

ESSENTIAL OIL EDUCATION FOR HEALTHCARE PROVIDERS

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ABSTRACT

Patient use of complementary and alternative medicine (CAM) has been increasing in the United States for a variety of reasons. Many patients perceive CAM as easier to understand, natural, and safer than conventional medicine. Increased exposure to other cultures and Internet access have made information regarding CAM more easily obtainable (Sissi & Benzie, 2011; Ventola, 2010). The use of essential oils is one CAM modality that continues to increase in popularity.

Despite popular use, formal education and training on the use of CAM, and specifically essential oils, are not typically a large component of the curriculum in nursing or medical schools in the United States. Many providers are not knowledgeable and do not feel comfortable discussing the topic with their patients (Jones, & Cook, 2012; Yildirim, Parlar, Eyigor, Serto, Eyigor, Fadiloglu, & Uyar, 2012; Zhang, Peck, Spalding, 2012).

Based on the need for enhanced knowledge of CAM modalities and the use of essential oils, a continuing education module was developed and implemented in collaboration with the American Association of Nurse Practitioners Continuing Education (AANP CE) center. The module included information on five commonly used essential oils, indications for use in patient populations, and safety and contraindications for use.

Pretest, posttest, and response questions were used to evaluate the effectiveness of the educational module. Data were collected over a three month period with a total of 231 participants completing both the module and required pretest, posttest, and evaluation questions. An increase in correct responses in the posttest when compared to the pretest, helped demonstrate learning occurred as a result of the module. Upon completion of the module, the majority of the participants reported they felt more comfortable discussing CAM/essential oils

with their patients. The majority of participants also reported as a result of the continuing education module they intend to ask their patients about their use of CAM. The overall results of the continuing education module demonstrated a positive impact on participants and increased knowledge of essential oil indications, safety, and contraindications, as evidenced by the posttest and evaluation results.

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DEDICATION

I dedicate this dissertation to my husband and children. Thank you Mark for your patience, understanding, and forgiveness during stressful times. I am blessed to have you as my husband and the father of our children. Thank you Myles, Ava, Valerie, and Elliot for letting your mom pursue a career.

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CHAPTER ONE. INTRODUCTION

Background

Complementary and alternative medicine (CAM) have been used by people for thousands of years. Most popular modalities include natural products, deep breathing, yoga, massage, and chiropractic care. Although the popularity of CAM decreased in the 20th century due to increased emphasis on evidence-based medicine, the National Center for Complementary and Alternative Medicine (NCCAM) released new data in 2008 demonstrating that consumer use of CAM is once again on the rise (National Center for Complementary and Alternative Medicine [NCCAM], 2014).

Providing comprehensive, holistic, and individualized care is a common goal of many healthcare professionals nationwide. The Internet, social media, and television commercials are frequent sources of advertisement for both traditional and alternative treatment options. Increased consumer awareness of alternative treatment options may prompt patients inquire about such therapies when seeing their providers. Growing popularity of complementary and alternative treatment use among patients has led to a demand for providers to consider more of an integrative approach to medicine and increase their knowledge and counseling skills for patients who choose to use complementary and alternative medicine.

Despite popular use, formal education and training on the use of CAM are not typically a large portion of the curriculum in nursing or medical schools in the United States. A large study of both medical students and nursing students demonstrated that both groups had very little knowledge on complementary and alternative treatment modalities (Yildirim et al., 2012). Additional research has demonstrated that CAM modalities used most frequently by patients are not those that are most familiar to providers. In addition, as many as 45% of patients report not

discussing their use of complementary and alternative treatments with their providers (Zhang, Peck, Spalding, Jones, & Cook, 2012). In an effort to improve patient communication, providers need to seek additional training and become familiar with CAM modalities most frequently utilized by their patient populations.

In December 2008, new findings on the use of CAM were released by the NCCAM and the National Center for Health Statistics (part of the Centers for Disease Control and Prevention). Approximately 40% of adults reported using some type of complementary medicine in their healthcare regimens. Non-vitamin natural products, deep breathing, chiropractic and osteopathic interventions, and massage were among the most frequently used complementary and alternative treatments (NCCAM, 2014). One area of complementary medicine with minimal exploration by the NCCAM is herbal medicine specific to the use of essential oils. Although essential oils would likely be considered part of non-vitamin natural products and research, additional data specific to patient use of essential oils needs to be collected.

Because there are not current guidelines available to assist providers in deciding when the incorporation of essential oils into a healthcare regimen may or may not be appropriate, some providers may choose to avoid having conversations with their patients regarding the use of essential oils. This may decrease communication among patients and providers and negatively impact quality of care. The purpose of this dissertation project is to describe the current use of common essential oils and to deliver an introduction for providers on the indications for the use of essential oils, routes of administration, safety considerations, and important patient teaching points.

Significance

Because the use of essential oils has grown in popularity, most people know someone who utilizes essential oils and encourages his/her friends and family to do the same. As many as 23% of Internet users have admitted to using social media sites such as blogs, facebook, twitter, and CaringBridge to follow other people's healthcare experiences (National Public Radio, 2013). Advertisements on the Internet and other social media settings from companies such as doTERRA™ and Young Living™, urge consumers to use essential oils to enhance wellness and improve health. In 2011, the essential oil fragrance and flavor global market was estimated at \$24 billion, growing annually at a rate of 10%. The United States is the largest importer and consumer of essential oils, utilizing 40% of the total production (Govindasamy, Arumugam, & Simon, 2013). A study commissioned by doTERRA and conducted by a third party found that 48% of the population has used essential oils and that the most common method of learning to use these products comes from the recommendations of friends (doTERRA, 2013). This data may be alarming to some healthcare providers, considering that a large number of patients use essential oils and their management is primarily governed by friends and distributors, many without backgrounds in healthcare or formal training.

Patient use of complementary and alternative medicines continues to increase for a variety of reasons. Many patients perceive CAM as easier to understand and safer than conventional medicine. Increased exposure to other cultures that traditionally use CAM, as well as unlimited access to the Internet, have made information regarding CAM more easily obtainable. Many individuals are beginning to recognize that multiple factors contribute to overall health and well-being. Others use CAM due to distrust or frustration with current healthcare systems (Ventola, 2010). Herbal medicine specifically, is most often used for health

promotion or for chronic disease management. Literature demonstrates that use of alternative remedies increase when conventional medicine is not effective for treatment. Other reasons include affordability, desire to avoid synthetic medicines, and increased satisfaction with personalized healthcare (Sissi & Benzie, 2011).

Many perceive traditional medicine as natural and, therefore, safe. This is not necessarily true however. There is always potential for unintended misuse and overdose. Toxicity and drug reactions may occur especially when taken in combination with prescription drugs, over the counter medications, or other herbs (Sissi & Benzie, 2011). For this reason, it is important that providers have a basic understanding of essential oils in order provide safety and guidance for patients who choose to incorporate oils into their healthcare regimen.

History of Essential Oils

Although the use of essential oil has increased in popularity in the last few years, people have used plant compounds for thousands of years throughout history. Early Chinese and Egyptian writing documentation as early as 3,000 B.C. describes the use of plants for medicinal purposes. Africans and Native Americans have also used herbs for healing rituals (University of Maryland Medical Center, 2014). Ethnobotany has played an important role in pharmacological research. Nearly 200 years ago, morphine was developed as the first pharmacologically active pure compound produced from extracted opium from the seed of *Papaver somniferum*. Medical products from plant derivatives continued with the development of penicillin by extracting from the fungus Penicillin in the 1900s (Sissi & Benzie, 2011).

Plants synthesize both fixed oils and essential oils. Fixed oils are made of esters of glycerol and fatty acids and are typically used as base oils or “carriers” for diluting essential oils. Essential oils consist of volatile, organic compounds that originate from a single botanical source

and add to the flavor and fragrance of the plant. The word “essential” refers to the intrinsic nature of the plant and “oil” refers to the liquid that is not water soluble (Tisserand & Young, 2014).

