Protocol #: 21-2561
Project Title: Effects of Aromatherapy on Patient Satisfaction with Surgical Abortion at Less than 10 weeks gestation: A Randomized Controlled Trial
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I. Hypotheses and Specific Aims:

A. Overall Research Question: Does lavender aromatherapy increase patient satisfaction during surgical abortion at less than 10 weeks gestational age?

B. Null Hypothesis: Among women undergoing surgical abortion prior to 10 weeks 0 days gestational age, there is no difference in patient satisfaction measured using the ISAS between those randomized to lavender aromatherapy or to placebo.

C. Primary Objective: To compare women's satisfaction with their abortion experience as measured on the Iowa Satisfaction with Anesthesia Scale (ISAS) following a surgical abortion less than 10 weeks 0 days gestational age between women randomized to lavender aromatherapy versus placebo. Our *hypothesis* is that women receiving lavender aromatherapy will report higher satisfaction scores as compared to women receiving placebo.

D. Secondary Objectives:
1. To examine if baseline state and trait anxiety are mediating factors between use of aromatherapy and patient satisfaction.
2. To evaluate differences in patient satisfaction in those who receive oral sedation compared to those who receive no sedation, in patients receiving lavender aromatherapy and placebo.
3. To compare maximum procedural pain measured by Visual Analog Scale (VAS) in patients receiving lavender aromatherapy and placebo.
4. To measure patient acceptability of lavender aromatherapy as a complementary and alternative medicine used during first trimester surgical abortion through a post- procedure survey.

II. Background and Significance:

A. Project Summary.

We propose a single-site, double-blinded, placebo-controlled clinical trial of lavender aromatherapy versus placebo for patient satisfaction in adult women having a surgical abortion before 10 weeks and 0 days gestation. We will evaluate whether lavender aromatherapy is an effective adjunct therapy for patient satisfaction during first trimester surgical abortion. We will measure satisfaction using the Iowa Satisfaction with Anesthesia Scale (ISAS). We hypothesize that women receiving lavender aromatherapy will report higher satisfaction scores compared to women receiving placebo.

Prior studies have investigated the use of aromatherapy in laboring patients, in menstruating women, and in general post-operative populations. No investigations have

focused on the use of lavender aromatherapy as an adjunct therapy to paracervical block and/or oral narcotics and anxiolytics in outpatient surgical abortion. Our study is novel in investigating patient satisfaction with first trimester surgical abortion using lavender aromatherapy.

The contribution of this proposed research to the literature is significant because current affordable anesthetic adjuncts to opioids and benzodiazepines are limited.

B. Background

In 2016, 80% of abortions occurred within the first ten weeks of gestation.[1] The majority of aspiration procedures occur in outpatient settings with premedication including a paracervical block and a non-steroidal anti-inflammatory drug.[2] Patients commonly report moderately severe pain that is not decreased with oral narcotic medications.[3] Patients have a great deal of interest in non- pharmacologic adjuncts that might reduce pain or anxiety, or improve the overall patient experience. A previous study showed auricular acupuncture reduced pain and anxiety; however, another study evaluating patient choice of ambient music, physical contact, narration, meditation, or focused breathing did not find that these interventions reduced pain scores.[4-6]

Anxiety may affect the vulnerability and experience of patients who present for first trimester surgical abortion and moreover, may be predictive of a patient's response to aromatherapy as a complementary and alternative medicine (CAM). Trait anxiety is a more stable, lasting, individual patient characteristic in people who have a tendency to view situations as more stressful or dangerous, whereas state anxiety is a temporary negative emotion and feeling of apprehensiveness or tension experienced during a threatening situation.[7] The stronger the anxiety trait, the more likely a person is to experience elevations in state anxiety.

Aromatherapy-use of essential oils, derived from plants, absorbed through the skin or olfactory system-can affect the body in three ways: pharmacologically through effects on hormones and enzymes, psychologically through relaxing and sedating effects, and physiologically through the brain's response to inhaling aromas[8-10]. Olfactory stimulation related to aromatherapy can reduce pain, specifically nociceptive and acute pain, and change physiologic parameters such as pulse, blood pressure, and skin temperature[9,11].

