluated and calculated using SPSS one-way ANOVA repeated measure analysis (see Tables 3-1, 3-2, 3-3).

Table 3-1
*Mauchly's Test of Sphericity*[a]

| Within Subject Effect | Mauchly's W | Approx.Chi-Square | df | Sig. | Epsilon[b] Greenhouse-Geisser |
|---|---|---|---|---|---|
| Nurse_Efficacy | 0.629 | 2.231 | 2 | 0.313 | 0.729 |

Note: Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.
a. Design: Intercept Within Subjects Design: Nurse Efficacy
b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Table 3-2
*Tests of Within-Subjects Effects*

| Source | | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared |
|---|---|---|---|---|---|---|---|
| Nurse Efficacy | Sphericity assumed | 17.238 | 2 | 8.619 | 2.181 | 0.156 | 0.267 |
| | Greenhous-Geisser | 17.238 | 1.458 | 11.820 | 2.181 | 0.174 | 0.267 |
| | Huynh-Feldt | 17.238 | 1.807 | 9.537 | 2.181 | 0.162 | 0.267 |
| | Lower-bound | 17.238 | 1.000 | 17.238 | 2.181 | 0.190 | 0.267 |
| Error (Nurse Efficacy) | Sphericity assumed | 47.429 | 12 | 3.952 | | | |
| | Greenhous-Geisser | 47.429 | 8.750 | 5.420 | | | |

Table 3-3
*Pairwise Comparison*

| (I)Nurse_ Efficacy | (J)Nurse_ Efficacy | Mean difference (I-J) | Std. Error | Sig. | 95% Confidence Interval for[a] Lower bound | 95% Confidence Interval for[a] Upper bound |
|---|---|---|---|---|---|---|
| 1 | 2 | -1.571 | 0.719 | 0.215 | -3.935 | 0.792 |
| | 3 | -2.143 | 1.079 | 0.282 | -5.689 | 1.403 |
| 2 | 1 | 1.571 | 0.719 | 0.215 | -.0792 | 3.935 |
| | 3 | -0.571 | 1.307 | 1.000 | -4.867 | 3.724 |
| 3 | 1 | 2.143 | 1.079 | 0.282 | -1.403 | 5.689 |
| | 2 | 0.571 | 1.307 | 1.000 | -3.724 | 4.867 |

Note: Based on estimated marginal means, a. Adjustment for multiple comparisons: Bonferroni.

Mauchly's sphericity test showed that the assumption was met, $X^2(2)=2.32$, p=0.313. The assumption was that the relationship between the different pairs of conditions was similar (see Table 3-1). In tests of within-subject effects, F ratio>1 at 2.18 indicated the time points would have had a significant effect on nurse efficacy. However, the significance level>0.05 at 0.156 resulted in no difference between conditions (see Table 3-2). Partial Eta Squared at 0.267, which was higher than 0.14, indicated large effects. Therefore, there was no significant main effect of each time point on nurse efficacy ($F(2,10)=2.18$, $p=0.156$, $\eta p^2=0.267$) (see Table 3-2). There was no significant difference between any of the three pairs (see Table 3-3).

Due to a small sample size of only seven nurses who completed surveys at the three points, the statistical results might not be representative. A paired t-test was performed to evaluate the difference between two time- points pre- and post-training. The test led to a statistically significant difference between pre-training and post-training results (*p* value=0.04) (see Table 3-4).

Table 3-4
*Nurse Efficacy Paired t-test on Pre-training and Post-training*

| | Means | SD | *P*-Value |
|---|---|---|---|
| Pre-training (n=18) | 32.11 | 3.6765 | 0.04 |
| Post-training (n=18) | 33.61 | 3.7595 | |

Pain score of eight patients from essential oil therapy documentation indicated a statistically significant pain relief. (see Table 4). A total of 11 participants expressed subjective positive responses to the therapy.

Table 4
*Pain Scores from Essential Oil Therapy Documentation*

| | Means | SD | *P*-Value |
|---|---|---|---|
| Preintervention (n=8*) | 6.125 | 2.9001 | 0.0052 |
| Postintervention (n=8) | 2.75 | 2.9641 | |

*the number of patients who are eligible for data analysis

**Data Analysis**

The descriptive variable measurement included pre and post-intervention groups' patient demographic information, pre and post-opioid pain scores, opioid usage, and nurse self-efficacy pre, post-training, and 4-week after training. (see Appendix G). The demographic information included: age, gender, race, marital status, and surgical type. (see Table 1).

A statistician from the corporate research institute was consulted about the statistical analysis. He taught how to perform a t-test and sent an interactive Excel template for later use during data analysis. The DNP student was able to conduct statistical calculations and data analysis. Statistical t-test was used to calculate means, standard deviations, and a *p*-value to determine if there was a statistical difference. If *p* value was less than 0.05, the result was statistically significant. The measures were pre and post-intervention groups' pain scores, pain score reduction percentage, and opioid usage in morphine equivalence per patient day.

After enrolled patients' data were collected in the data collection Excel file, a t-test was applied to compare the means of two different groups' (baseline and study groups) morphine equivalent opioid usage, pre, and post pain scores. Nurse surveys at three time-points were converted to an SPSS file and analyzed using SPSS software version 26 for a one-way repeated ANOVA analysis for a comparison at pre, post, and 4weeks post-training. The statistical significance of each metric was analyzed and calculated. A paired t-test was used to calculate the

mean scores of nurse self-efficacy pre and post-training. The positive statistical difference indicated the effectiveness of the provided therapy was confirmed.

All audited EHR data and nurse surveys were entered into a Microsoft Excel file (See Appendix K). No PHI or MRNs were included in the analytical dataset. The data's privacy and confidentiality have been maintained by storing data in electronic files on a hospital password-protected computer. The study lead investigator controlled the access to the Excel files and allowed access for the project team only.

Data were kept and stored on a hospital password-protected computer, safeguarded with a password and locked after use to protect the data and patients' information. The forms identifying the study patients were placed in a secure repository for shredding per the hospital policy after the required data were collected. As previously mentioned, no PHI was included in the analytical dataset. The list with MRNs used for auditing data was destroyed by the pharmacist and deleted to be not connecting to the final analyzed dataset. Patients' right to privacy and confidentiality were protected at all times, following facility and research institute policies.

## Discussion and Implications

The outcome measures indicated a meaningful usage of essential oil therapy: 1) Pain scores reduction was found within the pre-intervention group but a more clinically significant reduction in the post-intervention group; however, there is no statistically significant difference in pain reduction between the groups; 2) Opioid usage increased in the post-intervention group. The result was due to increased patient-controlled analgesia (PCA) use and higher pain severity at the pre-opioid time; Three out of the 17 analyzed patients in the post-intervention group used PCA with a dose of 326mg. Their usages were counted for 38.8% of the total doses. In the baseline group, five patients did not require opioids, and the highest dose used was 132 mg. In

the post-intervention group, the range of opioid usages was from 3.3 mg to 124.5mg. The median usage in the two groups was 26.2 in the baseline group and 36.3 in the post-intervention group. 3) Nurse self-efficacy indicated no statistical significance in three timeframes with a very small sample size (n=7). There was statistically significant between pre and post-training with a sample of 18 nurses.

The essential oil therapy-specific documentation was not completed on every patient. The results of the eight included patients with documented pre, and post-assessment pain scores indicated a significant decrease of 55.1%. Some float nurses cared for these patients and had not been trained, but some wrote a regular nursing progress note indicating the use of essential oil therapy. Among the 11 narrative responses of the included patients, the common themes from the documentation were “relaxing,” “calming," and “enjoyable scent.” One patient commented that the hospital should have provided therapy for everyone a long time ago.

The planned pain reduction was not identified by statistical analysis as the literature review indicated, however, lavender essential oil was effective and safe in managing PSP (Gorji et al., 2015; Hasanzadeh et al., 2015; Kim et al., 2007; Reynolds, Parker, Wells, & Card, 2018; Tisserand & Balacs, 1995; Yu & Seol, 2017). The results could be attributed to the use of PCA and higher severity of pre-surgery pain or physical condition because the post-intervention group included patients who were discharged to a skilled nursing facility instead of home directly. However, the patient’s positive clinical response to the therapy indicated a need to further evaluate usage in an expanded patient population in other units or hospitals. The nurse self-efficacy survey did not result in an improvement of self-efficacy at three time-points. A small sample of only seven nurses (18%) who returned the survey three times might contribute. Presumably, nurses were not motivated to participate actively. Due to the COVID-19 pandemic,

nurses found their patients' acuity was higher than previous hospitalized patients. Patients' care was more demanding. The training was provided over a video application rather than a face-to-face format. When calculating those nurses' responses who completed at least two surveys, the results indicated an improvement from pre to post-training. The results warranted a further implementation of the project when the patient population is more stable and predictable.

The limitations of the project were a small patient and nurse sample size, a single nursing unit, and lack of a standardized documentation tool for aromatherapy.

At the beginning of the implementation, there were not enough surgical patients when elective surgeries were on hold due to the COVID-19 pandemic. Some doctors opted out of the project leading to a reduction in eligible patients. The small sample size decreased the reliability of the statistical analysis. The fact that only the team members, instead of floor nurses, could obtain consent changed when patients consented and were offered the therapy. The DNP student could not physically go to the unit every day to provide training to patients and obtain consent. Other team members might be available during the day but not after regular working hours. Some consents were collected on the morning of post-op day 1. Patients who were provided the therapy on the day had more than a 12-hour gap without essential oil usage. Therefore, these patients' opioid usage might not be accurate as they were provided therapy immediately post-surgery upon arrival at the unit. Nurse training was through a web-based format that was new to some of the nurses. Not having an in-person class may have impacted the completion of the self-efficacy survey. There was no specific available documentation tool. Nurses in the unit were trained to create one for their documentation. However, when nurses floated from other units and were not trained, they did not know how to document for the study.

**Implications for Nursing and Healthcare**

PSP has been prevalent in the hospital and all healthcare systems. Essential oil therapy provided a useful tool for nurses to offer to their patients. Nurses' self-efficacy in addressing their patients' pain was improved through the implementation of this project (pre- and post-training). Patients with PSP were satisfied with the care and complementary regime they received. In addition to essential oil therapy usage in other healthcare systems, as discussed earlier in this report, this project also offered an essential tool for nurses and their patients for their care needs. Nursing as an instrument of healing was actualized in the project when they practiced the empathy, presence, and empowerment principles of aromatherapy and provided essential oil to their patients.