There are several different forms of aromatic extracting, but most essential oils are either distilled or cold-pressed. Distillation involves a heating and cooling processes using water and/or steam to remove volatile constituents from the plant. Cold-pressing, also referred to as expression, is a process specific to citric essential oils such as lemon, lime, tangerine, and grapefruit. This process involves puncturing the peel with a special device to extract the essential oil. There is a possibility that variations in concentration of essential oils exist from the same species. This may be caused by environmental factors such as growing conditions, differences in harvesting and distilling techniques, and/or genetics (Tisserand & Young, 2014). For example, one study compared oil composition of *Lavandula angustifolia* in Greece in two different experimental sites. Oil harvested on location was found to contain larger amounts of linalyl acetate and linalool when compared to oils harvested from the second experimental site. The results of the study concluded that well drainage light substrates and midday harvesting are more suitable for lavender harvesting (Hassiotis, Lazari, & Vlachonasios, 2010). Variations of key constituents may impact the quality of the oil and result in increased or decreased therapeutic effects.

Regulation of Product

Regulation of essential oils or dietary supplements in the United States is not the same as those for prescription or over the counter drugs and, in general, is less stringent. Manufacturers do not have to prove to the Food and Drug Administration (FDA) that claims made about the products are valid (NCCAM, 2014). Product regulations of essential oils focus primarily on

labeling for intended use. Essential oils are difficult to label due to the fact that some oils may be identified for several different purposes including food, drug, cosmetic, and household product depending on the intent for use. The FDA does not certify the quality of essential oils; rather, the FDA determines the product's intended use based on claims made from the labels, on websites, in advertising, and even consumer expectations (Food and Drug Administration [FDA], 2014).

Cultural Considerations

Approximately 38% of adults and 12% of children use CAM in the United States. The use of CAM has been observed in people with many different backgrounds, but is most popular in women with advanced levels of education and higher incomes. Among different cultures and ethnic groups, the use of CAM is most popular among Native Americans and least popular among African-Americans and Hispanic-Americans (Ventola, 2010).

Patients in the 21st century have endless access to medical information via the Internet and social media. The Pew Research Center's Internet & American Life Project is a non-partisan research center that examines the evolution of the use of the Internet in America. According to a survey conducted by the Pew Research Center, up to one third of the population has used the Internet to diagnose their own medical conditions or the medical conditions of someone else. Of the "online diagnosers," 46% sought medical attention from a healthcare provider, while 38% decided the illness or ailment was something they could treat at home. The remaining 11% said both or somewhere in between (Fox & Duggen, 2013). A similar study published in the Journal of the American Board of Family Medicine found that 74% of family medicine patients with Internet access utilized the internet for medical information for themselves or family members (Schwartz et al., 2006).

Unlimited access to information may tempt patients to not only self-diagnose, but also to attempt to treat their own illnesses. Although some of the information patients have access to on the Internet may be helpful, other information may be misleading, as well as unreliable, and may result in patients not seeking needed medical advice from a healthcare professional. Even though FDA regulation requires that alternative treatments such as supplements, herbs, and essential oils, not be labeled for treatment of medical conditions, it may be difficult for the average consumer to differentiate the labeled use from the “intended use.” For example, essential oil companies are required to disclose that oils are not intended to “diagnose, prescribe, or treat any disease, illness, or injured condition of the body,” then proceed to suggest that eucalyptus is “often used to support the respiratory system and sooth muscles after exercising” (Young Living, 2014, par. 1). Healthcare providers need to be knowledgeable and informative when assisting their patients in determining when/if essential oils may be effective in their current regimens.

Objectives and Project Description

The purpose of the practice improvement project was in increase nurse practitioners’ knowledge of essential oils as a CAM modality, and to enhance the delivery of holistic, individualized care. The purpose of the project was met by the achievement of the following objectives: 1) Recognize factors contributing to patient desire to incorporate CAM/essential oils into their healthcare regimes, 2) Identify commonly used essential oils and their indications for use in patient populations, 3) State safety concerns and possible adverse effects of commonly used essential oils, 4) Report enhanced comfort in practice when discussing the use of essential oils with patient populations.

An hour-long continuing education module was created and implemented in collaboration with the American Association of Nurse Practitioners Continuing Education (AANP CE) center

and was made available online for viewers. The target population included all nurse practitioners interested in expanding their knowledge of CAM modalities and the use of essential oils. The module was created to educate nurse practitioners on five commonly used essential oils, their indication for use in patient populations, as well as safety considerations regarding their use.

By increasing nurse practitioners' knowledge of CAM and the use of essential oils, nurse practitioners are better able to provide education and counsel patients who wish to incorporate such modalities into their healthcare regimens. Additionally, enhanced awareness of essential oils may increase discussions related to CAM and help facilitate better communication among patients and providers.

CHAPTER TWO. LITERATURE REVIEW

Introduction

A review of the literature was performed in order to identify existing research on commonly used essential oils and their effects on patient populations. Informal feedback from a social media poll of avid essential oil users demonstrated lavender, peppermint, lemon, eucalyptus, and melaleuca to be among the most commonly used single oils. These oils were also consistent with the National Association for Holistic Aromatherapy's list of most commonly used essential oils (National Association for Holistic Aromatherapy [NAHA], 2014). In reviewing the literature, those oils were also found to have the most scientific data available in comparison to other essential oils. Specific studies were reviewed to identify the usefulness of lavender, peppermint, lemon, eucalyptus, and melaleuca essential oils, as well as adverse or undesirable effects of these oils.

Essential Oils

Lavender Oil

The *Lavandula* family consists of many different species of lavender plants. Lavender essential oil is most often extracted from the species *Lavandula angustifolia*, more commonly known as English lavender or true lavender. *Lavandula angustifolia* is native to parts of Spain, France, and Italy, but is also cultivated in Europe and parts of the U.S. (International Union for Conservation of Nature [IUCN], 2013; National Resource Conservation Service [NRCS], 2014). Essential oils are extracted from the flowers of the plant through the distillation process. One acre of *Lavandula angustifolia* is estimated to produce approximately two gallons of essential oil (Adam, 2006). Primary constituents of lavender oil include Linalyl acetate and linalool (Tisserand & Young, 2014).

Lavender is considered to be one of the most versatile oils and may be used by consumers for hair loss, anxiety, pain, dementia, colic, depression, headaches, wound healing, migraines, lice, insomnia, and a variety of other ailments (National Library of Medicine, 2014). In the literature, lavender has been examined most frequently for its calming affects and ability to enhance sleep. Essential oil routes of administration among the literature included oral, topical, and inhaled. When taken orally every day in an inpatient setting, one study demonstrated that lavender was just as effective as lorazepam in treatment of anxiety (Appleton, 2012). When inhaled, multiple studies in both inpatient and outpatient settings reported participants experienced decreased anxiety and/or improvement in ability to sleep (Kutlu, Yilmaz, & Çeçen, 2008; Lytle, Mwatha, & Davis, 2014; McCaffrey, Thomas, & Kinzelman, 2009; Najafi, Tagharrobi, & Shahriyari-Kale-Masihi, 2014; Nord, & Belew, 2009). Additional literature demonstrated that lavender may be beneficial for topical use in treatment of minor burns, skin trauma, and episiotomy care (Jones, 2009; Koulivand, Ghadiri, & Gorji, 2013; Opperl-Sutter, 2011).

When used topically undiluted, lavender may cause adverse skin reactions. Most frequently, patients experienced acute eczema or contact dermatitis as a result of topical use (Posadzki, Alotaibi, & Ernst, 2012). Lavender has also demonstrated to have sedative effects on mice and should be used in caution with patients taking narcotics and sedatives (Tisserand & Young, 2014). In one case, an 18 month old child ingested a small amount of homemade lavandin extract and developed confusion and central nervous system depression three hours after ingestions (Landelle, Francony, Sam-Lai, Gaillard, Vincent, Wroblewski, & Danel, 2008). Although there are no known interactions between conventional medications and lavender

currently, because lavender is known to promote relaxation, lavender oil may further enhance effects of central nervous system depressants (Tisserand & Young, 2014).

Peppermint Oil

The botanical name for peppermint is *Mentha piperita*. The herb peppermint is a cross between two types of mint; water mint (*Mentha aquatica*) and spearmint (*Mentha spicata*) (NRCS, 2014). Peppermint is indigenous to Europe and the Middle East, but is now also grown throughout the United States (NCCAM, 2014). Oil is extracted from the peppermint leaves and stem via the distillation process. Primary constituents of peppermint oil include menthol, menthone, menthyl acetate, and neomenthol (Tisserand & Young, 2014).