The analgesic effect is one lavender's most studied properties.[12] Lavender has been used as a treatment for anxiety and mood disorders, as a sedative, spasmolytic, antihypertensive, antimicrobial, antifungal, and antiseptic.[13-14]

Obstetric and gynecologic pain has garnered the most attention when examining the efficacy of aromatherapy as an isolated therapeutic intervention.[11] Lavender essential oil aromatherapy significantly decreases the severity and length of menstruation pain, and also decreases pain intensity and increases satisfaction in laboring patients.[15-18] Although aromatherapy is widely used as a CAM adjunct, currently little is known about its effectiveness as an adjunct therapy for abortion.[8,19]

III. Preliminary Studies/Progress Report: None

IV. Research Methods

A. Outcome Measure(s):

Satisfaction will be assessed using the ISAS, a validated patient-experience centered measurement tool.[20-22] This survey was designed to specifically assess participant satisfaction with anesthetic care. The self-reported questionnaire consists of 11 question items such as “I hurt,” “I felt safe,” “I had nausea,” each assessed on a Likert-type scale ranging from “Disagree very much” to “Agree very much.” The responses are then scored from -3 to +3 and summed for a total possible score of -33 to +33 and then an average score can be obtained. This instrument has been validated in multiple studies, including prior abortion studies at this institution (Thaxton and Pitotti, manuscript in preparation). Maximum procedural pain will be assessed using an unmarked 100mm VAS scale, with anchors at 0mm (left) being “no pain” and 100mm (right) being “pain as bad as it could be.”

Based on variance findings from the NOVIA (Nitrous Oxide versus IV Sedation for Anesthesia study, we performed a sample size calculation with an alpha level of 0.05 and a beta of 0.83 in order to detect a 0.5U difference in the mean ISAS score between controls and patients receiving lavender aromatherapy.

B. Description of Population to be Enrolled:

i. Eligibility Criteria

Eligibility criteria include women who have decided to have an outpatient abortion and are at least 18 years of age, with a viable intrauterine pregnancy with gestational age less 10 weeks 0 days as determined by ultrasound crown rump length. The pregnancy viability criteria was included due to the stress, sadness and grief surrounding pregnancy loss that may affect the magnitude of difference of the exposure on the outcome of patient satisfaction. The less than 10 weeks 0 days gestational age limit was decided based on 1.) The majority of abortions occur at less than 10 weeks gestational age 2.) No cervical preparation is required and our surgical practice after this gestational age generally changes from manual to electric suction.

ii. Exclusion Criteria

Exclusion criteria include women with contraindications or allergies to ibuprofen, lidocaine, or jojoba oil, with non-viable intrauterine pregnancy or pregnancy greater than or equal to 10 weeks gestational age. This study will not recruit adults who are unable to consent or who are currently incarcerated.

iii. Number of Subjects and Statistical Power

Based on variance findings from the NOVIA (Nitrous Oxide versus IV Sedation for Anesthesia) study, we performed a sample size calculation with an alpha level of 0.05 and a beta of 0.83 in order to detect a 0.5U difference in the mean ISAS score between controls and patients receiving lavender aromatherapy. This sample size calculation resulted in a sample size of 200 participants (100 receiving lavender and 100 receiving placebo). We will enroll up to 220 participants to account for a 10% drop-out rate.

We will perform a secondary analysis to evaluate mean ISAS scores in patients who received oral sedation compared to those who did not receive oral sedation. Additionally, we will perform a secondary analysis to compare mean ISAS in patients with high and low state and trait anxiety scores.

C. Study Design and Research Methods

i. Research Design and General Methodological Approach

We propose a single-site, double-blinded, placebo-controlled clinical trial of lavender aromatherapy versus inert oil placebo for patient satisfaction in adult women having a first trimester outpatient surgical abortion before 10 weeks and 0 days gestation. Our study will be conducted at the University of Colorado Comprehensive Women's Health Center, a freestanding outpatient family planning clinic. All study endpoints will be collected on the date of procedure and thus no follow-up will be necessary. In order to be able to show that lavender aromatherapy is an effective adjunct to standard treatment, we will recruit 200 women (100 to receive the intervention of lavender aromatherapy and 100 to receive a placebo).

