# AROMATHERAPY FOR REDUCING HEALTHCARE-ASSOCIATED STRESS AMONG NURSES AND PATIENTS

# AROMATHERAPY FOR REDUCING HEALTHCARE-ASSOCIATED STRESS AMONG NURSES AND PATIENTS

By

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## Abstract

This paper examines the research-to-practice gap pertaining to aromatherapy treatment. Aromatherapy is an established technique for reducing stress, however, there is a lack of guidance on how this treatment can be utilized in clinical settings. In-patient acute care settings are recognized as some of the most high-stress environments in healthcare. High levels of stress have negative consequences for patient recovery, patient satisfaction, healthcare worker job performance, and organizational finances and reputation. Aromatherapy is an integrative modality that can be used to mitigate the issue of healthcare-associated stress. This paper examines the most current research on aromatherapy interventions, specifically those performed in high-acuity, inpatient settings. The most significant and consistent findings from the literature are presented in the form of best practice recommendations, which are further combined with expert recommendations to create a practical clinical aromatherapy protocol. To aid organizations in examining the benefits and feasibility of implementing an aromatherapy clinical protocol, this paper also reviews an empirical framework for employing the protocol in clinical practice.

# Chapter One: Introduction

Stress is a universal issue. Everyone experiences stress at various points in their life, and each person experiences stress in a unique way. Despite the fact that stress is an intrinsic response we all experience, there is no single agreed upon definition of stress. This discordance in our understanding of stress makes it challenging to identify, treat, and manage with objective measures. Consequently, stress continues to become more pervasive in both personal and occupation environments which has innumerable consequences. To address this growing concern, we must first investigate and synthesize the existing knowledge on stress. This chapter will explore the definitions of stress, discuss the physiological impact of stress, review techniques for managing stress, and elucidate the issue of occupational stress among healthcare workers.

## Background

### Defining Stress

The term "stress" was originally coined by Hans Selye as "the non-specific response of the body to any demand for change" (1976, p. 53). These demands are termed stressors, which are defined as "any agent that produces stress at any time" (Selye, 1976, p. 53). Since this definition was put forth in 1936, numerous other definitions have been proposed yet none have been universally agreed upon. Stress is a subjective and highly individualized experience which makes it challenging to define or measure. For the purpose of this paper, stress will be defined as a reaction to "a physical, emotional, or psychological demand that can lead to personal growth or overwhelm a person and lead to illness or worsening of existing acute or chronic illnesses" (Sorenson, 2017, p. 771). As explained by this definition, stress is not only bad; in fact, beneficial stress is often what drives us to maximize our performance and internal drive. This

paper will focus on the stress that is unbeneficial, more specifically, the stress that negatively impacts an individual's health and daily performance.

Stress is a multi-faceted state that is influenced by diverse components of an individual's life; work, relationships, and health are a few factors that may contribute to stress level and one's coping abilities (The American Institute of Stress, 2019a). One well-accepted model created by Hans Selye delineates these factors into two different types of stress: eustress and distress. Eustress is stress that has a "agreeable or healthy" influence, such as marriage or a promotion (Selye, 1976). Conversely, distress is stress that is "disagreeable or pathogenic," such as financial hardships or troubles at work (Selye, 1976). In 2014, a survey conducted by The American Institute of Stress reported that 77% of Americans included in the sample experienced physical symptoms such as fatigue, headache, and change in appetite due to stress (2019a). These physical symptoms are an example of negative outcomes that can arise from unbeneficial stress. Stress may also manifest in emotional reactions such as anxiety. Many people equate stress with anxiety, yet they are two different manifestations. Stress is a physiological response to a real or perceived stressor, whereas anxiety is an emotional response experienced in response to stress (Halter, 2018). While stress may lead to anxiety, anxiety cannot cause stress; stress and anxiety are not interchangeable, but they may produce overlapping physiological responses which makes it difficult to delineate these terms. In short periods these emotional responses can be advantageous, but sustained emotions such as anxiety can contribute to the negative impacts on one's health (Halter, 2018).

**The Physiology of Stress**

It is important to understand the basic physiology of the stress response. Data collected by sound, sight, smell, and other human senses is analyzed and interpreted by the brain. The

amygdala is the region of the brain responsible for processing emotions; when the amygdala perceives a threat it immediately sends a signal to the hypothalamus, thereby initiating a cascade of neural and hormonal signals (Sorenson, 2017). The hypothalamus employs the autonomic nervous system to communicate a distress signal to the adrenal glands located on the kidneys. The adrenal glands release epinephrine into the bloodstream where it is then carried around the body to produce various physical changes. Elevated blood pressure and heart rate, dilation of airways and pupils, or the release of stored glucose and fat are some examples of the changes that take place (Sorenson, 2017).

The activation of the hypothalamus-pituitary-adrenal pathway for short durations is termed acute stress. Acute stress stems from the recent past or the anticipated burdens of the immediate future (Sorenson, 2017). When stress is ongoing, either at high or low levels, it is deemed chronic stress. Chronic stress results in continuous activation of the stress response outlined above, which produces negative physiological outcomes (Sorenson, 2017). For instance, prolonged circulation of epinephrine damages blood vessels, while elevated cortisol levels stimulate appetite and increase the storage of unused nutrients as fat. These effects increase an individual's risk for heart attack, stroke, and other illnesses (Harvard Medical School, 2018). Other ramifications of stress that are pertinent to this paper include insomnia and anxiety. Sleep deprivation and anxiety are two of the most consequential stress symptoms impacting nurses' abilities to perform at work, and sleep deprivation greatly interferes with patients' abilities to heal (Stockert, 2017, p. 997). The stress response creates a state of hyperarousal; hyperarousal disrupts one's ability to fall asleep, one's ability to stay asleep, or one's quality of sleep (Stockert, 2017, p. 999; Bonnet & Arand, 2010). To a similar effect, stress can also produce anxiety among other emotional responses (Anxiety and Depression Association of America,

n.d.). Both sleep deprivation and anxiety exhaust one's coping mechanisms when they are present for an extended duration, consequently impairing the body's ability to maintain homeostasis. This imbalance is an outcome of stress that depletes one's health and facilitates disease and illness (Stockert, 2018).

**Impact of Stress on Nurses and Patients in Acute Care Settings**

Stress is a concern among healthcare staff such as nurses, as well as patients. In the presence of stress patient outcomes are negatively impacted (Chen, Fang, & Fang, 2015). A patient who suffers from chronic stress has an impaired ability to recover from illness; the stress response disrupts hormonal balances, lowers immune function, impairs digestion and nutrient absorption, depletes energy stores, and alters cardiovascular and respiratory functions among other effects (The American Institute of Stress, 2019b). The onset of an illness may be facilitated by these systemic changes, or if an illness arises from other factors such as genetics, these changes impair the body's ability to recuperate and recover. Consequently, patients in acute care who suffer from stress may experience prolonged recovery time, incomplete restoration to health, or long-lasting damage to their well-being (Cho, Lee, & Hur, 2017).

To a similar extent, stress in the acute care setting affects healthcare workers such as nurses. High stress situations affect people's mental, physical, and emotional capabilities (Chen et al., 2015). In the context of nursing, these stress outcomes impede nurses' ability to provide competent, effective, or high-quality care. Furthermore, nurses also experience high levels of stress related to their jobs. According to Chen et al. (2015), job stress is the number one occupational hazard in the United States. Job stress can result in forgetfulness, fatigue, headaches, and difficulty focusing, among other symptoms. Nurses may be predisposed to stress as they work in an environment with many demands. Furthermore, the stress experienced by

nurses potentially causes negative outcomes as nurses are responsible for direct patient care, and in a stressed state, may be unable to provide high-quality care to the expected standards (Chen et al., 2015).

Beyond individual effects, the influence of stress on nurses and patients both have a negative impact at the organizational level of the hospital. Delayed recovery results in lower patient satisfaction scores, which diminishes the reputability of a hospital (Johnson, 2014). Likewise, stress results in high rates of nurse burnout and nurse turnover. According to the *AIS Workplace Stress Survey*, 60% of employee absences can be linked to psychological problems resulting from job stress (Workplace Stress, 2018). Annually, unanticipated absenteeism costs American companies $602.00 per worker (Workplace Stress, 2018). This adds up to an estimated $300 billion in costs to employers to cover stress related healthcare and missed work (The American Institute of Stress, 2019b). Thus, the impacts of stress on healthcare workers such as nurses hinders the financial success of a hospital.

**Approaches to Stress Management**

Stress management involves treatment of the underlying cause – the stressors – as well as the mental, physical, or emotional symptoms that occur in response to stressors. Treating stress symptoms varies from person to person since we all have unique stressors, appraisal of those stressors, manifestations of our stress, and ways of coping. Examples of treatments for stress related health problems include pharmaceutical treatments such as painkillers and gastrointestinal medications, or alternative therapies such as acupuncture, massage, relaxation, heat or cold therapy, yoga, meditation, and aromatherapy (Chen et al., 2015). Some individuals may instead choose to make lifestyle changes with the hope that it will reduce the stressors in their life. Physical activity – particularly aerobic exercise – and diet are two methods proven to

reduce tension, improve and stabilize mood, and improve sleep and self-esteem (Anxiety and Depression Association of America, n.d.). Often a combination of lifestyle changes and other management techniques are necessary to reduce stress and maintain a balanced state.

Emerging research on alternative and complimentary therapies is proving these techniques to be successful at stress reduction. Aromatherapy is one such therapy. The term aromatherapy refers to the "therapeutic or medicinal use of aromatic substances for holistic healing" (National Association for Holistic Aromatherapy, 2020b, para 3). Most often the aromatic substance takes the form of an essential oil. Essential oils can be inhaled, used for massage, or ingested orally (Karadag, Samancioglu, Ozden, & Bakir, 2015). Inhaled essential oils cross the nasal mucous membrane to enter the blood stream and the limbic system of the brain. These actions influence the hypothalamus, endocrine system, and autonomic nervous system to achieve changes in respiratory rate, blood pressure, heart rate, and peripheral blood circulation to reduce stress (Chen et al., 2015). Similarly, when essential oils are used for a massage the aroma particles are both inhaled and absorbed into the subcutaneous tissue. Subcutaneous tissue is rich with blood vessels, allowing the aroma particles to be brought into the bloodstream and carried to the limbic system of the brain, thereby having the same effect as inhaled aroma particles (Babar, Al-Wabel, Shams, Ahamad, Khan, & Anwar, 2015). The mode of action of oral aromatherapy is not clearly understood. Similar to the way taste and olfaction interact when we eat, it is postulated that aroma molecules may linger at the back of the mouth and travel upwards into the nasal cavity where they cross the olfactory epithelium, a process termed retronasal olfaction (Özay, Çakir, & Ecevit, 2019). Other researchers suggest that the anti-microbial, anti-inflammatory, and antioxidant effects of oral aromatherapy reduce stress

symptoms such as bad breath or dry mouth; by reducing the symptoms of stress, stress itself is diminished (Seo, Song, Hur, Lee, & Lee, 2017).