Peppermint oil is used topically, orally, and by inhalation and has been most often studied in relationship to the oil's effect on the gastrointestinal system. Peppermint oil inhaled or taken orally has demonstrated some effectiveness in treatment of nausea and vomiting (Hines, Steels, Chang, & Gibbons, 2012; Lua & Zakaria, 2012). Further studies suggest that peppermint may be effective as an antispasmodic agent for upper and lower gastrointestinal diagnostic procedures, treatment of irritable bowel syndrome, and symptomatic treatment of dyspepsia and Crohn's disease (Khvorova & Neill, 2008; Kligler & Chaudhary, 2007; Saunjoo, Grundmann, Koepf, & Farrell, 2011; Smith, 2011).

The primary pharmacodynamic effect of peppermint oil on the gastrointestinal tract is related to the ability of menthol to interfere with the movement of calcium across the membrane resulting in relaxation of GI smooth muscle (Grigoleit & Grigoleit, 2005). Because of this, peppermint oil may exacerbate symptoms in patients with gastroesophageal reflux disease or hiatal hernias. Laboratory studies have identified that peppermint oil at high enough doses may inhibit cytochrome P450 1A2 and CYP3A4 activity. These enzymes are responsible for the

breakdown of various molecules and chemical and inhibition may increase availability of certain drugs including felodipine, amitriptyline, cyclosporine, and haloperidol (Kligler & Chaudhary, 2007; Tisserand & Young, 2014).

Because peppermint oil contains pulegone, peppermint oil may cause hepatotoxicity and neurotoxicity and can even be fatal. There is one documented case of a near fatal incident when a woman ingested a toxic dose of peppermint that required mechanical ventilation and treatment with inotropes (Nath, Pandey, & Roy 2012). Menthol may inhibit platelet aggregation and interfere with calcium influx into the myocardial cells and should be avoided in patients with atrial fibrillation and G6PD deficiency (Tisserand & Young, 2014).

Eucalyptus Oil

There are many different species of Eucalyptus ranging from shrubs to trees.

Eucalyptus globulus and *eucalyptus radiata* are two of the more popular species used for medicinal oils. Bluegum eucalyptus (*Eucalyptus globulus*) is also known as the Tasmanian bluegum and is one of the most largely planted eucalyptus in the world. Eucalyptus is native to Australia, but has been introduced into California, Spain, Portugal, Chile, and many other locations (Skolmen & Ledig, n.d.). *Eucalyptus radiata* is grown in Australia and is more commonly known as grey peppermint or narrow leaf peppermint (Global Biodiversity Information Facility, 2014). Essential oil is extracted from the leaves of the plant through the distillation process and the primary pharmaceutical constituent is cineole (also known as eucalyptol) (Tisserand & Young, 2014).

Eucalyptus is taken orally, inhaled, and applied topically. Although scientific evidence is limited to support eucalyptus oil use, the intended use of eucalyptus is for relief of nasal congestion and cough. Eucalyptus oil may also be used by consumers to treat conditions

associated with inflammation and may also be used for antimicrobial purposes (University of Maryland Medical Center, 2014). The active ingredient cineole has been shown to decrease pulmonary inflammation when inhaled by rats and guinea pigs (Bastos et al., 2011; Zhao, Sun, Fang, & Tang, 2014). Two different studies were identified in human subjects. In a study by Worth and Dethlefsen (2014), patients with asthma who took capsules of cineole three times per day showed improvement in pulmonary function. When inhaled, cineole decreased cough frequency in patients with acute bronchitis (Fischer & Dethlefsen, 2013).

Along with cineole, aromadendrene is another active constituent of eucalyptus globulus oil and is thought to have antimicrobial properties. Eucalyptus oil has demonstrated some efficacy in treatment of MRSA, gram positive bacteria, and fungi treated on isolated stains as well as in infected mice. (Laird & Phillips, 2012; Mayaud, Carricajo, Zhiri, & Aubert, 2008; Mulyaningsih, Sporer, Reichling, & Wink, 2011). An additional study demonstrated efficacy in treatment of gram negative E. coli as well (Bechir & Benali, 2012). No studies were identified in the literature that explored eucalyptus for treatment of infections in human subjects.

Eucalyptus is classified as a poison in Australia's national classification system and overdose may result in CNS depression, loss of consciousness, and respiratory failure in doses as low as 5ml. Some manufacturers do not recommend taking the product orally, however others still do (Tisserand & Young, 2014). One woman who took eucalyptus oil orally developed eucalyptus poisoning that resulted in generalized tonic clonic seizures (Eucalyptus, 2013). In another documented case analysis, a four year old child developed vomiting, lethargy, and ataxia following a grand mal seizure after dermal exposure to Eucalyptus for treatment of head lice (Waldman, 2011). Dermatitis may also occur if applied undiluted to skin (Tisserand & Young, 2014).

Lemon Oil

Lemon trees are grown all over the world including Spain, Iran, Argentina, and the United States (Crane, 2013). The botanical name for lemon is *Citrus x limon L.* and the main constituents include limonene and B-Pinene. Limonene may be either distilled or expressed from the fruit peel. Distilled lemon oil is more often used in flavoring, rather than fragrances, and is considered to have an inferior odor to expressed lemon oil (Tisserand & Young, 2014).

Lemon essential oil is used topically, orally, and for inhalation. Consumers use lemon essential oil for the believed antioxidant and anticancer effects. Limonene protects against high nitric oxide levels and induces cytochrome p450 which is responsible for metabolizing carcinogens to less toxic forms and preventing interaction of carcinogens with DNA (Sun, 2007; Tisserand & Young, 2014). Citrus limon is thought to affect the central nervous system and has shown some efficacy in protection from oxidative stress in the brains of rats. When taken orally by mice, studies demonstrated hepatoprotective activity, increase antioxidant effects on free radicals, and decrease in inflammatory pain (Bairagi, Kabra, & Mandade, 2011; Bhavsar, Joshi, Shah, & Santani, 2007; Campêlo et al., 2011).

Lemon oil is relatively safe and considered to have low toxicity. Nausea, vomiting, and diarrhea have been reported as dose related side effects when taken orally (Sun, 2007). Both expressed and distilled lemon oil have shown to be moderately irritating when applied undiluted. Expressed lemon oil has a risk of phototoxicity. Skin should not be exposed to sunlight for 12 hours after topical application (Tisserand & Young 2014).

Melaleuca Oil

Melaleuca oil is commonly known as tea tree oil and is of the botanical name *Melaleuca alternifolia*. Tea tree plants are native to Australia and essential oil is collected from the leaves

via the distillation process. Key constituents of melaleuca oil include terpinen-4-ol and cineole (Tisserand & Young, 2014).

Melaleuca oil is most often used topically by consumers for treatment of bacterial and fungal conditions of the skin. Such conditions include thrush, athlete's foot, fungal infections of the nail, cold sores, acne, lesions, and skin infections (Foster, 2014). Terpinen-4-ol demonstrates strong anti-inflammatory and broad-spectrum antimicrobial properties against bacterial, viral, fungal, and protozoal infections of the skin and mucosa. Terpinen is thought to decrease the production of tumor necrosis factor, several different types of interleukin, as well as prostaglandin (Pazyar, Yaghoobi, Bagherani, & Kazerouni, 2013).

Tea tree oil has been shown to rapidly eradicate *S. aureus* on biofilms in the laboratory setting (Kwieciński, Eick, & Wójcik, 2009). A review of literature by Pazyar et al. (2013) demonstrated efficacy of tea tree oil in treatment of acne, seborrheic dermatitis, gingivitis, MRSA, and accelerated wound healing. Tea tree oil has been shown to reduce allergic contact dermatitis and histamine induced skin inflammation (Koh, Pearce, Marshman, Finlay-Jones, & Hart, 2002; Wallengran, 2011).

Additional literature was not as convincing to support the use of melaleuca oil. One study compared the efficacy of tea tree oil body wash versus Johnson and Johnson body wash in decreasing the colonization of MRSA in critically ill patients and found no significant difference (Blackwood et al., 2013). Another small study demonstrated tea tree oil had no effect in accelerated treatment of patients with abscessed wounds or cellulitis (Chin & Cordell, 2013). A literature review by Flaxman and Griffiths (2005) concluded that although in vitro testing support the efficacy of melaleuca in eradicating MRSA, no clear evidence exists demonstrating its

effectiveness in clinical practice. After reviewing the literature, further research is needed to determine the efficacy of tea tree oil as use of an antimicrobial.