To expand the evaluation of essential oil use, this study team worked with another hospital in Arizona to duplicate the project using the same protocol. The goal is to combine the data from both facilities. The Arizona hospital has not had an opportunity to implement the protocol due to the current pandemic.

Additional nursing units and additional essential oil options are needed to expand the program. To increase the project's reliability, the Arizona hospital should consider mitigating or eliminating the project's barriers and limitations. If nurse self-efficacy is included in their study, they should have a separate training section. The educator should spend time introducing the survey tool. Making time available for trained nurses to obtain patients' consent could be another strategy. Waiting until surgery volume is more stable may also impact the number of eligible study patients. Surgeons should be well informed and prepared to participate. An essential oil therapy-specific documentation form can be created with the information technology department's assistance before the project implementation.

## Dissemination

The results were shared among the group members at the project closure. There are multiple options and forums for further dissemination. Smith-Stoner (2018) suggested traditional and virtual oral methods and traditional and virtual text methods. From the suggestion list, oral presentations to local and regional professional conferences will be one option. Presenting the study results at the study hospital would be an appropriate place to start. Such conferences as The National Association of Holistic Aromatherapy (NAHA) conference, the Academy of Integrative Health & Medicine Annual conference, Surgical Nursing conference, and Holistic Nursing conference will be considered as the next step.

The virtual oral presentation can be carried out via screen capture instructional video (Smith-Stoner, 2018). A nurse learning module for continuing education hours through an organization's distance learning center or a webinar for a broader audience in the profession will be appropriate.

Text sharing for dissemination can be implemented through an article for publication or article of lessons learned for future students (Smith-Stoner, 2018). The publication can be a submission to the university's SOAR program and other relevant professional journals. The possible journals include the *Journal of Holistic Nursing*, *Holistic Nursing Practice, Journal of Alliance of International Aromatherapists, Journal of Orthopedic Nursing,* and *Journal of Alternative and Complementary Therapy*.

The journals selected to submit a manuscript of this DNP scholarly project are specialized in complementary therapy with a professional audience. *The Journal of Orthopedic Nursing* is selected because most of the participants in the project were persons with orthopedic surgery. The submission guidelines will be followed. The project is appropriate for these

journals because it promotes holistic nursing and complementary therapy to the current treatment plan of care. There were similar articles published in the selected journals. One example is titled "The Effect of Listening to Music on Postoperative Pain in Adult Orthopedic Patients" by a DNP (Schneider, 2018). The article used a similar pain measurement scale and statistical methods.

A reflective sharing of the journey from start to completion of the project will be written out. What has been learned from the process, and what can be taught to others will be shared.

The virtual text formats for dissemination can be newsletters, and articles for the public (Smith-Stoner, 2018). The hospital and corporate newsletters can be utilized. Writing articles for the public can also be a method to disseminate the project.

## Conclusion

By applying the JHNEBP model, a practice question was raised: ""In an acute hospital surgical setting, does essential oil therapy complement pain and discomfort relief comparing to conventional pain management alone after 6 weeks?" A literature search was performed, researched and non-researched evidence was analyzed for a recommendation, which led to the intervention of essential oil therapy for post-surgical pain. The plan for implementation and evaluation was discussed in the paper.

An evidence-based practice change project was established using the JHNEBP model. A matching MRM theory was applied to the project. Kotter's change model guided the implementation of the planned project. The implementation of essential oil therapy demonstrated a clinically significant reduction in pain scores, but not a reduction in average daily opioid use. Nurse self-efficacy was improved post-training compared with pre-training, but the sample size was too small to demonstrate a statistical significance at three points in time pre-training, post-training, and four weeks post-training.

Additionally, patients and nurses expressed their satisfaction with essential oil therapy. The team plans to disseminate the results to other units in the hospital and other hospitals within the corporation for potential further use. A manuscript for publishing will be completed and submitted.

References

Acton, G.J., Irvin, B.L., Jensen, J.A., Hopkins, B.A., & Miller, E.W. (1997). Explicating middle-range theory through methodological diversity. *Advances in Nursing Science, 19*(3), 78–85. Retrieved from http://prx usa.lirn.net/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=ccm&AN=107318196&site=eds-live

Allard, M.E., & Katseres, J. (2016). Using essential oils to enhance nursing practice and self-care. *American Journal of Nursing, 116*(2), 42-49.

Anselmo, J. (2013). Relaxation. In B.M. Dossey & L. Keegan. (Eds.) *Holistic Nursing: A Handbook for Practice. (*6th ed.*).* (pp. 327-362). Burlington, MA: Jones & Bartlett Learning

Baglien, J. Meeting the call for non-drug options in healthcare. In Alliance of International Aromatherapy Conference Proceedings. Minneapolis, Minnesota, USA, September 2019, pp.141-151

Battaglia, S. (2009). *The Complete Guide to Aromatherapy. (*2nd ed.*).* Brisbane, Australia: The International Center of Holistic Aromatherapy

Biçer, S., Ünsal, A., & Demir, G. (2015). The aromatherapy massage applied to the facial area upon headache severity among patients who suffered from headaches during hemodialysis. *International Journal of Caring Sciences*, *8*(3), 722-728. Retrieved from https://search.proquest.com/docview/1732805734?accountid=158603

Boyce, V. J., & Natschke, M. (2019). Establishing a comprehensive aromatherapy program in patient care settings. *Pain Management Nursing, 20*(6), 532–540. https://doi.org/10.1016/j.pmn.2019.06.017=

Buckle, J. (1998). Clinical aromatherapy and touch: Complementary therapies for nursing practice. *Critical Care Nurse, 18*(5), 54-61. Retrieved from https://search.proquest.com/docview/228211001?accountid=158603

Buckle, J. (2013). Aromatherapy. In B.M. Dossey & L. Keegan. (Eds.) *Holistic Nursing: A Handbook for Practice. (*6th ed.*).* (pp. 563-581). Burlington, MA: Jones & Bartlett Learning

California Board of Registered Nursing. (2000). The BRN Report, 13 (1). Retrieved from: https://www.rn.ca.gov/pdfs/forms/brn500.pdf

Coles, J. (2019). C3 Non-pharmacological acute pain control utilizing nurse-led aromatherapy in coronary bypass graft patients: A pilot study...28th National Conference of American Society for Pain Management Nursing, September 26-29 2018, Bonita Springs, Florida. *Pain Management Nursing, 20*(2), 101. doi:10.1016/j.pmn.2018.11.041

Dang, D., & Dearholt, S. (2017). *Johns Hopkins Nursing evidence-based practice: Model and guidelines* (3rd ed.). Indianapolis, IN: Sigma Theta Tau International

Dignity Health. (n.d.). About us: Mission, Vision, and Value. Retrieved from: https://www.dignityhealth.org/sacramento/about-us/mission-vision-and-values

Dimitriou, V., Mavridou, P., Manataki, A., & Damigos, D. (2017). The use of aromatherapy for postoperative pain management: A systematic review of randomized controlled trials. *Journal of PeriAnesthesia Nursing, 32*(6), 530–541. https://doi.org/10.1016/j.jopan.2016.12.003

Dusek, J.A., Griffin, K.H., Finch, M.D., Rivard, R.L., & Watson, D. Integrative modalities: Saving money and reducing hospital stays. In Alliance of International Aromatherapy Conference Proceedings. Minneapolis, Minnesota, USA, September 2019, pp.155-165

Erickson, M.E. (2014). Modeling and role-modeling. In M.R. Alligood (Ed.), *Nursing Theorists, and Their Work (*8th ed. pp. 496-519*).* St. Louis, MO: Elsevier.

Gan, T.J. (2017). Poorly controlled postoperative pain: Prevalence, consequences, and prevention. *Journal of Pain Research, 10*, 2287-2298. Retrieved from: https://www.dovepress.com/poorly-controlled-postoperative-pain-prevalence-consequences-and-preve-peer-reviewed-article-JPR

Gorji, M.A.H., Ashrastaghi, O.G., Habibi, V., Charati, J.Y., Ebrahimzadeh, M.A.& Ayasi, M. (2015). The effectiveness of lavender essence on sternotomy related pain intensity after coronary artery bypass grafting. *Advanced Biomedical Research, 4*, 127. doi: 10.4103/2277-9175.158050

Harsoor, S.S. (2011). Emerging concepts in postoperative pain management. *Indian Journal of Anesthesia, 55* (2), 101-103. Retrieved from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3106378/?report=printable

Hasanzadeh, F., Kashouk, N.M., Amini, S., Asili, J., Emami, S.A.,…Sahebkar, A. (2016). The effect of cold application and lavender oil inhalation in cardiac surgery patients undergoing chest tube removal. *EXCLI Journal*, 15: 64-74. Retrieved from doi:10.17179/excli2015-748

Healthgrades. (2019). Mercy General Hospital. Retrieved from https://www.healthgrades.com/hospital-directory/california-ca-northern/mercy-general-hospital-hgst4b418d46050017

Henningfield, J.E., Ashworth, J.B., Garlach, K.K., Simone, B., & Schnoll, S.H. (2019). The nexus of opioids, pain, and addiction: Challenges and solutions. Preventive Medicine, 128 (2019), 105852. doi: 10.1016/j.ypmed.2019.105852

Hjermstad, M.J., Fayers, P.M., Haugen, D.F., Caraceni, A., Hanks, G.W., Loge, J.H.,…Kaasa, S. (2011). Studies comparing numerical rating scales, verbal rating scales, and visual analogue scales for assessment of pain intensity in adults: A systematic literature review. Journal of Pain and Symptoms Management, 41 (6), 1073-1093. doi: 10.1016/j.jpaonsymman.2010.08.16

Hozumi, H., Hasegawa, S., Tsunenari, T., Sanpei, N., Arashina, Y., Takahashi, K., … Tomimatsu, S. (2017). Aromatherapies using Osmanthus fragrans oil and grapefruit oil are effective complementary treatments for anxious patients undergoing colonoscopy: A randomized controlled study. *Complementary Therapies in Medicine, 34*, 165–169. https://doi.org/10.1016/j.ctim.2017.08.012

Ilter, S. M., Ovayolu, Ö., & Ovayolu, N. (2019). The effect of inhaler aromatherapy on invasive pain, procedure adherence, vital signs, and saturation during port Catheterization in oncology patients. *Holistic Nursing Practice, 33*(3), 146–154. https://doi.org/10.1097/HNP.0000000000000322

Institute of Medicine of the National Academies. (2004). Complementary and alternative medicine in the United States. Washington, DC: The National Academies Press. Retrieved from www.nap.edu.

