



The Feasibility of Using Aromatherapy for Pain Management in an Outpatient Clinic Setting

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THE FEASIBILITY OF USING AROMATHERAPY FOR PAIN MANAGEMENT
IN AN OUTPATIENT CLINIC SETTING

by

Krystal Ann Campanaro (Taranto)

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COLLEGE OF NURSING

In Partial Fulfillment of the Requirements

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DOCTOR OF NURSING PRACTICE

In the Graduate College

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THE UNIVERSITY OF ARIZONA
GRADUATE COLLEGE

As members of the DNP Project Committee, we certify that we have read the DNP project prepared by Krystal Ann Campanaro (Taranto), titled The Feasibility of Using Aromatherapy for Pain Management in an Outpatient Clinic Setting and recommend that it be accepted as fulfilling the DNP project requirement for the Degree of Doctor of Nursing Practice.

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Final approval and acceptance of this DNP project is contingent upon the candidate's submission of the final copies of the DNP project to the Graduate College.

I hereby certify that I have read this DNP project prepared under my direction and recommend that it be accepted as fulfilling the DNP project requirement.

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ARIZONA

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DEDICATION

I dedicate this degree to my husband and my parents. Without your endless love, support, and encouragement, I would not be where I am today. I am eternally thankful.

With love, Krystal.

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ABSTRACT

Purpose: This quality improvement project explored the feasibility of essential oil aromatherapy in patients suffering from acute or chronic pain syndromes in an outpatient urgent care setting.

Background: Pain management has led to substantial controversy from ailments of narcotics associated with traditional pharmacological interventions, such as addiction, high costs, respiratory complications, delayed recovery, and even death. These serious issues have created a necessity for alternative therapies to help reduce pain in patients that do not have adverse side effects. Data suggests that evidence-based essential oil protocols improved quality of life and resulted in optimization of pain control in diverse patient populations.

Methods: Following a brief 20-minute on-site education session with clinicians and staff, patients presenting with complaints of headache or musculoskeletal pain were asked to participate in a 20-minute educational PowerPoint presentation regarding aromatherapy and complete a feasibility survey. Potential participants chose a random four-digit code to de-identify their completed surveys. The project manager distributed a paper copy of the demographic survey to each outpatient clinic participant.

Outcomes Achieved: Collected results from the participant and staff surveys were analyzed. Each participant's pre- and post-intervention questionnaires were compared to assess interest in receiving aromatherapy for pain management if offered in the future. The project manager shared de-identified results with the provider. Lastly, the participating provider completed a short survey to assess the feasibility of offering aromatherapy to patients presenting with mild to moderate pain in the future.

Conclusions: Despite the known safety and analgesic effectiveness of essential oils, insufficient numbers of studies have explored a practical adaptation of an integrative approach. It was determined participant interest in aromatherapy use for pain management was well supported by patients presenting with pain. Furthermore, the survey noted support from the participating provider regarding the feasibility of adopting an aromatherapy pain management protocol. With interest discovered, organizational adoption of this protocol may be feasible to improve patient outcomes while adding to the mounting evidence of the advantages of essential oil use in pain management.

INTRODUCTION

Pain is one of the most frequent presenting complaints from patients within a healthcare setting. Yet, it can be difficult for patients to effectively communicate their experience within this highly complex symptom creating challenges for many healthcare providers to treat and manage. The opioid epidemic was declared a public health emergency in 2017 after accounting for 42,000 deaths in 2016 – 40% of which were attributed to prescribed opioids (U.S. Department of Health and Human Services [USDHHS], 2020). In 2019, over 70% of drug overdoses involved an opioid (Centers for Disease Control and Prevention [CDC], 2021). There has been a 4% increase in opioid related deaths in 2019 and no state in the United States (US) has had a decrease in opioid deaths (CDC, 2021). This crisis triggered the need for exploring alternative therapies to reduce pain in patients which also had decreased addictive risk and adverse side effects. Researchers have found essential oil effective in optimizing pain control in diverse patient populations across various studies (Lakhan et al., 2016; Daneshpooj et al., 2019; Tang et al., 2014; Gok Metin et al., 2017). Implementing evidence-based essential oil protocols for pain relief has resulted in a statistically significant reduction of pain and improved quality-of-life measures as reported by patients (Lakhan et al., 2016; Daneshpooj et al., 2019; Tang et al., 2014; Gok Metin et al., 2017). Despite these findings, the implementation of aromatherapy has not been readily adopted by primary care providers in outpatient clinic settings. This project explores the feasibility of adopting aromatherapy in an urgent care outpatient clinic in metropolitan central Arizona.

Background Knowledge and Significance

More than 750,000 people have died since 1999 due to drug overdose, and two out of three deaths (32%) involved an opioid, leading to death in almost 47,000 people in 2018 (CDC, 2020). Additionally, 2.1 million Americans are presently living with an opioid use disorder (Appold, 2020). Despite many patients using opioids as pharmacological intervention, patients continue to report inadequately managed pain, causing continued suffering (Johnson et al., 2016). A national survey conducted by the Substance Abuse and Mental Health Services Administration (SAMHSA) (SAMHSA, 2017) found the primary reason for misuse of pain relievers in people over the age of 12 were patients seeking to relieve physical pain. Although relief of physical pain is the leading indication for prescribing opioids, 62.3% of opioids are consumed inappropriately (SAMHSA, 2017). The dire need for alternative pain management therapies has become more evident over the decades. It is a longstanding issue that was declared a public health emergency in 2017 after nearly 20,000 deaths occurred in 2016 from opioid use alone (USDHHS, 2020). Alternatively, research regarding the use of aromatherapy indicates successful pain reduction in both adults and infants (Tang & Tse, 2014).

The challenge of successfully treating pain is complex; aromatherapy has been shown to be both a safe and effective approach to pain management. Aromatherapy was discovered centuries ago and is commonly utilized globally. High-quality studies support the effectiveness of aromatherapy in pain reduction (Lakhan et al., 2016). A meta-analysis conducted by Lakhan et al. (2016), indicated significant effects related to olfactory stimulation resulting in rapid pain reduction and was also noted to aid in regulating blood pressure, temperature, and pulse (Lakhan et al., 2016). Nurses in various settings report frustration in caring for patients presenting with

pain and are responsible for their direct role in dispensing pain medications. Accessibility to safe pain management protocols employing alternative therapies, such as aromatherapy empowers nurses with a safe evidence-based tool to provide comprehensive pain management.

The effectiveness of aromatherapy applications is well supported in the literature (Lakhan et al., 2016; Ilter et al., 2019; Daneshpajoo et al., 2019; Tanvisut et al., 2017; Tang et al., 2014; Olapour et al., 2013; Hekmatpou et al., 2017; Ashrastaghi et al., 2015; Shahnazi et al., 2012; Karimollahi et al., 2016; Gok Metin et al., 2017; Johnson et al., 2015). These findings further support the adoption of aromatherapy protocols for more comprehensive pain management. In a meta-analysis conducted by Lakhan et al. (2016), the authors evaluated 12 studies assessing the effectiveness of aromatherapy in patients presenting with acute and chronic pain. The participants reported substantial pain reduction following aromatherapy implementation (SMD = 1.18, 95% CI: -1.33, -1.03: $p < 0.0001$) (Lakhan et al., 2016). Additionally, a study reported a positive correlation between employing aromatherapy and pain reduction in oncology patients undergoing invasive port catheterization procedures (Ilter et al., 2019). Despite varying approaches and limitations, significant pain reduction findings are consistently reported, supporting the importance of aromatherapy as an effective intervention for patients experiencing acute or chronic pain.

Additional aromatherapy benefits include reduced blood pressure (Ilter et al., 2019), reduction in depression (Tang et al., 2014), and reduced anxiety levels, subsequently found in multiple studies measuring these outcomes. These results support the use of aromatherapy in current pain management protocols and celebrate its safety profile for all patients. There was no report of patients suffering adverse aromatherapy effects in any of the 12 studies including in this

literature search (Lakhan et al., 2016). Furthermore, most studies found aromatherapy is a more cost-effective alternative to traditional pain management making it a much more attractive option for patients and families. The implementation of aromatherapy is considerably less expensive than conventional pain therapies and can be applied multiple times daily for pain relief (Lakhan et al., 2016; Daneshpooj et al., 2019; Tang et al., 2014; Gok Metin et al., 2017). Cost-effectiveness should be considered as an additional positive outcome of aromatherapy treatment.

In January 2015, pain management standards emphasized the importance of implementing non-pharmacologic pain management options in lieu of pharmacological interventions when feasible (Johnson et al., 2016). Unfortunately, adequately managing patients' pain levels has proven to be challenging, even with pharmacological intervention. In patients suffering from acute and chronic pain, lack of pain control is currently reported. Furthermore, traditional pain management practices using opioids have received much criticism due to significant risks, including addiction and death. With the upswing of the national opioid epidemic, healthcare providers have begun to explore alternative therapies to alleviate pain with fewer detrimental side effects. With opioids for pain management, patients are at higher risk for adverse side effects, and patient outcomes suffer. Of grave concern, regularly consuming pain medication is recognized as producing amplified drug tolerance and hyperalgesia (Johnson et al., 2016).

In various studies, the use of aromatherapy in reducing pain has been shown to produce significant pain relief with no adverse side effects. Healthcare providers, however, may be unwilling or hesitant to prescribe alternative therapies due to insufficient training and knowledge (Tang & Tse, 2014). The over-prescribing of opioid medications is costly for patients and

healthcare facilities, bringing unintended consequences of addiction and death. These consequences include high cost, safety, lack of effective pain management, and poor patient outcomes. As advanced practice nurse healthcare providers, the primary goal is to lead patients to optimal health and quality of life standards. Providers can achieve this by providing adequate pain relief and implementing effective evidence-based pain-reducing measures, like aromatherapy, for pain management, subsequently reducing the use of opioid medications.

Local Problem

Over 55,000 suspected opioid overdoses have been reported in Arizona alone since 2017, with over 100,000 naloxone doses dispensed. It is estimated that more than two people a day in Arizona die due to opioid overdose (Arizona Department of Health Services [AZDHS], 2017). In comparison, heart disease is the leading cause of death across the nation, with over 12,000 deaths occurring in 2017 within Arizona alone (Stats of the State of Arizona, 2018). Approximately 18,000 people die annually from opioid overdose in Arizona, a much larger number than those who fall victim to heart disease.

Aromatherapy protocols are most employed in labor and delivery and oncology settings (Lakhan et al., 2016; Tanvisut et al., 2017). Pain is a common patient presentation in urgent care settings. Patients are at increased risk when opioids are prescribed due to the nature of transient provider relationships and lack of follow-up. Aromatherapy has not been readily adopted in urgent care settings despite the need for effective, low-risk pain management.

Intended Improvement

Project Purpose

This DNP project aims to test the feasibility of adopting aromatherapy pain management protocol in an urban urgent care setting. As advanced practice nurses, it is crucial to explore current evidence-based practices, available to our patient populations. With opioids leading to an array of adverse events that can result in death, it is imperative to explore the use of alternative therapies that may provide relief to patients experiencing pain. The issues circling opioid use have led to the research of integrative modalities, such as aromatherapy, to reduce pain. Various studies report the effectiveness of aromatherapy in pain reduction.

Project Question

Is it feasible to implement aromatherapy as an analgesic intervention in adult patients presenting with mild to moderate pain in an urban Arizona urgent care clinic?