Acute toxicity may occur with use of melaleuca oil when used to treat skin conditions with inappropriate high doses. Weakness, drowsiness, incoordination, and muscle tremors have been noted in both humans and animals when treated with inappropriate doses. There are many documented cases in which melaleuca oil has caused contact dermatitis (Posadzki, Alotaibi, & Ernst, 2012). Melaleuca oil should be diluted when applied topically. There is no known safe and effective concentration of melaleuca, and therefore, melaleuca oil should not be taken orally (Tisserand & Young, 2014).

Theoretical Framework

The theory of andragogy was utilized to guide the development and implementation of the continuing education module to increase provider knowledge of CAM and commonly used essential oils. Malcolm Shepard Knowles was a leading figure for adult education in the United States in the twentieth century. He was the first to attempt a comprehensive theory of how adults learn. Androgogy is described as both an art and a science, and is the term utilized to refer to any type of adult learning. Knowles identified that children and adults learn very differently. He recognized that in order for learning to occur, learning activities needed to be conducive to the needs of adult learners (Smith, 2002). The theory of andragogy is an appropriate theoretic framework to guide the creation of continuing education modules as online learning methods are geared towards adult learners.

In order for the continuing education module to be effective, learning strategies need to be tailored towards the methods that are most effective for the adult learner. The adult learner typically has several different roles and responsibilities, aside from being a student. Many have

jobs, spouses, children, and community obligations. Distance education and online courses are becoming an increasingly popular and effective method for adult learners to enhance their knowledge and obtain degrees. Online courses have helped meet the demands of the adult learner in providing a flexible schedule to accommodate the multiple roles of the learner (Ross-Gordon, 2011).

The ability of healthcare professionals to obtain continuing education credits online through learning modules is an effective method to meet the needs of adult learners. The continuing education module for the dissertation project was made available online for participation by any nurse practitioner in the United States at his or her own personal leisure. Different teaching styles were incorporated in the continuing education module to meet the diverse needs of the participants. Methods included text, audio, images, a video interview, and case studies for application of learned content.

Knowles' theory of andragogy has five basic principles or assumptions that were applied to facilitate the creation of the continuing education module. The first assumption is that adults are self-directed, independent learners. Adults need to be actively engaged in the learning process and able to participate independently as their schedule permits (Smith, 2002). The online learning module was available for participants to choose to complete at their own discretion. Numerous learning styles including auditory, visual, and case study applications were utilized throughout the module to engage all types of adult learners. Additionally, participants were able to evaluate the module and offer feedback and recommendations as to how to improve the learning activity.

The second assumption is that adults have personal experiences that serve as a resource when learning (Smith, 2002). Participants of the learning module were all nurse practitioners

with their own professional experiences serving as a foundation for learning. Throughout the learning module, participants were able to apply new information to past experiences, thus meeting the need for experiential learning as an adult learner. The third assumption of andragogy is that adult learners are goal oriented and wish to enhance knowledge associated with their social role (Smith, 2002). The learning module was available online through the AANP continuing education center and was made available with many other continuing education topics. Participants were able to freely choose the topics most applicable to their current role or personal interests. In addition, objectives were clearly stated at the beginning of the learning module to meet the needs of adults as goal oriented learners.

The fourth assumption is that adult learning is problem centered and that adults want to be able to apply new information immediately (Smith, 2002). The online learning module provided information on CAM/essential oils that participants were able take back to clinical practice and apply to their current patient population. In addition, participants were able to “practice” application of knowledge through case studies towards the end of the learning module. The final assumption of andragogy is that adults’ motivation to learn is internal (Smith, 2002). By participating in the online learning module, it is intended that providers will have increased comfort regarding CAM/essential oils. Enhanced knowledge on the subject matter may contribute to personal satisfaction and enhanced self-esteem when counseling patients on CAM/essential oil use. References were also made available for participants seeking additional information on CAM/essential oils.

Conclusion

In summary, key constituents of lavender, peppermint, lemon, melaleuca, and eucalyptus have demonstrated some effectiveness in treatment of a variety of ailments. In addition to the

usefulness of essential oils, there is also a possibility for significant side effects and drug interactions. A large amount of literature supporting the effectiveness of essential oils and their key constituents was conducted on animals in laboratory settings. Further research is necessary on human subjects to demonstrate their effectiveness and identify additional safety considerations. Enhanced knowledge on the effectiveness of essential and limitations of available literature, can improve communication among patients and providers and create dialect regarding CAM/essential oil use and improve patient outcomes.

CHAPTER THREE. PROJECT DESCRIPTION

Project Implementation

Project Description

The continuing education module was intended for voluntary participation by any nurse practitioner in any area of practice wishing to expand his or her knowledge on CAM modalities and the use of essential oils. The educational module consisted of a power point presentation with voice over and written text. The educational module included information on the use of CAM in the United States and identified reasons why a growing number of patients are choosing to incorporate CAM into their healthcare regimens. Reasons identified included affordability, desire to avoid synthetic medicines, perception of safety, and increased satisfaction with personalized healthcare. The educational module contained literature findings on five commonly used essential oils: lavender, peppermint, lemon, melaleuca, and eucalyptus. Key constituents of each oil were identified and indications for use and safety considerations were included in the findings. Case studies were also included to demonstrate clinical application of content and to elicit critical thinking from participants.

In addition, a ten minute recorded interview with an essential oil consumer and distributor, Leah Christopherson, was incorporated into the module. Information in the lecture and power point presentation included in the continuing education module were obtained through an extensive review of literature. Development of the module was guided by principles of the adult learning theory, in an effort to utilize various learning styles to meet the needs of adult learners.

Project Development

The need for an interview with a consumer and essential oil distributor was identified due to a lack of evidence based literature on consumer use of essential oils. Leah Christopherson started using essential oils approximately two years ago, and shortly after became a distributor for one of the largest essential oil companies in the nation. She is currently a team leader for approximately 90 distributors. Leah expressed interest in the project and agreed to participate in a videotaped interview regarding her experience with essential oils. She discussed how her family uses essential oils and how her team and other consumers share information regarding the use of essential oils. She also provided a video demonstration on how to apply essential oils.

The interview was held on March 13, 2015 in Leah's home. Prior to the interview, Leah gave verbal consent for herself and her minor child to be videotaped. With the assistance of media support staff at North Dakota State University, the video was reviewed and edited to decrease background noise and enhance transitions to discussion topics. The video was then converted to a useable format to be placed within the PowerPoint presentation.

The continuing education module was recorded in the studio at the Information Technology Services at North Dakota State University. The initial recording took place in April, with two additional recordings needed for completion and edits. The PowerPoint presentation and video were then converted and saved to the appropriate file type, per the AANP CE center requirements.

The pretest, posttest, and evaluation were created to measure the effectiveness of the module and its perceived usefulness by participants. The pretest, posttest, and evaluation will be discussed further in the evaluation section. References were also made available as handouts for participants to further explore the literature independently, if desired.

Project Dissemination

The application and continuing education module were submitted to the AANP CE center on June 2, 2015. Revisions were made to one slide due to absence of audio recording. The module was resubmitted and approved on June 5, 2015. The continuing education module was available for online viewing for all members of the AANP on June 15, 2015. All participation was voluntary and one free CE hour was granted to participants who completed the module and pretest/posttest and evaluation. Non-members were also able to participate and receive free CE credit by providing contact information and creating an account through the AANP.

Self-learning modules are an effective learning tool used by many healthcare providers to achieve needed continuing education hours and maintain competency with current evidence-based practice guidelines. E-learning courses have demonstrated a positive impact on learners and have been proven to aid participants in obtaining adequate knowledge of course content (Dalhem & Saleh, 2014). The use of such education methods is on the rise. Data collected in an analysis predicts that 50% of all continuing medical information (CME) in the next 7-10 years will be obtained via online learning modules. More than 70% of online CMEs are available for less than \$10.00, making this an affordable, convenient option for many providers (Harris, Sklar, Amend, & Novalis-Marine, 2010).

Institutional Review Board Approval

Participation in the practice improvement project did not involve direct contact and therefore provided minimal risk to the participant. No identifying data was collected via the pretest, posttest, or evaluation, and participant information was kept confidential by the AANP CE center. Results and data were provided by the AANP CE center in comprehensive percentages only. The module was created in accordance with the AANP CE policies and

standards. The project was certified as exempt by the North Dakota State University Institutional Review Board on May 6, 2015 (Appendix B).