## Summary

Stress is an issue among patients and nurses in acute care settings. Prolonged stress has significant impacts on mental, physical, and emotional health, which has numerous costs when not addressed. Within the healthcare setting, stress impedes patients' recoveries and encumbers nurses' abilities to provide thorough, attentive care (Chen et al., 2015). This has widespread effects not only on the affected individuals, but also on hospitals' reputability and commercial success. The literature suggests that stress reduction needs to be prioritized to mitigate these unprofitable and negative consequential outcomes (The American Institute of Stress, 2019a).

While many options are available for managing stress and stress symptoms, this paper will examine the use of aromatherapy. There is a growing body of research on the effectiveness of aromatherapy to mitigate stress among a variety of populations. However, a review of the most recent studies being conducted on aromatherapy reveals that much of the samples are not adequately representative of the consumers and the findings are inconsistent. Furthermore, in the studies where aromatherapy is suggested to be effective at reducing stress, little evidence exists on how these findings should be carried into practice. The following chapters of this thesis will not only address the research gap on aromatherapy but will put forth an analysis of current research and propose a recommendation for implementing aromatherapy in the health-care setting. With these recommendations, it is expected that aromatherapy may be better utilized to alleviate stress for nurses and patients, and ultimately improve workplace and health outcomes through improved wellbeing.

# Chapter Two: Review of Literature

This chapter addresses a review of current literature on aromatherapy as an integrative intervention for stress. The PICOTS question used to guide this search is: For nurses and patients in the acute care setting, are aromatherapy interventions effective at reducing verbal ratings and physiological markers of stress? Articles for the literature review were obtained from PubMed, CINAHL, and Academic Search Complete. Within all databases, results were limited to studies conducted in the last five years and the terms "stress," "nurses," "patients," "essential oils," and "aromatherapy" were used to guide the search. The filters used on CINAHL were "full text" and "academic journal," and the filter used on PubMed was "full text." To be included in the literature review, studies must meet the following criteria (a) Be written in English (b) Exclude outpatient, home health, palliative care, and university settings (c) Have samples comprised of nurses or patients in acute care (d) Have an intervention including aromatherapy modalities. In addition to a comprehensive search of the above databases, a manual search of the references used in the selected articles was also conducted using the same criteria. For a condensed overview of all the studies included in the literature review, refer to the table of findings (Appendix A).

## Effects of Aromatherapy on Stress Among Patients

Although stress is often not the primary focus of a patient's healthcare during hospitalization, stress plays a key role in a patient's wellbeing and recovery. Consequently, it is imperative that patients' stress is mitigated in the acute care setting as much as possible. The following articles focus on the use of aromatherapy to alleviate stress experienced by patients in the acute care setting.

Cho, Lee, and Hur (2017) hypothesized that aromatherapy would cause a significant decrease in stress and a significant improvement in quality of sleep when compared to a group that was not receiving aromatherapy treatment. To test their hypothesis, the researchers deigned a non-randomized experimental study. Using convenience sampling, a group of 64 patients in the Intensive Care Unit (ICU) at a university hospital were recruited for the study; due to attrition, data was included for 60 participants. The intervention consisted of deep breathing with lavender essential oil and then sleeping with an aromastone present in the room (aroma stones are rocks or similarly shaped man-made dishes on which several drops of essential oil are placed and allowed to sit at room temperature and release the aroma). Both the deep breathing and aroma stone interventions were implemented at 9:00 pm on days 1 and 2 of the hospitalization in the ICU. Pre- and post-test evaluations were conducted before and after the aromatherapy intervention to measure stress reduction (Cho et al., 2017).

The study found significant reductions in perceived stress, objective stress, systolic blood pressure, heart rate, and sleep quality among the experimental group participants, with p-values less than 0.001. The study did not find a significant difference in diastolic blood pressure between the experimental and control groups (Cho et al., 2017). The researchers of this study also conducted a statistical analysis of the participants' demographic information and baseline health but found no significant difference between the experimental and control groups. The homogeneity of the sample size augments the researcher's ability to control for confounds and strengthens the design of the study, although it does limit the generalizability of the results. A notable weakness to this study is that it was conducted within the ICU at a single hospital, which limits the applicability of the findings to other populations or settings (Cho et al., 2017).

Another randomized study was executed to explore the effect of 2% lavender essential oil aromatherapy on the anxiety and sleep quality ratings of patients in a coronary intensive care unit (Karadag, Samanicioglu, Ozden, & Bakir, 2017). The sample was composed of 60 patients at a hospital in Turkey who were selected based on inclusion criteria and willingness to participate. Random assignment was used to designate 30 patients to the control group and 30 patients to the experimental group. For a period of 15 days, the experimental group received 2% lavender essential oil aromatherapy for 20 minutes before going to sleep, while the control group did not receive any aromatherapy treatment. Both groups completed a pre-test on day 1 of the intervention and a post test on day 15 of the intervention. The pre- and post-test consisted of two tests: the Pittsburg Sleep Quality Index (PSQI) and the Beck Anxiety Inventory (BAI). In addition, as part of the pre-test all participants filled out a questionnaire regarding their demographic information to appraise the sample's homogeneity (Karadag et al., 2017).

Analysis of the PSQI and BAI data from this study revealed a significant improvement in sleep quality and decrease in anxiety levels in the group that received aromatherapy treatment, but not in the control group (Karadag et al., 2017). This is demonstrated by a p-value of 0.006 for sleep quality and a p-value of 0.001 for anxiety, which was obtained by a t-test analysis of pre- and post-test results in the experimental group. Conversely, the same test reveals an insignificant difference in pre- and post-test sleep quality ratings ($p=0.493$) and anxiety ratings ($p=0.123$) within the control group (Karadag et al., 2017). One weakness to this study is the method of sampling. The authors utilized convenience sampling to select the subjects for this study and did not employ random selection during the process. This limits the generalizability of the study findings to other populations. One strength of the study is the evaluation of the homogeneity of the sample. A t-test determined the demographics and characteristics of the sample were

homogeneous, with a p-value of <0.05, which demonstrates that the authors identified possible confounds and minimized their effects as much as possible (Karadag et al., 2017).

Salamati, Mashouf, and Mojab (2017) conducted a single-blind trial to examine the effects of aromatherapy on vital signs in patients following open heart surgery. Stress activates the sympathetic nervous system which in turn causes tachycardia, hypertension, and other physiologic changes. Informed by this physiologic process, Salamati et al. (2017) selected vital signs as a measure for stress levels among the 40 patients who were selected to participate using inclusion and exclusion criteria; all participants were recruited to the experimental group and there was no control group. Prior to the open-heart surgery, each participant underwent a patch-test of the lavender essential oil to eliminate the possibility of allergic reactions. After undergoing surgery and 10 minutes after being extubated, the participants' systolic blood pressure, diastolic blood pressure, heart rate, SpO2, and central venous pressure were measured using a Japanese analogue barometer (Salamti et al., 2017). The participants were then given a cotton swab containing two drops of 2% distilled lavender essential oil which was placed under their oxygen mask and left in place for 10 minutes. 30 minutes after the aromatherapy intervention, vitals were measured once again using the same analogue tool (Salamati et al., 2017).

Vital signs before and after the intervention were compared using paired t-tests and chi-square analysis. Furthermore, the relationship between demographics and physiological variables was examined using Fishers' exact (Salamati et al., 2017). The researchers found a significant difference ($p<0.05$) in the vital signs after the intervention for systolic blood pressure ($p<0.001$), diastolic blood pressure ($p=0.001$), and heart rate ($p=0.03$). The changes in SpO2, respiratory rate, and central venous pressure following the intervention were not found to be significant

(Salamati et al., 2017). Strengths to this study design include the use of blinding – which reduces the risk of bias in the results – and the analysis of the relationship between demographics and the vital sign measures, which were found to be insignificant (Salamati et al., 2017). Conversely, the fact that only one aromatherapy intervention was carried out per patient, alongside the small sample size all from the same region, impedes the generalizability of the study findings. Salamati et al. (2017) do not address the method of sampling, which also limits the credibility of these findings. The researchers tentatively conclude that aromatherapy can reduce blood pressure and heart rate, and therefore stress, but further research with a larger sample, randomization, and implementation of a control group should be conducted to confirm these findings (Salamati et al., 2017).

Bikmoradi et al. designed a randomized controlled trial to study the effect of aromatherapy on stress as measured by vital signs in patients who had received a coronary artery bypass surgery (CABG). At a teaching hospital in Hamadan, Iran, all patients who had undergone a CABG were assessed for eligibility and 60 were included in the data analysis and findings (Bikmoradi et al., 2015). Participants were randomly assigned to either the control group or the aromatherapy group. Both groups received an aromatherapy diffuser intervention on day 2 and day 3 after their CABG surgery; the diffuser of the aromatherapy contained 2% lavender oil, while the diffuser of the control group contained distilled water as a placebo (Bikmoradi et al., 2015). Contrary to the other studies discussed in this literature review, the results from Bikmoradi et al. (2015) revealed no significant difference in the mental stress scores nor vital signs between the aromatherapy and control group. The one exception to this was found in systolic blood pressure, for which there was a significant difference ($p<0.05$) in pre- and post-

intervention measures in the aromatherapy group compared to the control group (Bikmoradi et al., 2015).

The findings of the Bikmoradi et al. study are limited by several weaknesses of the research design. First, the small sample size limits the generalizability of the findings. Second, the intervention was only carried out for 20 minutes across two days (Bikmoradi et al., 2015). Current research concerning the duration of aromatherapy required to yield benefits on the user is lacking; thus, a 20-minute intervention may have limited the researcher's ability to adequately assess the effects of aromatherapy on stress and vital signs since the minimum effective exposure time is not established. Conversely, the use of a control group and a placebo is a strength of the study because it increases the validity of the findings. The use of random assignment to treatments also adds credibility to the study (Bikmoradi et al., 2015).