Johnson, J. R., Rivard, R. L., Griffin, K. H., Kolste, A. K., Joswiak, D., Kinney, M. E., & Dusek, J. A. (2016). The effectiveness of nurse-delivered aromatherapy in an acute care setting. *Complementary Therapies in Medicine, 25*, 164-169. doi:10.1016/j.ctim.2016.03.006

Joint Commission on Accreditation of Healthcare Organizations (TJC). (2019). JACHO facts about joint commission accreditation standards for health care organizations: Pain assessment and management. Retrieved from

https://www.jointcommission.org/facts_about_joint_commission_accreditation_standards_for_health_care_organizations_pain_assessment_and_management/

Kallush, A., Riley, C. A., & Kacker, A. (2018). Role of complementary and alternative Medicine in otolaryngologic perioperative. *The Ochsner Journal, 18*(3), 253–259. doi:10.31486/toj.18.0014

Karcioglu, O., Topacoglu, H., Dikme, O., & Dikme, O. (2018). A systematic review of the pain scales in adults: Which to use? *American Journal of Emergency Medicine, 36*(4), 707–714. doi:10.1016/j.ajem.2018.01.008

Kim, J. T., Ren, C. J., Fielding, G. A., Pitti, A., Kasumi, T., Wajda, M., . . . Bekker, A. (2007). Treatment with lavender aromatherapy in the post-anesthesia care unit reduces opioid requirements of morbidly obese patients undergoing laparoscopic adjustable gastric banding. *Obesity Surgery*, *17*(7), 920-5. doi:10.1007/s11695-007-9170-7

Kogon, K., Blakemore, S., & Wood, J. (2015). *Project management for the unofficial project manager*. Dallas, TX: BenBella Books.

Kotalik, J. (2012). Controlling pain and reducing misuse of opioids: ethical considerations. *Canadian family physician Medecin de famille canadien, 58*(4), 381–e195

Kotter, J. (2012). *Leading Change*. Boston, MA: Harvard Business Review Press.

Lakhan, S.E., Sheafer, H., & Tepper, D. (2016). The effectiveness of aromatherapy in reducing pain: A systematic review and meta-analysis. *Pain Research and Treatment*, 2016. http://dx.doi.org/10.1155/2016/8158693

Lederer, A.K., Schmucker, C., Kousoulas, L., Fichtner-Feigl S, Huber R. (2018). Naturopathic treatment and complementary medicine in surgical practice—a systematic review. *Dtsch Arztebl Int 2018;* 115: 815–21. doi: 10.3238/arztebl.2018.0815

Meghani, N., Tracy, M. F., Hadidi, N. N., & Lindquist, R. (2017). Part II: The effects of aromatherapy and guided imagery for the symptom management of anxiety, pain, and insomnia in critically ill patients: An integrative review of current literature. *Dimensions of Critical Care Nursing, 36*(6), 334–348. https://doi.org/10.1097/DCC.0000000000000272

Meredith, J. R., Mantel, S. J., & Shafer, S. M. (2017). *Project management in practice* (6th ed.). Hoboken, NJ: John Wiley & Sons.

The National Center for Complementary and Integrative Health. (n.d.). NCCIH, 2016 Strategic Plan. Retrieved from: https://www.nccih.nih.gov/about/nccih-2016-strategic-plan

Natschke, M., & Boyce, V. (2019). A multifaceted approach to pain management using aromatherapy: A train the trainer model. In Alliance of International Aromatherapy Conference Proceedings. Minneapolis, Minnesota, USA, September 2019, pp.125-139

Olapour, A., Behaeen, K., Akhondzadeh, R., Soltani, F., Al Sadat Razavi, F., & Bekhradi, R. (2013). The effect of inhalation of aromatherapy blend containing lavender essential oil on cesarean postoperative pain. *Anesthesiology and pain medicine, 3*(1), 203–207. doi:10.5812/aapm.9570

Pierce, A. (2019). Is there a place for essential oils in patient care? Fact vs. fiction. *Dental Academy of Continuing Education*. February 2019, Retrieved from RDHMAG.com

Reynolds, J., Parker, B., Wells, N., & Card, E. (2018). Using aromatherapy in the clinical setting: Sense of scents. *American Nurse Today, 13* (6). Retrieved from https://www.americannursetoday.com/aromatherapy-clinical-set

Rice, K. L., Castex, J., Redmond, M., Burton, J., Guo, J. W., & Beck, S. L. (2019). Bundling interventions to enhance pain care quality (BITE Pain) in medical-surgical patients. *The Ochsner Journal, 19*(2), 77–95. doi:10.31486/toj.18.0164

Royal Cornwall Hospital Trust. (2018). *Aromatherapy and massage midwifery clinical guideline*s. Version 3. Retrieved from: https://doclibrary-rcht.cornwall.nhs.uk/DocumentsLibrary/RoyalCornwallHospitalsTrust/Clinical/MidwiferyAndObstetrics/AromatherapyAndMassageMidwiferyClinicalGuideline.pdf

Salamati, A., Mashouf, S., & Mojab, F. (2017). Effect of inhalation of lavender essential oil on vital signs in open-heart surgery ICU. *Iranian Journal of Pharmaceutical Research, 16* (1), 404-409. doi: 10.22037/ijpr.2017.1952

Salamati, A., Mashouf, S., Sahbaei, F., & Mojab, F. (2014). Effects of Inhalation of Lavender Essential Oil on Open-heart Surgery Pain. *Iranian Journal of Pharmaceutical Research: IJPR, 13*(4), 1257–1261. doi: 10.22037/ijpr.2014.1575

Sansone, P., Pace, M.C., Passavanti, M.B., Pota, V., Colella, U., & Aurilio, C. V. (2015). Post-surgical pain epidemiology and incidence of acute and chronic post-surgical pain. *Annals of Italian Chiropractic, 86*, 285-292. Retrieved from https://www.researchgate.net/publication/281614967_Epidemiology_and_incidence_of_acute_and_chronic_Post-Surgical_pain/download

Scheidel, C., & Brown, P. (2019). Clinical aromatherapy in an acute care hospital. In Alliance of International Aromatherapy Conference Proceedings. Minneapolis, Minnesota, USA, September 2019, pp.125-139

Schneider, M.A. (2018). The effect of listening to music on postoperative pain in adult orthopedic patients. *Journal of Holistic Nursing, 36* (1): 23-32.

doi: 10.1177/0898010116677383

Schwarzer, R., & Jerusalem, M. (1995). The general self-efficacy scale (GSE) (English Version). Retrieved from http://userpage.fu-berlin.de/~Ehealth/engscal.htm

Seyyed-Rasooli, A., Salehi, F., Mohammadpoorasl, A., Goljaryan, S., Seyyedi, Z., & Thomson, B. (2016). Comparing the effects of aromatherapy massage and inhalation aromatherapy on anxiety and pain in burn patients: A single-blind randomized clinical trial. Burns *Journal of The International Society For Burn Injuries*, *42*(8), 1774–1780. https://doi.org/10.1016/j.burns.2016.06.014

Soltani, R., Soheilipour, S., Hajhashemi, V., Asghari, G., Bagheri, M., & Molavi, M. (2013). Evaluation of the effect of aromatherapy with lavender essential oil on post-tonsillectomy pain in pediatric patients: A randomized controlled trial. *International Journal of Pediatric Otorhinolaryngology*, *77*(9), 1579–1581. https://doi.org/10.1016/j.ijporl.2013.07.014

Stevensen, C. (1995). Non-pharmacological aspects of acute pain management. *Complementary Therapies in Nursing and Midwifery*, *1* (3): 77-84. https://doi.org/10.1016/S1353-6117(05)80081-2

Stratton, T. P., Palombi, L., Blue, H., & Schneiderhan, M. E. (2018). Ethical dimensions of the prescription opioid abuse crisis. *American Journal of Health-System Pharmacy*, *75*(15), 1145–1150. https://doi-org.prx-usa.lirn.net/10.2146/ajhp170704

Tanvisut, R., Traisrisilp, K., & Tongsong, T. (2018). Efficacy of aromatherapy for reducing pain during labor: A randomized controlled trial. *Archives of Gynecology and Obstetrics*, *297*(5), 1145-1150. doi:10.1007/s00404-018-4700-1

THE NEW OPIOID PROBLEM: Prescription drugs gone wrong (2018). In Grey House Publishing (Ed.), *Opinions throughout history: Drug use & abuse*. Grey House Publishing. Retrieved from: https://prx-usa.lirn.net/login?qurl=https%3A%2F%2Fsearch.credoreference.com%2Fcontent%2Fentry%2Fgreyothdua%2Fthe_new_opioid_problem_prescription_drugs_gone_wrong_2018%2F0%3FinstitutionId%3D9628

Thomas, P.L., & Bleich, M. (2020). Measuring the value of projects within organizations, healthcare systems, and globally. In J. L. Harris, L. A. Roussel, C. Dearman, & P. L. Thomas (Eds.). *Project planning and management: A guide for nurses and interprofessional team* (3rd ed.) (pp. 221–232). Burlington, MA: Jones & Bartlett Learning.

Tisserand, R., & Balacs, T. (1995). *Essential Oil Safety: A Guide for Healthcare Professionals*. New York: Churchill Livingstone.

