

# **The Use of Essential Oil Therapy for Treatment of Post Operative Nausea and Vomiting**

Wendy S. Nichols, BSN, CRNA  
Soothing Scents, Inc

## **What are Essential Oils?**

Essential Oils (EOs) are concentrated, aromatic, volatile compounds made from plants.

They differ from vegetable oils by evaporating when exposed to air, leaving no oily residue.

In most cases, they are obtained from plants by a distillation process. The plant material containing the desired compounds (leaves for peppermint, flowers for lavender, and rhizomes for ginger) is placed in a large distillation apparatus with water. As the water is heated, the steam passes through the plant material, vaporizing the volatile compounds. The vapor flows through a coil, condensing back to liquid, forming the “essential oil”.

Each EO contains anywhere from 100 – 300 different molecular components, chemically classed as alcohols, terpenes, ketones, phenols, esters, etc.

Each plant develops these molecules through evolution to accomplish specific tasks, for example:

- to attract pollinators such as bees or birds
- to repel attackers such as insects, fungi, bacteria, or animals
- to provide protection from drought conditions
- to heal damage to the plant

Essential oils have been in use for thousands of years by numerous civilizations. They are extensively used today in the fragrance and food industries, in addition to being widely used throughout the world medicinally.

## **What is the difference between “Aromatherapy” and “Essential Oil Therapy”?**

The term “aromatherapy” can mean the use of essential oils or more commonly in the US, means the use of a fragrance that smells like an essential oil. For

example, if a large company wanted to mass produce lavender “aromatherapy candles”, they would use one of the compounds found in lavender, the alcohol linalol, which is responsible for its distinctive smell. This compound would be diluted with additional chemicals to produce a consistent aroma, and would be much cheaper to obtain.

By contrast, “essential oil therapy” means that the oil is used without any alteration or manipulation, pure and whole. It is widely believed that the synergy of all the molecular compounds working together, quenching undesired effects and enhancing desired ones, produce the essential oils’ healing benefits. High quality, medical grade essential oils are produced using organically grown plants, and processed by meticulous distillers who check the final product with mass spectrometry to verify therapeutic compound levels.

## **Which essential oils relieve nausea?**

Four essential oils have been found to provide relief from nausea:

**Peppermint** (*Mentha Piperita*) has been a classic essential oil choice for the treatment of nausea for hundreds of years. There are studies showing its efficacy in reducing PONV (Tate, 1997), chemotherapy induced nausea (Fuguenik, 1998), and colonic spasms during colonoscopy (Asao et al, 2001; Leicester & Hunt, 1982) and after colostomy surgery (McKensie & Gallacher, 1989). Peppermint is believed to exert its antispasmodic influence on the gastric lining and colon through its alcohol compounds menthone and menthol.

In a small randomized, placebo controlled study of 18 women postoperative for gynecological surgery there was a statistically significant reduction in nausea and fewer anti-emetics and analgesics used in the group receiving peppermint EO compared to the control (no treatment) and the placebo (Tate, 1997). Various mechanisms of actions may explain effectiveness of peppermint for nausea. Luteolin-7-O-rutinoside of *Mentha Piperita* demonstrated a potent inhibitory effect on histamine release in rats given 100 and 300 mg/kg orally (Inoue, Sugimoto, Masuda, Kamei, 2002). The authors conclude that this dose-related inhibition could reduce allergic rhinitis and gastrointestinal responses mediated by histamine, such as motion sickness. Whether or not *Mentha Piperita* works in other pathways of nausea has yet to be determined. Evidence that humans can detect olfactory stimuli while sleeping or under anesthesia was demonstrated in one test of 10 adults who experienced prolonged light sleep in response to peppermint EO, measured by EEG (Badia, et al 1990).

**Spearmint** (*Mentha Spicata*) *Mentha spicata* has similar anti-emetic benefits as peppermint, but may prove effective for longer periods than peppermint (Buckle, 2003). There are no studies on its efficacy for nausea and vomiting, although spearmint contains the same alcohol molecule, menthol, as peppermint, and is often used to calm the stomach in after dinner mints and teas. The Carvone in

Spearmint gives it a distinctive aroma, and often is preferred over the more stimulating odor of peppermint.