## Effects of Aromatherapy on Stress Among Nurses

Of equal importance to the stress of patients is the stress experienced by healthcare workers. As outlined in the introduction, stress interferes with the nurses' ability to provide effective, quality care which may result in decreased patient safety, satisfaction, and increased costs (Chen et al., 2015; Johnson, 2014). The following articles examine aromatherapy as an alternative method for reducing stress among nurses.

The purpose of the study conducted by Chen, Fang, and Fang (2015) was to examine the effectiveness of lavender essential oil at reducing occupation-related stress among nurses. To address this objective, an experimental study was conducted in two phases. The first phase consisted of a cross-sectional design with a sample of 259 nurses, while the second phase consisted of 110 nurses selected from the phase 1 group. The average age of participants was 33.18 years, and the sample consisted of nurses working at teaching hospitals in southern Taiwan

who provided direct patient care (Chen et al. 2015). During the first phase, nurses reported the number of stress symptoms they experienced during a given shift across seven workdays. Nurses who reported having more than 4.6 stress symptoms related to their occupation were then recruited to phase two and were broken into the control and experimental groups. The experimental group wore a bottle containing 3% lavender essential oil over their right chest for a period of four workdays, while the control group wore a bottle that did not contain any essential oil. Both groups were required to fill out the stress symptom scale at the end of their shift on the day prior to the intervention, on each of the four days during which the intervention took place, and then four days after the intervention was terminated. Results were examined using the ANOVA mean comparison, the chi-square test, and the mixed-model analysis (Chen et al., 2015).

During the study, data from the stress symptom scale revealed that the number of job-related stress symptoms decreased from 5.6 to 2.8 among the experimental group but increased from 5.6 to 5.8 among the control group during the 4-day intervention period (Chen, Fang, & Fang, 2015). However, when looking at the decrease in stress symptoms experienced by the experimental group, analysis reveals that the benefits of lavender essential oil are only present when used for 3 or more days. On day 1 and day 2 of the study, the change in number of stress symptoms in the experimental group when compared to changes experienced by the control group was not statistically significant, with p-values of 0.126 and 0.159 respectively (Chen, Fang, & Fang, 2015). Conversely, the changes witnessed on day 3 and day 4 have p-values of 0.035 and 0.026 respectively, which are statistically significant (Chen, Fang, & Fang, 2015). Thus, the study concludes that pinning 3% lavender essential oil over the right chest is effective at reducing the number of stress symptoms experienced by nurses working in teaching hospitals

in south Taiwan, but only when the aromatherapy is used for 3 or more days (Chen, Fang, & Fang, 2015). This study corroborates its credibility by identifying possible confounds and statistically analyzing them to ensure they do not have a significant impact on the findings of the study. A weakness of this study is that it only examines a select population of individuals in southern Taiwan, which limits the generalizability of the results. Additionally, the researchers only used subjective data to measure stress reduction, so adding objective measures could have strengthened this study.

Donaldson, Ingrao, Drake, and Ocampo (2017) designed a quasi-experimental study to examine the effect of blended essential oils on nurses' subjective anxiety ratings. The study implemented convenience sampling to obtain 44 registered nurses working on an orthopedic trauma surgical unit at a hospital in southern California. All 44 participants were involved in the intervention, which consisted of the placement of two diffusers containing a blend of essential oils on the unit where the nurses work. All of the participants rated their anxiety using the State Anxiety Inventory Form Y (STAI Y-1) intermittently during the 2-week pre-intervention period and during the 2-week intervention. The STAI Y-1 is a questionnaire measuring overall anxiety as well as 20 subcategories of anxiety. Data from the STAI Y-1 was separated into pre-test data, from the pre-intervention period, and post-test data, from the intervention period (Donaldson et al., 2017).

The findings from this study were largely inconsistent with previous conclusions about nurses' job-related stress levels, although they did align with two other studies that found no significant relationship between aromatherapy and anxiety (Donaldson et al., 2017). Data analysis of the STAI Y-1 results revealed no significant difference in the participant's anxiety levels after the aromatherapy intervention ($p=0.09$). Out of all the STAI Y-1 measures, a

significant difference was only observed in the pre- and post-test ratings for one construct: feeling tense ($P<0.05$). Thus, there was little evidence that aromatherapy reduced anxiety ratings of registered nurses in the orthopedic surgical trauma unit, although 38 of the 44 nurses did report that they generally liked the aromatherapy (Donaldson et al., 2017). Several limitations to this study lie in the research design. The study utilized a non-randomized, small convenience sample and did not have a control group, both of which limit the generalizability and validity of the findings. Despite these weaknesses, the study bolstered its credibility by discussing similar research studies that examined the same intervention, as well as studies that concluded similar findings.

Johnson et al. (2017) conducted a quasi-experimental study to examine the effects of lavender aromatherapy on perceived stress among nurses and other health-care staff using a convenience sample from a level one trauma center in Phoenix, Arizona. The sample originally included 134 participants but was narrowed to 71 after applying inclusion and exclusion criteria. The final sample consisted of registered nurses, charge nurses, and patient care technicians on a trauma intensive care unit, surgical specialty care unit, and trauma orthopedic unit. Prior to the aromatherapy intervention participants completed a survey developed by emergency room nurses at Vanderbilt University Medical Center to assess perceived stress. After the pre-survey was completed by all participants, a diffuser containing lavender essential oil was placed in a nurse-only room on each of the three units and was run 24 hours a day for 30 days. At the end of the 30 days the participants filled out the same survey that was administered prior to the intervention (Johnson et al., 2017).

The results of this study were evaluated using a dependent sample t-test. Perceived stress levels in the workplace were evaluated using the survey question: “how often do nurses feel

stressed at work in a typical week?" The mean response to this question prior to the intervention decreased during the post-intervention. This difference was found to be significant with a p-value of 0.021, indicating that lavender aromatherapy is effective at reducing perceived stress levels among nurses in the workplace (Johnson et al., 2017). Conversely, following the intervention there were no significant changes in optimal energy levels, feeling overwhelmed, feeling stressed due to personal life, or feeling capable of dealing with workplace stressors (Johnson et al., 2017). One strength of this study is that the researchers attempted to account for outside variables by asking participants to report additional stress-reducing activities they engaged in such as yoga or exercise. Furthermore, the researchers analyzed participant demographics and found no significant difference between the groups of nurses on each of the three units. A weakness to this study is the use of a convenience sample. The lack of randomization, paired with the fact that the participants are all from the same hospital and the same city, limits the generalizability and applicability of the study findings. Additionally, the outcome variables were only measured at the end of the 30-day intervention, and more periodic measurements may have offered more accurate reflections of the nurses' stress levels, energy levels, and other measured emotions.

Huanhuan et al. (2018) conducted a systematic review to examine the effects of aromatherapy, massage, and aromatherapy massage on the reduction of workplace stress among nurses. To evaluate findings on this subject the researchers gathered a sample of ten studies – including both randomized and nonrandomized designs – guided by the Cochrane Handbook for Systematic Reviews of Interventions. The databases searched in this study included PubMed, Web of Science, PsychINFO, Embase, and the Cochrane Library, plus a manual search of references used in selected articles. The initial search yielded 1088 studies, but following the removal of duplicates, application of exclusion criteria, and assessment of study eligibility, a

final sample of ten studies was acquired (Huanhuan et al., 2018). The samples in each study had a mean size of 14-120, involved inpatient and outpatient nurses from six different countries, and included predominantly female participants with mean ages of 25.9-47 years. The findings were appraised with descriptive analysis, and each study was also evaluated for bias using either the Cochrane Collection Tool or the MINORS checklist (Huanhuan et al., 2018). A summary of the data from each study was presented in a table of findings.

While many of the individual studies report aromatherapy, massage, or aromatherapy massage as significantly reducing stress among nurses, the authors' overall analysis leads them to conclude that there is insufficient evidence to conclude effectiveness (Huanhuan et al., 2018). Only ten studies were found to provide information on this subject, which reveals a lack of existing research on the subject. The sample sizes within the studies were consistently small, which limits the generalizability of the findings. Furthermore, many of the studies were found to have a high risk for bias due to nonrandomization, attrition, and unclear reporting methods among others. Several studies were also found to have a gap between the subjective and objective measures of stress, which suggests the evaluation tools were not valid indicators of stress (Huanhuan et al., 2018).

Overall, the systematic review conducted by Huanhuan et al. did not find aromatherapy, massage, or aromatherapy massage to be effective methods to reduce stress among nurses. The authors suggest that further research must be conducted with larger sample sizes and an extended time frame to examine the long-term impact of these interventions. Future studies must also utilize an appropriate tool to measure stress and must design a quality intervention study by which the design trail can be clearly and consistently understood and used for analysis (Huanhuan et al., 2018). For the intention of this paper, it is important to note that one study

examined stress levels among 16 outpatient nurses; this literature review is concentrated on acute care which excludes outpatient care and consequently may limit the applicability of the findings of Huanhuan et al. (2018) to the PICOT question guiding this analysis.

Chronic stress may result in various health complications including a reduction in saliva production, buildup of oral sulfur compounds, and a decrease in oral pH. To examine the effects of aromatherapy on improving stress and oral health, Seo, Song, Hur, Lee, and Lee (2017) conducted a non-randomized controlled clinical trial using an intervention of aromatherapy mouthwash. The study included 120 ICU nurses at Eulji University Hospital in South Korea. Participants were recruited using convenience sampling, and once selected using inclusion and exclusion criteria, were divided into three groups of 40 (Seo et al., 2017). The experimental group used aromatherapy mouthwash once a day for three days, the placebo group used a saline mouthwash once a day for three days, and the control group used no mouthwash. Experimental outcomes were measured seven times prior to the intervention and then immediately prior to and 10 minutes following the intervention, as well as 30 minutes after the intervention on day three. Each outcome was measured using an appropriate evaluation tool; stress and xerostomia were measured using a visual analogue scale, halitosis was measured with a portable breath checker, and salivary pH was measured with bromothymol blue and bromocresol purple test papers (Seo, et al., 2017).