Data Collection

Prior to participation in the module, participants were asked to complete the pretest to evaluate their existing knowledge of the course content. Upon successful completion of the module, participants were then asked to complete the posttest and evaluation. The pretest and posttest consisted of seven multiple choice questions to assess the participants' knowledge of patients' desire for the use of CAM, essential oil indications for use, and safety considerations. The evaluation section contained demographic questions and questions related to overall effectiveness and satisfaction with the continuing education module.

The AANP CE Center collected the data from the pretest, posttest, and evaluation and provided results on a monthly basis. Data was received at the end of each month for the months of July, August, and September. Only participants that successfully completed all required components of the pretest, posttest, and evaluation were included in the data collection and analysis.

CHAPTER FOUR. EVALUATION

Evaluation Methods

Pretest and posttest questions were created based upon learning objectives of the continuing education module (Appendix C and D). Demographic data were collected prior to the pretest. Participants were asked to share their area of practice and the number of years providing care as nurse practitioners. Demographic data were collected related to the number of patients participants see in their practice who utilize essential oils or CAM. Responses included: a) I have no idea, b) hardly any, less than 10%, c) a few, 10-30%, d) about half, 50%, e) the majority >50%, or f) all of them. Participants were asked “How familiar are you with the use of CAM/essential oils?” Utilizing a likert scale, response options included 1- Not at all familiar, 2- slightly familiar, 3- somewhat familiar, 4- moderately familiar, or 5- extremely familiar. Finally, participants were asked “How often do you address the use of CAM/essential oils with your patients?” Response options were 1- never, 2- rarely, 3- sometimes, 4-often, or 5-always.

The pretest consisted of seven questions used to evaluate the participant’s knowledge of essential oils prior to starting the education module. Following completion of the module, a posttest using the same seven questions was again completed by the participant. Pretest and posttest results were then compared to determine the effectiveness of the continuing education module intervention. In addition, participants were required to complete an evaluation form and provide feedback on the usefulness and effectiveness of the learning module. The AANP CE center collected the data and provided a monthly comprehensive report for the months of July, August, and September.

The first learning objective was to recognize factors contributing to patient desire to incorporate CAM/essential oils into their healthcare regimens. An estimated 5 minutes of lecture

time was spent discussing a variety of reasons why patients choose to utilize CAM. In addition, Leah Christopherson discusses her and her family's personal reasons for utilizing essential oils in the video interview and demonstration. Two pretest and posttest questions were used to evaluate the first objective. The first question was as follows: "All of the following are reasons patients choose to use CAM EXCEPT." Responses included a) affordability, b) desire to avoid synthetic medicines, c) increased satisfaction with personalized healthcare, or d) CAM products are natural and therefore safer than traditional medicine. The second question was a true or false question. "The use of CAM increases when conventional medical treatment is effective," a) true, or b) false.

The second learning objective was to identify commonly used essential oils and their indications for use in patient populations. Approximately 15 minutes of lecture was spent discussing five essential oils and how/why patients use the oils. A review of literature was also discussed within the time period. Leah Christopherson discussed in the video interview and demonstration how she and her family use essential oils on a daily basis. Evaluation of the second objective was completed through two pretest and posttest questions. The first question was as follows: "Melaleuca oil is most often used by consumers for treatment of all of the following EXCEPT." Multiple choice responses included a) athlete's foot, b) skin infections, c) cold sores, or d) 2nd degree burns. The second evaluation question was, "Peppermint oil may be effective in treatment in all of the following except." Multiple choice response options included a) nausea, b) vomiting, c) GERD, or d) IBS.

The third learning objective was to state safety concerns and possible adverse effects of commonly used essential oils. Approximately 20 minutes of the lecture was used to discuss adverse effects and safety concerns of essential oils. Literature findings were reviewed in the

same time period. Leah Christopherson discusses the topic briefly in the video interview and demonstration, and learned information was also applied in case study examples. The third objective was evaluated with three pretest and posttest questions. The first question was as follows: “Which key constituent of an essential oil may inhibit platelet aggregation and interfere with calcium influx into the myocardial cells and should be avoided in patient with cardiac fibrillation and G6PD deficiency.” Multiple choice responses included a) linalool in lavender essential oil, b) menthol in peppermint essential oil, c) cineole in eucalyptus essential oil, or d) citrus in limon in lemon essential oil. The second question was a true or false question. “Essential oils should be undiluted when applied topically to enhance therapeutic effects,” a) true, or b) false. The third question was: “Which essential oil has risk for phototoxicity when used topically.” Multiple choice responses included a) lemon essential oil, b) peppermint essential oil, c) melaleuca essential oil, or d) lavender essential oil.

The fourth objective was to report enhanced comfort in practice when discussing CAM and the use of essential oils with patients. As a result of the entire 45 minute presentation including video interview/demonstration and case study examples, the goal was that the participant will have increased knowledge and comfort discussing essential oils and apply learned information to patient populations. The final objective was measured utilizing a likert scale in the evaluation section following the posttest. The statement was as follows; “As a result of the module, I feel more comfortable discussing the use of essential oils with my patients.” Participants were asked to rate their level of agreement by choosing one of the following responses: 1- strongly disagree, 2- disagree, 3-neither agree nor disagree, 4-agree, or 5-strongly agree.

Additional evaluation questions were included at the end of the posttest and were utilized to broadly assess the effectiveness of the learning module and the objectives. Following completion of the continuing education module, participants were asked to use a likert scale to rate their level of agreement with the following statement: “I plan to ask my patients about CAM/Essential oil use after completing this module.” Possible responses included 1- strongly disagree, 2- disagree, 3- neither agree not disagree, 4- agree, or 5- strongly agree. Finally, participants were asked about changing their practice as a result of the educational module. Response options included: a) I will modify my practice, b) I will seek more information before modifying my practice, or c) I see no need to modify my practice.

CHAPTER FIVE. RESULTS

Presentation of Findings

Data reports from the continuing education module were received in aggregate form monthly from the AANP CE center for the months of June, July, and August. A total of 231 participants received continuing education certificates for completion of the educational module, pretest, posttest, and evaluation questions. The completion rate for the project was approximately 54.2% as 426 participants started the module, but did not complete all required components in order to receive a certificate of continuing education. Findings of the project include data only from the 231 participants who completed the educational module, pretest, posttest, and evaluation questions.

The majority of participants were female, with males consisting of only 6.9% of the total participants. Over half of the participants have practiced as nurse practitioners for more than 10 years. Family practice nurse practitioners had the largest participation rate with approximately 62.5% of participants working in family practice.

Table 1

Participant Demographics

Demographics	(%)	(n)
Gender		
Male	6.9	16
Female	93.1	215
Years of Practice		
<5 Years of Practice	15.6	36
5-10 Years of Practice	27.3	63
10-20 Years of Practice	28.6	66
>20 Years of Practice	28.6	66
Area of Practice		
Family	125	62.5
Adult	31	13.36
Women's Health	8	3.5
Acute Care	8	3.5
Internal Medicine	8	3.5
Other	32	13.8

Most of participants reported that they rarely or never ask patients about their use of CAM/essential oils in clinical practice. Approximately 38.4% of participants reported that they had no idea how many or what percentage of patients in their practice utilize CAM/essential oils. Nearly 35.7% of participants reported that they are not familiar with the use of CAM/essential oils, while another 42.4% where only slightly familiar.

Table 2

Demographics of Participants' Clinical Practice

Percentage of Participants Who Address the Use of CAM/Essential Oils with Their Patients	(%)	(n)
Never	45.5	105
Rarely	28.6	66
Sometimes	22.1	51
Often	3.9	9
Percentage of Patients that Utilize CAM/Essential Oils in Participants Clinical Practice		
I Have No Idea	38.4	88
<10%	25.3	58
10-30%	28.8	66
50%	6.1	14
>50%	1.31	3
Percentage of Participants Familiar with the Use of CAM/Essential Oils		
Not Familiar	35.7	82
Slightly Familiar	42.2	97
Somewhat Familiar	17.8	41
Moderately Familiar	3.5	8
Extremely Familiar	0.9	2

Participants reported a high level of satisfaction with the educational module. Greater than 66% of participants reported that the module “Very” or “Extremely” enhanced their comfort when discussing CAM/Essential oils use with patients. Sixty-seven percent of participants plan to ask their patients about CAM/essential oils and the majority plans to modify their practice or seek more information about the topic. About 85% of participants reported they felt the module was either “Extremely” or “Very” free of commercial bias.