**Lavender** (*Lavandula angustifolia*) is purported to have sedative effects when inhaled in humans and animals (Lis-Balchin, & Hart, 1999), along with anxiolytic, anticonvulsive, motor inhibitory and spasmolytic effects in animals (Block, Gyllenhaal, & Mead, 2004; Buchbauer, Jirovetz, et al 1993). Inhalation of lavender oil vapors in mice produced a serum level comparable to that of an intravenous injection. Absorption into the blood stream was rapid via the nasal and lung mucosa and very low levels were required to produce a sedative effect (Buchbauer, Jirovetz et al, 1991). In clinical studies, inhalation of lavender demonstrated greater improvements in mood and less anxiety in 77% of 122 patients in an intensive care unit (Dunn et al, 1995), increased sleep time and less restlessness during sleep in 4 patients (Hardy, Kirk-Smith, Stretch, 1995), and greater relaxation, less depression, and CNS depressant activity in 23 females with insomnia (Schultz, Hubner, & Ploch, 1997). In 13 healthy female subjects, lavender oil reduced alpha waves of parietal and posterior temporal regions after inhaling lavender oil (Masago et al, 2000). Buchbauer and colleagues (1991) found the sedative effects of lavender were closely dependent on the exposure time of the oil. Kiecolt-Glaser and colleagues (2004) are currently examining behavioral, autonomic, endocrine, and immune effects of *Lavandula angustifolia* to determine potential mechanism of action and efficacy of sedative effects.

**Ginger** (*Zingiber Officinale*) is a traditional remedy for nausea. This EO contains the molecule zingiberene, believed to play a role in its anti-inflammatory and anti-emetic properties. The botanical form of ginger has been shown to be effective for n/v associated with pregnancy (Fischer-Rasmussen et al, 1991; Sripramote & Lekhyananda, 2003; Vutyavanich, Kraissarin, Ruangsri, 2001; Willetts, Ekangaki, & Eden, 2003), motion sickness (Lien, Sun, Chen, Kim & Hasler, 2003), and for prevention of post-operative nausea and vomiting (PONV) with gynecological surgery (Pongrojapaw & Chiamchanya, 2003). Dosages of *Zingiber Officinale* ranged from a total daily dose of 1 to 2 grams taken in capsule form. Significant effects on nausea were consistent, although effects on vomiting were less reliable. One study found no effect of two different doses on PONV following laparoscopic surgery (Eberhart et al, 2003)

The mechanism of action of motion sickness is thought to be related to gastric dysrhythmias and elevation of plasma vasopressin, both which were assessed in a cross-over, double-blind, randomized placebo controlled study and ameliorated with 1 and 2 grams of oral ginger taken as a preventative before circular vection induced nausea (Lien, Sun, Chen, Kim, Hasler, Owyang, 2003). Ginger also prolonged the latency period before nausea onset and shortened the recovery time.

Portnoi (2003) and Vutyavanich & Kraissarin (1997) determined ginger to be safe during pregnancy and without toxicity and adverse outcomes of the baby

following childbirth. The formulation in these studies was ingestion of powdered or extract of ginger, rather than aromatherapy. If the ingested form of ginger is safe and lacks toxicity, the inhaled form has greater likelihood of safety, but the efficacy has not been determined.

***A note about why these four EOs are thought to work better in combination:***

Apart from the obvious benefits of utilizing each EOs contribution to relieving nausea, the complex aroma produced will help prevent the unwanted side effect of conditioned aversion. In a study involving children undergoing chemotherapy and using peppermint oil for nausea relief, researchers found that the readily identifiable and ubiquitous nature of peppermint caused the patients to experience nausea whenever they smelled peppermint toothpaste, gum, mints, etc (Post-White, 2004).

**How do essential oils work?**

It is known that EOs can be absorbed by the body through topical application to the skin, oral ingestion and by inhalation. The fastest, safest and simplest method is inhalation. EOs have a measurable effect at very low concentrations (Jori, Bianchelli, 1969) and affect research subjects while asleep, even if they lost the ability to smell (Badia, Boecher, 1991).

By smelling the aromatic vapor of an EO, the molecules travel up the olfactory tract to the limbic system, which in turn, transmit the input to the central nervous system. This is, in fact, how all smells are processed, whether they are molecules given off by baking bread or flower gardens.

A second aspect of aroma processing occurs in the amygdala and hippocampus. These areas store and recall the emotional memories of a specific smell. Odor cues produce memories with greater intensity of emotions than any of the other senses (Herz, 1996).

This is an important factor to understand when using EO therapy for nausea. With one deep breath through the nose, a person will not only transmit the beneficial molecules from the EO to the CNS, they will instantly recognize if the smell is pleasant or familiar and what memories is evokes or creates (Savic, 2001).