The study found that aromatherapy mouthwash is effective at reducing stress. Participants were asked to rate their stress from 0 to 10, 0 being “not stressed at all” and 10 being “extremely stressed out.” Prior to the intervention, the group receiving the aroma gargle had an average stress score of 5.4. After each of the three aroma gargle interventions, this average decreased to 4.58, 4.63, and 4.38. Comparatively, in the saline gargle group and the control group, mean

stress scores were unchanged (Seo et al., 2017). In an effort to account for discrepancies between each group, demographics and mouth hygiene habits were analyzed and found to be homogenous. The results of this study are substantiated by the homogeneity of the samples as well as the inclusion of a control and placebo group and the absence of participant attrition. However, the findings are limited by a nonrandomized design, subjective reporting, and the experimental group's cognizance of the intervention. Furthermore, the aromatherapy mouthwash comprised a blend of four essential oils, which restricts the potential to distinguish which of the essential oils is affecting the experimental outcomes of interest (Seo et al., 2017).

## Summary

The nine studies examined in this chapter investigate the effectiveness of aromatherapy treatment at reducing stress. The research addresses aromatherapy interventions for both nurses and patients, and conclude similar findings among both populations. Out of these studies, six concluded statistically significant findings in stress reduction resulting from aromatherapy treatment. In the subsequent chapter, the statistically significant findings will examined in greater depth and translated into recommendations for clinical practice.

# Chapter Three: Best Practice Recommendations

This chapter will put forth recommendations on how aromatherapy can be best implemented in the clinical setting. These recommendations are drawn from the literary evidence presented in chapter two, specifically, the six studies that reported aromatherapy treatment methods were effective at reducing stress among either patients or nurses in the acute care setting. Based on the research examined in the literature review, best-practice recommendations will be focused on five area of implementation (see table 1-5): essential oil aroma and dilution level, delivery method, timing of implementation, qualifying individuals, and means for measuring the effect. These recommendations were drawn from all nine research studies, but results from those with a higher level of evidence were considered in greater depth (see Appendix B). Readers should note that the findings regarding aromatherapy techniques for nurses and patients are so consistent with one another that the results are synthesized into recommendations that apply equally to both in the high acuity environment.

Table 1

*Best Practice Recommendations for Essential Oil to be Used in Aromatherapy*

| **Recommendation** | **Rationale** | **References** | **Level of Evidence** |
|---|---|---|---|
| Lavender essential oil 2% - 100% | Lavender essential oil, percentage not identified | Cho, E. H., Lee, M. Y., & Hur, M. H. (2017). The effects of aromatherapy on intensive care unit patients' stress and sleep quality: A nonrandomised controlled trial. *Evidence-Based Complementary & Alternative Medicine (ECAM), 2017,* 1-10. doi: 10.1155/2017/2856592 | Level III |
| | 2% lavender essential oil | Karadag, E., Samancioglu, S., Ozden, D., & Bakir, E. (2017). Effects of aromatherapy on sleep quality and anxiety of patients. *Nursing in Critical Care, 22*(2), 105-112. doi: 10.1111/nicc.12198 | Level II |
| | 2% lavender essential oil | 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. | Level III |
| | 3% lavender essential oil | Chen, M., Fang, S., & Fang, | Level III |

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| | | L. (2015). The effects of aromatherapy in relieving symptoms related to job stress among nurses. *International Journal of Nursing Practice, 21*(1), 87-93. doi: 10.1111/ijn.12229 | |

Table 2

*Best Practice Recommendations for Aromatherapy Delivery*

| Recommendation | Rationale | References | Level of Evidence |
|---|---|---|---|
| Direct inhalation: 2 drops essential oil placed on cotton material and inhaled | 2 x 2 cotton gauze instilled with 2 drops lavender oil, pinned on patients scrubs below nose | Karadag, E., Samancioglu, S., Ozden, D., & Bakir, E. (2017). Effects of aromatherapy on sleep quality and anxiety of patients. *Nursing in Critical Care, 22*(2), 105-112. doi: 10.1111/nicc.12198 | Level II |
| | Cotton swab impregnated with 2 drops lavender oil, placed under oxygen mask | 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. | Level III |
| Ambient inhalation: 3 drops essential oil on aromastone or in diffuser | 3 drops essential oil placed on aromastone | Cho, E. H., Lee, M. Y., & Hur, M. H. (2017). The effects of aromatherapy on intensive care unit patients' stress and sleep quality: A nonrandomised | Level III |

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| | | controlled trial. *Evidence-Based Complementary & Alternative Medicine (ECAM), 2017,* 1-10. doi: 10.1155/2017/2856592 | |
| | Nebulizing diffuser placed in a closed room | Johnson, K., West, T., Diana, S., Todd, J., Haynes, B., Bernhardt, J., & Johnson, R. (2017). Use of aromatherapy to promote a therapeutic nurse environment. *Intensive and Critical Care Nursing, 40*, 18-25. doi: 10.1016/j.iccn.2017.01.006 | Level VI |

Table 3

*Best Practice Recommendations for Timing and Duration of Aromatherapy Therapy*

| Recommendation | Rationale | References | Level of Evidence |
|---|---|---|---|
| For direct inhalation aromatherapy: 10-20 minutes a day, anytime, can be done once or on consecutive days for the same effect | Before sleep for 20 minutes, 15 days in a row | Karadag, E., Samancioglu, S., Ozden, D., & Bakir, E. (2017). Effects of aromatherapy on sleep quality and anxiety of patients. *Nursing in Critical Care, 22*(2), 105-112. doi: 10.1111/nicc.12198 | Level II |
| | 10 minutes following extubation, for 10 minutes, once | Salamati, A., Mashouf, S., & Mojab, F. (2017). Effect of inhalation of lavender essential oil on vital signs in open heart surgery ICU. *Iranian Journal* | Level III |

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| | | *of Pharmaceutical Research, 16*(1), 404-409. | |
| For ambient inhalation aromatherapy: 12-24hrs, anytime, for a minimum of three days | During sleep at night (8pm-8am); even 1-night yields result (no minimum # nights) | Cho, E. H., Lee, M. Y., & Hur, M. H. (2017). The effects of aromatherapy on intensive care unit patients' stress and sleep quality: A nonrandomised controlled trial. *Evidence-Based Complementary & Alternative Medicine (ECAM), 2017,* 1-10. doi: 10.1155/2017/2856592 | Level III |
| | 24 hours a day for 30 days | Johnson, K., West, T., Diana, S., Todd, J., Haynes, B., Bernhardt, J., & Johnson, R. (2017). Use of aromatherapy to promote a therapeutic nurse environment. *Intensive and Critical Care Nursing, 40*, 18-25. doi: 10.1016/j.iccn.2017.01.006 | Level VI |

Table 4

*Best Practice Recommendations for Aromatherapy Qualification Criteria*

| Recommendation | Rationale | References | Level of Evidence |
|---|---|---|---|
| Individual is oriented and conscious | Individual is lucid | Cho, E. H., Lee, M. Y., & Hur, M. H. (2017). The effects of aromatherapy on intensive care unit patients' stress and sleep | Level III |

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|---|---|---|---|
| | | quality: A nonrandomised controlled trial. *Evidence-Based Complementary & Alternative Medicine (ECAM), 2017,* 1-10. doi: 10.1155/2017/2856592 | |
| | Individual is oriented and conscious | 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. | Level III |
| | Individual is conscious | Bikmoradi, A., Seifi, Z., Poorolajal, J., Araghchian, M., Safiaryan, R., & Oshvandi, K. (2015). Effect of inhalation aromatherapy with lavender essential oil on stress and vital signs in patients undergoing coronary artery bypass surgery: A single-blinded randomized clinical trial. *Complementary Therapies in Medicine, 23*(3), 331-338. doi: 10.1016/j.ctim.2014.12.001 | Level II |
| Individual is able to communicate and has no significant sensory impairments | Individual is able to communicate; individual has no severe hearing or speech impairments | Karadag, E., Samancioglu, S., Ozden, D., & Bakir, E. (2017). Effects of aromatherapy on sleep quality and anxiety of patients. *Nursing in Critical Care, 22*(2), 105-112. doi: 10.1111/nicc.12198 | Level II |

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|---|---|---|---|
| | Individual has no smell impairment | Bikmoradi, A., Seifi, Z., Poorolajal, J., Araghchian, M., Safiaryan, R., & Oshvandi, K. (2015). Effect of inhalation aromatherapy with lavender essential oil on stress and vital signs in patients undergoing coronary artery bypass surgery: A single-blinded randomized clinical trial. *Complementary Therapies in Medicine, 23*(3), 331-338. doi: 10.1016/j.ctim.2014.12.001 | Level II |
| | Individual is able to communicate; individual has normal olfactory function | Chen, M., Fang, S., & Fang, L. (2015). The effects of aromatherapy in relieving symptoms related to job stress among nurses. *International Journal of Nursing Practice, 21*(1), 87-93. doi: 10.1111/ijn.12229 | Level III |
| Individual is breathing independently and spontaneously | Individual is extubated and is breathing spontaneously | 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. | Level III |
| | Individual has not been intubated within the past 24 hours | Bikmoradi, A., Seifi, Z., Poorolajal, J., Araghchian, M., Safiaryan, R., & Oshvandi, K. (2015). Effect of inhalation aromatherapy with lavender | Level II |

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| | | essential oil on stress and vital signs in patients undergoing coronary artery bypass surgery: A single-blinded randomized clinical trial. *Complementary Therapies in Medicine, 23*(3), 331-338. doi: 10.1016/j.ctim.2014.12.001 | |
| Individual has no known allergies to flowers or plants | Individual has no known allergies to flowers nor plants | Karadag, E., Samancioglu, S., Ozden, D., & Bakir, E. (2017). Effects of aromatherapy on sleep quality and anxiety of patients. *Nursing in Critical Care, 22*(2), 105-112. doi: 10.1111/nicc.12198 | Level II |
| | Individual has no known allergies to plants | Bikmoradi, A., Seifi, Z., Poorolajal, J., Araghchian, M., Safiaryan, R., & Oshvandi, K. (2015). Effect of inhalation aromatherapy with lavender essential oil on stress and vital signs in patients undergoing coronary artery bypass surgery: A single-blinded randomized clinical trial. *Complementary Therapies in Medicine, 23*(3), 331-338. doi: 10.1016/j.ctim.2014.12.001 | Level II |
| Individual has no known allergies to essential oil or other scents | Individual has no known allergies to essential oils | Cho, E. H., Lee, M. Y., & Hur, M. H. (2017). The effects of aromatherapy on intensive care unit patients' stress and sleep quality: A nonrandomised | Level III |