White, K.M. (2016). Evidence-Based Practice. In K.M. White, S. Douley-Brown, & M.F. Terhaar. *Translation of Evidence into Nursing and Health Care* (pp. 3-24). New York, NY: Springer Publishing Company

Yayla, E. M., & Ozdemir, L. (2019). Effect of inhalation aromatherapy on procedural pain and anxiety after needle insertion into an implantable central venous port catheter: A quasi-randomized controlled pilot study. *Cancer Nursing, 42*(1), 35–41. https://doi.org/10.1097/NCC.0000000000000551

Yu, S.H., & Seol, G.H. (2017). Lavandula angustifolia Mill. Oil and its active constituent Linalyl Acetate alleviate pain and urinary residue sense after colorectal cancer surgery: A

randomized controlled trial. *Evidenced-Based Complementary and Alternative Medicine*, 2017, 1-7. http://dx.doi.org/10.1155/2017/3954181

# Appendix A

## Summary of Primary Research Evidence

| Citation | Design, Level Quality Grade | Sample Sample Size | Intervention Comparison | Theoretical Foundation | Outcome Definition | Usefulness Result Key Findings |
|---|---|---|---|---|---|---|
| Baglien, J. Meeting the call for non-drug options in healthcare. In Alliance of International Aromatherapy Conference Proceedings. Minneapolis, Minnesota, USA, September 2019, pp.141-151 | Level V<br><br>Clinician experience | N/A | Non-drug options for healthcare, including aromatherapy | Clinical aromatherapy | Aromatherapy is effective non-drug therapy for pain | Recommended for use in a clinical setting |
| Dusek, J.A., Griffin, K.H., Finch, M.D., Rivard, R.L., & Watson, D. Integrative modalities: Saving money and reducing hospital stays. In Alliance of International Aromatherapy Conference Proceedings. Minneapolis, Minnesota, USA, September 2019, pp.155-165 | Level V<br><br>Clinician experience and financial evaluation | 2730 | Integrative modalities (IM) (aromatherapy included)<br>Patients without IM | Pain relief and Cost-effective analysis | 898 dollars saving per admission | Recommended integrative medicine, including aromatherapy |
| Gorji, M.A.H., Ashrastaghi, O.G., Habibi, V., Charati, J.Y., Ebrahimzadeh, M.A.& Ayasi, M. (2015). The effectiveness of lavender essence on sternotomy related pain intensity after coronary artery bypass grafting. *Advanced Biomedical Research*, *4*, 127. doi: 10.4103/2277-9175.158050 | Randomized pretest and posttest-controlled trial.<br><br>Level I<br><br>Q-B, Good | Adults with coronary artery bypass grafting (CABG)<br>50 | Lavender with Supplemental oxygen vs supplemental oxygen only | Affect patients physically and psychologically Holistic nursing principle | The change in pain score on a VAS | Pain perception intensity was lower in intervention than control group |
| Hasanzadeh, F., Kashouk, N.M., Amini, S., Asili, J., Emami, S.A.,…Sahebkar, A. (2016). The effect of cold application and lavender oil inhalation in cardiac surgery patients undergoing chest tube removal. *EXCLI Journal*, 15: 64-74. Retrieved from doi:10.17179/excli2015-748 | Randomized controlled open label trial.<br><br>Level I<br><br>Q-B, Good | Adults post chest tube removal<br>80 | Four groups: 1. cold gel pack; 2. Inhale; 3. Cold gel and inhale; 4. Control group (not use either application) | Pain is a multi-dimensional phenomenon | The change on VAS; a modified-McGill pain questionnaire (SFM-MPQ) was used to evaluate pain quality; | Three interventional groups demonstrated significant pain and anxiety reduction |

| | | | | | | |
|---|---|---|---|---|---|---|
| Johnson, J. R., Rivard, R. L., Griffin, K. H., Kolste, A. K., Joswiak, D., Kinney, M. E., & Dusek, J. A. (2016). The effectiveness of nurse-delivered aromatherapy in an acute care setting. *Complementary Therapies in Medicine*, *25*, 164-169. doi:10.1016/j.ctim.2016.03.006 | The retrospective study, no control group. Time-dimensional design<br><br>Level III<br>Q-A, high | 3776 | Lavender; Ginger; Mandarin; Sweet Majoram; Combination | Aromatherapy as one modality of holistic nursing | Pain level change on VAS | Results show promising pain control |
| Kim, J. T., Ren, C. J., Fielding, G. A., Pitti, A., Kasumi, T., Wajda, M., . . . Bekker, A. (2007). Treatment with lavender aromatherapy in the post-anesthesia care unit reduces opioid requirements of morbidly obese patients undergoing laparoscopic adjustable gastric banding. *Obesity Surgery*, *17*(7), 920-5. doi:10.1007/s11695-007-9170-7 | A prospective randomized placebo con-trolled study<br><br>Level I<br><br>Q-B, Good | Laparoscopic adjustable gastric banding (LAGB)<br>54 | Lavender with oxygen vs oxygen with baby oil | pharmaco-physiologic and psycho-physiologic effect of essential oil | The pain score changes in VAS | The reduction of post-op pain perception and the demanding for opioids |
| Natschke, M.,& Boyce, V. (2019). A multifaceted approach to pain management using aromatherapy: A train the trainer model. In Alliance of International Aromatherapy Conference Proceedings. Minneapolis, Minnesota, USA, September 2019, pp.125-139 | Level V<br><br>Clinician experience | N/A | Aromatherapy and other complementary therapies for patients to select | Clinical aromatherapy | Aromatherapy is effective for pain | Recommended for use in a clinical setting |
| Olapour, A., Behaeen, K., Akhondzadeh, R., Soltani, F., Al Sadat Razavi, F., & Bekhradi, R. (2013). The effect of inhalation of aromatherapy blend containing lavender essential oil on cesarean postoperative pain. *Anesthesiology and pain medicine*, *3*(1), 203–207. doi:10.5812/aapm.9570 | A triple blind, randomized placebo-controlled trial<br><br>Level I<br><br>Q-C, low | Cesarean<br>60 | Lavender vs placebo | Complementary and multimodal pain management Lavender chemical property | The pain score changes in VAS | Pain score reduction in intervention group |
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|---|---|---|---|---|---|---|
| Salamati, A., Mashouf, S., Sahbaei, F., & Mojab, F. (2014). Effects of Inhalation of Lavender Essential Oil on Open-heart Surgery Pain. *Iranian Journal Of Pharmaceutical Research: IJPR*, *13*(4), 1257–1261. doi: 10.22037/ijpr.2014.1575 | A single-blind trial<br><br>Level II<br><br>Q-C, low | Adults open heart surgery 40 | Lavender pre-posttest, no control group | Aromatherapy for physical and psychological health. No invasive and less side effects | The pain score changes in VAS | No statistically difference pre- and post-intervention in pain reduction |
| Scheidel, C., & Brown, P. (2019). Clinical aromatherapy in an acute care hospital. In Alliance of International Aromatherapy Conference Proceedings. Minneapolis, Minnesota, USA, September 2019, pp.125-139 | Level V<br><br>Clinician experience | N/A | Aromatherapy in an acute care hospital | Clinical aromatherapy | Aromatherapy is effective for pain and other indications | Recommended for use in a clinical setting |
| Yu, S.H., & Seol, G.H. (2017). Lavandula angustifolia Mill. Oil and its active constituent Linalyl Acetate alleviate pain and urinary residue sense after colorectal cancer surgery: A randomized controlled trial. *Evidenced-Based Complementary and Alternative Medicine*, 2017, 1-7. http://dx.doi.org/10.1155/2017/3954181 | Randomized pretest and posttest-controlled trial.<br>Level I<br><br>Q-B, Good | Adult patients underwent robotic or laparoscopic surgery for Colorectal Cancer<br><br>44 | Lavender Almond oil solvent vs Routine pain medication | Utilize the property of lavender and the core component as a complementary therapy | The change in pain score on a VAS | Inhalation of Lavender and linalyl relieve postoperative pain significantly than control group |

Appendix B

Summary of Systematic Review

| Citation | Quality Grade | Question | Search Strategy | Inclusion/ Exclusion Criteria | Data Extraction and Analysis | Key Findings | Usefulness/ Recommendation/ Implications |
|---|---|---|---|---|---|---|---|
| Dimitriou, V., Mavridou, P., Manataki, A., & Damigos, D. (2017). The use of aromatherapy for postoperative pain management: A systematic review of randomized controlled trials. *Journal of PeriAnesthesia Nursing*, *32*(6), 530–541. https://doi.org/10.1016/j.jopan.2016.12.003 | Grade A | Aromatherapy for postoperative pain | PubMed and Cochrane databases | Inclusion: RCTs study of aromatherapy on postoperative pain; any surgical procedure; single essential oil or application; using VAS or numerical rating scale (NRS) Exclusion: another language other than English; animal study | Data extracted by two individuals | Mixed findings: some studies support and others not the recommendation of aromatherapy as a complementary addition | Five RCT support the aromatherapy for postoperative pain, others found not conclusive on the research question |
| | | | | | | | |
| Lakhan, S.E., Sheafer, H., & Tepper, D. (2016). The effectiveness of aromatherapy in reducing pain: A systematic review and meta-analysis. *Pain Research and Treatment*, 2016. http://dx.doi.org/10.1155/2016/8158693 | Grade A | Aromatherapy for postoperative pain | PRISMA and Cochrane guidelines | Inclusion: Aromatherapy for pain; in English; using a visual analog scale to measure pain Exclusion: no pain scale used; vague measures; measure for another problem with the same scale; case studies with no control; reported other conditions | Data for the non-pain measure was not extracted. Analysis using the standard mean difference and effect size | Aromatherapy for postoperative patients has significant pain control or significant higher satisfaction with pain management | Aromatherapy can be a safe addition to current pain management with cost-saving |
| | | | | | | | |