An example of this would be when an isopropyl alcohol pad is used to treat nausea. The patient may experience relief of the nausea, but the smell reminds them of unpleasant experiences, such as injections, IV insertions or dental visits, producing a negative emotional reaction. Smelling pleasing aromas is known to enhance the emotional memory of events, even if they are inherently unpleasant.

Another aspect of odor processing involves the trigeminal nerve. Located within the lining of the nose, the stimulation of this nerve by aromatic vapor can produce sensations such as warming or cooling. These nerve fibers can also affect the perception of nasal airflow during breathing (Savic, 2001). This is the mechanism thought to produce the deep cooling breaths experienced when inhaling peppermint or spearmint EOs.

## **What are the safety considerations of essential oil therapy?**

Inhaling essential oils is very safe. The majority of side effects reported in the literature are skin rashes or skin irritation, with the remainder due to excessive oral intake (Price, Price, 2002). For use in a hospital setting, with sedated patients recovering from anesthesia, the safest method is to provide the EO in an unbreakable, hand held container that prevents skin or mucous membrane contact. There are no contraindications to the 4 essential oils listed, even during pregnancy. Small children can safely use these EOs with supervision.

## **Can essential oil therapy be used for other types of Nausea?**

Any type of nausea can be relieved by essential oil use. The following is an explanation of the major causes of nausea and how QueaseEASE™, the unique blend of 4 essential oils can help.

### POSTOPERATIVE NAUSEA AND VOMITING (PONV)

Postoperative nausea and vomiting (PONV) affects at least 30% of the 35 million patients undergoing surgery and anesthesia in the United States each year [25]. It can range from minor queasiness to sustained vomiting, prolonging a patient's recovery room time or leading to unplanned hospital admissions. Patients rank PONV as the most distressing aspect of their surgical experience, rating it more unpleasant than pain [26, 27].

The additional costs incurred by a nauseated patient can be substantial. These charges include additional medication, prolonged recovery room stays and unplanned hospitalizations for outpatients. A study found the additional costs to be approximately \$415 per patient experiencing PONV [28]; another study estimated the cost of PONV for an average outpatient surgery center could be as high as \$1.5 million per year [29].

The cause of PONV is complex and involves many factors. The nausea and vomiting center of the brain lies in the medulla and receives input from multiple sources such as the GI tract, central nervous system and inner ear, each having

the potential to be activated during surgery and anesthesia. In addition, pain, anxiety and dehydration all increase the incidence of PONV, as do individual patient characteristics. These include being female, having a history of motion sickness or PONV, being a nonsmoker and receiving narcotics postoperatively [30].

A variety of drugs are available to prevent and treat PONV in the hospital or surgery center. They work with varying degrees of success, have a number of adverse effects and can be quite expensive [31]. The drugs used in a hospital usually have to be administered by a registered nurse, via injection, and can have side effects such as interaction with pain medication resulting in breathing difficulties and excessive drowsiness that require close observation by the nursing staff.

With over 60% of surgeries occurring on an outpatient basis, PONV after discharge presents an additional challenge. This can happen in over 35% of patients up to the 5<sup>th</sup> post op day [32]. A German study showed that 14% of outpatients experienced nausea traveling home [33]. This aspect of PONV is particularly distressing due to the lack of effective over-the-counter (OTC) treatments.

QueaseEASE™ was developed for use in treating PONV by a nurse anesthetist. It was designed to be used in the OR, recovery room (PACU), hospital room or even in the car on the way home. It can be used anywhere, anytime queasiness strikes. The portable container is safe and easy to manage for a medicated patient, and even with repeated use, should last at least 6 months. Because it is drug-free, interactions with pain killers and other sedatives are not a factor.

## MOTION SICKNESS

Motion sickness is a condition caused by exposure to unfamiliar motion that ranges from mild discomfort to continual vomiting. It is thought to be caused by a conflict in the brain; between input from the eyes and movement sensed by the inner ear. A typical sufferer would be someone below the deck of a boat in rolling seas, unable to view the horizon, or someone trying to read in a car. It can occur on any type of moving vehicle - a boat, automobile, plane, train, amusement park ride or even when playing virtual reality games.

The more dramatic symptoms start with a feeling of queasiness followed by excessive mouth watering, cold sweating and vomiting. Other symptoms include drowsiness, dizziness, loss of appetite, excessive yawning, headache, and an overall feeling of misery.