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| | | controlled trial. *Evidence-Based Complementary & Alternative Medicine (ECAM), 2017,* 1-10. doi: 10.1155/2017/2856592 | |
| | Individual has no known allergies to lavender essential oil | Karadag, E., Samancioglu, S., Ozden, D., & Bakir, E. (2017). Effects of aromatherapy on sleep quality and anxiety of patients. *Nursing in Critical Care, 22*(2), 105-112. doi: 10.1111/nicc.12198 | Level II |
| | Individual has no known allergies to lavender | Chen, M., Fang, S., & Fang, L. (2015). The effects of aromatherapy in relieving symptoms related to job stress among nurses. *International Journal of Nursing Practice, 21*(1), 87-93. doi: 10.1111/ijn.12229 | Level III |
| | Individual has no known allergies or sensitivities to scents | Johnson, K., West, T., Diana, S., Todd, J., Haynes, B., Bernhardt, J., & Johnson, R. (2017). Use of aromatherapy to promote a therapeutic nurse environment. *Intensive and Critical Care Nursing, 40*, 18-25. doi: 10.1016/j.iccn.2017.01.006 | Level VI |
| | Individual has no known allergies to aroma essential oils | Seo, E. Y., Song, J. A., Hur, M. H., Lee, M. K., & Lee, M. S. (2017). Effects of aroma | Level III |

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| | | mouthwash on stress level, xerostomia, and halitosis in healthy nurses: A non□ randomized controlled clinical trial. *European Journal of Integrative Medicine*, 10, 82– 89. | |
| Individual does not have asthma nor other pulmonary disease | Individual has no history of asthma | Karadag, E., Samancioglu, S., Ozden, D., & Bakir, E. (2017). Effects of aromatherapy on sleep quality and anxiety of patients. *Nursing in Critical Care, 22*(2), 105-112. doi: 10.1111/nicc.12198 | Level II |
| | Individual has no asthma, no chronic obstructive pulmonary disease (COPD), nor any other pulmonary disease | 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. | Level III |
| | Individual has no asthma nor other reactive airway disease | Johnson, K., West, T., Diana, S., Todd, J., Haynes, B., Bernhardt, J., & Johnson, R. (2017). Use of aromatherapy to promote a therapeutic nurse environment. *Intensive and Critical Care Nursing, 40*, 18-25. doi: 10.1016/j.iccn.2017.01.006 | |
| Individual is hemodynamically stable | Individual has no arrythmias and has a systolic blood pressure greater than 100 | Cho, E. H., Lee, M. Y., & Hur, M. H. (2017). The effects of aromatherapy on intensive care | Level III |

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| | mmHg | unit patients' stress and sleep quality: A nonrandomised controlled trial. *Evidence-Based Complementary & Alternative Medicine (ECAM), 2017,* 1-10. doi: 10.1155/2017/2856592 | |
| | Individual has a heart rate greater than 60 beats per minute, a systolic blood pressure greater than or equal to 100, and a diastolic blood pressure greater than or equal to 60 | 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. | Level III |
| | Individual is hemodynamically stable | Bikmoradi, A., Seifi, Z., Poorolajal, J., Araghchian, M., Safiaryan, R., & Oshvandi, K. (2015). Effect of inhalation aromatherapy with lavender essential oil on stress and vital signs in patients undergoing coronary artery bypass surgery: A single-blinded randomized clinical trial. *Complementary Therapies in Medicine, 23*(3), 331-338. doi: 10.1016/j.ctim.2014.12.001 | Level II |
| Individual is not pregnant | Individual is not pregnant; the effect of essential oils on pregnancy has not been studied | Seo, E. Y., Song, J. A., Hur, M. H., Lee, M. K., & Lee, M. S. (2017). Effects of aroma mouthwash on stress level, xerostomia, and halitosis in | Level III |

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| | | healthy nurses: A non□ randomized controlled clinical trial. *European Journal of Integrative Medicine*, 10, 82– 89. | |
| Individual has no history of addiction | Individual has no history of opioid addiction | 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. | Level III |
| | Individual has no history of narcotic addiction nor alcohol addiction | Bikmoradi, A., Seifi, Z., Poorolajal, J., Araghchian, M., Safiaryan, R., & Oshvandi, K. (2015). Effect of inhalation aromatherapy with lavender essential oil on stress and vital signs in patients undergoing coronary artery bypass surgery: A single-blinded randomized clinical trial. *Complementary Therapies in Medicine, 23*(3), 331-338. doi: 10.1016/j.ctim.2014.12.001 | Level II |
| Individual does not use antianxiety medications presently nor in the past | Individual is not taking antianxiety medications | Cho, E. H., Lee, M. Y., & Hur, M. H. (2017). The effects of aromatherapy on intensive care unit patients' stress and sleep quality: A nonrandomised controlled trial. *Evidence-Based Complementary & Alternative Medicine (ECAM),* | Level III |

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| | | *2017,* 1-10. doi: 10.1155/2017/2856592 | |
| | Individual is not using antianxiety drugs | Bikmoradi, A., Seifi, Z., Poorolajal, J., Araghchian, M., Safiaryan, R., & Oshvandi, K. (2015). Effect of inhalation aromatherapy with lavender essential oil on stress and vital signs in patients undergoing coronary artery bypass surgery: A single-blinded randomized clinical trial. *Complementary Therapies in Medicine, 23*(3), 331-338. doi: 10.1016/j.ctim.2014.12.001 | Level II |

Table 5

*Best Practice Recommendations for Measuring the Effect of Aromatherapy*

| Recommendation | Rationale | References | Level of Evidence |
|---|---|---|---|
| Perceived stress pre- and post-intervention with numerical rating tool | Perceived stress with numeric rating tool | Cho, E. H., Lee, M. Y., & Hur, M. H. (2017). The effects of aromatherapy on intensive care unit patients' stress and sleep quality: A nonrandomised controlled trial. *Evidence-Based Complementary & Alternative Medicine (ECAM), 2017,* 1-10. doi: 10.1155/2017/2856592 | Level III |

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| | Perceived stress questionnaire every 30 days: "how often do nurses feel stressed at work in a typical week?"<br><br>"Always" scored as a 1, "Never" scored as a 5 | Johnson, K., West, T., Diana, S., Todd, J., Haynes, B., Bernhardt, J., & Johnson, R. (2017). Use of aromatherapy to promote a therapeutic nurse environment. *Intensive and Critical Care Nursing, 40*, 18-25. doi: 10.1016/j.iccn.2017.01.006 | Level VI |
| | Perceived stress with visual analogue scale every 30 days (scale components: always, most of the time, about half the time, once in a while, never) | Seo, E. Y., Song, J. A., Hur, M. H., Lee, M. K., & Lee, M. S. (2017). Effects of aroma mouthwash on stress level, xerostomia, and halitosis in healthy nurses: A non□ randomized controlled clinical trial. *European Journal of Integrative Medicine*, 10, 82– 89. | Level III |
| Heart rate and systolic blood pressure pre- and post-intervention | Heart rate, systolic blood pressure, and stress index (heart rate variability tool) | Cho, E. H., Lee, M. Y., & Hur, M. H. (2017). The effects of aromatherapy on intensive care unit patients' stress and sleep quality: A nonrandomised controlled trial. *Evidence-Based Complementary & Alternative Medicine (ECAM), 2017,* 1-10. doi: 10.1155/2017/2856592 | Level III |
| | Systolic blood pressure, | Salamati, A., Mashouf, S., & | Level III |

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|---|---|---|---|
| | diastolic blood pressure, and heart rate | 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. | |
| | Systolic blood pressure | Bikmoradi, A., Seifi, Z., Poorolajal, J., Araghchian, M., Safiaryan, R., & Oshvandi, K. (2015). Effect of inhalation aromatherapy with lavender essential oil on stress and vital signs in patients undergoing coronary artery bypass surgery: A single-blinded randomized clinical trial. *Complementary Therapies in Medicine, 23*(3), 331-338. doi: 10.1016/j.ctim.2014.12.001 | Level II |

## Summary of Best Practice Recommendations

When translating aromatherapy research to clinical practice, one of the most frequently debated topics is what essential oil should be used to achieve and maximize the desired effect. Beyond choosing what aroma should be used, the dilution level must also be selected. The nine articles assessed in the literature review above use lavender, cape chamomile, bergamot, lemon, sweet orange, peppermint, tea tree, and ylang ylang essential oils. Out of these aromas, only the lavender essential oils and a blend involving peppermint, lemon, tea tree, and ylang ylang were found to be effective at reducing stress. However, since the essential oil blend was only found effective in a single study, the results are not significant enough to support this use in clinical practice. Furthermore, should an individual experience an adverse reaction to aromatherapy conducted with a blend of essential oils, it is difficult to identify which essential oil caused the reaction. By conducting aromatherapy with a single essential oil, clinical therapists can exert greater control over the treatment. Lavender essential oils in varying dilution levels were found effective at reducing stress in five of the studies. Lavender oil is thought to be the least toxic and allergenic essential oil, and is efficacious at producing relaxing, sedative, and carminative effects (Karadag et al., 2017). In one study, lavender was found to be the essential oil most enjoyed by nurses and the essential oil nurses were most likely to use in the future (Johnson et al., 2017). Therefore, lavender essential oil – ranging from 2% to 3% – is recommended as the best essential oil for reducing stress based on the current literary findings. One study found 100% lavender essential oil to be effective, however, undiluted essential oils have a higher risk of causing skin irritation or damage (National Association for Holistic Aromatherapy, 2020a). For this reason, the range of 2%-3% was selected as the best practice recommendation.

Many methods exist for delivering aromatherapy. Some common examples of aromatherapy application include diffusers, aroma stones, direct inhalation, aroma baths, aroma sprays, and roll-on essential oils. The diverse array of delivery methods is useful in making aromatherapy more accessible; however, having so many options also creates the issue of deciding which one is best to achieve your desired outcome. Analysis of the research in chapter two of this thesis yields two suggestions for delivering aromatherapy in high acuity settings. The first recommendation for best practice is to place two drops of essential oil on a cotton material and inhale from this directly, hereby referred to as direct inhalation aromatherapy (Karadag et al., 2017; Salamati et al., 2017). The second recommendation is to provide aromatherapy through ambient inhalation (Cho et al., 2017; Johnson et al., 2017). For the purposes of this thesis, ambient inhalation refers to any method that ejects diffuse aroma into the environment. Analysis of the literature reveals both an aromastone and a nebulizing diffuser are methods of ambient inhalation that may be used to reduce stress in the acute care setting. It is important to note that when utilizing ambient delivery, the aromatherapy should be conducted in a closed room so that its effects are limited to the desired area.