Project Objectives

The purpose of this QI project is to explore the feasibility of adopting aromatherapy as a pain relief intervention. The plan is to increase provider and patient knowledge of aromatherapy for pain management through education and to test the feasibility of adopting aromatherapy in this outpatient urgent care clinic. Adopting aromatherapy as a pain intervention may directly lead to decreased prescriptions for opioids, limiting the number of unintended opioid addictions and death and reduce the patient burden associated with the high cost of opioid medications. The specific aims of this QI project included:

Aim 1: Educating providers and patients regarding the various benefits of essential oils/aromatherapy regarding pain relief.

Aim 2: Determine the feasibility of delivering aromatherapy to patients presenting with mild to moderate pain.

Theoretical Framework

Lewin's Change Theory

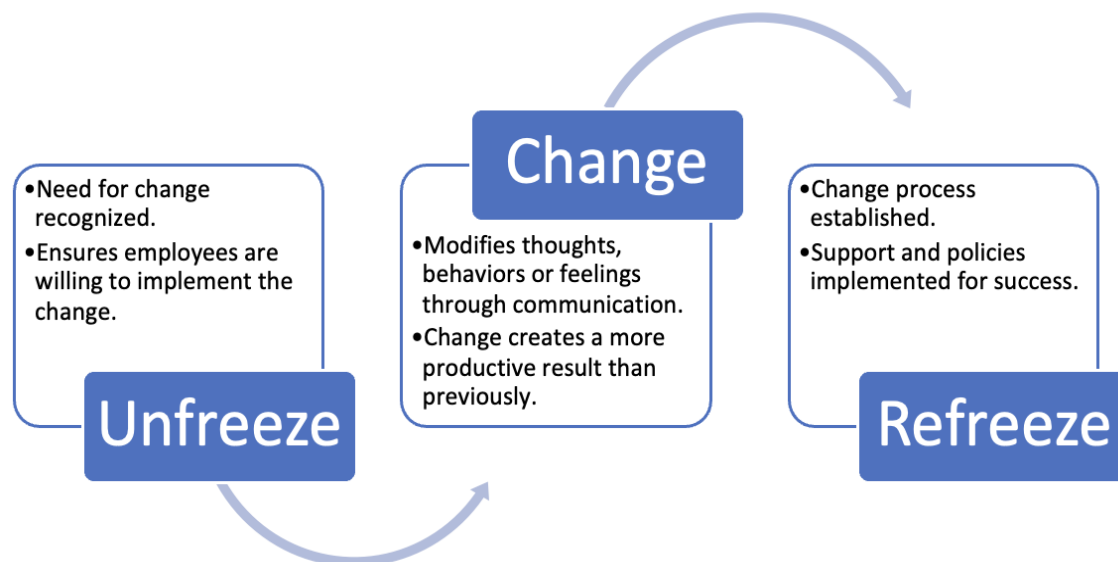
The change theory guiding this project was Lewin's change theory (LCT) (Figure 1), which encompasses three stages. Kurt Lewin's change management theory has been considered the epitome of change models due to its longstanding use, which is applicable for personal, group, and organization changes (Kaminski, 2011). The three stages within LCT facilitate the release of long-held beliefs, patterns, or counterproductive standards to effectively move forward to an improved process. *Unfreezing*, *change*, and *refreezing* are the three stages to achieve change implementation in this theory (Kaminski, 2011).

Unfreezing is the stage that makes it possible to deviate from the current process that has become counterproductive through recognizing the need for a change, ultimately yielding the desire to change. This stage focuses on changing the current behavior through analysis and overcoming the tensions of individual opposition and group conformity, through brainstorming, open dialogue, personal development, and team building (Kaminski, 2011). Next, the change stage facilitates modifying thoughts, behavior, and feelings, or all three. In this secondary stage, change creates a more liberating and productive result than the previous process. The change stage requires clear communication among all team members and a thorough project charter before implementation (Mcbride & Tietze, 2019). In the final stage, refreezing, the new change process is established and viewed as the standard operating procedure. Supportive mechanisms

were implemented at this stage to foster knowledge and adoption of aromatherapy use and its feasibility (Kaminski, 2011).

Figure 1

Lewin's Change Theory



The application of Lewin's change theory (LCT) guides the development of this aromatherapy adoption quality improvement (QI) project, recognizing the need to unfreeze the current practice of opioid prescribing, and educate providers and patients of aromatherapy effectiveness in the hopes of adopting an aromatherapy pain treatment protocol in the future. This theory emphasizes the importance of stakeholder understanding needed for clinicians to change their behavior and administer an essential oil for its known benefits versus prior practice of narcotic prescriptions. Guided by this framework, clinician and patient education was the tool employed to unfreeze opioid prescribing, promote the change of adopting essential oils potentially leading to the refreezing of an aromatherapy pain protocol. Within this theory, by

increasing understanding, the provider and patient aromatherapy education intervention pave the way to the possible adoption of implementing aromatherapy for pain management within the urgent care setting. Understanding Lewin's change theory (LCT) key principles guided the project leader in overcoming challenges and promoting the successful implementation of the QI project.

Literature Synthesis

Evidence Search

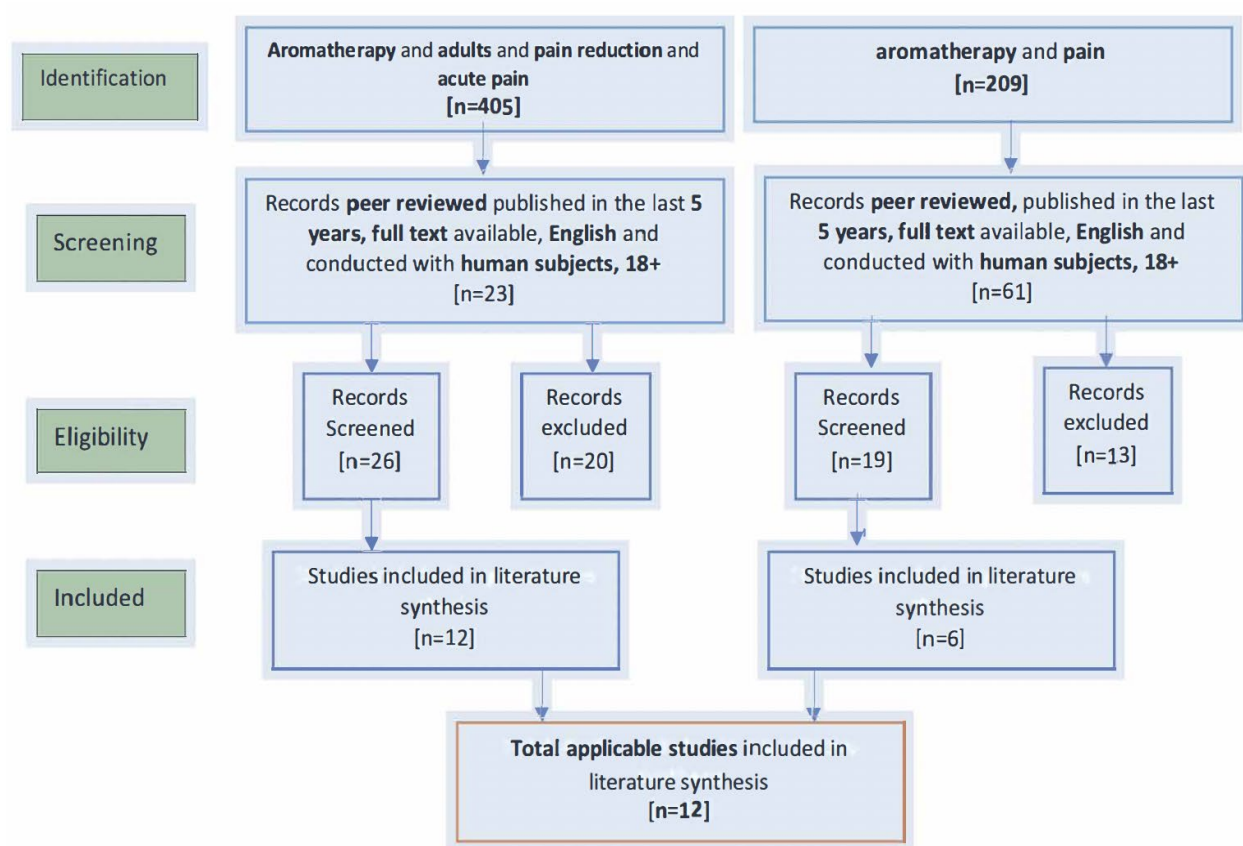
The project manager performed a literature search in two primary databases, which were accessed to gain information for this subject: PubMed and CINAHL. Search terms containing the following verbiage were used to find relevant articles; "aromatherapy," "pain reduction," "acute pain," "chronic pain," "essential oils," and "pain." Initially, the search within CINAHL under "aromatherapy" and "pain" yielded 405 total results. These results were narrowed by adding "essential oils" and "adults," leaving 23 articles to review. On PubMed, searching the terms "aromatherapy and pain" yielded 290 results, which was reduced to 61 when adding filters of English language, adult age (18 years and older), published within the last five years, and full-text availability. The search was reduced further to 18 articles with the terms "acute pain OR chronic pain" and "pain reduction" added to the search.

The systematic review of the literature searched in both databases produced adequate results to study the subject at hand; however, the majority were irrelevant. Once unrelated articles were removed from the count, the results depicted 12 articles that addressed the topic sufficiently. The included studies consisted of seven RCTs, one systematic and meta-analysis review, a quasi-experimental pretest and posttest, a non-randomized controlled trial, a triple-

blind randomized placebo-controlled trial, and one purposive sampling method to evaluate the relationship between aromatherapy and pain reduction in patients.

Figure 2

Literature Synthesis Flowchart



Comprehensive Appraisal of Evidence

Reduction of Pain with Aromatherapy

The National Council of State Boards of Nursing introduced aromatherapy and essential oils as a category under holistic nursing due to its therapeutic effects on multiple ailments (Shahnazi et al., 2012). This support of aromatherapy to treat various types of pain is informed by evidence-based studies in literature. In a study focused on women in labor, women in the latent and early active phase of labor indicated significantly lower pain levels within the aromatherapy group than the control group ($p < 0.001$). The latent phase pain levels of women in the control group were 2.60 versus 1.88 ($p = 0.010$), and early active phase pain levels were 4.39 versus 3.82 ($p = 0.031$), indicating a significant difference (Tanvisut et al., 2018). Similarly, a study conducted to examine the effectiveness of aromatherapy in patients undergoing invasive procedures showed significant findings. Results on pain levels revealed a mean pain score within the intervention group of 6.2 \pm 1.6 before the procedure, which was decreased to 5.0 \pm 1.2 during the procedure. This number increased to 5.5 \pm 1.2, signifying a statistically significant decrease in pain levels.

In contrast, before the procedure, the control group did not show any reduction in pain levels. The mean pain level was 6.0 \pm 0.9, which increased to 7.4 \pm 1.4 during the procedure; supporting use of aromatherapy is beneficial to the control group (Ilter et al., 2019). Another study examined postoperative pain in women who had undergone a cesarean section. The intervention group which received aromatherapy treatment reported less postoperative pain in four ($p = 0.008$), eight ($p = 0.024$), and 12 ($p = 0.011$) hours after the procedure than the placebo group, indicating a significant decrease (Olapour et al., 2013). Patients undergoing orthopedic

surgery similarly reported a significant reduction in pain levels ($p = 0.0001$) in the intervention group versus the control group. The duration of the pain within these patients was considerably reduced (Hekmatpou et al., 2017). Substantial results were noted in patients undergoing a CABG procedure; the intervention group reported significantly lower pain intensity for sternotomy pain in phases 2, 3, and 4 of the data gathered (Ashrastaghi et al., 2015). In a population of women with painful menstrual cycles, participants reported that aromatherapy effectively reduced pain levels. Findings indicated statistically significant reductions in pain, with the mean (SD) pain levels decreasing in the treatment group after both the first and second months ($p < 0.01$). The control group did not reduce pain levels in either cycle one or two (Karimollahi et al., 2016).