Table 3

Satisfaction with Educational Module

Degree in Which Participants Reported Enhanced Ability to Discuss CAM/Essential Oil Use with Patients	(%)	(n)
Not At All	0.9	2
Slightly	2.2	5
Moderately	29.4	68
Very	52.8	122
Extremely	14.7	34
Degree Participants Plan to Modify Practice as a Result of the Educational Module		
No Need to Modify Practice	6.1	14
Will Seek More Information on Topic	68.4	158
Will Modify Practice	25.5	59
Degree Participants Plan to Ask Patients About Their Use of CAM/Essential Oils in Clinical Practice as a Result of Education Module		
Strongly Disagree	5.6	13
Disagree	1.3	3
Neither	25.1	58
Agree	52.4	121
Strongly Agree	15.6	36
Degree in Which Participants Feel More Comfortable Discussing CAM/Essential Oil as a Result of the Education Module		
Strongly Disagree	6.5	15
Disagree	1.3	3
Neither	18.2	42
Agree	61.5	124
Strongly Agree	12.6	29

Table 3 *Satisfaction with Educational Module (Continued)*

Degree in Which Participant Feels Content was Free of Commercial Bias		
Slightly	0.9	2
Moderately	14.4	33
Very	34.4	79
Extremely	50.4	116

Objective One

The first objective was to recognize factors contributing to patient desire to incorporate CAM/essential oils into their healthcare regimens. Prior to completing the educational module, approximately 27.7% of participants answered the following question correctly, “All of the following are reasons patients choose to use CAM EXCEPT:” with the correct response being “CAM products are natural and therefore safer than traditional medicine.” Following completion of the module, 60.4% of participants were able to correctly identify factors contributing to patients’ desire to utilize CAM/Essential oils.

Additionally, participants were asked to choose whether the following statement is true or false: “The use of CAM increases when conventional medical treatment is effective.” Prior to completing the educational module, 67.7% of participants provided the correct response of “false.” The number of participants responding correctly after completing the continuing education module increased to 81.8%. Participants were better able to recognize factors contributing to patient desire to incorporate CAM/essential oils into their healthcare regimens as a result of the continuing education module.

Objective Two

The second objective was to identify commonly used essential oils and their indications for use in patient populations. In order to evaluate the second objective, participants were asked, “Melaleuca oil is most often used by consumers for treatment of all of the following EXCEPT.” Prior to completing the continuing education module, 57% of participants provided the correct response of “2nd degree burns.” Following completion of the continuing education module, the number of participants able to correctly answer the question increased to 88.3%.

The second objective was also measured by the question “Peppermint oil may be effective in treatment in all of the following except.” Approximately 33.3% of participants chose the correct response “GERD,” before having completed the educational module. The number of participants who answered this question correctly following completion of the education module more than doubled, with 75.3% choosing the correct response. As a result of the continuing education module, participants were better able to identify commonly used essential oils and their indications for use.

Objective Three

The third objective was to state safety concerns and possible adverse effects of commonly used essential oils. Three questions were utilized to measure the objective. In the first question, participants were asked, “Which key constituent of an essential oil may inhibit platelet aggregation and interfere with calcium influx into the myocardial cells and should be avoided in patient with cardiac fibrillation and G6PD deficiency?” Prior to completing the continuing education module, only 38.8% of participants chose the correct response “Menthol in peppermint essential oil.” After completing the continuing education module, 72.1% of participants were able to identify the correct response.

In the second question, participants were asked to state whether the following statement is true or false: “Essential oils should be undiluted when applied topically to enhance therapeutic effects.” Before completing the education module, 55.6% of participants chose the correct response, “false.” After completing the module, 86.6% of participants were able to identify the correct response. The final question to evaluate the third objective was; “Which essential oil has risk for phototoxicity when used topically?” Prior to completing the continuing education module, 35.2% of participants were able to identify the correct response “Lemon essential oil.” Following completion of the education module, the percentage of participants able to identify the correct response more than doubled to 81.8%. The improvement in the posttest scores demonstrates that participants were able to identify safety concerns and possible adverse effects of commonly used essential oils.

Objective Four

The fourth objective was to report enhanced comfort in your practice when discussing CAM and the use of essential oils with your patients. The final objective was measured utilizing a likert scale in the evaluation section following the posttest. The statement was as follows; “As a result of the module, I feel more comfortable discussing the use of essential oils with my patients.” Participants were asked to rate their level of agreement by choosing one of the following responses: 1- strongly disagree, 2- disagree, 3- neither agree nor disagree, 4- agree, or 5- strongly agree. Approximately 62% of participants agreed with this statement, while an additional 12.6% strongly agreed. The high level of agreement demonstrated that the majority of participants report enhanced comfort in their practice when discussing CAM and the use of essential oils with patients after viewing the module.

Qualitative Data

Participants were allowed to provide additional comments and recommendations for future continuing education topics. Many participants left comments stating the continuing

education module was good, great, and/or informative. Examples of comments include the following: “Great program. I have a lot of patients increasingly asking about essential oils;” “I have been wondering about essential oils. I do not promote them, but have maybe two or three patients who use them. This was a very good program,” and “I really appreciate this. I use essential oils and it inspired me to research more. Thank you.”

Several participants provided recommendations for future continuing education topics. Suggestions for topics included whole food supplements, thyroid cancer, shingles vaccine, and CAM related to major public health problems such as chronic pain and obesity. Eight participants reported experiencing technical difficulties related to audio and the ability to view the video interview.

CHAPTER SIX. DISCUSSION AND RECOMMENDATIONS

Interpretation of Results

The participants reported overall satisfaction with the continuing education module. Using a likert scale, participants were asked to rate the extent in which the program enhanced their ability to achieve all four objectives. Approximately 15% of participants reported 5 out of five, or “extremely,” while another 53% reported 4 out of 5, or “Very.” Approximately 84% of participants reported a very high level of satisfaction with the degree in which the content was free of commercial bias.

Literature findings suggest that as many as 45% of patients are not discussing their use of alternative treatment modalities with their providers (Zhang et al., 2012). The findings of this project reflected an even lower rate of communication among patients and providers when it comes to discussing CAM/Essential oils. As stated in chapter 5, approximately 74% of participants reported that they “rarely” or “never” discuss the use of CAM/essential oils. Following completion of the educational module, about 63% of participants “agreed” or “strongly agreed” with the statement “I plan to ask my patients about CAM/Essential oil use after completing this module.” Increased intent to discuss the use of CAM/Essential oils and reported comfort discussing the CAM/Essential oils ultimately demonstrate the effectiveness of the dissertation project.

Limitations

A number of limitations were associated with the dissertation project. First, monthly data received from the AANP CE center was comprehensively analyzed upon receipt. In order to ensure confidentiality, the AANP CE center does not provide raw data from individual participants. Having monthly analysis only, somewhat limited the ability to analyze results,

uncover further significant findings, and identify additional knowledge gaps. For example, perhaps participants' areas of practice may have demonstrated an increase or decrease in understanding of CAM/Essential oils. Additionally, it cannot be determined whether or not participants with more years of experience had a greater/lesser understanding of CAM/Essential oils.

The AANP also had formatting requirements and limitations on the number of questions that could be included in the pretest, posttest, and evaluation. The ability to ask additional demographic data may have been helpful to gather more information to draw further conclusions. Participants were provided only one section at the very end of the evaluation in which they were allowed to leave comments.

A second limitation was that many of the participants reported technical difficulties with downloading and viewing the continuing education module. Approximately a dozen participants reported difficulty with the audio, poor quality of the video demonstration, and/or a lengthy downloading process. One participant commented "Took days for the program to start playing with multiple attempts." Among the data received from the AANP CE center, a reported 426 individuals initiated the program, however only about half received certificates for completing all components including the continuing education module, the pretest, posttest, and evaluation. One could hypothesize that there may have been a higher rate of completion and certificates issued if the educational module presented without any technical difficulties.