Consistent with the diverse array of essential oils and delivery methods available for aromatherapy, there are also many variations in the timing and duration of aromatherapy. Aromatherapy can be implemented at any time during the day or night and for as long as desired. However, based on the existing research, implementing aromatherapy at specified times and for a designated period may maximize the effect on stress reduction. For methods of direct inhalation, the best practice recommendation is to implement aromatherapy for 10-20 minutes, any time of the day. This can be done once, or on consecutive days, to achieve the same effect (Karadag et al., 2017; Salamati et al., 2017). For ambient delivery, the best practice

recommendation drawn from the literature is to implement the aromatherapy for 12-24 hours, for a minimum of three consecutive days (Cho et al., 2017; Johnson et al., 2017).

One of healthcare providers' greatest responsibilities is to weight the risk versus benefit ratio of any given health intervention and decide whether or not it has anticipatable benefits for the patient. In the context of applying aromatherapy to the high acuity setting, guidelines must be in place to help providers decide if aromatherapy poses a risk to patients, or conversely, if it is applicable and has anticipated benefits. Thorough analysis and compilation of research findings on aromatherapy yields a lengthy list of criteria an individual should meet before receiving aromatherapy treatment. These screening measures aim to eliminate any adverse effects that could arise from aromatherapy use. The five goals hoped to achieve through these recommendations are as follows: 1) to prevent an allergic reaction to the essential oil 2) to avoid exacerbation of any chronic or acute breathing issues 3) to prevent abuse or addiction to essential oils 4) to verify an individual has clear communication skills allowing them to convey if something is wrong 5) to avoid over stimulation of the parasympathetic nervous system. These goals may be achieved by following the detailed inclusion and exclusion criteria presented in Table 4.

Following an intervention, one must have the proper measures for evaluating the intervention's efficacy. Furthermore, assessment of the intervention should include whether or not the desired outcome(s) were achieved; in this case, the outcome measures should reflect if stress reduction was achieved or not. The studies examined in the literature review above present a vast array of evaluation tools. The State Trait Anxiety Inventory Form Y (STAI Y-1), Beck Anxiety Inventory, visual analogue scale, qualitative descriptions of perceived stress, and vital sign measures a few key examples. Of these measures, two were found to be most efficacious

and reliable. The first best practice recommendation is to use perceived stress ratings pre- and post-intervention. These stress ratings should be quantitative, which can be achieved by using a numeric rating tool. The second-best practice recommendation is to utilize heart rate and systolic blood pressure values. Other vital signs were not consistently impacted by the use of aromatherapy, but heart rate and systolic blood pressure demonstrate sufficient evidence in reflecting stress levels when measured prior to and after the intervention.

## Summary

Overall, the nine research studies evaluated in the literature review here reflect a variety of suggestions for implementing aromatherapy in the clinical setting. Aromatherapy is a relatively new therapy being used in in-patient environments, and as such, many questions are arising as to how, when, and where it should be implemented. The recommendations detailed in the tables above reflect best-practice suggestions based on evidence from the most current research.

# Chapter Four: Implementation and Evaluation

The final chapter of this paper will examine a theoretical plan for implementing and evaluating an aromatherapy treatment protocol in the clinical setting. To perform this investigation, the benefits and feasibility of implementing a protocol will be assessed using the Plan-Do-Study-Act (PDSA) framework developed by the Institute for Healthcare Improvement (IHI; 2017). The PDSA framework helps pilot change through a scientific process involving four elements. First, a plan is developed for creating a change. Second, the test is carried out. Third, the data is analyzed and results are compared to predictions. Fourth, the plan is refined and altered based on the findings from the first tested change (IHI, 2020). The introduction of an aromatherapy protocol for both patients and healthcare providers in an acute care setting will be discussed below using the PDSA model.

## Implementation

### Plan

The first step in the PDSA model is to plan your test for change. This involves various components, including development of a question and the predicted outcome (IHI, 2017). The question examined in this paper was presented in chapter two: For nurses and patients in the acute care setting, are aromatherapy interventions effective at reducing verbal ratings and physiological markers of stress? The prediction is that nurses and patients who receive aromatherapy treatment will experience a reduction in stress. This will be reflected in both lower physiological markers, such as systolic blood pressure and heart rate, as well as subjective reports of perceived stress.

The second component of planning is to design the pilot. In this step, the planners must identify the elements of who, what, when, and where (IHI, 2017). The effect of aromatherapy on

both patients' and nurses' stress levels will be tested by implementing an aromatherapy treatment protocol (see Appendix C). Although this paper focuses on stress among patients and registered nurses, it is reasonable to assume that other healthcare providers also experience stress and would benefit equally from an aromatherapy treatment. Therefore, the protocol includes treatment for patients and all healthcare staff.

Beyond those who will receive the aromatherapy treatment, the "who" element of planning also encompasses those who will help implement the change. The first key stakeholder in this process is a clinical nurse educator. Clinical nurse educators often have master's preparation and are adept at "teaching methods in response to innovations in nursing science and ongoing changes in the practice environment (American Association of Colleges of Nursing [AACN], 2020, para. 17)." These skills enable them to conduct research, serve as consultants, and help shape new policies (AACN, 2020). The aromatherapy treatment protocol is highly driven by nurses; given this, a clinical nurse educator is an ideal candidate to help direct the piloted change and conduct teaching with the healthcare staff. Other key stakeholders include the registered nurses on the unit to administer the treatment, charge nurses who will help oversee and introduce the protocol, and unit managers who will approve and monitor implementation of the protocol. The unit manager will also help budget and allocate funding to execute the protocol. In the planning stage, these individuals must be identified, contacted, and collaborated with on the plan for implementing change.

The final step of planning is to identify what data will be collected. The data will need to provide insight on the effectiveness of the protocol, the ease of implementing the protocol, and the cost and benefit to the hospital. This data will be collected through two primary means: a pre- and post-program survey given to the registered nurses implementing the protocol, and an audit

of the results in the aromatherapy treatment log (see Appendix D). The survey will incorporate both close-ended and open-ended questions. The first section will have pre-determined multiple choice and true-false questions, while the second section will provide an area for nurses to write in general-feedback and suggestions for improvement. Evaluation of this data will be discussed below.

**Do**

The second step in the PDSA framework is to run a preliminary test on a small scale (IHI, 2017). To maximize the ease of testing this protocol, the plan for change will only be implemented on one inpatient, acute care unit and will run for six months. If the implementation is successful, the protocol may be introduced to additional inpatient units. During the first month, the nurse educator will provide brief in-service teachings to the registered nurses on the protocol being introduced. This teaching will take approximately 15 minutes, and will occur during staff meetings at shift change; by including the in-service teachings just prior to and during the beginning of the registered nurses' shifts, the costs to the hospital will be minimal. Following this teaching, the nurse educator will make him/herself available to the registered nurses should they have additional questions or require clarification. During the subsequent five months, the registered nurses will begin implementing the protocol and documenting in the aromatherapy treatment log. The nurse educator will be responsible for observing implementation of the protocol and documenting what is occurring. This will include frequency of aromatherapy usage on the unit, who is receiving the aromatherapy treatments, and any problems or inefficiencies that he/she notes. During these five months the nurse educator will periodically make him/herself available on the unit so that nurses may seek clarification and guidance on difficulties that arise.

In summary, the implementation stage will include development of a question and hypothesis, creation of a plan to execute the protocol pilot, and the six-month period during which the pilot is implemented. During this time the nurse educator will teach registered nurses how to use the protocol, answer questions that healthcare staff have about the piloted change, and document observations he or she makes about the test run. The data collected by the nurse educator will be supplemented by data from the registered nurses utilizing the protocol, who will document objective data in the aromatherapy treatment log and record subjective thoughts and feedback in the surveys.

## Evaluation

### Study

The third step in the PDSA model is to summarize the findings from the test and reflect on what they indicate (IHI, 2017). At the conclusion of the six-month pilot, this data will be gathered and analyzed to provide insight on the effectiveness of the protocol implementation. The nurse educator will be responsible for analyzing the data and comparing it to the expected outcome: patients and healthcare workers who receive aromatherapy treatment will experience reductions in physiological markers and verbal ratings of stress. In the aromatherapy treatment log, the physiological markers of heart rate and blood pressure and the verbal ratings of stress are recorded both prior to and following the aromatherapy treatment. The nurse educator will examine these values from the six-month trial period to examine whether stress markers were reduced after an aromatherapy treatment. This will indicate whether the aromatherapy protocol is effective at reducing stress levels among patients and healthcare workers and to what degree.

The second piece of data the nurse educator will analyze are the pre/post-program surveys completed by registered nurses using the protocol to deliver aromatherapy treatment.

This will allow the nurse educator to identify elements of the protocol nurses found helpful, as well as areas that need improvement. The inferences drawn from the aromatherapy treatment log and the nurse surveys should then be discussed with the charge nurses and unit manager. Together, these leaders can determine the next steps for implementing the protocol.

**Act**

The final component of the PDSA framework is to adapt, adopt, or abandon the plan based on the findings from the pilot (IHI, 2017). If the pilot reveals the change to be an overall success, but with minor issues, the plan can be adapted so that it is more effective the second time it is implemented. If the pilot shows the change is very effective with no issues, the change can be adopted on a larger scale, such as introducing it to additional hospital units. The third option is abandonment; if the change is found to be ineffective and not worth allocating resources to its development, the change may be discarded and not tested again (IHI, 2017). This decision will rely on the nurse educator's observations and the inferences drawn from the collected data. Alongside leaders on the unit where the change was tested, the nurse educator will scrutinize the strengths and weaknesses of the protocol implementation and determine what actions to take next.

The evaluation stage involves not only an analysis of the data, but also creation of a plan to move forward. If the change – in this case the aromatherapy protocol – is chosen to be adopted or adapted, a new plan must be created. The PDSA framework is cyclical. At the end of the fourth stage (act), a new strategy is developed and the four-step process is started again at the beginning (plan). The question and hypothesis will likely be unchanged, but other components must be re-identified: the who, what, where, and when. These components will rely on findings

from the first test of the change, which is why it is essential to evaluate the data and make modifications for improvement.