The only study in this search to use aromatherapy massage in conjunction with inhalation for diabetic patients experiencing neuropathy pain found a statistically significant reduction in pain levels. The VAS tool resulted in pain scores in the intervention group: 6.5 at baseline, 4.0 in the second week, and 2.0 at week four. The results were 6.0 at baseline, 5.0 in the second week, and 5.5 in week four within the control group. This study indicated a statistical significance in pain reduction through aromatherapy treatment (Gok Metin et al., 2017). The final analysis was the largest, which reviewed 10,262 patient records of patients who received aromatherapy interventions from nurses at ten large hospitals. Considering only pain reduction results, the study revealed that using sweet marjoram resulted in the most significant single oil average pain change at -3.31 units (95% CI: -4.28, -2.33). Unspecified combinations of four oils (ginger, lavender, mandarin, and sweet marjoram) revealed an estimated pain change of -3.43 (95% CI: -4.43, -2.43). These findings are consistent with most literature, indicating a statistically significant correlation between aromatherapy interventions and pain reduction (Johnson et al.,

2015). The results of these studies are highly encouraging, supporting the utilization of aromatherapy interventions to significantly reduce pain levels in patients.

Common Results and Findings

The literature observed commonalities among the studies indicating a strong correlation between pain reduction and aromatherapy (Lakhan et al., 2016; Ilter et al., 2019; Daneshpajoo et al., 2019; Tanvisut et al., 2017; Tang et al., 2014; Olapour et al., 2013; Hekmatpou et al., 2017; Ashrastaghi et al., 2015; Shahnazi et al., 2012; Karimollahi et al., 2016; Gok Metin et al., 2017; Johnson et al., 2015). Despite variability within the studies presented, each study's findings supported aromatherapy interventions to decrease pain levels and other health ailments in patients internationally. The VAS (Visual Analog Scale) results to measure pain intensity were commonly incorporated within each study's protocols, allowing the authors to adequately discern differences in pain prior, during, and after the interventions were given. Although variation between studies is noted regarding the protocol, most of the studies measured pain prior, during, and after receiving the intervention. In contrast, others applied the VAS tool in stages or used a VAS tool variation to better assess pain. The high consistency present within the studies' protocols increases generalizability, compelling the results to support the question at hand.

Strengths of Evidence

Outcomes for the studies within the literature established important and notable findings, indicating aromatherapy interventions deserve a rightful residence within healthcare. Additionally, the systematic review and meta-analysis study reported significant results supporting the pain-relieving effectiveness of aromatherapy treatments. Final analysis determined a significant reduction in pain related to aromatherapy, (SMD = 1.18, 95% CI: -1.33,

-1.03: $p < 0.0001$) (Lakhan et al., 2016). This study executed Cohen's standards, indicating a large effect size, and heterogeneity was high at 96.6 (Lakhan et al., 2016). The evaluation of the systematic review and meta-analysis results signifies a positive and credible correlation to pain reduction in conjunction with aromatherapy patients in various pain syndromes. The systematic review and meta-analysis study provide the strongest level of evidence to guide practice decisions.

Weaknesses of Evidence

Conflicting Results

In exception to one study, all the studies reported significant positive pain-relieving results in their research. A study examined the effects of aromatherapy (lavender scented) before IUD placement, the outcomes resulted in no significant changes in pain level between the intervention and control group ($p < 0.51$) (Shahnazi et al., 2012). However, anxiety levels within this study did indicate a significant change ($p < 0.001$), recognizing aromatherapy offers variability of health benefits (Shahnazi et al., 2012). Although this study's pain relief findings did not align with the other studies, it does support the argument recognizing various positive effects when using aromatherapy in patient care settings. The preponderance of these findings supports this project's PICO question.

Limitations

Various study limitations were identified within this review. For example, the type of aromatherapy used within the studies is inconsistent, as various oils were tested to reduce pain. This inconsistency impedes comparison of results and identification of the oils effectiveness. Although lavender was the most employed oil, combinations of oils, or just one oil, were used in

other studies. Furthermore, there is inconsistency in pain measurement tools, making it difficult to compare outcomes between studies. Additional limitations are related to different patient populations. The studies were performed in patients experiencing pain in various settings such as oncology, surgical, burn, labor, and other specialty areas. These differing pain etiologies may account for different pain alleviation effectiveness. The final limitation is a paucity of recent research. Researchers in all the studies openly cite a need for further study and consistent application to understand better the connection between pain reduction and aromatherapy interventions in patients.

METHODS

Project Design

The purpose of this project is to assess the feasibility of implementing an aromatherapy pain relief intervention in outpatient adults in a community-based clinic. The project employed a quantitative pre- and post- intervention survey design for patients and a brief post- intervention questionnaire survey of clinician perceived barriers and facilitators to adopting this integrative aromatherapy intervention, following an in-person education session. The data collection consisted of an educational-based pre- and post- intervention survey for the participants and a post-questionnaire survey for the participating provider. The survey's assessed patient participants presenting with pain knowledge of essential oils and aromatherapy and willingness to receive aromatherapy as a treatment in the future. The post-questionnaire survey for the clinician assessed perceived benefits and barriers to adopting an aromatherapy protocol within the clinic setting in the future.

After attending an in-person educational session to increase employee knowledge regarding essential oil use and aromatherapy application, willing patients presenting with mild to moderate musculoskeletal pain or a headache were offered a 15-minute in-person educational session on the benefits of the aromatherapy application in a designated patient exam room. Patient education included evidence supporting integrative methods to manage pain safely and effectively. Willing participants were immediately surveyed to assess the likelihood of undergoing aromatherapy interventions in the future. This project focused on the adoption of a pain management aromatherapy intervention supported with education. Data was collected at baseline and post-intervention with the pre- and post-intervention surveys to measure the effectiveness of the education. The participants were asked to respond to whether they would consider having an aromatherapy intervention and asked to rank the feasibility of implementing aromatherapy within the urgent care setting.

Model for Implementation

The Institute for Healthcare Improvement (IHI) Model for Improvement (MFI) was followed to direct the project's design and methods. The Model for Improvement tool functions by accelerating an existing model or implementing a new model (Institute for Healthcare Improvement [IHI], 2021). The project manager's (PM) goals focused on developing an evidence-based PowerPoint presentation discussing aromatherapy for pain management, followed by education of the PowerPoint to patients experiencing musculoskeletal or headache pain. The PM collected the participant results and perceptions after completing aromatherapy education and evaluated the feasibility of aromatherapy adoption in an outpatient setting.

The PM established a project timeline (Appendix F) to guide project implementation and goals within the designated time frame. The aromatherapy education was provided at an urgent care clinic in North Phoenix for patients that met the inclusion criteria and were willing to participate in the study. The education was administered through a PowerPoint presentation discussing the benefits of aromatherapy and evidence-based findings for 15 minutes. The total time spent for each participant was 20 minutes. The PM detailed the results of this QI project through a pre-intervention (Appendix D), post-intervention survey (Appendix D), and a clinician post-intervention questionnaire (Appendix D). The outcome measures are based on the knowledge gained from the educational presentation and participant response. Utilization of the MFI plan-do-study-act cycle guided the PM in developing tools to assess participant knowledge after the educational presentation, conduct the implementation process, and evaluate the feasibility of adoption.

Plan-Do-Study-Act (PDSA) Cycle

The IHI (2021) utilizes a plan-do-study-act (PDSA) cycle to aid in the implementation and facilitation of this project's goals and recommendations. The model uses a PDSA cycle (plan, do, study, act) focused on identifying changes tested, resulting in any notable improvements (Frankel et al., 2017). The model contains three questions building the basis of the aim, outcome, process measures, and ideas for the improvement, and once these are disclosed, the PDSA cycle commences (Frankel et al., 2017).

Plan

The planning began with the PM identifying strategies for application, such as identifying objectives, predicting expected results, and producing a method for data collection (IHI, 2021).

The PDSA cycle was initiated by the PM establishing plans to be met for implementation. The PM developed an educational presentation in a PowerPoint presentation regarding aromatherapy, its associated benefits, evidence-based practice, and safety for all participants. An in-person meeting was held within the clinic, discussing the project details, and assessing the medical staff's interest totaling 20 minutes. The PM provided staff education through the educational PowerPoint Presentation. One clinician and one medical assistant were recruited for this QI project. A recruitment flyer was created and placed within the waiting area of the urgent care to recruit 5-10 potential participants presenting with musculoskeletal or headache pain.

Do

Within this phase, implementation and data collection began, as well as potential problems or concerns were identified (IHI, 2021). This portion consisted of implementation of the plans described above. Before receiving the educational presentation, pre-intervention surveys were collected from willing participants, gauging participant perception and knowledge of aromatherapy. The PM then gave the educational presentation. Once the presentation was given, the post-intervention surveys were immediately given to the participants to assess if participant knowledge, perception, and willingness to receive aromatherapy demonstrated significant findings. At the end of the project implementation, the clinician questionnaire was collected to assess provider insight regarding the feasibility of aromatherapy adoption. The PM remained on-site throughout the intervention to address any questions or concerns and aid in the facilitation of the project. The PM collected the data from the pre- and post-intervention surveys and clinician questionnaire to perform analysis.