For purposes of masking, all patients enrolled in the study will be required to wear a cloth face covering over their nose and mouth during their procedure to minimize diffusion of the aromatic scent in the procedure room. All participants will receive standard pre-operative analgesia with 600mg Ibuprofen PO and local anesthetic with a standardized 20 cc cervical block (10cc of 1% lidocaine without epinephrine mixed with 10cc of 0.9% normal saline). The State-Trait Anxiety Inventory (STAI)and a pre-procedure patient survey will be filled out prior to the procedure. A visual analog scale (VAS) for maximum procedure pain will be filled out immediately after procedure completion (as defined as removal of the speculum). Lastly, the Iowa Satisfaction with Anesthesia Scale (ISAS) and a post-procedure patient survey will be administered 15 minutes after the completion of the procedure. Surgical abortion procedures will proceed per usual clinical practice.

ii. Subject Recruitment and Allocation

This study will be performed at the University of Colorado Women's Comprehensive Health Center (CWHC) - a free-standing family planning clinic providing pregnancy termination services up to 22 weeks gestational age. Procedures at CWHC are performed by OBGYN residents, Complex Family Planning fellows, and faculty.

Eligibility for participation will be determined by abortion clinic physician providers, all of whom are study team members,at initial encounter. Women presenting for abortion will be screened by clinic physician providers for eligibility based on chart review, dating ultrasound, and patient preference for pain control (IV anesthesia or no) following initial provider interview. If determined to be eligible for participation and interested, women will meet with trained research staff study team members who will explain the study as well as the risks and benefits of participation.

CWHC performs approximately 20-25 surgical abortions less than 10 weeks 0 days gestational age without intravenous sedation each month . We assume 80% enrollment and a drop our rate of 10%. Based on this information, we approximate that recruitment will be completed in 12 months.

D. Description, Risks and Justification of Procedures and Data Collection Tools:

i. Admission Procedure

Patients presenting for abortion procedure up to 10 weeks 0 days gestation will be screen by an abortion clinic physician provider, all of whom are study members, for eligibility criteria, only after medical chart has been reviewed, ultrasound has been performed, and participant has signed appropriate clinical consent forms for the surgical abortion procedure. If eligible, the woman will be approached for possible participation by a research assistant in a private clinic room. If interested and willing to participate, the patient will undergo consent for study enrollment. All participants determined to be eligible and approached will be documented per CONSORT guidelines.

Following enrollment, participants will be instructed on how to self-administer the aromatherapy. Participants will fill out a pre-procedure survey with questions related to prior use and feelings regarding aromatherapy and other CAM techniques. Additionally, they will fill out the State-Trait Anxiety Inventory (STAI), which is a 40-item self-reported questionnaire to measure their current state of anxiety and anxiety proneness. The STAI takes approximately 10 minutes to complete. Pre-procedure temperature, pulse and blood pressure will be recorded.

Study randomization to lavender aromatherapy or placebo will occur just prior to the initiation of the abortion procedure. A permutated block stratified randomization scheme will be utilized so that equal numbers of participants receiving no sedation and PO sedation will be randomized to lavender aromatherapy or placebo. 1cc of dilute lavender aromatherapy and placebo will be pre-filled in a 5/8 dram mini amber glass bottle provided to the patient. Immediately prior to procedure start (defined as after receiving antibiotic and emptying bladder), participants will be instructed to self-administer the study product. They will bring down their personal cloth mask to chin level and rub the study product within the amber glass bottle on their upper lip and nose (left and right ala, alarfacial grooves, and columella). Participants will be instructed to take 4 deep breaths and then replace their mask over their nose. The patient will then proceed to the procedure.

The participant, providers, and research team will be blinded to the treatment allocation. The level of training of the physician performing the procedure will be documented (e.g. resident, fellow, attending). If the physician is at any point concerned about participant health or safety, treatment allocation will be revealed in order to provide optimal management. If allocation is unmasked to the treatment team, this will be recorded.