## Conclusion

This paper examines a critical issue among acute based healthcare settings – stress – and puts forth best practice recommendations for mitigating this issue. Stress has numerous negative consequences for healthcare providers and patients alike. Increased cost to the hospital, diminished satisfaction, and detriments to health and wellbeing are a few notable consequences. Best-practice recommendations for reducing stress take the form of a clinical protocol, which is created with information drawn from high-quality research and accredited aromatherapy organizations. Theoretical implementation of this practice is discussed following the PDSA framework, which allows organizations to test this practice, evaluate its effectiveness, and revise the plan to maximize its effectiveness. Overall, this paper aims to bridge the gap between existing research suggesting aromatherapy to be an effective stress reduction tool, and the lack of guidance on how aromatherapy treatment can actually be used in the high acuity clinical setting. The compilation of this information is expected to support the safe use of aromatherapy in the clinical setting, and will hopefully inspire further exploration and investigation into methods for reducing stress in acute-care settings.

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Appendix A

Table of Findings

| Author(s) and Date | Objective/ purpose | Design (Setup & sampling method) | Sample (Who) | Setting (Where) | Intervention | Findings | Notes |
|---|---|---|---|---|---|---|---|
| Bikmoradi, A., Seifi, Z., Poorolajal, J., Araghchian, M., Safiaryan, R., & Oshvandi, K. (2015). | Explore how inhalation aromatherapy (lavender essential oil) influences stress and vital signs in patients after a coronary artery bypass surgery (CABG). | Single-blind randomized control trial. | 60 patients who had undergone a CABG. 30 patients in experimental group and 30 patients in control group. | Ekbatan Therapeutic and Educational Center | two drops of 2% lavender essential oil (aromatherapy group) or two drops of distilled water (control group) placed inside of oxygen mask and worn for 20 minutes on day 2 and 3 after surgery. | No statistically significant difference in mental stress scores in the aromatherapy nor control group. No statistically significant difference in vital signs between control & aromatherapy group except in SBP on third day ($p<0.05$). | Sample determined to be homogenous. |
| Chen, M., Fang, S., & Fang, L. (2015). | Determine effects of aromatherapy (lavender essential oil) | Experimental study with cross-sectional design and | 110 nurses. 57 nurses in control group and 53 nurses in | South Taiwan. | Small bottles containing 3% lavender essential oil pinned over | No significant statistical difference in control variables | Stress symptom scale used to evaluate job-related stress experienced by |

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| | on reducing number of workplace-related stress symptoms. | purposive sampling. | experimental group. | | right chest. | between control and experimental group. Stress symptoms were about the same between the experimental and control groups prior to the intervention (p=0.692). Number of stress symptoms of experimental group decreased from 5.6 to 2.8 during intervention; number of stress symptoms of control group increased from 5.6 to 5.8. Change in the stress symptoms | subjects at the end of each workday. Self-reporting tool may have resulted in biased answers from the participants regarding stress levels. |

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| | | | | | | experienced by the experimental group when compared to the change experienced by the control group was not significant on day 1 (p=0.126) or day 2 (p=0.159) but was significant on day 3 (p=0.035) and day 4 (p=0.026) of intervention. | |
| Cho, E. H., Lee, M. Y., & Hur, M. H. (2017). | Examine the effect of aromatherapy (deep breathing with essential oil) on stress and sleep quality of patients as measured by stress, blood pressure, | Non-randomized experimental study with pre-test post-test design | 64 patients; data only analyzed from 60. | ICU at an unspecified university hospital | 3 drops lavender essential oil put on aromastone; patient asked to breathe in deeply 10 times; aromastone hung on bedside rail while patient | No significant difference in the initial heart rate, blood pressure, or sleep quality ratings of the experimental and control groups. Significant difference in the initial | Studies on control group and experimental group took place during different date ranges. |

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| | heart rate, and sleep quality ratings. | | | | slept overnight. Implemented at 9 pm on day of admittance and the following day | perceived stress rating ($p<0.001$) and objective stress index ($p=0.02$) of the control group and experimental group. On the first and second mornings after undergoing aromatherapy there was a significant difference in the perceived stress, objective stress index, systolic blood pressure, and heart rate between the control and experimental group ($p<0.001$ for both mornings and all variables). No | |

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| | | | | | | significant difference in diastolic blood pressure between the experimental and control group (p=0.783). No significant difference in sleep quality of control and experimental group within 1 hour of being admitted (p=0.524), but there was a significant difference in sleep quality on the first and second morning after the aromatherapy intervention (p<0.001 for both mornings). | |
| Donaldson, J. (2017). | Explore effectiveness | Quasi-experimental, | 44 registered nurses | Orthopedic surgical | Two electronic | 38 nurses liked the | Anxiety measured with |

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| | of workplace aromatherapy (blend of cape chamomile bergamot, lemon, & sweet orange) at reducing stress in hospital nurses as measured by anxiety scores. | non-randomized design with convenience sampling | | trauma unit in southern California | diffusers placed on orthopedic surgical trauma unit | aromatherapy, three nurses would have preferred other essential oil scents, two nurses disliked the aromatherapy because the essential oil was too strong, and one nurse disliked the aromatherapy because it gave her a headache and nausea. No statistical difference between mean pre-test and mean post-test anxiety scores (P=0.09). Significant difference (P<0.05) in pre and post-test scores for feeling tense. | State Trait Anxiety Inventory Form Y (STAI Y-1); anxiety used as an indicator of stress. Possible that factors other than stress influenced anxiety levels. No control group. |
| Huanhuan, L., Ying, S., | Identify, analyze, and summarize | Systematic review with | 10 studies with total | | | Not sufficient evidence to | Accounted for bias by using the |

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|---|---|---|---|---|---|---|---|
| Zhuangjie, X., Yuan, L. Shouqui, L., Jie, Y., …, Minghui, Z. (2019). | existing research on massage and aromatherapy to reduce nurses' stress. | descriptive analysis of evidence. | sample of 628 nurse from six different countries. 16 outpatient nurses, 612 inpatient nurses. | | | conclude effective stress reduction using aromatherapy, massage, or aromatherapy massage. Conclusion drawn from high risk of bias (attrition, selection, etc.), mixed significant and non-significant results, and mixed findings when comparing subjective and objective results. | MINORS checklist to evaluate the quality of nonrandomized studies (6/10) and the Cochrane Collaboration Tool to evaluate bias in the randomized controlled trials (4/10); RCTs had low risk for bias whereas nonrandomized studies had mixed scores for unbiased assessment and lacked follow-through evaluation<br><br>Studies include dependent variables of aromatherapy, massage, and aromatherapy massage; may be difficult to |

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| | | | | | | | isolate aromatherapy effects from massage effects.<br><br>Wide range of tools used to measure stress in each study |
| Johnson, K., West, T., Diana, S., Todd, J., Haynes, B., Bernhardt, J., & Johnson, R. (2017). | Evaluate perceived stress before and after implementing lavender essential oil. | Quasi experimental design with convenience sampling. | 71 healthcare personnel including registered nurses, charge nurses, and patient care technicians | Trauma ICU, surgical specialty care unit, and trauma orthopedic unit as level one trauma hospital in phoenix, AZ. | Lavender essential oil diffused 24 hours per day for 30 days in a nursing-designated area on each of the three units; each area had a closed door and was not located near patient rooms | Nurses do experience significant stress in the workplace. Mean scores for the question "how often nurses feel stressed at work in a typical week" decreased significantly post-intervention ($p < 0.001$). The intervention did not have a significant effect on nurses' optimal energy | Weaknesses include the lack of a control group and lack of random selection. Results may have been influenced by other relaxing activities the participants engaged in outside of work on breaks; participants were asked to report these activities in an attempt to mitigate confounds. Literature review |

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| | | | | | | level, feeling of being overwhelmed, stress related to personal life, nor confidence in ability to handle stressors at work. | conducted prior to carrying out study to evaluate existing research. |
| Karadag, E., Samancioglu, S., Ozden, D., & Bakir, E. (2017). | Examine effects of aromatherapy (2% lavender essential oil) on stress & anxiety of patients. Hypothesized a difference in pre- and post-test sleep quality scores and anxiety ratings of patients receiving aromatherapy. | Randomized controlled study | 60 patients with mean age of 50.33. 30 patients in control group, 30 patients in experimental group | Coronary ICU in a university hospital in Taiwan | Experimental group given 2% lavender oil via inhalation for 15 days. | Significant difference found between pre-and post-test sleep quality ($p=0.006$) and anxiety scores ($p=0.001$) in experimental group. No significant difference found between pre- and post-test sleep quality ($p=0.493$) and anxiety scores ($p=0.123$) in the control group. | Anxiety scores used as reflective measure of stress |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Salamati, A., Mashouf, S., & Mojab, F. (2017). | Examine use of noninvasive methods to relive stress and pain; Examine the change in vital signs, as a measure of stress, of patients in open heart surgery ICU before and after lavender essential oil aromatherapy. | Single-blind clinical trial. Sampling method not addressed. | 40 patients in cardiac ICU undergoing open heart surgery | Cardiac ICU Moheb Hospital and Tehran Center. | Cotton swab impregnated with 2 drops of 2% lavender essential oil placed in patients' oxygen mask for 10 minutes. | Significant differences ($p<0.05$) in systolic blood pressure ($p<0.001$), diastolic blood pressure ($p=0.001$), and heart rate ($p=0.03$). No significant difference in respiratory rate ($p=0.1$), SpO2 ($p=0.5$), or central venous pressure ($p=0.2$). Reduction in blood pressure and heart rate indicates reduction in sympathetic nerve activity | Reduction in BP not a direct indicator in a reduction of stress. Vital signs could be influenced by pain, analgesics, anesthesia, or extubating procedure occurring immediately prior to the intervention.<br><br>No significant relationship between demographics and physiological variables. |
| Seo et al., 2018 | Examine the effects of aromatherapy | Non-randomized controlled | 120 dayshift ICU nurses. 30 nurses in | ICU at Eulji University | Aromatherapy mouthwash consisting of | Aroma mouthwash reduces stress, | Strengths: Control group & placebo group); |

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|---|---|---|---|---|---|---|---|
| | mouthwash on xerostomia, halitosis, stress, and salivary pH of nurses. | trial with convenience sampling. | experimental group (aroma mouthwash), 30 nurses in placebo group (saline mouthwash), and 30 nurses in control group (no mouthwash). | Hospital in Daejeon City | 1:1:2:1 ration of peppermint, lemon, tea tree, and ylang ylang essential oils. Experimental group gargled 15-30$cm^3$ of the solution for 10-15 seconds once a day for three days. | reduces halitosis, and improves xerostomia but has no significant effect on salivary pH. | no attrition; three sample groups found to be homogenous<br><br>Weaknesses: aromatherapy mixture makes it difficult to isolate effects of each essential oil; subjective measures of stress (self-reported) may not be accurate; non-randomized; original participants did not have significant halitosis; participants aware of intervention (lack of participant blinding) |

Appendix B

Levels of Evidence

| Level of Evidence | Description |
|---|---|
| Level I | Evidence from a systematic review or meta-analysis of all relevant RCTs. |
| Level II | Evidence obtained from well-designed RCTs. |
| Level III | Evidence obtained from well-designed controlled trials without randomization. |
| Level IV | Evidence from well-designed case control and cohort studies. |
| Level V | Evidence from systematic reviews of descriptive or qualitative studies. |
| Level VI | Evidence from single descriptive or qualitative studies. |
| Level VII | Evidence from the opinion of authorities and or reports of expert committees. |

Information retrieved from: Melnyk, B.M. & Fineout-Overholt, E. (2011). Evidence-based practice in nursing and healthcare: A guide to best practice (2nd ed.). Philadelphia, PA: Wolters Kluwer Health/Lippincott Williams and Wilkins.