Study

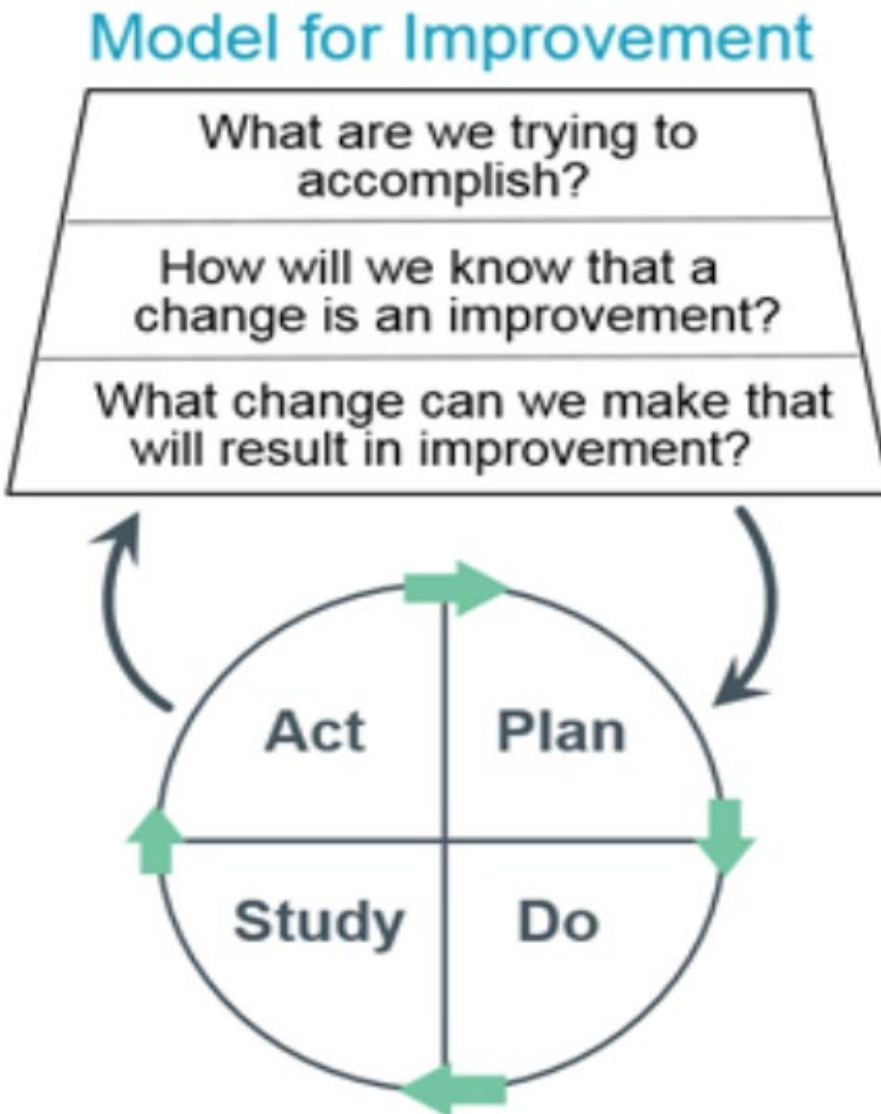
The PM assessed the data within the study phase and identified a relationship between participant response and the feasibility of adopting aromatherapy in an outpatient setting. Collected questionnaires and documentation were analyzed and reviewed to assess if the results correlate with the predicted outcomes of the project (IHI, 2021). The PM compared the data results with the assumption that the feasibility of aromatherapy implementation and willingness to receive the intervention would be found among participant responses. The results of the data analysis aided the project manager in identifying positive and negative aspects of the QI project.

Act

This final phase entailed identifying barriers needed to reach an optimal result based on the project outcomes (IHI, 2021). The education findings revealed the feasibility of implementing aromatherapy for pain management in an urgent care facility and participant willingness. At this stage, it is determined if this project should be repeated to assess further the feasibility of aromatherapy use in an outpatient setting.

Figure 3

Illustration of the Model for Improvement



Note. Adopted from *Model for Improvement*, by the Institute for Healthcare Improvement, 2019 (<http://www.ihl.org/resources/Pages/HowtoImprove/default.aspx>).

Setting and Stakeholders

This QI project was conducted in a community-based urgent care facility which is part of a large non-profit hospital and medical group network in Phoenix Arizona. With multiple providers, ranging from physician assistants, nurse practitioners, MD's and DO's, the facility is equipped with knowledgeable healthcare providers. This clinic cares for a diverse patient population and is centrally located with easy access to various communities. Other services offered in this facility include physical therapy, imaging, laboratory diagnostics, women's health, and urgent care.

This facility has various providers, including physician assistants, nurse practitioners, and medical doctors assessing and treating patients. These providers were able to identify individuals who may benefit from the aromatherapy education intervention. The clinic is open Monday-Sunday from 7:00 am to 7:00 pm and is open on holidays. Although this clinic has received recognition as an exceptional outpatient urgent care clinic, offering alternative therapies such as aromatherapy will further support their advocacy for evidence-based, innovative approaches to patient care.

Key stakeholders within the clinic include patients, clinicians, medical assistants, practice management, and leadership. Patients provided feedback and pain responses to the aromatherapy education. Practice management provided leadership support and approval of the project. The project manager was responsible for the project implementation and any approvals needed to facilitate the process. Medical assistants were responsible for identifying potential patient participants and informing them about the project. Interested participants were introduced to the project manager, who surveyed the patients before and immediately following the aromatherapy

education. The clinician provided education and supported participating patients through ongoing education and follow-up.

Stakeholders are imperative to QI project success, as they heavily influence the production of the executed project. Essential stakeholders buy-in of the innovation is critical to successful implementation; specifically, when the change requires adopting a new process (Broome & Marshall, 2020). The potential adoption of the aromatherapy intervention relies upon stakeholder buy-in, engagement, and collaboration.

Planning the Intervention

The initial step to project implementation is ensuring buy-in from the key stakeholders. To do this, the project manager communicated with the members of the urgent care regarding the proposed project in face-to-face discussions. Once site approval was obtained from the urgent care facility (Appendix A), the project manager set forth a timeline for implementation. Within the urgent care waiting room, project fliers were placed in various areas. This flyer identified the project objectives and inclusion criteria, visit information, and the project manager's contact information (Appendix C). The use of aromatherapy education was presented to patients presenting with headaches and musculoskeletal pain. The office manager and participating provider approved the project implementation over four weeks from September – October 2021. Once approved, the office manager and project manager held a staff meeting to provide education regarding the project's purpose, duration, and goal. The project manager recruited the designated representative provider to participate and have direct involvement in the study. An in-service for the participating medical assistant and additional staff was held to share pertinent information before initiation.

The project manager gave the educational presentation to the participating staff and patients consisting of a PowerPoint slideshow. The project manager created the slideshow totaling eight slides, taking approximately 15 minutes to present. The educational presentation contained a title page, aromatherapy overview, the history of aromatherapy and its uses, how aromatherapy works, evidence-based support, professional organizational guidelines for aromatherapy use, and the significance of aromatherapy in an outpatient facility (Appendix E). The educational presentation also included a brief overview of aromatherapy indications, safety, and the importance of receiving the treatment from a qualified practitioner.

The participating provider was given a disclosure form (Appendix B) before the initiation of the project. Once this was completed, recruitment for participants began. Willing participants completed the disclosure form (Appendix B) and the pre-intervention survey (Appendix D) before the educational presentation. Once the participants completed the pre-intervention survey, the project manager presented the educational slideshow in a patient exam room. When the educational presentation was complete, the project manager gave the participant the post-intervention survey to complete (Appendix D). At the end of the project implementation, the participating provider was given a post-intervention survey (Appendix D) to complete, assessing the feasibility of adopting aromatherapy into the clinic.

The pre-intervention survey contained two questions: *“How do you feel about aromatherapy or essential oils?”* and *“Would you consider receiving aromatherapy for pain management? Why or why not?”* (Appendix D). The post-intervention survey for participants (Appendix D) contained four questions:

“How do you feel about this project?”

“Do you feel that your knowledge regarding aromatherapy has increased?”

“Would you consider receiving aromatherapy for pain management?”

“Do you feel it is feasible to do within this clinic? Why or why not?”

The post-intervention survey for the clinician contained five questions (Appendix D):

“How do you feel about this project?”

“What are some challenges and strengths you experienced throughout this project?”

“What changes would you recommend?”

“Would you consider adopting aromatherapy for pain management?”

“Do you feel it is feasible to do within this clinic? Why or why not?”

The provider noted positive feelings toward the project stating, *“I felt this project was informative to both staff and patients that may be experiencing pain.”* The provider advised changes to be considered are consistent with ensuring that any future aromatherapy intervention for pain management could be *“performed and completed within a total of 20-25 minutes of a patient encounter”* to avoid delay of patient visits. Regarding adopting aromatherapy for pain management, the provider stated, *“I would be highly interested in offering aromatherapy for pain management to interested patients.”* The provider felt it would be feasible to implement in the clinic due to the patient population in the area, noting: *“In this growing, family-centered and retirement community, many people have interest in alternative therapies to help manage their symptoms versus traditional medicinal management.”*

Participants and Recruitment

Throughout four clinical shifts, a goal of 5-10 patients presenting to the clinic with mild to moderate acute headache or musculoskeletal pain were asked by the medical assistant to participate in the study. Inclusion criteria for participants ages 18 and older, presenting with mild to moderate pain as measured by the visual analog scale (VAS) scores greater than '3,' but less than '8.' Exclusion criteria included participants experiencing severe and uncontrollable pain rated an '8' or above on the VAS scale. The medical assistant approached patients presenting with musculoskeletal pain or headaches and offered aromatherapy education intervention to interested patients. Patients willing to participate received an in-person private aromatherapy educational presentation in a designated patient exam room. The urgent care facility houses eight private patient rooms, one of which will be selected solely for aromatherapy education. The project employed a qualitative pre-post intervention patient survey (Appendix D) design coupled with a brief survey of the clinicians' perceived barriers and facilitators to adopting this integrative intervention (Appendix D). Staff was educated through the PowerPoint by the project manager on essential oil use and aromatherapy application and benefits (Appendix E). Participating patients completed the post-intervention survey to assess the patient's knowledge and willingness and the participant's likelihood of receiving aromatherapy for immediate pain relief in the urgent care clinic in the future (Appendix D). Willingness was measured by participant response to receive aromatherapy intervention. Knowledge was assessed by the participant's ranked response to the educational session and feasibility of implementation within the clinic. The project manager shared de-identified data of the surveys with the clinic providers regarding the potential adoption of aromatherapy for pain relief in the clinic.

This pilot intervention focused on the feasibility of managing patient pain by implementing aromatherapy intervention in an outpatient setting through assessing patient perceptions to the education regarding the intervention. Data was collected at baseline and post-intervention with the surveys to measure the effectiveness of the education and participant response. A patient exam room was successfully utilized for the patient education, which further supports the feasibility of implementing aromatherapy in this urgent care clinic.

Consent and Ethical Considerations

This QI project placed a strong emphasis on protecting all participating patients. The project manager obtained approval of the study from the Institutional Review Board (IRB). Participation within the study was voluntary, with participants' ability to opt-out of the study at any time, and all collected information was unidentified. Consent with a thorough explanation of this project's process and purpose was given to each individual, including privacy standards, participant engagement expectancy, and project objectives (Appendix B). Each participant was given the project manager's contact information to ensure ease of communication if any questions or concerns arose. As mentioned in the previous section, each participant's protected health information (PHI) was de-identified and given a four-digit code for security and privacy. The data was collected solely by the project manager. All results were stored on a secure device in a password-protected folder on a password-protected computer.

Timeline

A timeline is essential to the development and advancement of the project and is provided in Appendix F. Following Institutional Review Board (IRB) approval (Appendix A); the data collection was started in September 2021 and completed in October 2021.

Data Collection

The project manager developed a pre- and post-intervention survey totaling six questions for the participants and five total questions for the clinician. The participants answered the pre-intervention survey immediately before the educational presentation began to assess their baseline perceptions and knowledge of aromatherapy for pain management. After the educational presentation, the participants completed the post- intervention survey to determine if the presentation increased their understanding of aromatherapy and if they would be interested in receiving aromatherapy for pain in the future.

Willing participants chose a random four-digit code to de-identify their completed surveys for privacy and accuracy. Each survey takes approximately 2.5 minutes to complete, totaling five minutes for the pre- and post- intervention surveys. The participants recorded their four-digit code on a patient self-reported survey for privacy. The de-identified data were collected and transferred to an Excel spreadsheet on a password-protected laptop.

Data Analysis

Pre- and post-intervention surveys were compared to determine the effectiveness of the aromatherapy educational session. The data analyzed included a) pre-intervention survey for participants, b) post-intervention survey for participants, and c) a post-survey questionnaire for the provider. The project manager gathered all results and immediately transferred the de-identified data to Microsoft Excel to perform analysis. The Microsoft Excel Spreadsheet was saved using a password-protected file within a password-protected laptop only the project manager could access. The project manager used descriptive statistics to analyze the data collected from the pre- and post-intervention surveys. To ensure accuracy, each participant's

response was scored. Additionally, participants were asked to rank the feasibility of the intervention on a scale of 0-10.