A third limitation is that essential oils are one of many different CAM modalities and data collected may be somewhat limited by the grouping of all CAM modalities together with essential oils in the demographic and evaluation questions. For example, one provider may have a vast comprehensive knowledge of essential oils and know nothing about other CAM

modalities. It is also a possibility that some participants may have had a good understanding of other CAM modalities, but little knowledge specific to essential oils. The results may have been different if the investigators were able to gather more specific data related to participants' existing knowledge of a variety of specific CAM modalities.

Finally, limited research available on essential oils and effects on human subjects makes it difficult to formulate precise recommendations for providers regarding their use. As stated in chapter one, lack of FDA regulation of essential oil may lead to increased/decreased therapeutic properties and inconsistent research results. Further research is needed to formulate more detailed recommendations regarding the safety and efficacy of essential oils.

Recommendations

The continuing education module received positive results and demonstrated learning occurred among participants. Therefore, it is reasonable to suggest that all nurse practitioners caring for patients who utilize CAM complete continuing education related to CAM modalities and essential oils. The continuing education module will be available on the AANP CE center until June of 2017. Although data will no longer be collected for the dissertation project, nurse practitioners still have the opportunity to complete all portions of learning activity in order to receive one free hour of continuing education credit.

Because essential oils are widely available on the market and utilized by a large variety of patients, it could be beneficial for all healthcare providers who participate in health promotion or patient teaching to complete the continuing education module. Other healthcare providers could include physicians, physician assistants, nurses, and physical or occupational therapists. The AANP CE center allows non-nurse practitioner providers to participate in continuing education activities, however awareness of the education opportunity would likely be low as

most seek continuing education credits through their own professional organizations. The module could be made available to online continuing education centers of other respective organizations.

Both literature findings and the findings of the dissertation project demonstrate there is a need for nurse practitioners and healthcare providers to enhance their knowledge of CAM modalities in order to better serve the patient population. Therefore, it may be reasonable to recommend that the continuing education module be incorporated as one part of CAM education into the curriculum for nurse practitioners. Nurse practitioners need additional training on CAM modalities in order to guide and educate patients who chose to incorporate alternative therapies into their healthcare regimens.

Implications for Practice

The dissertation project was significant because it adds to the resources available to enhance provider knowledge of CAM, and specifically essential oils. By utilizing the AANP CE center, the project was able to impact a large number of nurse practitioners throughout the nation. Lack of current evidence based guidelines on CAM modalities requires providers to independently obtain knowledge related to alternative therapies. Knowledge of CAM modalities and essential oils will enhance communication among patients and providers and improve quality of care.

The use of complimentary treatment modalities continue to rise as patients have increased exposure to different cultures and unlimited access to information online. Healthcare providers in all areas of practice will likely work with patients who choose to incorporate CAM modalities into their healthcare regimens. Completing educational programs specific to CAM modalities

will enhance delivery of comprehensive care and perhaps identify additional therapies in need of further research.

Implications for Future Research

Based on the demographic questionnaire and the pretest/posttest findings, the dissertation project supported the need for increased provider knowledge of essential oils and CAM modalities. Future evidence based research on the safety and efficacy of individual CAM modalities is needed in order to create evidence-based guidelines for providers to utilize in practice. Although the NCCAM has taken initiatives to increase research related to complementary and integrative health approaches, large gaps in the literature currently exist. Reliable, unbiased research needs to be conducted so that policies may be made based on scientific evidence. The pretest/posttest and evaluation findings of the dissertation project demonstrated that results of future research related to the topic can be effectively disseminated via online continuing education modules.

Application to Other Nurse Practitioner Roles

Nurse practitioners are well known for their ability to provide comprehensive care. In order to do so, nurse practitioners in all settings must work collaboratively with the patient to determine appropriate traditional and alternative therapies when suitable. Knowledge of CAM modalities and essential oils will help nurse practitioners in all roles offer counseling and guidance related to the safety and efficacy of alternative treatment options. Ultimately, demonstrating knowledge of CAM modalities and essential oils further esteems the role of a nurse practitioner as a provider of comprehensive holistic care.

Conclusion

Many patients incorporate various forms of complementary and alternative medicine into their healthcare regimen with or without the knowledge or approval of their healthcare providers. Regardless of the individual provider's beliefs concerning the effectiveness of essential oils, providers need to be knowledgeable and informative when counseling patients regarding the use of essential oils in their healthcare regimens. A basic understanding of essential oil constituents, indications for use, safety considerations, and contraindications can help facilitate communication and enhance delivery of holistic individualized patient care.

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APPENDIX A. AANP APPROVAL LETTER



The Voice of the Nurse Practitioner®

June 5, 2015

Rebecca Boesl
DNP Student

Dear Rebecca,

The continuing education activity *Essential Oil Education for Healthcare Providers* is approved for continuing education by the American Association of Nurse Practitioners. All session contact hours are approved as submitted.

Use the following statement in your literature to indicate the maximum *credit one person can obtain* upon completion of this activity.

“This program is approved for 1.0 contact hour(s) of continuing education by the American Association of Nurse Practitioners. Program ID 1506259. This program was planned in accordance with AANP CE Standards and Policies and AANP Commercial Support Standards.”

This approval is for the continuing education activity listed in the original application. With this approval, ALL changes to this program must be reported to the AANP for review as soon as they are identified. This includes but is not limited to:

- session drops/additions,
- speaker changes,
- objective changes,
- date and /or venue changes.

Any changes to content or speakers that is not reviewed by the AANP are not approved for credit.

ID number 1506259 has been assigned to this application. Refer to this number with *all communication* pertaining to this application.

Thank you,

A handwritten signature in black ink that reads "Stormy Causey". The signature is written in a cursive style with a long, sweeping underline.

Stormy Causey
CE Coordinator

APPENDIX B. INSTITUTIONAL REVIEW BOARD APPROVAL LETTER



May 6, 2015

Dr. Heidi Saarinen
Nursing

Re: IRB Certification of Exempt Human Subjects Research:
Protocol #PH15246, "Essential Oil Education for Healthcare Providers"

Co-investigator(s) and research team: Rebecca Boesl

Certification Date: 5/6/15 Expiration Date: 5/5/18
Study site(s): online
Sponsor: n/a

The above referenced human subjects research project has been certified as exempt (category # 1, 2) in accordance with federal regulations (Code of Federal Regulations, Title 45, Part 46, Protection of Human Subjects). This determination is based on the original submission with revised protocol and consent/information screen (received 5/6/15).

Please also note the following:

- If you wish to continue the research after the expiration, submit a request for recertification several weeks prior to the expiration.
- The study must be conducted as described in the approved protocol. Changes to this protocol must be approved prior to initiating, unless the changes are necessary to eliminate an immediate hazard to subjects.
- Notify the IRB promptly of any adverse events, complaints, or unanticipated problems involving risks to subjects or others related to this project.
- Report any significant new findings that may affect the risks and benefits to the participants and the IRB.

Research records may be subject to a random or directed audit at any time to verify compliance with IRB standard operating procedures.

Thank you for your cooperation with NDSU IRB procedures. Best wishes for a successful study.

Sincerely,

Kristy Shirley

Digitally signed by Kristy Shirley
DN: cn=Kristy Shirley, o=NDSU,
ou=Institutional Review Board,
email=kristy.shirley@ndsu.edu, c=US
Date: 2015.05.06 15:25:07 -0500

Kristy Shirley, CIP, Research Compliance Administrator

For more information regarding IRB Office submissions and guidelines, please consult http://www.ndsu.edu/research/integrity_compliance/irb/. This Institution has an approved FederalWide Assurance with the Department of Health and Human Services: FWA00002439.

INSTITUTIONAL REVIEW BOARD

NDSU Dept 4000 | PO Box 6050 | Fargo ND 58108-6050 | 701.231.8995 | Fax 701.231.8098 | ndsu.edu/irb

Shipping address: Research 1, 1735 NDSU Research Park Drive, Fargo ND 58102

NDSU is an EO/AA university.