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|---|---|---|---|---|---|---|---|
| Lederer, A.K., Schmucker, C., Kousoulas, L., Fichtner-Feigl S, Huber R. (2018). Naturopathic treatment and complementary medicine in surgical practice—a systematic review. *Dtsch Arztebl Int 2018;* 115: 815–21. Doi: 10.3238/arztebl.2018.0815 | Grade B | What complementary therapy can be added to support surgical patients' symptom care, including pain and anxiety | Medline, Web of Science, Cochrane library | Different therapy included for symptoms related to surgery, pain, nausea/vomiting, anxiety and stress, wound healing | Data were from systematic review; Synthesis was made | Aromatherapy is useful for surgical pain and nausea vomiting; two studies found reduction of anxiety | There was no recommendation made for aromatherapy |
| | | | | | | | |
| Meghani, N., Tracy, M. F., Hadidi, N. N., & Lindquist, R. (2017). Part II: The effects of aromatherapy and guided imagery for the symptom management of anxiety, pain, and insomnia in critically ill patients: An integrative review of current literature. *Dimensions of Critical Care Nursing, 36*(6), 334–348. https://doi.org/10.1097/DCC.0000000000000272 | Grade A | Aromatherapy and guided imagery (GI) for management of pain, anxiety, and insomnia in critically ill patients | CINAHL, Medline, PubMed. Integrative therapies, anxiety, pain, insomnia, sleeplessness, aromatherapy | Include: Primary studies examining the effect of aromatherapy and GI on anxiety, pain, insomnia in ICU, adults; in English Hospice, Gyn/Ob patients excluded | Review only | Relief of symptoms listed | Aromatherapy is recommended for use in this population for pain and anxiety relief |
| | | | | | | | |
| Stevensen, C. (1995). Non-pharmacological aspects of acute pain management. *Complementary Therapies in Nursing and Midwifery, 1* (3): 77-84. https://doi.org/10.1016/S1353-6117(05)80081-2 | Grade C | Unknown | PubMed/USA library. Acute pain and aromatherapy | Reflective review | Not included | Aromatherapy as one complimentary modality | Some indication of pain relief; recommend for further research |

## Appendix C

## SWOT Analysis

| | |
|---|---|
| Strength<br>• A trained aromatherapy nurse<br>• A dedicated DNP student<br>• A senior director of nursing as a preceptor<br>• Clinical practice supports the implementation of aromatherapy<br>• Relationship with aromatherapy experts established | Opportunities<br>• Organizational support ready<br>• A team available<br>• National trend<br>• Situational and patient demanding<br>• Interprofessional collaboration demonstrated |
| Weakness<br>• Surgeons opted out | Threats<br>• Time constraint<br>• Video based training-less effective<br>• Untrained nurses<br>• Lack of documentation or completion of nurse survey |

# Appendix D

## Aromatherapy/Essential Oil Practice Guidelines

Mercy General Hospital

Subject: Essential Oil Therapy Guidelines

Departments: Nursing

Background:
Aromatherapy, using essential oils obtained from aromatic plants, is used to enhance patient sense of well-being and aid in the alleviation of physical, emotional, and spiritual discomfort as determined by a nursing assessment. Essential oils are not intended to treat or prevent illness or injury. The goal of essential oil therapy is to promote patient well-being and comfort. Essential oils can be used for a variety of symptoms such as pain, anxiety, nausea, sleeplessness, headache, or the desire for enhanced spiritual well-being. These guidelines support a pilot project for essential oil therapy administered through inhalation that will be implemented after IRB approval.

Patients or staff who have an allergy or sensitivity to the essential oil, a pulmonary condition (including asthma and COPD), or symptoms of migraines should not expose or be exposed to the triggering oil.

Only approved essential oils may be used for patient care and according to this guideline. Management of clinical aromatherapy treatment is not to be done using essential oils from an outside source or brought in by the patient or family.

Assessment for appropriateness and implementation of essential oil therapy will be initiated only by nursing staff who have completed training for this pilot project.

Procedure:

1. Essential oil therapy is within the RN scope of practice and does not require a provider order.

2. Inclusion criteria for pilot project:
    - Adults over the age of 18
    - Admitted for surgery or procedure

3. Essential oil contraindications/exclusions:
    - Topical application.
    - Oral ingestion.
    - Dissemination through infuser.
    - Patients experiencing migraine headaches.
    - Patients with allergy/sensitivity to the essential oil.
    - Pediatric patients.
    - Patients with pulmonary conditions, including asthma and COPD, unless otherwise approved by a provider.

4. Discuss risks and benefits of essential oils and their potential as a complementary therapy to patients' medical treatment. Therapy proceeds after patient agreement is obtained (Attachment A: Patient Education).

5. Implementation:

    - Obtain agreement from the patient and document agreement in the medical record.

- Essential oil selection is based on the following: (1) reason for use and desired potential outcome and (2) patient preference in regard to the essential oil.
- Assess patient for contraindications.

6. Safety:
   - Gloves are worn when handling essential oils.
   - Essential oils are kept in a cool, dark, and secure location when not in use (medication room).
   - Essential oil containers are labeled with supplier's name, common essential oil name, botanical name, date opened, and expiration date.
   - If essential oil container breaks or spills, use gloves, mask, and eye protection when cleaning up the spill. Refer to Safety Data Sheet (SDS) for specific instructions.
   - If essential oils come in direct contact with eyes or mucus membranes, wipe the area. If essential oils are ingested, DO NOT induce vomiting. The mouth should be rinsed with water, juice, or milk and follow SDS instructions.

7. Direct inhalation:
   - Perform hand hygiene and apply gloves.
   - Place cotton wick inside single patient use applicator.
   - Apply two (2) drops of one (1) essential oil on the cotton wick.
   - Quickly replace lid on essential oil container and return to storage location. The essential oil container should not leave the medication room.
   - Remove gloves and perform hand hygiene.
   - Add essential oil and patient label to inhalation applicator.
   - Place "essential oil therapy" signage outside patient room (Attachment B).
   - Instruct the patient to inhale the essential oil by taking slow, deep breaths through the nose for no greater than ten (10) minutes at a time and once per hour.
   - Instruct the patient to notify staff in regard to any change in condition, including but not limited to, a change in respiratory or cardiac status, headache, or itchy/watery eyes that may represent an adverse effect of the essential oil.
   - If adverse reactions related to the therapy occur in patients, visitors, or staff, discontinue therapy immediately by removing essential oil inhaler from the room. Affected individuals should be assessed and appropriate interventions taken.
   - The inhaler lasts approximately 48 hours and is discarded in the regular trash once the aroma is no longer present or detectable by smell. If the patient requests to continue essential oil therapy past 48 hours, then a new inhaler will be used.

8. Patient and Family Education:
   - Educate the patient/family on the essential oil purpose, benefits, and correct use. (Attachment A).
   - Place approved signage outside the patient's room to alert staff and visitors to essential oil therapy use (Attachment B).

9. Documentation (on progress note for essential oil therapy
   - Initial assessment is documented as follows:
     a. Indication for use,
     b. Patient agreement or refusal,
     c. Type of essential oil used,
     d. Pain/discomfort level,
     e. Patient response, and
     f. Education regarding therapy
   - Reassessment is performed and documented every shift while essential oil therapy is in use as follows:
     a. Indication for use,
     b. Type of essential oil being used,
     c. Pain/discomfort assessment, and

d. Patient response

References:

1. The Joint Commission (2019). Pain Management-Leadership Responsibilities for Providing Non-pharmacologic Modalities for Managing Pain—LD.04.03.13 EP 2. Retrieved from: https://www.jointcommission.org/standards_information/jcfaqdetails.aspx?StandardsFaqId=1813&ProgramId=46
2. The National Association for Holistic Aromatherapy (2019). Retrieved from: https://naha.org/explore-aromatherapy/about-aromatherapy/what-is-aromatherapy/
3. U.S. Food and Drug Administration (2017). Aromatherapy. Retrieved from: https://www.fda.gov/Cosmetics/ProductsIngredients/Products/ucm127054.htm
4. Tisserand, R. & Young, R. (2014). *Essential oil safety: A guide for health care professionals* (2nd ed.). Edinburgh, Scotland: Elsevier.

Statutory/Regulatory Authorities:

**1.** The Joint Commission states non-pharmacologic pain treatment modalities should be available for patients who refuse opioids or for whom physicians believe may benefit from complementary therapies.
**2.** The Joint Commission Accreditation Manual utilizes the Food and Drug Administration (FDA) classification for a product as part of its definition of a medication (Aromatherapy and Essential Oils FAQs 11/19). According to the FDA, whether or not an aromatherapy product is considered a 'medication' is based on the intended use. If a product is intended for therapeutic purposes, such as treating or preventing disease, it would be considered a drug. If the aromatherapy is being used to create a "healing environment" or some other non-specific purpose, then it would not be classified as a medication.
**3.** The FDA states a drug must list its intended use and must meet requirements of FDA approval. There are no claims or recommendations for the use of aromatherapy for medicinal purposes.

ORIGINATED: 12/2019

Appendix D-1

Patient Information Handout (included in Aromatherapy Practice Guidelines)

# Aromatherapy – Patient Education

## What is Aromatherapy?

Aromatherapy is the use of essential oils from plants to help support emotional, physical, or spiritual well-being. Aromatherapy is offered on this unit as an additional way to help relieve your discomfort, in addition to your usual care.

## What are Essential Oils?

Essential oils are liquids taken from the roots, leaves, seeds, or blossoms of plants. Each oil has its own kind of scent and uses for healing. On this unit, lavender essential oil is used to relieve discomfort after surgery. Discomfort may be pain, anxiety, restless sleep, or stress.

## How does Aromatherapy Work?

Sense of smell is important when using aromatherapy. When you smell the scent of lavender, the smell receptors in your nose connect with different areas of the brain that control emotion and memory. Breathing in the essential oil sends messages to the area of the brain that controls emotion and memory.

## How do I use Aromatherapy?

On this unit, you will be given a plastic tube that contains a cotton wick that already contains drops of lavender essential oil. To benefit from aromatherapy, open the tube and inhale deeply for up to 10 minutes. Aromatherapy can be used as frequently as every hour.

## Safety Concerns

It is your choice to use aromatherapy. There are no known side effects to using aromatherapy, however if you know you are sensitive to scents or do not like the smell of lavender do not use the aromatherapy.

If you have any questions or concerns about aromatherapy use, please talk to your nurse or contact Nenhuan Huang, RN, MSN, AHN-BC, HWNC-BC, IIA-C (certified aromatherapy nurse) at XXX-XXX-XXXX

Appendix D-2

Patient Signage Cards (included in Aromatherapy Practice Guidelines)

**Essential Oil Therapy in Use**

Please contact the nurse for any questions

## Appendix E-1

### Nurse Survey Information Sheet (Note: Title to change on each survey)

*Pre-Survey to Essential Oil Therapy Training*
*Post-Survey to Essential Oil Therapy Training*
*4 Week Post-Survey to Essential Oil Therapy Training*

You are being asked to participate in an Evidence-Based Practice Project on nurses' experience associated with providing essential oil therapy (also called aromatherapy) to patients in the Acute Surgery Unit (ASU) at Mercy General Hospital.