RESULTS

Demographics

There were seven female and three male participants. Among the participants, 80% (n=8) identified as white, 10% (n=1) were Hispanic, and 10% (n=1) were African American. No participants were under the age of 20, and 90% (n=9) of the participants were 30 or older, while 40% (n=4) were 60 years and older. Eighty percent (n=8) of the participants reported musculoskeletal pain, and 20% (n=2) reported headache pain. These findings, in addition to patient demographics, are shown in Table 1.

Table 1

Participant Demographics

Participant	Gender	Age	Pain: MSK/HA	Hispanic, Latino/a, or Spanish	Race
1	Male	60+	MSK	Yes	Hispanic
2	Female	40-49	MSK	No	White
3	Female	30-39	HA	No	White
4	Female	20-29	MSK	No	African American
5	Female	60+	MSK	No	White
6	Female	50-59	MSK	No	White
7	Female	30-39	MSK	No	White
8	Male	60+	HA	No	White
9	Female	40-49	MSK	No	White
10	Male	60+	MSK	No	White

Outcomes

Results of Pre- and Post-Intervention Surveys

All (N=10) participants completed the study's pre- and post-intervention survey, attaining a participation rate of 100% (Table 2). Out of the 10 participants' surveys, all except one demonstrated increased knowledge, and indicated willingness to receive aromatherapy supporting the feasibility of adopting the aromatherapy pain relief intervention at the clinic in the future. Some 90% of participants reported the information shared was valuable, only one participant reported the session was not beneficial (Table 2).

Table 2

Pre-Intervention and Post-Intervention Survey Results and Participation

<i>Variable</i>	<i>N</i>
<i>Completed Pre-Intervention Survey</i>	<i>10</i>
<i>Completed Post- Intervention Survey</i>	<i>10</i>
<i>Completed Both Pre- and Post-Intervention Surveys</i>	<i>10</i>
<i>No Change in Scores</i>	<i>0</i>
<i>Improvement in Scores</i>	<i>9</i>
<i>Decrease in Scores</i>	<i>1</i>

Among the 10 total participants in the pre-intervention survey, 20% reported little to no prior knowledge of essential oils and neutral feelings towards aromatherapy. Eight of the participants indicated they would be interested in receiving aromatherapy for pain relief, one participant reported being unsure due to a lack of knowledge regarding aromatherapy, and one patient reported no interest (Table 3). And 80% of participants responded that they would be interested in receiving aromatherapy for pain management in the pre-intervention survey, and

two participants felt unsure due to lack of knowledge or efficacy. One participant stated, “*I am unsure if it would help with my pain,*” and the other participant said, “*I do not know what aromatherapy is.*” The survey outcomes are displayed in a bar graph (Figure 4).

Table 3

Participant Willingness to Receive Aromatherapy

Participants	Yes	Unsure	No
1	X		
2	X		
3	X		
4			X
5	X		
6	X		
7	X		
8	X		
9		X	
10	X		

An “x” indicates response by participant.

Post-intervention survey concluded that nine of the participants would be interested in receiving aromatherapy for pain management if it were available in the future (Figure 4). An 80% agree it would be feasible to receive aromatherapy within the urgent care clinic setting (Table 4). All 10 of the participants reported the educational presentation increased their knowledge regarding aromatherapy and its potential benefits, and 90% of the participants reported willingness to receive aromatherapy (Figure 4).

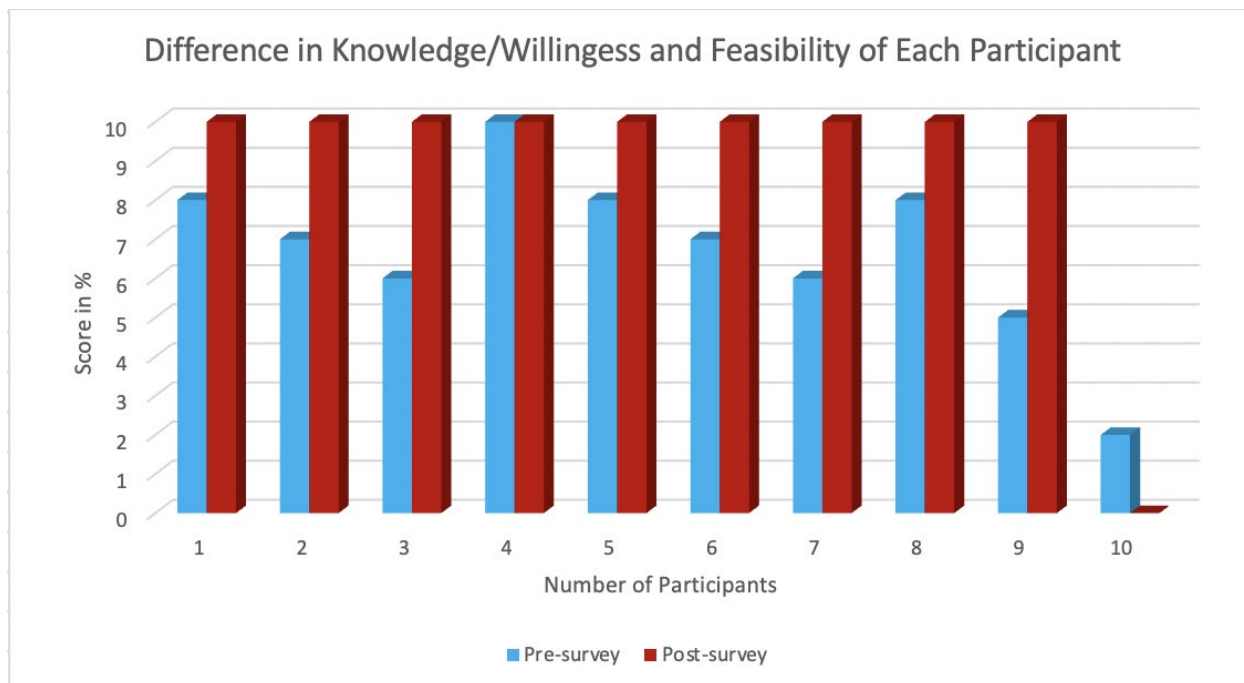
Table 4*Feasibility of Intervention Ranked Response (0-10)*

Participants	Score
1	10
2	10
3	10
4	0
5	10
6	10
7	10
8	10
9	0
10	10

Post-intervention survey concluded that nine of the participants would be interested in receiving aromatherapy for pain management if it were available in the future (Figure 4). An 80% agree it would be feasible to receive aromatherapy within the urgent care clinic setting (Table 4). All 10 of the participants reported the educational presentation increased their knowledge regarding aromatherapy and its potential benefits, and 90% of the participants reported willingness to receive aromatherapy (Figure 4).

Figure 4

Difference in Knowledge and Willingness of Each Participant



All 10 participants used a personalized 4-digit code to de-identify their data for comparison among the pre- and post-intervention surveys. The data demonstrated a statistically significant pre- to post-difference in participants' willingness and feasibility to receive aromatherapy treatment for pain management (Figure 4).

Feasibility of Aromatherapy Implementation

Results of the post-intervention survey showed that 80% (N=8) of participants agreed that aromatherapy in the urgent care clinic was feasible. Ninety percent (N=9) stated they were interested in receiving aromatherapy if permitted in the future. Only 10% (N=1) felt that the educational presentation was not helpful and that they did not develop an interest in receiving the aromatherapy intervention.

On the open-ended post-intervention questionnaire, the participating provider (N=1) noted interest in offering aromatherapy in the clinical setting. Despite time constraint concerns, the provider felt aromatherapy should be further evaluated as a feasible pain management option to interested patients.

DISCUSSION

Summary

Results promoted discussions among the project manager, provider, and office staff regarding the potential adoption of aromatherapy for pain management. The American Holistic Nurses Association (AHNA) introduced aromatherapy and essential oils as a category under holistic nursing due to its therapeutic effects on multiple ailments (Santos et al., 2021). Recognizing aromatherapy can be used for various types of pain is highlighted by the studies within the literature findings. These evidence-based alternative therapies have been proven to be safe and effective leading to improved symptom management and optimization of individual pain relief (Lakhan et al., 2016). Despite these positive findings, there is a lack of adoption of this intervention and patient education regarding alternative therapies, evidenced by the pre- and post-intervention survey results.

Implementing the educational presentation at the urgent care facility yielded positive findings, with participants indicating increased knowledge of aromatherapy and interest in receiving it in the future. Since this urgent care does not yet offer alternative therapies, the results from this project can help guide the adoption of an alternative therapy program providing patients with education regarding the use of aromatherapy for various pain syndromes. Furthermore, the facility can adopt this project manager's aromatherapy educational presentation to use with existing and future patients.

Interpretation

The primary objective of this QI project was to determine the feasibility of aromatherapy use for pain in an outpatient clinic using a pre- and post-intervention survey. Pre-intervention survey results focused on the patient's perception or existing knowledge of aromatherapy and evaluated initial participant willingness to receive aromatherapy for pain. The secondary objective of the project was to increase participant knowledge through the educational presentation of aromatherapy and re-evaluate participant willingness from the post-intervention survey. The educational presentation was successful in achieving its purpose of providing participants with evidence-based research of aromatherapy and its benefits for pain relief. From the data, it was clear that most participants (n=10; nine patients, one practitioner) were open to clinical aromatherapy as a pain management treatment. The post-intervention survey results demonstrated a positive correlation among participant knowledge concerning aromatherapy use for pain, as well as willingness to receive aromatherapy.

The post-intervention questionnaire from the provider indicated positive results. Further discussion with the clinician highlighted the positive impact of aromatherapy if available to the rapidly evolving family and retirement community this clinic serves. The project manager predicted the educational presentation would provide invaluable feedback and become an effective tool to assess the feasibility of implementing aromatherapy for pain management in the urgent care setting. Overall, the results of this study matched the anticipated outcomes by the project manager.

Implications

Practice and Education

The lack of available alternative pain management resources for patients presenting with pain necessitates patient guidance and education. The results of this project reinforce the need to provide patients with education regarding integrative treatments to help optimize their symptoms. By providing aromatherapy education to patients experiencing pain, both the clinician and the patient can evaluate additional avenues for pain treatment through informed decision-making. Completion of this project has led to a deepened knowledge of aromatherapy and future implications.

Future aromatherapy outpatient feasibility projects may proceed with the next cycle of the Plan-Do-Study-Act (PDSA) cycle examining implementation and data collection. In efforts to assess aromatherapy adoption more efficiently in an outpatient setting, it is highly recommended that aromatherapy application to willing participants be studied to evaluate the effectiveness of pain reduction. Applying and reviewing an aromatherapy intervention will aid in the promotion of adoption based on statistical findings.

Strengths and Limitations

Consistent with quality improvement projects, this sample size was small and therefore not generalizable. Additionally, all project participants volunteered to participate in an aromatherapy educational session and may have been predisposed to consider an aromatherapy intervention. Further exploration of potential participants who declined participation could also inform the next PDSA cycle. The survey questions for this project served the needs of an exploratory initial PDSA cycle, following a pilot offering an aromatherapy intervention, larger

sample sizes with validated tools could strengthen generalizability. Challenges were found to be related to patient knowledge and acceptance of learning about aromatherapy for pain management. Strengths were identified as the willingness to receive aromatherapy if offered after the education was given to the participants. A demographic survey addressing additional participant information would be helpful to assess community needs and trends further.