Appendix C

# POLICY: CLINICAL AROMATHERAPY PROTOCOL

## 1. Scope:

1.1 Applicable Entities
This policy applies to patients or healthcare staff – hereby referred to as the recipient – working in the clinical setting.

1.2 Applicable Departments
All adult inpatient acute care units. Excludes neonatal, pediatric, obstetrics/post-partum, outpatient, university, infusion or dialysis clinics, and home health settings.

## 2. Purpose:

2.1 To outline the practice for implementing clinical aromatherapy treatment with lavender essential oil to reduce stress and promote physical and emotional wellbeing.

## 3. Policy Statements:

3.1 Registered Nurses will supervise and/or implement the aromatherapy treatment among both patients and healthcare staff after completion of facility-specific training. Family members or friends of the recipient may follow instructions for delivering the aromatherapy treatment as supervised and directed by a Registered Nurse who has completed the specific training.

## 4. Policy guidance:

4.1 General Overview

4.1.1 Essential oils should be purchased by the hospital from a verified source.

4.1.2 Essential oils should be clearly labeled and stored in a cool, dark location only accessible to licensed staff.

4.2 Assessment and Selection

4.2.1 The Registered Nurse will assess indications for implementation of aromatherapy treatment. Assess the recipient for physical symptoms or verbal reports of stress. Employ a visual analogue or -10 numerical scale

to assess recipient's perceived stress, and utilize basic assessment skills to observe for physical signs of stress such as sweating, inability to sit still, elevated heart rate, elevated blood pressure, difficulty focusing, subjective reports of fatigue, etc.

4.2.2 Before initiating aromatherapy treatment, the Registered Nurse will screen the recipient using the following criteria. An answer of yes = 0, an answer of no = 1. If the sum of all answers is greater than 0, halt implementation of the aromatherapy treatment and seek counsel from a licensed physician or Certified Clinical Aromatherapy Practitioner (CCAP) before continuing. If the sum of all answers is 0, continue with the aromatherapy treatment.

a. The individual is oriented and conscious.

b. Individual is able to communicate and has no significant sensory impairments.

c. Individual is breathing independently and spontaneously.

d. Individual has no known allergies to flowers or plants.

e. Individual has no known allergies to essential oil or other scents.

f. Individual does not have asthma nor other pulmonary disease.

g. Individual is hemodynamically stable [follow facility parameters].

h. Individual is not pregnant.

i. Individual has no history of addiction.

j. Individual does not use antianxiety medications presently nor in the past.

4.3 Patient or Staff Agreement

4.3.1 Discuss purpose of aromatherapy treatment and safety considerations.

4.3.2 Obtain verbal permission from recipient to continue with aromatherapy treatment.

4.3.3 Have the recipient rate his or her stress level on a scale of 0 to 10, 0 being no stress and 10 being the most stress they've ever experienced.

4.3.4 Take the recipient's blood pressure and heart rate. Record the systolic blood pressure and heart rate.

4.3.4 Document education, verbal permission, pre-intervention stress rating, pre-intervention systolic blood pressure, and pre-intervention heart rate in the aromatherapy treatment log located at the unit nurse's station (Appendix D).

4.4 Perform Treatment

Select the method to be implemented based on available resources and/or recipient's preference and follow the appropriate directions as follows:

3.4.1 Direct inhalation aromatherapy

a. Apply 2 drops of 2-3% lavender essential oil to a cotton material. Have the recipient put on a face mask or oxygen mask if not wearing one already; place the cotton material under the mask. Alternatively, have the recipient hold the cotton material up to his or her nose, being careful not to touch the area instilled with essential oil.

b. Allow the recipient to inhale the aroma for 10-20 mins.

3.4.2 Ambient inhalation aromatherapy

a. Place three drops of 2-3% lavender essential oil on an aromastone. Alternatively, put three drops of 2-3% lavender essential oil in a diffuser and turn the diffuser on.

b. Leave the aromatherapy treatment in place for 12-24 hrs.

c. Repeat step (a) and (b) for two consecutive days to achieve an aromatherapy treatment lasting three days total.

4.5 Evaluate Effect of Lavender Essential Oil

4.5.1 Perceived stress.

a. Have the recipient rate his or her stress level on a scale of 0 to 10, 0 being no stress and 10 being the most stress they've ever experienced.

i. For direct inhalation, measure perceived stress immediately after discontinuing the aromatherapy treatment.

ii. For ambient inhalation, measure perceived stress once every 12 hours.

b. Compare the value from 4.5.1 (a) to the value obtained at step 3.4.1 (a) or 3.4.2 (a) of the intervention.

c. If the number obtained following the intervention is lower than that obtained prior to the intervention, the aromatherapy intervention may be considered successful in reducing stress.

4.5.2. Systolic blood pressure and heart rate

a. Take the individual's blood pressure and heart rate.

i. For direct inhalation, measure blood pressure and heart rate immediately after discontinuing the aromatherapy treatment.

ii. For ambient inhalation, measure blood pressure and heart rate once every 12 hours.

b. Record systolic blood pressure and heart rate.

c. Compare these values from 4.5.2 (b) to the values obtained in step 3.4.1 (a) or 3.4.2 (a) of the intervention.

d. If the post-intervention systolic blood pressure and heart rate are lower than the values recorded prior to the intervention, the aromatherapy intervention may be considered successful in reducing stress.

4.6 <u>Document</u>

4.6.1 Assessment and screening

4.6.2 Patient verbal consent

4.6.3 Aromatherapy treatment

a. Dilution of lavender essential oil used (2% or 3%)

b. Mode of aromatherapy treatment

c. Duration of aromatherapy treatment

4.6.4 Outcome

a. Pre- and post-intervention perceived rating of stress (0 to 10). Decrease or increase.

b. Pre- and post-intervention systolic blood pressure and heart rate. Decrease or increase.

c. Recipient's response and/or how they tolerated the treatment

4.7 Safety Considerations

4.7.1 Practitioner-related

[If any error in handing the essential oil occurs, or should the Registered Nurse delivering the treatment experience an adverse reaction, immediately report to supervisor and create an incident report.]

a. As much as possible, perform the aromatherapy treatment in an enclosed area (such as a private patient room with the door closed) to prevent spread of the aroma to other spaces.

b. Wear gloves when handling the essential oil to avoid dermal irritation.

c. If implementing ambient aromatherapy, ensure the recipient is alone in the room to avoid unplanned aromatherapy treatment of nearby individuals.

4.7.2 Recipient-related

[If any of the following reactions occur, immediately contact the advanced practice provider overseeing the patient's care. In the case that a reaction occurs and the recipient is a healthcare staff member, immediately report to unit supervisor and seek medical treatment. Document the reaction as a potential allergy in the

electronic medical record and aromatherapy treatment log (Appendix D).]

a. If the lavender essential oil comes in contact with the eye(s), immediately flush the eye(s) with cool water. Contact the provider for further direction.

b. If the aromatherapy treatment causes dermal irritation, immediately halt treatment and wash the area with gentle soap and cool water. Contact the provider for further direction.

c. If an individual ingests any amount of the lavender essential oil, immediately contact the closest poison control center for guidance, encourage the affected individual to drink whole or 2% milk (if not contraindicated by a lactose or dairy allergy), and discourage vomiting.

d. If the individual begins to experience difficulty breathing, trouble swallowing, or altered mental status, immediately halt the aromatherapy treatment. Monitor the individual closely, provide oxygen per facility protocol, and attach recipient to a heart rate and oxygen saturation monitor until symptoms subside. Contact the provider for further direction.

**5. Definitions:**

5.1 Ambient Inhalation Aromatherapy: Any aromatherapy method whereby an aroma is ejected diffusely into the environment. This method may be used to treat a single individual or multiple individuals simultaneously.

5.2 Aroma Stone: An unglazed ceramic or stone object – natural or manmade – on which several essential oils are dropped upon. The stone sits at ambient temperature and releases aroma into the surrounding environment.

5.3 Clinical Aromatherapy: The controlled use of natural plant extracts in the clinical setting to maximize emotional, physical, and spiritual wellbeing.

5.4 Diffuser: A device that ejects aroma substance into the air through tiny mist droplets or evaporative steam.

5.4 Direct Inhalation Aromatherapy: Any aromatherapy method whereby undiluted essential oil is placed on a carrier material or contained in a bottle and inhaled directly by the individual recipient. This method is only effective in treating one individual at a time.

5.5 Essential Oil: A distilled extract of highly aromatic substances produced by plants

## 6. External References:


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6.3 Cho, E. H., Lee, M. Y., & Hur, M. H. (2017). The effects of aromatherapy on intensive care unit patients' stress and sleep quality: A nonrandomised controlled trial. *Evidence-Based Complementary & Alternative Medicine (ECAM), 2017,* 1-10. doi: 10.1155/2017/2856592

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# Appendix D

## Aromatherapy Treatment Log

| Name of individual receiving treatment | Date | Screening criteria = 0?<br><br>***If answer is no, halt intervention and seek medical guidance from a specialist before continuing | Education performed? | Verbal permission obtained? | Pre-intervention stress rating | Pre-intervention systolic blood rating | Pre-intervention heart rate | Post-intervention stress rating | Post-intervention systolic blood rating | Post-intervention heart rate | Notes:<br><br>e.g. Direct or ambient aromatherapy, dilution of lavender essential oil used |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *[Last name, First name]* | *[M/D/Y]* | *[Yes or no]* | *[Yes or no]* | *[Yes or no]* | *[0-10]* | *[X mmHg]* | *[X bmp]* | *[0-10]* | *[X mmHg]* | *[X bmp]* | |
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