If you choose to voluntarily participate, you will be asked to: 1) answer ten questions about your experience on a survey at three different time periods. The survey will be administered prior to completing training on essential oils therapy, immediately after the training, and about 4 weeks after the training.

Your participation in aromatherapy training will take two hours of your time and each survey should take about 5 minutes.

The risks of harm associated with this study are minimal; that is, they are similar in type or intensity to what you encounter during your daily activities.

The benefits of engaging in this training are not definite, but we hope to learn that by improving the comfort and confidence levels of the nursing staff with essential oil therapy training, patient outcomes ultimately will be improved. There are no direct rewards or benefits to you in this activity.

Your participation will be anonymous. You will not be personally identified in any reports or publications that may result from this project. The Dignity Health CA/NV Institutional Review Board (IRB) for Mercy General Hospital (MGH) has reviewed the project protocol and survey tools.

You may ask questions of the researcher at any time by calling_____(name of the investigator) (XXX-XXX-XXXX) or sending an email at jane.doe @usa.edu.

Your participation in this evidence-based practice project is completely voluntary. You may decline to participate by not completing the pre-training survey or may stop participation at any time and for any reason during the 4-week time period. Declining to participate or ending your participation at any time will have no effect/impact on your job at Mercy General Hospital, either positive or negative, or your relationship with your leadership or Dignity Health.

By completing the pre-training survey you agree to participation in all study activities including post-training surveys and offering Essential Oil Therapy to patients to complement other pain relief options. Thank you for your participation in this evidence-based project!

## Appendix E-2

## General Self-Efficacy Survey

*Note: Title to change on each survey*
*Pre-Survey to Aromatherapy Training*
*Post-Survey to Aromatherapy Training*
*4 Week Post-Survey to Aromatherapy Training*

Directions: To ensure your confidentiality and allow us to pair your surveys without collecting your name or any other identifying information, please answer the following questions:

1. What is the second digit of your street address? (Example: if you live at 2739 Main St, enter "7")
2. What year did you graduate high school? (Example: if you graduated in 1993, enter "93")
3. What is the LAST letter in your middle name? (Example, if your middle name is Dale, enter "E". If you have no middle name, enter X).

**Enter your answers here**: ___ - ___ ___ - ___

A great deal of research confirms what we nurses already know:

- Nursing is a critical factor in patient outcomes, and
- Nursing is best when nurses feel comfortable with, and confident in, their roles.
- Patients, the hospital, and nurses themselves all benefit from improving the comfort and confidence levels of the nursing staff.

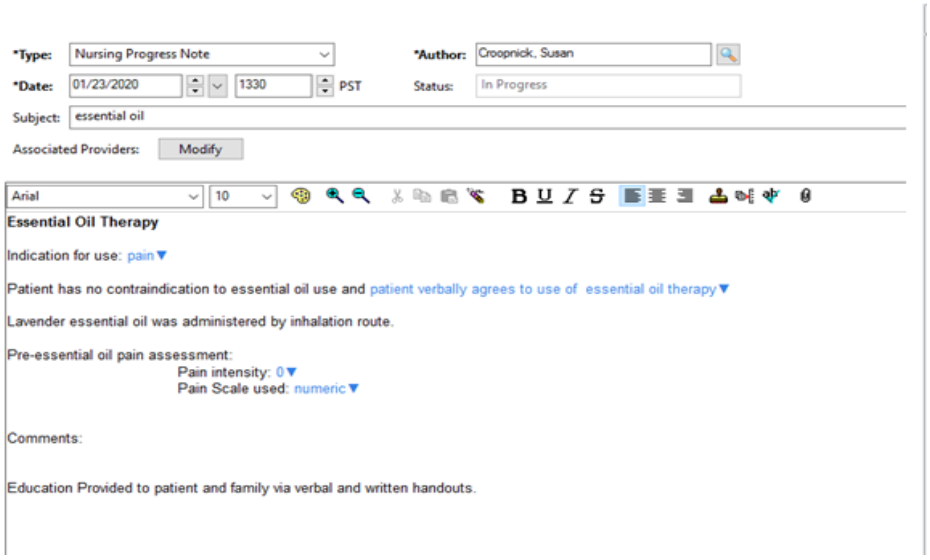
The following 10 questions ask you to express your own level of comfort and confidence in your ability to provide essential oil therapy for pain/discomfort relief to your patients. The only "right answer" is the one that describes *your present* feelings about your role in providing essential oil therapy. Again, *individual* answers expressed here are anonymous. Place a checkmark in the box that best expresses your response to each of the following questions:
1 = Not at all true; 2 = Hardly true; 3 = Moderately true; 4 = Exactly true

| | 1<br>Not at all true | 2<br>Hardly true | 3<br>Moderately true | 4<br>Exactly true |
|---|---|---|---|---|
| I can always manage to solve difficult problems if I try hard enough. | | | | |
| If someone opposes me, I can find the means and ways to get what I want. | | | | |
| It is easy for me to stick to my aims and accomplish my goals. | | | | |
| I am confident that I could deal efficiently with unexpected events. | | | | |
| Thanks to my resourcefulness, I know how to handle unforeseen situations. | | | | |
| I can solve most problems if I invest the necessary effort. | | | | |
| I can remain calm when facing difficulties because I can rely on my coping abilities. | | | | |
| When I am confronted with a problem, I can usually find several solutions. | | | | |
| If I am in trouble, I can usually think of a solution. | | | | |
| I can usually handle whatever comes my way. | | | | |

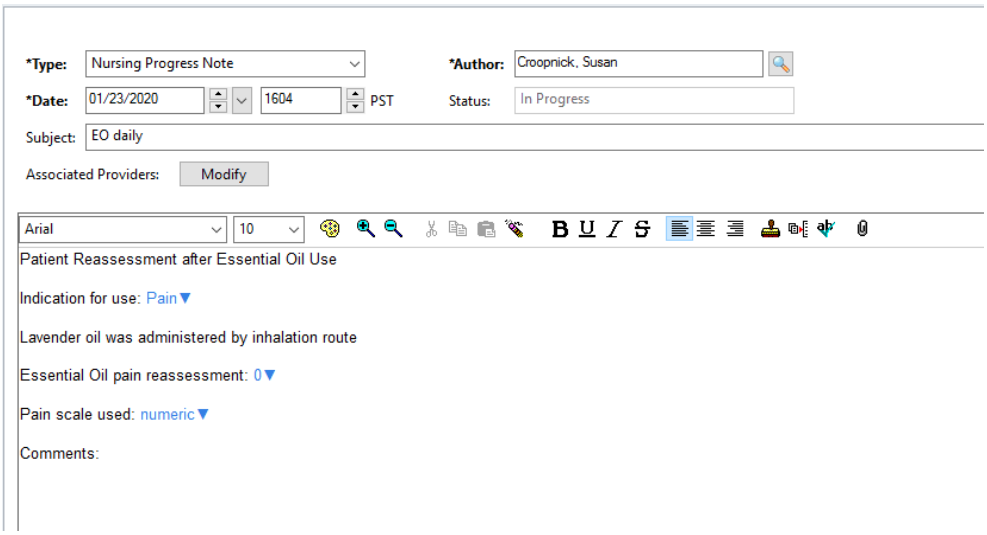
Schwarzer, R., & Jerusalem, M. (1995). The general self-efficacy scale (GSE) (English Version). Retrieved from http://userpage.fu-berlin.de/~Ehealth/engscal.htm

Appendix: F

EHR Template for Documentation of Essential Oil Therapy




Patient Reassessment after Essential Oil Use



## Appendix G

## Descriptive Variable and Measurement Information

| | Measure | Description | Data Source | Possible Range of Values |
|---|---|---|---|---|
| **Population** | Patient ID | Medical Record Number (MRN) | | N/A |
| | Age | At the start of intervention | | 18-85 |
| | Gender | Gender | Electronic Health Record (EHR) or assessment tool forms | 1=Female; 0=Male |
| | Race | Function title | | 0=White<br>1=Hispanic<br>2=Black<br>3=Asia<br>4=Others |
| | Marital Status | At the start of intervention | | 0=Not married<br>1= Married<br>2=Divorced<br>3=Widowed |
| | Surgical Types | At the start of intervention | | 0=Orthopedic<br>1=Thoracic/CVS<br>2=Abdomen<br>3=Pelvic/urology |
| **Outcome** | Pain Score | Preintervention Assessment (opioid and essential oil therapy) | | 0-10 |
| | Pain Score | Postintervention Assessment (opioid and essential oil therapy) | | 0-10 |
| | Nurse self-efficacy | Preintervention Assessment | GSE Scale form | 10-40 |
| | Nurse self-efficacy | Postintervention assessment | GSE scale form | 10-40 |
| | Nurse self-efficacy | Postintervention assessment-4 weeks | GSE scale form | 10-40 |
| | Opioids usage | Preintervention | Medication deliver system | Factual Numbers |
| | Opioids usage | Postintervention | Medication deliver system | Factual Numbers |

## Appendix H

## Project Timeline

| Steps | Timeframe | Responsible Person(s) |
|---|---|---|
| IRB Approval form the University & Facility | 01/10/20--2/12/20 | DNP student |
| Meet with key stakeholders | 03/16/20 | DNP student, ASU manager, Senior director of nursing, CNS |
| Prepare and conduct nurse training | 05/18/20--06/12/20 | DNP student, CNS (educator) |
| Baseline sample selection and data collection | 05/11/20--06/05/20 | DNP student, pharmacist |
| Purchase material | 05/11/20--05/18/20 | DNP Preceptor |
| Stock and dispense essential oil inhaler | 05/18/20--07/15/20 | DNP student, staff nurse |
| Consent and recruit patients | 06/01/20--07/12/20 | DNP student, surgery educator, CNS, preceptor |
| Data collection | 06/01/20--07/15/20 | DNP student, CNS, pharmacist |
| Data analysis | 07/15/20-07/22/20 | DNP student |
| Dissemination of results | 08/0120—11/15/20 | DNP student |

# Appendix I

## Budget

| **EXPENSES** | | **REVENUE** | |
|---|---|---|---|
| Direct | 0 | Billing | 0 |
| Salary and benefits[a] | 2280 | Grants | 0 |
| Supplies (lavender and inhalers) | 200 | Institutional budget support | 0 |
| Service | 0 | | |
| Statistician[b] | 100 | | |
| Indirect (printing materials) [c] | 86.7 | | |
| Overhead (electricity, etc.) | 0 | | |
| Training [d] | 1000 | | |
| **Total Expenses** | **3666.7** | **Total Revenue** | **0** |
| **Net Balance** | | | **-3666.7** |

Note: [a]One continue education hour for 38 nurses with 60 dollars average hourly pay.