Initially, this intervention was to assess pain in willing participants, provide aromatherapy education and intervention, followed by re-assessing participant pain levels. Due to IRB constraints, the plan changed. To increase the likelihood of adoption, future projects should consider implementing the aromatherapy application and collecting data to assess feasibility further. Although this QI project's findings support aromatherapy feasibility in this urgent care clinic, evaluating the outcomes of an actual aromatherapy application intervention would better inform the adoption of the intervention at the clinic.

DNP Essentials Addressed

The Doctor of Nursing Practice Essentials (DNP) highlights the foundational outcome competencies that are deemed essential to all advanced nursing practice graduates (American Association of Colleges of Nursing [AACN], 2006). The DNP Essentials discussed in this project include *DNP Essential I: Scientific Underpinnings for Practice*, *DNP Essential II: Organization and Systems Leadership for Quality Improvement and Systems Thinking*, *DNP Essential III: Clinical Scholarship and Analytical Methods for Evidence-Based Practice*, and *DNP Essential VI: Interprofessional Collaboration for Improving Patient Population and Health Outcomes* (AACN, 2006).

DNP Essential I: Scientific Underpinnings for Practice

The discipline of nursing at the doctoral level places emphasis on the principles that oversee the life process, well-being, and the optimal function of human beings, regardless of their health status (AACN, 2006). The objective of this project was to explore the feasibility of implementing alternative treatment options for patients that may be suffering from pain, aiding in the optimization of function and well-being, whether they are sick or well. Patients presenting with pain are at a higher risk for opioid use and dependency, resulting in death. As discussed previously, the DNP must exercise their role to evaluate, educate and recommend alternative treatment options to patients to reduce adverse events while providing relief. Incorporating aromatherapy to reduce pain in patients can increase patient health status and increase safety. A cornerstone of the DNP Essentials is improving health status in individuals using nursing processes and actions (AACN, 2006).

DNP Essential II: Organization and Systems Leadership for Quality Improvement and Systems Thinking

The role of an advanced practice nurse includes an organizational and systems leadership component that focuses on ongoing improvement of health outcomes, ensuring patient safety and practice (AACN, 2006). This project emphasizes creating a clinic-wide aromatherapy adoption that would provide alternative treatments to patients with pain. The feasibility of this project was the core component of this quality improvement (QI) project, assessing the response and needs of the patients seen in this community location. This DNP Essential considers the current and future needs of the patient population with a foundation derived from scientific findings in nursing and other clinical sciences (AACN, 2006). It also analyzes the cost-effectiveness of

current practice initiatives, risks, and improving health outcomes (AACN, 2006). The use of aromatherapy in the urgent care facility was desirable and feasible among the participating patients and clinician. Furthermore, various studies within the literature found significant benefits associated with the use of aromatherapy. These studies also focused on cost-effectiveness and safety, as aromatherapy/essential oils are substantially less expensive and yield little to no risk compared to traditional pain management therapies (Lakhan et al., 2016).

DNP Essential III: Clinical Scholarship and Analytical Methods for Evidence-Based Practice

The DNP implements analytic techniques to critically appraise literature and additional evidence available to determine the best approach for implementation (AACN, 2006). The project manager initiated this project founded on the robust understanding of evidence-based practice and research, which guided the development of this quality improvement project. Through a strenuous literature review, various research articles were evaluated and chosen to provide a foundation for the overall project initiative. Furthermore, the DNP program prepares the graduate to design, evaluate, direct a quality improvement (QI) project while promoting safe and efficient patient-centered care (AACN, 2006). The DNP graduate is prepared to locate and apply any relevant findings to help develop practice guidelines and improve the practice (AACN, 2006). Within this QI project, the project manager created and facilitated an educational presentation regarding the feasibility of aromatherapy in the urgent care setting while facilitating the process from start to finish, evaluated the data and outcomes efficiently, and focused on improving patient-centered care through the potential adoption of aromatherapy in the practice setting.

DNP Essential VI: Interprofessional Collaboration for Improving Patient Population and Health Outcomes

The DNP program prepares the graduate to effectively communicate, lead interprofessional teams in analyzing complex practice and organizational concerns (AACN, 2006). The project manager identified the lack of alternative therapies at a robust urgent care facility and identified issues surrounding the need for alternative therapies in an evolving community. The project manager proposed to assess the feasibility of implementing aromatherapy through education and assessment of participants, which the urgent care facility can potentially adopt to offer more holistic care and improve the quality of life through additional consideration to their patients and community.

Conclusions

The results of this quality improvement (QI) demonstrate the potential adoptability and feasibility of implementing an aromatherapy protocol for pain management in this urgent care setting. Nine of the ten participants were interested in receiving aromatherapy, and eight felt it feasible to implement it within the practice. The clinician reported similar interest in adopting an aromatherapy protocol, the potential barrier of total time needed for the intervention to prevent patient care delays.

The results of this QI project align with the literature. Evidence-based aromatherapy protocols have been adopted in a variety of settings and resulted in the optimization of pain control in diverse patient populations. Most of the studies reported a statistically significant decrease in pain levels and related benefits of aromatherapy use. These results support the utilization of aromatherapy in current pain management protocols. Aromatherapy offers a

remarkable safety profile with no indication of adverse effects from aromatherapy interventions (Lakhan et al., 2016).

Furthermore, most researchers cite aromatherapy as a more cost-effective alternative to traditional opioid pain management today, making it a much more attractive option for patients and families (Lakhan et al., 2016; Daneshpooj et al., 2019; Tang et al., 2014; Gok Metin et al., 2017). This should be considered an added advantage to the positive patient outcomes of aromatherapy treatment and further evaluated by the urgent care clinic for potential adoption. Despite the discussed limitations of this QI project, insight into future practice, education and research is provided and should be considered in conjunction with the feasibility of adoption to help improve the quality of life in patients that suffer from pain.

Plan for Sustainability

If adopted by clinic management, this project could be sustained by the next PDSA cycle, piloting aromatherapy during clinic hours in the room previously designated for education. Initial plans for this quality improvement project included trial aromatherapy application. Time constraints and the Institutional Review Board (IRB) requirements prohibited aromatherapy intervention in this first PDSA cycle. The project manager made a pivot to only test feasibility with an educational intervention. Next steps should include sustainability reached by achieving leadership support at the clinical practice to develop an aromatherapy pain relief intervention protocol. Additionally, key stakeholders can further support this initiative by designating a project manager to continue to promote adoption of aromatherapy in this practice setting.

Plan for Dissemination

The results of this QI project were presented to the urgent care provider and office manager through a PowerPoint created by the project manager. In efforts to foster adoption and advance future research and practice, the results of this QI project can be disseminated to additional care facilities interested in assessing the feasibility of aromatherapy adoption. Plans to present the project findings at a clinical conference in the future are being considered.

APPENDIX A:

HONOR HEALTH SITE APPROVAL / THE UNIVERSITY OF ARIZONA INSTITUTIONAL
REVIEW BOARD AUTHORIZATION LETTER



Student Project Authorization & HIPAA Acknowledgement

1. **HIPAA Acknowledgement:**
I acknowledge that I have completed HIPAA (Health Information Portability and Accountability Act) training through my school or through HonorHealth and understand that my access to and use of patient information is limited to permissible uses under HIPAA. I understand that my access to and use of patient information may be further restricted by HonorHealth and by my capacity as a student.
2. **IRB Approval:**
I acknowledge that it is my responsibility to obtain IRB approval, pursuant to 45 CFR 164.512(i)(1)(i), for projects that require such approval. Failure to obtain proper approval may result in HonorHealth terminating my student project, dismissal from my clinical/student rotation, or other such action HonorHealth deems necessary.
3. **Student Affiliation Agreement:**
I understand that HonorHealth participates in teaching programs for students in various health care professions through student projects. I understand that, to participate in such programs, I must ensure that my school has a current Student Affiliation Agreement on file with HonorHealth Urgent Care – Gavilan Peak.

PROJECT DESCRIPTION

Name of School: University of Arizona

Degree/Name of Program: DNP-FNP

Dates of Project: July 15 - October 1, 2021

IRB Number: in progress (project will not commence until IRB received & verified)

Brief Description of Project: The purpose of this project is to assess the feasibility of an aromatherapy intervention for pain relief in outpatient adults presenting at HonorHealth Urgent Care - Gavilan Peak. The project will employ a quantitative pre-post patient survey design for participants coupled with a brief survey of clinicians' perceived barriers and facilitators to adopting this integrative intervention.

Goal of Project: To determine feasibility of delivering aromatherapy to patients presenting with mild to moderate pain at HonorHealth Urgent Care – Gavilan Peak.

ACKNOWLEDGEMENT AND AGREEMENT

I certify that I received a copy, have read, understand, and agree to the above. I understand that I am not authorized to perform student research projects beyond the scope of what has been authorized on this form. Should the scope of my Student Research Project change, I understand that I will need to fill out a new form.

Krystal A. Campanaro (Taranto)

PRINTED NAME



SIGNATURE

July 5, 2021

DATE



AUTHORIZATION FROM HONORHEALTH URGENT CARE – GAVILAN PEAK

Julie Osgood

PRINTED NAME



SIGNATURE

Nurse Practitioner

TITLE

July 7, 2021

DATE



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<http://rgw.arizona.edu/compliance/home>**Date:** August 24, 2021**Principal Investigator:** Krystal Ann Campanaro**Protocol Number:** 2107006595**Protocol Title:** Feasibility of Using Aromatherapy for Pain Management in an Outpatient Clinic Setting**Determination:** Human Subjects Review not Required**Documents Reviewed Concurrently:****Data Collection Tools:** *Post-intervention Survey - Clinicians .docx***Data Collection Tools:** *Post-intervention Survey - Participant.docx***Data Collection Tools:** *Pre-intervention Survey - Participant.docx***HSPP Forms/Correspondence:** *FINAL - IRB Determination - AUG Updates.pdf***Informed Consent/PHI Forms:** *Disclosure Form Clinician - Krystal C. .docx***Informed Consent/PHI Forms:** *Disclosure Form Patients - Campanaro - Updated for IRB EDIT (2).docx***Other Approvals and Authorizations:** *HHGP-Site Authorization and HIPPA Acknowledgement - Finalized .docx***Participant Material:** *Aromatherapy for Pain - Campanaro.pptx***Recruitment Material:** *DNP FLYER UPDATED for IRB EDIT (4).pptx***Recruitment Material:** *Medical Assistant Recruitment Script - IRB Updated AUG (2).docx***Regulatory Determinations/Comments:**

- Not Research as defined by 45 CFR 46.102(l): As presented, the activities described above do not meet the definition of research cited in the regulations issued by U.S. Department of Health and Human Services which state that "Research means a systematic investigation, including research development, testing, and evaluation, designed to develop or contribute to generalizable knowledge. Activities that meet this definition constitute research for purposes of this policy, whether or not they are conducted or supported under a program that is considered research for other purposes. For example, some demonstration and service programs may include research activities. For purposes of this part, the following activities are deemed not to be research."

The project listed above does not require oversight by the University of Arizona.