APPENDIX C. PRETEST QUESTIONS

Pretest Questionnaire

1. How often do you address the use of CAM/essential oils with your patients?
 - a. 1- Never
 - b. 2- Rarely
 - c. 3- Sometimes
 - d. 4- Often
 - e. 5- Always
2. What percentage of the patients use some type of CAM/Essential oils in the population you serve?
 - a. 0- I have no idea
 - b. 1- Hardly any, less than 10%
 - c. 2- A few, 10-30%
 - d. 3- About half, 50%
 - e. 4- The majority do > 50%
 - f. 5- All of them
3. How familiar are you with the use of Essential oils?
 - a. 1- Not at all familiar
 - b. 2- Slightly familiar
 - c. 3- Somewhat familiar
 - d. 4- Moderately familiar
 - e. 5- Extremely familiar
4. All of the following are reasons patients choose to use CAM EXCEPT:
 - a. Affordability
 - b. Desire to avoid synthetic medicines
 - c. Increased satisfaction with personalized healthcare
 - d. **CAM products are natural and therefore safer than traditional medicine**
5. Which key constituent of an essential oil may inhibit platelet aggregation and interfere with calcium influx into the myocardial cells and should be avoided in patient with cardiac fibrillation and G6PD deficiency?
 - a. Linalool in lavender essential oil
 - b. **Menthol in peppermint essential oil**
 - c. Cineole in eucalyptus essential oil
 - d. Citrus limon in lemon essential oil
6. Essential oils should be undiluted when applied topically to enhance therapeutic effects.
 - a. True
 - b. **False**
7. Which essential oil has risk for phototoxicity when used topically?
 - a. **Lemon essential oil**
 - b. Peppermint essential oil
 - c. Melaleuca essential oil
 - d. Lavender essential oil
8. Melaleuca oil is most often used by consumers for treatment of all of the following EXCEPT:
 - a. Athletes foot

- b. Skin infections
 - c. Cold sores
 - d. 2nd degree burns**
9. Peppermint oil may be effective in treatment in all of the following except:
- a. Nausea
 - b. Vomiting
 - c. GERD**
 - d. IBS
10. Use of CAM increases when conventional medical treatment is effective.
- a. True
 - b. False**

APPENDIX D. POSTTEST AND EVALUATION QUESTIONS

Post Test Questionnaire and Evaluation

1. All of the following are reasons patients choose to use CAM EXCEPT:
 - e. Affordability
 - f. Desire to avoid synthetic medicines
 - g. Increased satisfaction with personalized healthcare
 - h. CAM products are natural and therefore safer than traditional medicine**
2. Which key constituent of an essential oil may inhibit platelet aggregation and interfere with calcium influx into the myocardial cells and should be avoided in patient with cardiac fibrillation and G6PD deficiency?
 - a. Linalool in lavender essential oil
 - b. Menthol in peppermint essential oil**
 - c. Cineole in eucalyptus essential oil
 - d. Citrus limon in lemon essential oil
3. Essential oils should be undiluted when applied topically to enhance therapeutic effects.
 - a. True
 - b. False**
4. Which essential oil has risk for phototoxicity when used topically?
 - a. Lemon essential oil**
 - b. Peppermint essential oil
 - c. Melaleuca essential oil
 - d. Lavender essential oil
5. Melaleuca oil is most often used by consumers for treatment of all of the following EXCEPT:
 - a. Athletes foot
 - b. Skin infections
 - c. Cold sores
 - d. 2nd degree burns**
6. Peppermint oil may be effective in treatment in all of the following except:
 - a. Nausea
 - b. Vomiting
 - c. GERD**
 - d. IBS
7. Use of CAM increases when conventional medical treatment is effective.
 - a. True
 - b. False**
8. Gender
 - a. Male
 - b. Female
9. Years of experience in healthcare
 - a. <5 years
 - b. 5-10 years
 - c. 10-20 years
 - d. >20 years
10. What is your area of practice?
 - a. Family

- b. Adult
 - c. Women's health
 - d. Acute care
 - e. Internal medicine
 - f. Other
11. I plan to ask my patients about CAM/Essential oil use after completing this module:
- a. 1- Strongly disagree
 - b. 2- Disagree
 - c. 3- Neither agree not disagree
 - d. 4- Agree
 - e. 5- Strongly agree
12. As a result of the module, I feel more comfortable discussing the use of essential oils with my patients:
- a. 1- Strongly disagree
 - b. 2- Disagree
 - c. 3- Neither agree not disagree
 - d. 4- Agree
 - e. 5- Strongly agree
13. As a result of this educational activity:
- a. I will modify my practice
 - b. I will seek more information before modifying my practice
 - c. I see no need to modify my practice
14. If you plan to modify practice, please explain how you will modify your practice?
15. What, if any, change would you recommend to this educational offering?
Please list in the comment box provided.

APPENDIX E. EXECUTIVE SUMMARY

Background

Providing comprehensive, holistic, and individualized care is a common goal of many healthcare professionals nationwide. Growing popularity of complementary and alternative medicine (CAM) modalities among patients in the United States has led to a demand for providers to consider more of an integrative approach to medicine and increase their knowledge and counseling skills for patients who choose to use complementary and alternative medicine.

Despite popular use, formal education and training on the use of CAM, and specifically essential oils, are not typically a large component of the curriculum in nursing or medical schools in the United States. Many providers are not knowledgeable and do not feel comfortable discussing the topic with their patients (Jones, & Cook, 2012; Yildirim, Parlar, Eyigor, Serto, Eyigor, Fadiloglu, & Uyar, 2012; Zhang, Peck, Spalding).

The use of essential oils is one CAM modality that has been increasing in popularity. In 2011, the essential oil fragrance and flavor global market was estimated at \$24 billion, growing annually at a rate of 10%. The United States is the largest importer and consumer of essential oils, utilizing 40% of the total production (Govindasamy, Arumugam, & Simon, 2013). Because there are not current guidelines available to assist providers in deciding when the incorporation of essential oils into a healthcare regimen may or may not be appropriate, some providers may choose to avoid having conversations with their patients regarding the use of essential oils. Enhancing providers' knowledge of essential oils may help facilitate communication among patients and providers and enhance delivery of comprehensive, holistic care.

Project Summary

Based on the need for enhanced knowledge of CAM and essential oils, a continuing education module was created and implemented in collaboration with the American Association of Nurse Practitioners Continuing Education Center (AANP CE Center). The module consisted of a PowerPoint presentation with voiceover, a video demonstration, and case studies. The module included information on five commonly used essential oils, their indication for use in patient populations, as well as safety considerations regarding their use.

The continuing education module was made available on the AANP CE Center website for voluntary participation by nurse practitioners to view throughout the nation at their own convenience. The module was available free of charge for both AANP members and nonmembers. The target audience included any nurse practitioner looking to enhance his or her knowledge of CAM and essential oils.

Results

Data reports from the continuing education module were received in aggregate form monthly from the AANP CE center for the months of June, July, and August. A total of 231 participants received continuing education certificates for completion of the educational module, pretest, posttest, and evaluation questions. Family practice nurse practitioners had the largest participation rate with approximately 62.5% of participants working in family practice.

Participants reported a high level of satisfaction with the educational module. Greater than 66% of participants reported that the module “Very” or “Extremely” enhanced their comfort when discussing CAM/Essential oils use with patients. Sixty-seven percent of participants plan to ask their patients about CAM/essential oils and the majority plans to modify their practice or seek more information about the topic.

There were four learning objectives that correlated with pretest and posttest questions and participants scored higher on the posttest in regards to all four objectives. An increase in correct responses demonstrated learning occurred as a result of the module. Participants were also given an opportunity to provide feedback related to the continuing education module. Many participants left comments stating the continuing education module was good, great, and/or informative. Several negative comments were made related to technological difficulties and delayed ability to download module. The overall results of the module demonstrated positive results and enhanced awareness of CAM/essential oils.

Recommendations

The continuing education module received positive results and demonstrated learning occurred among participants. Because essential oils are widely available on the market and utilized by a large variety of patients, it could be beneficial for all healthcare providers who participate in health promotion or patient teaching to complete the continuing education module. Other healthcare providers could include physicians, physician assistants, nurses, and physical or occupational therapists. The AANP CE center allows non-nurse practitioner providers to participate in continuing education activities, however awareness of the education opportunity would likely be low as most seek continuing education credits through their own professional organizations. The module could be made available to online continuing education centers of other respective organizations.

Both literature findings and the findings of the dissertation project demonstrate there is a need for nurse practitioners and healthcare providers to enhance their knowledge of CAM modalities in order to better serve the patient population. Therefore, it may be reasonable to recommend that the continuing education module be incorporated as one part of CAM education

into the curriculum for nurse practitioners. Nurse practitioners need additional training on CAM modalities in order to guide and educate patients who chose to incorporate alternative therapies into their healthcare regimens.