Immediately after procedure completion, a VAS documenting maximum procedural pain will be completed. Women will be monitored for a minimum of 15 minutes after procedure completion. Post-procedure temperature, pulse and blood pressure will be recorded, and participants will receive written and verbal discharge instructions. At this point, participants will receive and complete the ISAS as well as a post-procedure survey with questions related to their experience using scented oils during their abortion procedure.

After completion of all study materials, if the patient prefers to remove the study product, they will be provided a wet gauze upon request.

ii. Follow-up Procedure

All study endpoints will be collected on the date of the procedure. Patients will not be followed up after procedure unless clinically indicated.

iii. Description of products to be used

Lavandula angustifolia* (English Lavender)*: A 10% dilute *Lavandula angustifolia* essential oil blend will be used in this study. *Lavandula angustifolia* was chosen based on the idea that the oil can promote relaxation and treat anxiety, nausea and menstrual cramps. To create the dilute essential oil blend, 60 drops of *Lavandula angustifolia* will be added to one fluid ounce (2 tablespoons/30mL) of jojoba carrier oil.

Jojoba Oil (100% organic golden expeller-pressed *Simmondsia chinensis*): Jojoba oil is the liquid produced in the seed of *Simmondsia chinensis* (jojoba) plant shrub. Jojoba is a clear golden liquid wax at room temperature with a faint nutty aroma. Jojoba was chosen as a carrier oil because of its stark similarities to the natural occurring sebum of humans based on its wax esters and fatty acids.

The anticipated risks of the use of the jojoba oil and *Lavandula* essential oil are: skin irritation and undesired intensity or characteristic of the scent.

E. Potential Scientific Problems:

i. Criteria for Discontinuation

In order to ensure and prioritize optimal medical care, if an unanticipated reaction or intolerance to the study product is encountered during the procedure, the patient or provider can request immediate withdrawal of their face mask where upon a clinical staff member will provide a wet gauze to wash the upper lip and nose (left and right ala, alarfacial grooves, and columella). If a reaction or intolerance is encountered, this will be recorded along with the timing (prior to start of procedure, during the procedure, or after the procedure but prior to submitting all study documents).

F. Data Analysis Plan:

i. Data Management

Data will be entered into RedCap on the date of the procedure by research staff at CWHC. Research staff will have completed institutional review board training in RedCap prior to initiation of the study. Study packets will be stored in a secure file cabinet located in the clinic. These cabinets will be kept locked at all times. The study consents will be kept in the same room in a separate locked cabinet with a different key. Only IRB-approved study team members will have access to RedCap and participant materials. The list that links the participant information to the study identification number will kept separately and will be destroyed after data analysis is complete.

ii. Data Analysis

Satisfaction will be assessed using the ISAS, a validated patient-experience centered measurement tool.[20-22] This survey was designed to specifically assess participant satisfaction with anesthetic care. The self-reported questionnaire consists of 11 question items such as “I hurt,” “I felt safe,” “I had nausea,” each assessed on a Likert-type scale ranging from “Disagree very much” to “Agree very much.” The responses are then scored from -3 to +3 and summed for a total possible score of -33 to +33 and then an average score can be obtained. This instrument has been validated in multiple studies, including prior abortion studies at this institution (Thaxton and Pitotti, manuscript in preparation).

Maximum procedural pain will be assessed using an unmarked 100mm VAS scale, with anchors at 0mm (left) being “no pain” and 100mm (right) being “pain as bad as it could be.”

We will perform descriptive analyses for the demographic data collected in this study. ISAS scores will be averaged and comparison of means will be performed. Maximum procedural pain scores on the VAS will be compared using a Student’s t-test. We will assess patient acceptability by evaluating the results from the survey portion of this study using descriptive statistics and 95% confidence intervals for acceptability based on the survey data.

A subgroup analysis of patient satisfaction will be performed according to participant preference for pain control (oral sedation or no sedation), as well as baseline characteristics such as anxiety (state and trait) and previous experience using CAM techniques.

We will use a p-value of <0.05 as a cut-off for statistical significance.