If the nature of the project changes, submit a new determination form to the Human Subjects Protection Program (HSPP) for reassessment. Changes include addition of research with children, specimen collection, participant observation, prospective collection of data when the study was previously retrospective in nature, and broadening the scope or nature of the study activity. Please contact the HSPP to consult on whether the proposed changes need further review.

The University of Arizona maintains a Federalwide Assurance with the Office for Human

APPENDIX B:
CONSENT DOCUMENT (DISCLOSURE AND CONSENT FORM)

Feasibility of Using Aromatherapy for Pain Management in an Outpatient Clinic Setting

**Krystal Campanaro RN, BSN
University of Arizona DNP Candidate**

The purpose of this project is to assess the feasibility of using aromatherapy as an analgesic intervention in adult patients presenting with mild to moderate pain at HonorHealth Urgent Care - Gavilan Peak.

Criteria to participate in this study include English-speaking individuals, of any gender, over the age of 18 years, living in the United States, presenting to the urgent care with complaints of mild to moderate musculoskeletal or headache pain.

If you choose to take part in this project, you will be asked to partake in a 15-minute educational presentation regarding aromatherapy and essential oils. Following the presentation, you will be asked to complete a survey to assess the likelihood of participating in aromatherapy in the future and assess your current knowledge of aromatherapy. It will take approximately 2 ½ minutes to complete the survey. After learning about aromatherapy, you will answer a post-survey to assess your interest in receiving aromatherapy in the future and to assess if you have gained deeper knowledge regarding the use of aromatherapy.

There are no foreseeable risks associated with participating in this project. Your name will not be collected or linked to your answers; therefore, your responses are anonymous.

If you choose to participate in the project, participation is voluntary, refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. You may withdraw at any time from the project. In addition, you may skip any question that you choose not to answer. By participating, you do not give up any personal legal rights you may have as a participant in this project.

For questions, concerns, or complaints about the project, you may call Krystal Campanaro at 623-523-9622 or email her at kat6219@email.arizona.edu.

You agree to have your responses used for this project.

Aromatherapy and Pain Reduction in Adult Patients

Krystal Campanaro, RN, BSN

University of Arizona DNP Candidate

The purpose of this project is to assess the feasibility of using aromatherapy as an analgesic intervention in adult patients presenting with mild to moderate pain at an Urgent Care facility in North Phoenix.

After learning about aromatherapy in a brief PowerPoint educational session, you will be asked to complete a brief survey of your perceived barriers and facilitators to adopting this integrative intervention.

Your participation in this project is purely voluntary as a clinician at the urgent care site. Your refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. You may withdraw at any time from the project. In addition, you may skip any question that you choose not to answer. Your responses are anonymous. Your name will not be collected or linked to your answers.

If you choose to participate in the project, participation is voluntary, refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. You may withdraw at any time from the project. In addition, you may skip any question that you choose not to answer. By participating, you do not give up any personal legal rights you may have as a participant in this project.

For questions, concerns, or complaints about the project, you may contact the project manager Krystal Campanaro at 623-434-6440 or kat6219@email.arizona.

Your participation in the project indicates your consent and you agree to have your anonymous responses used for this project.

APPENDIX C:
RECRUITMENT MATERIAL (RECRUITMENT FLYER AND RECRUITMENT SCRIPT)



Figure 1. Essential Oils

Got Pain?



Figure 3. Students' Essential Oils

Learn about **natural, safe, cost-effective** ways to help manage your pain.

Who can participate?

- Adults 18 years and older
- Individuals experiencing pain such as headaches or musculoskeletal pain
- Must be willing to spend up to 20 minutes in visit
- Must be willing to participate in a study

All participation will be limited to one-time visit

- No follow-up necessary
- All included educational materials and supplies will be provided free of charge.

Let your healthcare provider know if you are interested in participating, or use contact information listed below to sign up!

- Please let the **medical assistant** know at your visit if you are interested in participating **today!**

Questions?

Contact Krystal:
 Kat6219@email.arizona.edu

Medical Assistant Recruitment: Aromatherapy and Pain DNP Project

Krystal A. Campanaro

On four designated shifts, one provider medical assistant (MA) within the urgent care will recruit patients that are presenting with musculoskeletal or headache pain to participate in the study. This script will help to guide the staff in recruiting potential participants.

Script: "Our office is offering education of aromatherapy for patients that are experiencing mild-moderate pain at no additional cost in a study. Since you are presenting with pain, we would like to see if you would be interested in participating today in this doctorate project with our nurse practitioner student, Krystal?"

If the patient is interested in participation, the Principal Investigator/Project Manager, Krystal Campanaro, will meet with the patients to review consent and educational information.

APPENDIX D:

EVALUATION INSTRUMENTS (PRE- AND POST-INTERVENTION SURVEY:

PARTICIPANT / POST-INTERVENTION SURVEY: CLINICIAN)

Pre-Intervention Survey: Participant's

1. How do you feel about aromatherapy or essential oils?
2. Would you consider receiving aromatherapy for pain management? Why or why not?

Post-Intervention Survey: Participant's

1. How did you feel about this project?
2. Do you feel that your knowledge regarding aromatherapy has increased?
3. Would you consider receiving aromatherapy for pain management?
4. Do you feel it is feasible to do within a clinic? Why or why not?

Post-Intervention Survey: Clinician's

1. How did you feel about this project?
2. What are some challenges and strengths you experienced throughout this project?
3. What changes would you recommend?
4. Would you consider adopting aromatherapy for pain management?
5. Do you feel it is feasible to do within a clinic? Why or why not?

APPENDIX E:
PARTICIPANT MATERIAL (EDUCATIONAL PRESENTATION OUTLINE)

Educational Presentation Outline

1. Brief introduction and greeting; thank you for participating.
2. What is aromatherapy?
3. Discuss history of aromatherapy and past uses.
4. Mechanism of action of aromatherapy.
5. Evidence-based support of aromatherapy.
6. Discuss Professional Organizational Guidelines and safety.
7. Discuss uses in outpatient practice, considerations, and application.
8. Distribute the survey to the participant.

APPENDIX F:
PROJECT TIMELINE

Completion Date	Planning	Pre-Implementation	Implementation	Evaluation
August 24th, 2021	IRB Approval received	Data collection survey tool assembled (paper and electronic copy)		
September 2021	Participant recruitment 5-10 patients experiencing pain		MA's recruit same day	
September 1 st 2021	Staff meeting prior to implementation began			
September 14th-20th, 2021	Data collection completed on the 20th.		All participant surveys collected and safely stored each day	Survey completed by clinician
October 7th, 2021	All data collection, analysis, findings, and interpretations written into proposal			.
October/November 2021	Final Defense Presentation			

APPENDIX G:
LITERATURE REVIEW GRID

Pub. Year; Author's Last Name	Title of Publication	Type of Study	Main Outcomes of Findings	Support for and or Link to Project
2019 Daneshpajoo et al.	Comparison of the effects of inhalation aromatherapy using Damask Rose aroma and the Benson relaxation technique in burn patients: A randomized clinical trial	<p>Randomized clinical trial</p> <p>132 subjects selected through use of a sequential sampling method. They were randomly allocated by the Permuted block randomization method and placed into 4 groups.</p> <p>One group exposed subjects to rose aroma (5 drops of 40% rose aroma). Another group was solely the Benson Relaxation technique, another group consisted of the combined group of rose aroma and Benson technique, and the 4th group was the control group.</p> <p>Use of the Persian version of burn specific pain anxiety scale (BSPAS) to monitor pain levels.</p> <p>Burn patients ranged in ages from 18-60 years old. Each subject needed to be able to communicate verbally and have a second degree or higher burn injury.</p> <p>Patients had to be admitted to the burn ward 72 hours post burn.</p> <p>The burn specific pain anxiety scale (BSPAS) was filled out in three stages within the three days. The four groups were assessed as before the intervention and dressing (Time1 = T1), immediately after the intervention but before wound dressing (Time2 = T2) and immediately after wound dressing (Time3 = T3). The patients were asked to specify their responses to each item on the Visual Analog Scale and a blind</p>	<ul style="list-style-type: none"> - Patients in the control group received routine care. Once patients were assessed for pain and anxiety levels, they were asked to rest for 20 min on the bed prior to wound dressing changes daily for three consecutive days and once a day for 30 –45 min. - The results indicated that both the pain anxiety scores decreased significantly on the second and third days at both T2 compared to before the intervention (T1), and this reduction was higher at T3. In addition, the pain anxiety scores of T3 were significantly lower than the T2 on the second day and the third day. - The aromatherapy group also received routine care but was asked to inhale 5 drops of aroma of 40% rose oil for 20 minutes total. The oil was dropped onto a 10 × 10 cm gauze, which was then attached to the patient's shirt 20 cm from the patient's nose. The researcher continued this for three consecutive days and once a day between 30- 45 min before daily wound dressing. - The results for pain anxiety scores were significantly decreased at T2 and T3 compared with T1. This reduction was higher on the second day at T2 and on the third day at T3. On the second and third days, no statistically significant differences were reported between T2 and T3. - In all three days at T2, the inhalation of rose aroma alone reduced pain & anxiety compared to the control group and the effect size related to the rose aroma on pain/anxiety was significant. - The three days assessing T2, the inhalation of rose aroma was more effective in reducing pain anxiety compared to the Benson technique and yielded longer lasting results. 	<ul style="list-style-type: none"> - Findings within this study indicate that inhaling rose aromatherapy in efforts to reduce pain and anxiety in burn patients aided in reduction of pain in subjects significantly. - The use of rose aromatherapy in conjunction with the Benson technique showed the greatest results in subjects with pain and anxiety during their treatments, alleviating both pain and anxiety in said subjects. - The study recommends the use of aromatherapy for alternative treatments to pain management. - The study notes that aromatherapy has a lower cost, no side effects and creates an understanding to use and apply for patients and loved ones. This creates an easy educational platform for families, patients, and medical professionals to help endorse the use of aromatherapy in treatment of patients with pain.