[b]Consultation to statistician

[c]Printing patient consent 0.15X10X35=52.5 and nurse survey 0.15X6X38=34.2 for a total of $86.7

[d]Two educators spent 5 hours each for education with 100 dollars hourly pay.

x

# Appendix J1

## Facility IRB Approval Letter

Federal Wide Assurance (FWA) #00001499
Dignity Health IORG0001540

| | |
|---|---|
| **Date:** | April 17, 2020 |
| **IRB:** | Dignity Health CA/NV IRB #00006573<br>3400 Data Drive<br>Rancho Cordova, CA 95670 |
| **To:** | Nenhuan Huang, RN, MSN |
| **IRB #:** | CANV DHIRB-2020-512 |
| **Study Title:** | Essential Oil Therapy for Alleviation of Discomfort in Surgical Patients |
| **IRB Submission:** | Submission Response for Initial Review Submission Form |
| **Protocol Version Date:** | 4/16/2020 |
| **Reference #:** | 033009 |
| **Review Cycle:** | 12 Months |
| **Approval Expiration Date:** | 04/15/2021 |
| **IRB Review Type:** | Expedite – Category 4 |
| **IRB Review Date:** | 04/16/2020 |
| **IRB Decision:** | Approved |

The Institutional Review Board (IRB) reviewed and **approved** your new protocol submission including the following documents listed in Appendix 1.

Approved under Expedited Category 4: Collection of data through noninvasive procedures (not involving general anesthesia or sedation) routinely employed in clinical practice, excluding procedures involving x-rays or microwaves. Where medical devices are employed, they must be cleared/approved for marketing.

Please be sure you have received a final administrative approval letter prior to implementing your study.

If you expect to encounter a study-participant population of non-English speaking persons, please be reminded to submit certified translation(s) of the approved consent and/or authorization document(s) in the appropriate language for IRB review and approval.

As principal investigator for the above referenced study, you are responsible for the following:

- Adherence to applicable Federal regulations, Dignity Health policy and the policies of this Institutional Review Board.
- Supervision and responsibility for all investigators and research team members engaged in research covered by this IRB; ensure all licensed study personnel act within their scope of practice and, if applicable, their medical staff credentials; and non-licensed personnel act within their job description and facility policies and guidelines.
- Responsible for using the current IRB approved consent form (if applicable).
- Record keeping of all activities including documentation of informed consent when applicable.
- Promptly reporting all internal adverse events according to Dignity Health and IRB guidelines.
- Promptly reporting external adverse events according to Dignity Health and IRB guidelines.
- Promptly reporting any deviations from the protocol or consent process (including 'emergency' enrollment).
- Promptly reporting any new unanticipated risks or new information that may impact the protocol, study participants or others.
- Promptly reporting all study management correspondence with regulatory agencies and sponsors including administrative actions.

Dignity Health is organized and operates according to its Federal Wide Assurance with the Department of Health and Human Services (DHHS) Office of Human Research Protections (OHRP). Dignity Health IRBs operate in compliance with the Code of Federal Regulations (CFR) including 45 CFR 46, 21 CFR 56 and 21 CFR 11.
(Revised 04/01/2016)

# Appendix J2

## Administrative Approval Letter

**Dignity Health Research Institute**
3400 Data Drive
Rancho Cordova, CA 95670
direct 916.851.2259
fax 916.859.7125

Date: April 23, 2020

Nenhuan Huang, RN
Mercy General Hospital
4101 J Street
Sacramento, CA 95819

RE: Administrative Approval for **Essential Oil Therapy for Alleviation of Discomfort in Surgical Patients**

Dear Ms. Huang:

This letter will serve as a notice of final approval for you to conduct the research project entitled, **"Essential Oil Therapy for Alleviation of Discomfort in Surgical Patients" ONLY** at Mercy General Hospital. Should you decide to conduct this study at other Dignity Health facilities, or modify the research design at any time during study conduct, you must revise your protocol and request a new IRB review and approval.

The administrative, IRB/regulatory, and legal approvals of your study are complete, and the research project may proceed in compliance with Dignity Health policy, IRB requirements, federal and state regulations, and the terms of the Dignity Health CA/NV IRB letter dated April 17, 2020. In addition, this letter confirms an implementation plan to begin retrospective data collection in May 2020, nurse training in June/July 2020, and surgical patient recruitment after nurses have completed training. Please also refer to the responsibilities of the principal investigator, as defined by FDA GCP guidelines and throughout the Dignity Health Research Institute policies and procedures.

Because this is an observational study which has no bearing on treatment decisions, this is not a qualifying clinical trial; therefore there are no routine research procedures to be billed to Medicare/insurance. Dignity Health is not required to report an NCT number on any Medicare claim or follow any Medicare research billing requirements, and you do not need to complete a Research Encounter Form upon enrollment of each subject. If applicable, please ensure that copies of the signed consent documents (ICF and HIPAA forms) are placed in the subject's medical record.

If you have any questions, or need any administrative assistance with your study, please contact Rae Lynn Stafford by email at raelynn.stafford@dignityhealth.org or by phone at 916-851-2259.

Sincerely,

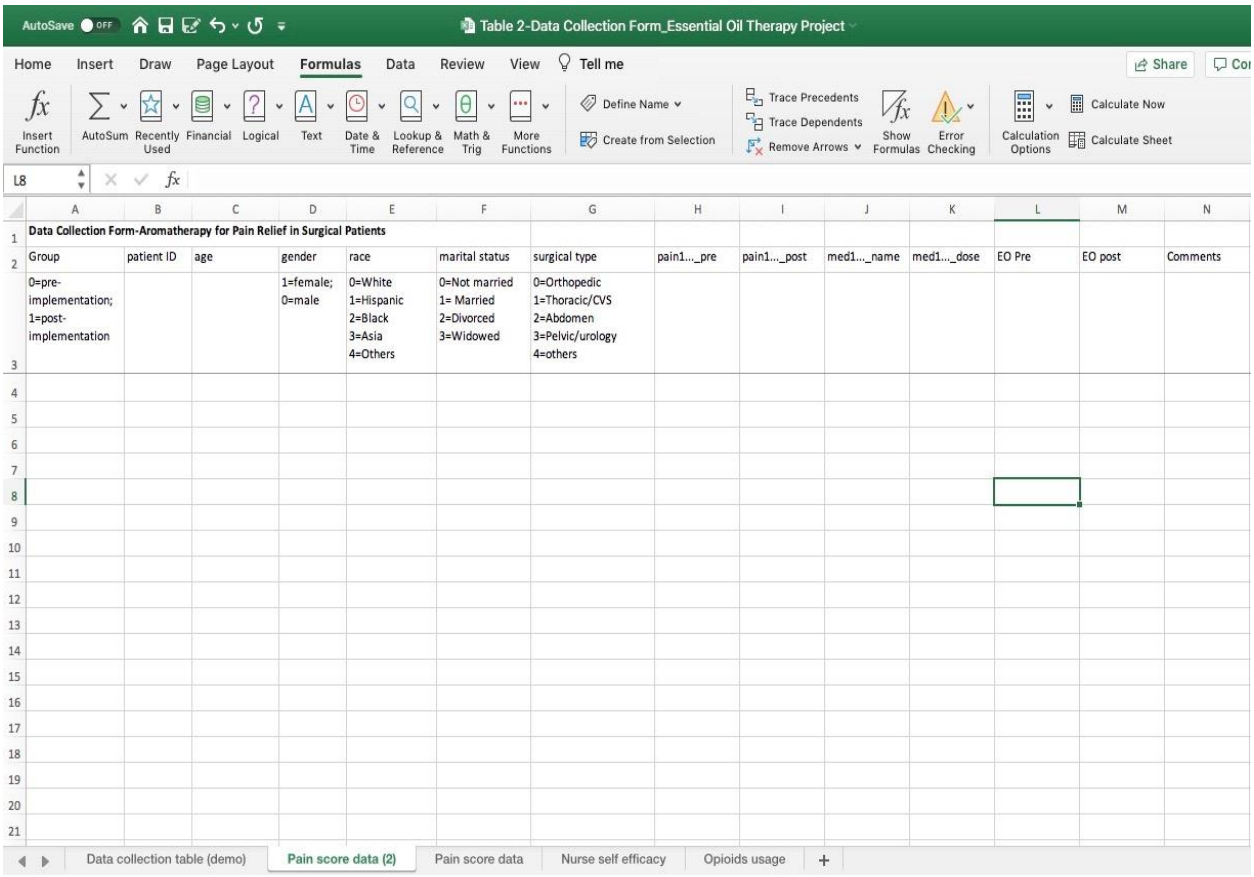
Rae Lynn Stafford, MBA

for

Connie Clemmons-Brown
System SVP, Patient Care Services, CommonSpirit Health
Accountable Executive for System Nursing Research