G. Summarize Knowledge to be Gained:

Currently, there are no known studies investigating the use of lavender aromatherapy in outpatient abortion procedures. Through this randomized, placebo-controlled trial, we expect to find that lavender aromatherapy will improve satisfaction with anesthesia, will be acceptable to patients, and will improve the overall patient experience for women undergoing first trimester surgical abortion. If effective in increasing satisfaction with minimal side-effects, aromatherapy could not only be a low-cost, complementary addition to current, standard pain management for first trimester abortion, but even more, it could also improve the overall abortion care experience for patients. Given current limited anesthesia options, aromatherapy could serve as an affordable and acceptable non-narcotic, non-sedating adjunct to current standard of care during first trimester surgical abortion. Within a larger scope, our project represents a growth area in abortion research: patient-centered care. The impact of this project is to inform the practice of patient-centered abortion care through evaluation of patient-experience centered outcomes; if effective, aromatherapy techniques could be instituted in any outpatient surgical abortion practice in an effort to provide care that is respective of, and responsive to patient preferences and needs.

H. References:

1. Guttmacher Institute. “Induced Abortion in the United States,” May 3, 2016. https://www.guttmacher.org/fact-sheet/induced-abortion-united-states.
2. O’Connell, Katharine, Heidi E. Jones, Melissa Simon, Vicki Saporta, Maureen Paul, E. Steve Lichtenberg, and National Abortion Federation Members. “First-Trimester Surgical Abortion Practices: A Survey of National Abortion Federation Members.” *Contraception* 79, no. 5 (May 2009): 385–92. https://doi.org/10.1016/j.contraception.2008.11.005.
3. Micks, Elizabeth A., Alison B. Edelman, Regina Maria Renner, Rongwei Fu, William E. Lambert, Paula H. Bednarek, Mark D. Nichols, Ethan H. Beckley, and Jeffrey T. Jensen. “Hydrocodone-Acetaminophen for Pain Control in First-Trimester Surgical Abortion: A Randomized Controlled Trial.” *Obstetrics and Gynecology* 120, no. 5 (November 1, 2012): 1060–69. https://doi.org/10.1097/AOG.0b013e31826c32f0.

4. Ndubisi, Chioma, Antoinette Danvers, Melanie A. Gold, Lisa Morrow, and Carolyn L. Westhoff. “Auricular Acupuncture as an Adjunct for Pain Management during First Trimester Abortion: A Randomized, Double-Blinded, Three Arm Trial.” *Contraception* 99, no. 3 (2019): 143–47. https://doi.org/10.1016/j.contraception.2018.11.016.
5. Tschann, Mary, Jennifer Salcedo, Reni Soon, and Bliss Kaneshiro. “Patient Choice of Adjunctive Nonpharmacologic Pain Management during First-Trimester Abortion: A Randomized Controlled Trial.” *Contraception* 98, no. 3 (September 1, 2018): 205–9. https://doi.org/10.1016/j.contraception.2018.05.007.
6. Tschann, Mary, Jennifer Salcedo, and Bliss Kaneshiro. “Nonpharmaceutical Pain Control Adjuncts During First-Trimester Aspiration Abortion: A Review.” *Journal of Midwifery & Women’s Health* 61, no. 3 (2016): 331–38. https://doi.org/10.1111/jmwh.12445.
7. Wiedemann K. Anxiety and Anxiety Disorders. In: Smelser NJ, Baltes PB, eds. *International Encyclopedia of the Social & Behavioral Sciences*. Pergamon; 2001:560-567. doi:10.1016/B0-08-043076-7/03760-8
8. Boehm, Katja, Arndt Büssing, and Thomas Ostermann. “Aromatherapy as an Adjuvant Treatment in Cancer Care — A Descriptive Systematic Review.” *African Journal of Traditional, Complementary, and Alternative Medicines* 9, no. 4 (July 1, 2012): 503–18.
9. Shin, Byung-Cheul, and Myeong Soo Lee. “Effects of Aromatherapy Acupressure on Hemiplegic Shoulder Pain and Motor Power in Stroke Patients: A Pilot Study.” *Journal of Alternative and Complementary Medicine (New York, N.Y.)* 13, no. 2 (March 2007): 247–51. https://doi.org/10.1089/acm.2006.6189.
10. Trevelyan, Joanna E., and Brian Booth. *Complementary Medicine for Nurses, Midwives and Health Visitors*. Basingstoke: Macmillan, 1994.
11. Lakhan, Shaheen E., Heather Sheafer, and Deborah Tepper. “The Effectiveness of Aromatherapy in Reducing Pain: A Systematic Review and Meta-Analysis.” *Pain Research and Treatment* 2016 (2016): 1–13. https://doi.org/10.1155/2016/8158693.
12. Denner, Sallie Stoltz. “Lavandula Angustifolia Miller: English Lavender.” *Holistic Nursing Practice* 23, no. 1 (January 2009): 57–64. https://doi.org/10.1097/01.HNP.0000343210.56710.fc.
13. Sasannejad, Payam, Morteza Saeedi, Ali Shoeibi, Ali Gorji, Maryam Abbasi, and Mohsen Foroughipour. “Lavender Essential Oil in the Treatment of Migraine Headache: A Placebo-Controlled Clinical Trial.” *European Neurology* 67, no. 5 (2012): 288–91. https://doi.org/10.1159/000335249.
14. Cavanagh, H. M. A., and J. M. Wilkinson. “Biological Activities of Lavender Essential Oil.” *Phytotherapy Research* 16, no. 4 (June 2002): 301–8. https://doi.org/10.1002/ptr.1103.
15. Ou, Ming-Chiu, Tsung-Fu Hsu, Andrew C. Lai, Yu-Ting Lin, and Chia-Ching Lin. “Pain Relief Assessment by Aromatic Essential Oil Massage on Outpatients with Primary Dysmenorrhea: A Randomized, Double-Blind Clinical Trial.” *The Journal of Obstetrics and Gynaecology Research* 38, no. 5 (May 2012): 817–22. https://doi.org/10.1111/j.1447-0756.2011.01802.x.