Pub. Year; Author's Last Name	Title of Publication	Type of Study	Main Outcomes of Findings	Support for and or Link to Project
		researcher on the study processed the results.	<ul style="list-style-type: none"> – The Benson relaxation technique was taught to the patients through a researcher, and all questions were answered. Each patient was given an MP3 to listen to the audio file for 20 minutes. The patients were told to focus on tranquil thoughts and words in a comfortable position. The subjects were taught to breathe regular, deep breaths, while relaxing their muscles. The intervention was performed for three consecutive days and once a day, for 30 – 45 min before changing daily dressing under the researcher's supervision. – The results indicate that the pain anxiety scores were significantly decreased at T3, as well as T2 compared to T1, and this reduction was significantly higher at T3. Additionally, on the first, second and third days, the mean pain anxiety scores were significantly decreased at T3 compared to T2 	
2019 Ilter et al.	<p>The effect of inhaler aromatherapy on invasive pain, procedure adherence, vital signs, and saturation during port catheterization in oncology patients</p> <p><i>Holistic Nursing Practice</i></p> <p>Wolters Kluwer Health, Inc.</p>	<p>Nonrandomized controlled trial</p> <p>Focused on patients inserting a port catheter to undergo chemotherapy treatments.</p> <p>60 subjects total; 30 patients within the intervention group and 30 within the control group.</p> <p>Ages: 18 and up with no other health or communication issues. Data was collected through a questionnaire.</p> <p>The VAS scale was used to interpret pain in each subject.</p>	<p>Using orange, chamomile, and lavender oil with a 1:1:1 ratio, diluted in distilled water (70mL), and applied to a sponge that was then placed 10Cm from the patient. Duration was for 15 minutes, on average, findings as follows:</p> <p>Results on pain levels indicated that the mean pain score within the intervention group was 6.2 +/- 1.6 before the procedure, which was then decreased to 5.0 +/- 1.2 during the procedure. This increased after the procedure to 5.5 +/- 1.2, indicating a statistically significant decrease in pain levels.</p> <p>Control group indicated no decrease in pain with results as follows: before the procedure mean pain score was 6.0 +/- 0.9, which increased to 7.4 +/- 1.4 during the procedure, decreasing to 6.5 +/- 1.6 after the procedure.</p>	<p>This study denotes that there is a strong and positive correlation between aromatherapy use and pain reduction during the insertion of a port catheter for patients that will be receiving chemo.</p> <p>The conclusion of the study supports the notion that the use of aromatherapy through inhalation significantly decreased pain levels in these patients, and it also indicated a positive relationship with blood pressure management during port catheterization for patients diagnosed with cancer.</p> <p>The study recommends that for invasive procedures, aromatherapy</p>

Pub. Year; Author's Last Name	Title of Publication	Type of Study	Main Outcomes of Findings	Support for and or Link to Project
		<p>Vital signs recorded before, during and after.</p> <p>Data evaluated with chi 2 test, student t test and 2-factor analysis of variance for repeated measures.</p>	<p>Additionally, the vital signs and saturation of patients within the intervention group showed a significant decrease in mean arterial pressure. No effect was found on respiratory rate or saturation levels.</p>	<p>should be considered a reliable alternative in reduction to pain, reducing blood pressure levels and helps comfort for patients enduring an invasive procedure.</p>
2017 Tanvisut et al.	<p>Efficacy of aromatherapy for reducing pain during labor: a randomized controlled trial</p> <p><i>Archives of Gynecology and Obstetrics</i></p>	<p>Randomized controlled trial</p> <p>The primary outcome was pain scores.</p> <p>Aromatherapy was only provided to the study group during the 1st stage of labor.</p> <p>Study included 104 women, 52 in each group.</p>	<ul style="list-style-type: none"> - Findings in this study indicated that over half of the subjects that used aromatherapy to help with their labor pains showed significant decrease in their pain levels. - The study indicated that in the latent and early active phase of labor, aromatherapy yielded significant results, however, in the late labor it had become less effective. - Pain score within the first stage of labor was significantly reduced through use of aromatherapy. - Use of aromatherapy also showed a decrease in the use of epidural anesthesia/spinal anesthesia. - In conjunction with decreased pain relief in subjects using aromatherapy, it was also noted to show a significant decrease in anxiety. - There is a possible correlation of a higher rate of vaginal birth and lower incidences of operative deliveries. 	<ul style="list-style-type: none"> - Study supports the use of aromatherapy as an adjunct for pain control, specifically in laboring mothers to aid in pain relief. - Majority of women who used the aromatherapy reported no side effects and advised that they would use aromatherapy in future labors, also stating that they would recommend it to friends due to its pain alleviating effects and relaxation properties. - The pain score was noted to be significantly decreased in subjects using aromatherapy
2017 Hekmatpou et al.	<p>The effect of aromatherapy with the essential oil of orange on pain and vital signs of patients with fractured limbs admitted to the emergency ward: A randomized clinical trial.</p>	<p>A purposive sampling method was used.</p> <p>VAS scale used to measure pain levels.</p>	<p>The results indicate changes in pain severity for the intervention group, demonstrating significant statistical differences at different times.</p> <p>Over time, the pain reduced significantly in the intervention group.</p>	<ul style="list-style-type: none"> - The study researches the effect of aromatherapy on patients with fractured limbs admitted to the emergency department with the use of orange scented oil to reduce pain. - These findings demonstrate a progressive effect of the orange essential oil on pain relief in patients that experience orthopedic fractures.

Pub. Year; Author's Last Name	Title of Publication	Type of Study	Main Outcomes of Findings	Support for and or Link to Project
2017 Gok Metin et al.	Aromatherapy massage for neuropathic pain and quality of life in diabetic patients. <i>Journal of Nursing Scholarship</i>	Open-labeled randomized controlled clinical study. VAS scale to measure pain DN4 questionnaire used to assess neuropathic pain. Data collected from participants with the Neuropathic Pain Impact on Quality Life questionnaire.	Week four of study demonstrated a significant decrease in pain within the intervention group, and a higher rating for quality of life.	Findings are significant and are indicative of neuropathic pain relief in patients with diabetes using essential oils.
2016 Lahhan et al.	The effectiveness of aromatherapy in reducing pain: a systematic review and meta-analysis <i>Pain Res Treat</i>	Systematic review (qualitative) and meta-analysis (quantitative) study Uses VAS, visual analog scale, to measure pain. (Evaluates pain intensity).	<ul style="list-style-type: none"> - Results were gathered from multiple and different tests that were implemented through either applying an essential oil (aromatherapy), or by not doing so. - Areas that this article explored were related to chronic neck/back/knee/shoulder pain, menstrual/labor/childbirth pains, hospice/cancer pain, hemodialysis pain, post-operative pain, and pain related to Guillain Barre Syndrome and Multiple Sclerosis. - The authors applied different essential oils to areas that were affected (listed above) for either chronic or acute pain syndromes and found overall that majority of the patients that received the aromatherapy showed a decrease in their symptoms, and an increase in their healing, in comparison to those in the placebo group or who did not receive the aromatherapy treatments. - In conjunction to decreasing pain levels in patients, the use of aromatherapy simultaneously decreased anxiety and depression in the patient groups, as well. 	<ul style="list-style-type: none"> - Findings in this study suggest that the use of aromatherapy for pain management yields positive results regarding pain reduction in patients. - The use of aromatherapy in conjunction with an existing pain management plan also showed significant long-term results in patients that suffer from pain. However, patients with chronic pain did not show the same success rates as those with acute pain through use of aromatherapy application. - The use of aromatherapy is a more cost-effective alternative to pain management in comparison to the standard care and pain management treatment that is commonly prescribed today. - Aromatherapy creates safe pain management treatment with no adverse effects, while narcotics offer a plethora of negative

Pub. Year; Author's Last Name	Title of Publication	Type of Study	Main Outcomes of Findings	Support for and or Link to Project
				effects on patients and their health.
2016 Karimollahi et al.	The effect of lavender aromatherapy on the pain severity of primary dysmenorrhea: a triple-blind randomized clinical trial	Triple-blind randomized clinical trial. Pain severity measured through VAS scale for the first 3 days of menstruation before intervention and 2 months after intervention. Data analyzed through descriptive statistics and independent/paired sample t-tests.	Findings revealed in this study that aromatherapy inhalation indicated a significant decrease in pain severity during menstruation in women.	The study highlights that the results are positive, yet more studies and further research is needed to ensure accuracy of the findings. The use of aromatherapy has no negative side effects and is a cost-effective alternative for pain reduction.
2015 Ashrastaghi et al.	The effectiveness of lavender essence on sternotomy related pain intensity after coronary artery bypass grafting	Randomized clinical trial 50 patients that were authorized for CABG procedure were divided into two groups by the Rand function of random numbers, 25 in control group and 25 in the intervention group. VAS pain scale was used to assess pain levels in patients. The t-test, chi- squared test, and repeated measures of analysis of variance via SPSS software to analyze the results were used.	The results indicated that the intervention group reported lower pain intensity in phases 2, 3, and 4 of the measurements gathered. In the intervention group, patients received a mixture of oxygen and Lavender oil for 15 minutes through an oxygen face mask. The patient's pain severity was measured before, five, thirty, and sixty minutes after the intervention was applied.	Implementation of Lavender aromatherapy offers effective pain reduction and should be considered an alternative therapy for pain control in patients.
2015 Johnson et al.	The effectiveness of nurse-delivered aromatherapy in an acute care setting <i>Elsevier Journals</i>	A retrospective, observational study. Study performed at 10 of 12 Allina hospitals in Minneapolis, MN. Electronic Health Records where patients were given aromatherapy	Nurse delivered aromatherapy within this study indicated significant findings that pain, among various other symptoms, were reduced in adjunctive to normal care.	This large study did show in favor that aromatherapy oils were effective in reduction of ailments within hospitalized patients. There were limitations present within this study, such as nurses not recording pain scores consistently.

Pub. Year; Author's Last Name	Title of Publication	Type of Study	Main Outcomes of Findings	Support for and or Link to Project
		interventions from nurses were only included in this study. VAS pain scale used.		It was not an RCT and had an absence of the control group.
2014 Tang et al.	Aromatherapy: does it help to relieve pain, depression, and stress in community-dwelling older persons? BioMed Research International	Quasi-experimental pretest and posttest control group study. Size of the sample was calculated through use of Cohen's d table. Participants were 65 years and above, residing in a community center for the elderly and had been experiencing chronic pain for 3 months prior to study. 82 participants totaled the study, 38 assigned to the control group and 44 were in the intervention group.	A four-week aromatherapy program was implemented and designed as an alternative therapy to pain management in the elderly population. The main outcome resulted in significant reduction in not only pain within this population of subjects through use of aromatherapy, but also in depression and anxiety symptoms, as well. Lavender and bergamot essential oils that were used through inhalation through the nasal passage showed a significant decrease in depression, anxiety, and stress in the intervention group, as well. The control group showed an increase in psychological distress, as they did not receive the aromatherapy or any information on pain and pain management, as the intervention group had received.	The program results indicate that the elderly participants benefited from decreased levels of pain, depression, anxiety, and stress upon completion of the 4-week program. The participants chose to continue to use the aromatherapy as part of their daily living for relief of their symptoms after the study had concluded, indicating their beliefs of its effectiveness. Nonpharmacological interventions for pain management have fewer side effects, and it was found in this study that the elderly population prefers to abstain from use of any narcotics, if/when possible. This study found that aromatherapy can help maintain health in community-dwelling elderly subjects.
2013 Olapour et al.	The effect of inhalation of aromatherapy blend containing lavender essential oil on cesarean postoperative pain	Triple blind, randomized placebo-controlled trial study. Participants admitted to the general hospital for cesarean section.	A higher correlation was seen in the interventional group versus the control group for reduction of pain levels postoperatively. A decrease in the VAS score in the Lavender group than the placebo group values demonstrated significance at four, eight and twelve hours after the first intervention.	The findings in this study suggest that lavender should be considered for use in postoperative pain management in cesarean deliveries to reduce pain levels experienced by patients up to 12 hours after surgery.

Pub. Year; Author's Last Name	Title of Publication	Type of Study	Main Outcomes of Findings	Support for and or Link to Project
	<i>Anesthesiology and Pain Medicine Journal</i>			Lavender should be used in conjunction with other treatments to help reduce pain levels more effectively.
2012 Shahnazi et al.	Inhaled lavender effect on anxiety and pain caused from intrauterine device insertion <i>Journal of Caring Sciences (JCS)</i>	Randomized control clinical trial Married women in reproductive ages. VAS Scale used to measure pain levels.	The results of this study indicated aromatherapy significantly reduced anxiety of IUD insertion. It also indicated a significant reduction in systolic and diastolic blood pressure levels. Unfortunately, the study did not show any significant findings in the reduction of pain.	Anxiety levels and systolic/diastolic blood pressures levels were found to have substantial findings within this study. The study was not able to prove a reduction in pain from inhalation of essential oils. However, the study did note that other studies have found Lavender to reduce pain in wound changes.

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