Appendix K1

Data Collection Form—Pain Score & Medication Use



| | A | B | C | D | E | F | G | H | I | J | K | L | M | N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **Data Collection Form-Aromatherapy for Pain Relief in Surgical Patients** | | | | | | | | | | | | | |
| 2 | Group | patient ID | age | gender | race | marital status | surgical type | pain1..._pre | pain1..._post | med1..._name | med1..._dose | EO Pre | EO post | Comments |
| 3 | 0=pre-implementation; 1=post-implementation | | | 1=female; 0=male | 0=White 1=Hispanic 2=Black 3=Asia 4=Others | 0=Not married 1= Married 2=Divorced 3=Widowed | 0=Orthopedic 1=Thoracic/CVS 2=Abdomen 3=Pelvic/urology 4=others | | | | | | | |
| 4 | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | |
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| 12 | | | | | | | | | | | | | | |
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| 14 | | | | | | | | | | | | | | |
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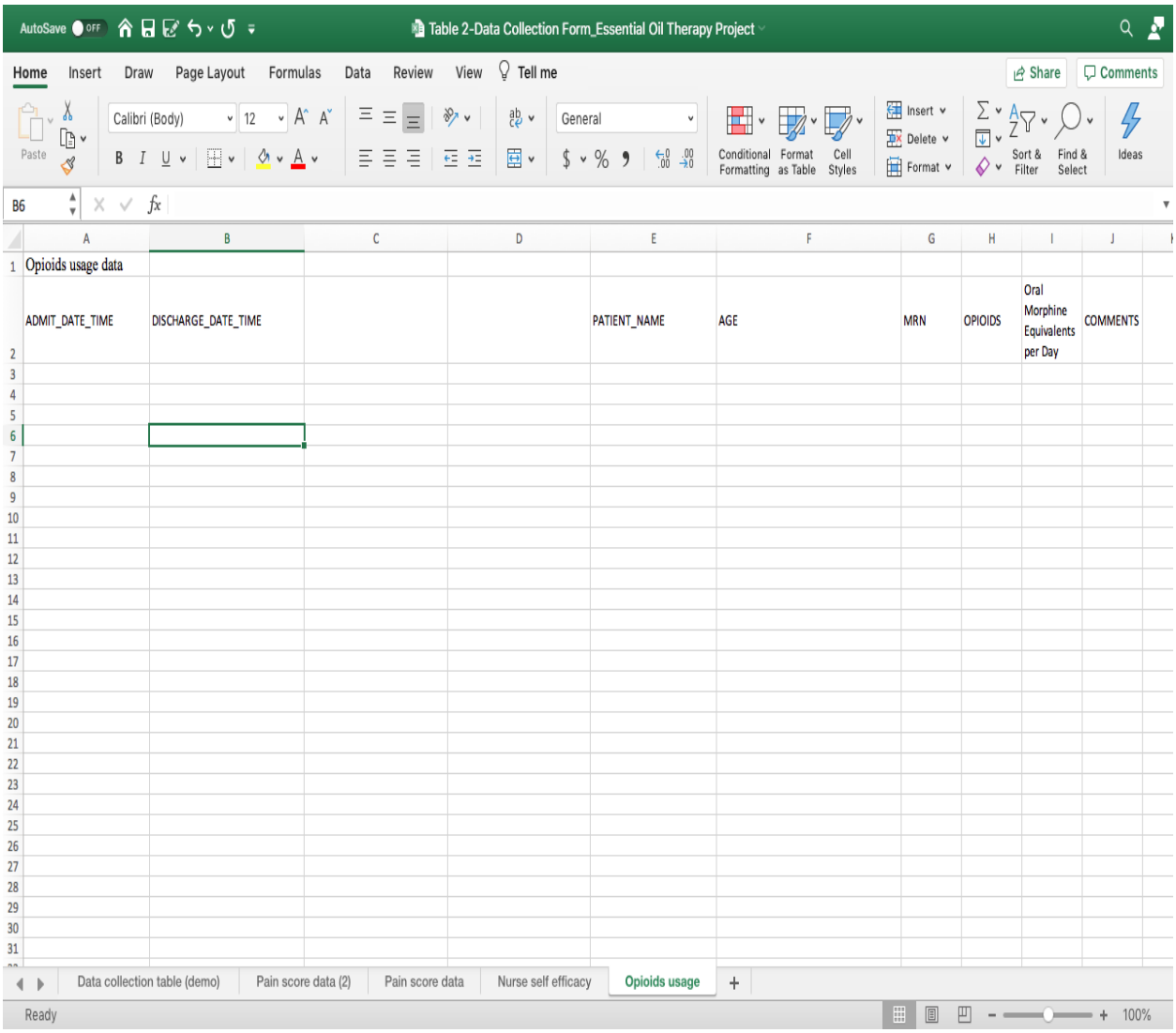
| 17 | | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | | |
| 19 | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | |
| 21 | | | | | | | | | | | | | | |

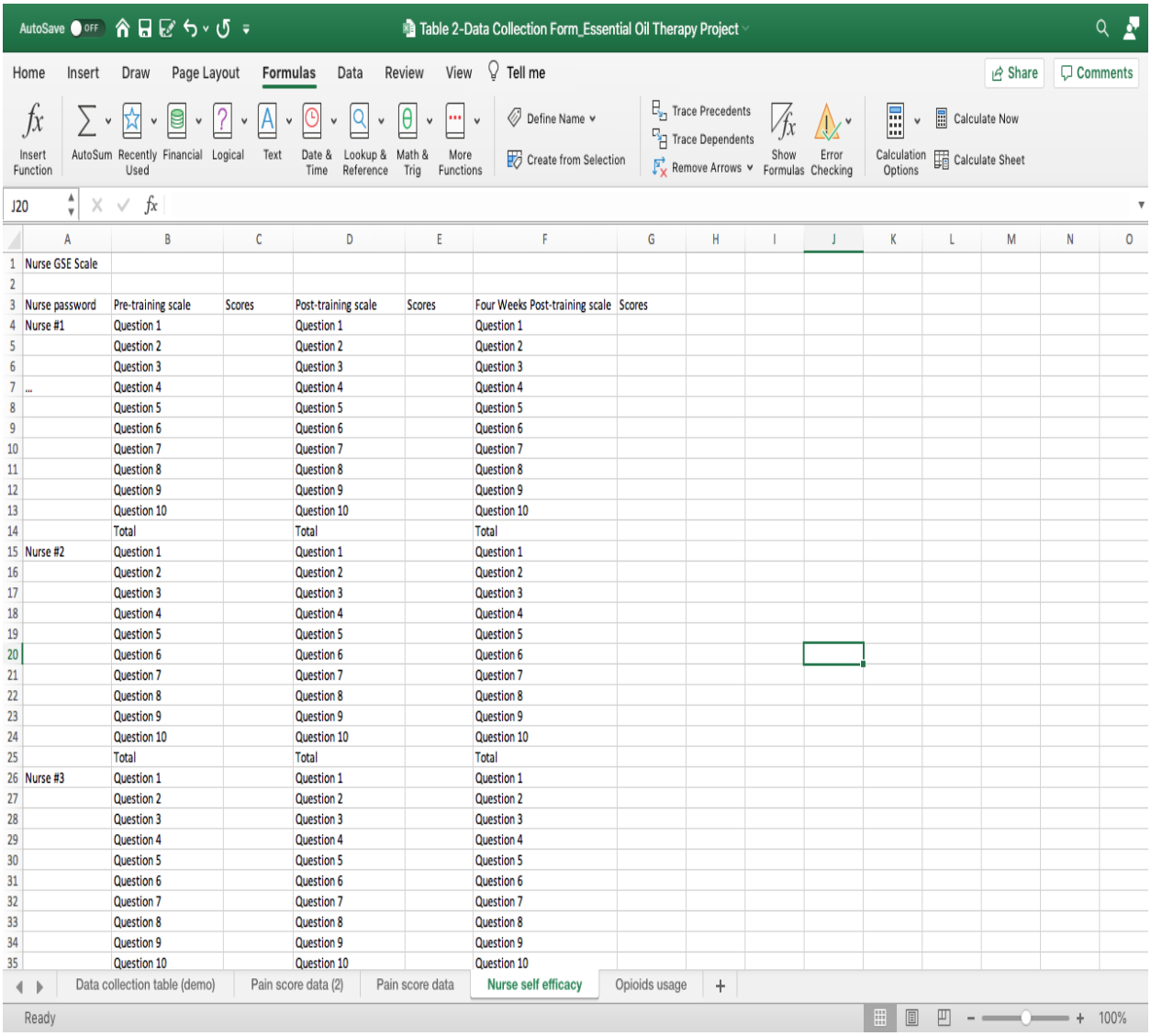
Appendix K2

Data Collection Form—Opioid usage



Appendix K3

Data Collection—Nurse Self-Efficacy Survey



| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| 1 | Nurse GSE Scale | | | | | | |
| 2 | | | | | | | |
| 3 | Nurse password | Pre-training scale | Scores | Post-training scale | Scores | Four Weeks Post-training scale | Scores |
| 4 | Nurse #1 | Question 1 | | Question 1 | | Question 1 | |
| 5 | | Question 2 | | Question 2 | | Question 2 | |
| 6 | | Question 3 | | Question 3 | | Question 3 | |
| 7 | ... | Question 4 | | Question 4 | | Question 4 | |
| 8 | | Question 5 | | Question 5 | | Question 5 | |
| 9 | | Question 6 | | Question 6 | | Question 6 | |
| 10 | | Question 7 | | Question 7 | | Question 7 | |
| 11 | | Question 8 | | Question 8 | | Question 8 | |
| 12 | | Question 9 | | Question 9 | | Question 9 | |
| 13 | | Question 10 | | Question 10 | | Question 10 | |
| 14 | | Total | | Total | | Total | |
| 15 | Nurse #2 | Question 1 | | Question 1 | | Question 1 | |
| 16 | | Question 2 | | Question 2 | | Question 2 | |
| 17 | | Question 3 | | Question 3 | | Question 3 | |
| 18 | | Question 4 | | Question 4 | | Question 4 | |
| 19 | | Question 5 | | Question 5 | | Question 5 | |
| 20 | | Question 6 | | Question 6 | | Question 6 | |
| 21 | | Question 7 | | Question 7 | | Question 7 | |
| 22 | | Question 8 | | Question 8 | | Question 8 | |
| 23 | | Question 9 | | Question 9 | | Question 9 | |
| 24 | | Question 10 | | Question 10 | | Question 10 | |
| 25 | | Total | | Total | | Total | |
| 26 | Nurse #3 | Question 1 | | Question 1 | | Question 1 | |
| 27 | | Question 2 | | Question 2 | | Question 2 | |
| 28 | | Question 3 | | Question 3 | | Question 3 | |
| 29 | | Question 4 | | Question 4 | | Question 4 | |
| 30 | | Question 5 | | Question 5 | | Question 5 | |
| 31 | | Question 6 | | Question 6 | | Question 6 | |
| 32 | | Question 7 | | Question 7 | | Question 7 | |
| 33 | | Question 8 | | Question 8 | | Question 8 | |
| 34 | | Question 9 | | Question 9 | | Question 9 | |
| 35 | | Question 10 | | Question 10 | | Question 10 | |