16. Lee, Myeong Soo, Hye Won Lee, Mohamed Khalil, Hyun Suk Lim, and Hyun-Ja Lim. “Aromatherapy for Managing Pain in Primary Dysmenorrhea: A Systematic Review of Randomized Placebo-Controlled Trials.” *Journal of Clinical Medicine* 7, no. 11 (November 10, 2018). https://doi.org/10.3390/jcm7110434.
17. Kaviani, Maasumeh, Sara Azima, Narges Alavi, and Mohammad Hossein Tabaei. “The Effect of Lavender Aromatherapy on Pain Perception and Intrapartum Outcome in Primiparous Women.” *British Journal of Midwifery* 22, no. 2 (February 2014): 125–28. https://doi.org/10.12968/bjom.2014.22.2.125.
18. Tanvisut, Rajavadi, Kuntharee Traisrisilp, and Theera Tongsong. “Efficacy of Aromatherapy for Reducing Pain during Labor: A Randomized Controlled Trial.” *Archives of Gynecology and Obstetrics* 297, no. 5 (May 2018): 1145–50. https://doi.org/10.1007/s00404-018-4700-1.
19. Upchurch, Dawn M., and Laura Chyu. “Use of Complementary and Alternative Medicine among American Women.” *Women’s Health Issues* 15, no. 1 (January 2005): 5–13. https://doi.org/10.1016/j.whi.2004.08.010.
20. “Dexter - 2012 - Iowa Satisfaction with Anesthesia Scale.Pdf.” Accessed August 24, 2020. https://www.franklindexter.net/PDF%20Files/IowaSatisfactionAnesthesiaScale.pdf.
21. Dexter, Franklin. “Iowa Satisfaction with Anesthesia Scale.” *Korean Journal of Anesthesiology* 62, no. 3 (2012): 297. https://doi.org/10.4097/kjae.2012.62.3.297.
22. Dexter, Franklin, John Aker, and Will A. Wright. “Development of a Measure of Patient Satisfaction with Monitored Anesthesia Care: The Iowa Satisfaction with Anesthesia Scale.” *Anesthesiology* 87, no. 4 (October 1997): 865–73. https://doi.org/10.1097/00000542-199710000-00021.