Infants appear to be highly resistant to motion sickness. Susceptibility increases with age, peaking at 10 – 12 years old, after which it begins to decrease. Females are more prone to motion sickness than males [34], especially during

times of increased hormonal activity, such as menstruation and pregnancy [35]. From one third to one half of airline passengers will experience some degree of motion sickness when encountering heavy turbulence [36] and it is estimated that 90% of all travelers, including seasoned sailors, experience motion sickness at some point in their life [37]. Even 70% of Space Shuttle astronauts suffer from a form of motion sickness [38].

The good news is that most individuals adapt to the uncomfortable motion over time. Additionally, there are many things that travelers can do to minimize motion induced discomfort. (See table below).

Over the counter (OTC) medications are available to prevent the symptoms. The most widely used OTC medication is the oral tablet Dramamine. This drug works best if used prior to experiencing motion, doing very little to reverse nausea once it has begun. Drowsiness is a common side effect, therefore, anything that might cause additional drowsiness, such as alcohol should be avoided while taking this medication.

A prescription only medication, the Scopolamine patch, is applied to the skin at least 4 hours prior to travel, usually behind the ear, and slowly releases medication over 3 days to prevent motion sickness. It is not considered an effective treatment once symptoms have begun and causes side effects such as dry mouth, drowsiness, and blurred vision. If the symptoms persist and the vomiting begins to cause serious problems such as dehydration, medical attention would be required, which may include IV fluids and injectable anti-nausea medications.

Among the drug free remedies, ginger tablets show some promise. They were found to be more effective than placebo in treating motion sickness in Danish naval cadets at sea [39]. Acupressure bands, also natural and drug free, have been used successfully to prevent motion sickness. These bands use a small plastic tab to put pressure on the P 6 acupressure point near the wrist. They can be worn on both wrists and have no side effects [40].

QueaseEASE™ could prove to be of great benefit in easing motion induced nausea. The fact that it is inhaled and not ingested will be appreciated by those suffering from motion sickness. QueaseEASE™ is provided in a container ideally suited for travel; small, portable and discreet, easily fitting in a pocket or around one's neck on a convenient and accessible lanyard. Since QueaseEASE™ is drug-free; side effects such as drowsiness and dry mouth are avoided, allowing the user to get the most from their travel experience.

<u>GENERAL PREVENTION</u>	<u>BOAT</u>	<u>PLANE</u>	<u>CAR</u>
Avoid foods high in protein, calories and salt	When planning a cruise, choose a large modern vessel with stabilizers.	Select a seat in the middle of the plane, usually over the wing	Sit in the front seat
Avoid dairy products	Choose a calm venue, like the Caribbean	Don't read or watch a video	Drive if possible
Avoid Alcohol 24 hrs prior to and during motion	Select an outside Cabin	Look out of the window	Don't read, knit, or play video games
Drink plenty of water	Once on board: If Seasickness strikes on board:	Listen to music	Look straight ahead
Decrease unpleasant odors in immediate environment	Stay on deck facing forward if possible	Avoid alcohol	Pull over to read maps
Increase Ventilation	If you must be in your cabin, lie on your back and focus on slow, deep breathing	Eat light, non greasy meal	Make sure there is plenty of fresh air
	Make sure there is good ventilation and no unpleasant odors in the cabin	If turbulence strikes:	Make sure there are no unpleasant odors
	When going to a dining room, choose one mid ship with an outside view	Put your seat back, keep head still and turn on overhead ventilation to increase air flow	
		Focus on slow, deep breathing	

## MORNING SICKNESS or NVP

Nausea and vomiting of pregnancy (NVP), commonly called morning sickness, affects 50 - 90% [41] of pregnant women, approximately 3 - 5.5 million per year in the United States. The exact cause is unknown, but is probably due to a number of factors such as increased hormone levels, stress, fatigue and a higher sensitivity to odors. It doesn't necessarily occur only in the mornings, it can strike at any time of day. NVP usually develops between the 4<sup>th</sup> and 6<sup>th</sup> week of pregnancy and in half the cases, ends by the 14<sup>th</sup> to 16<sup>th</sup> week of pregnancy [42]. It can have quite a negative impact on a woman's ability to work; 47% of women with NVP feel their job efficiency is reduced and 35% lose work time, on average 62 work hours per woman, per pregnancy (Arsenault, 2002).

Current recommendations for women with NVP include increasing rest and eating whatever appeals to them during the first trimester of pregnancy. Alternative therapies such as ginger tablets (in doses no more than 1 gm) and acupressure bands have been found to be beneficial. When conservative methods fail, drugs can be cautiously given, with Dicletin found to have the greatest safety and efficacy.

The use of QueaseEASE™ for treating NVP has not yet been formally studied. Responses to our surveys suggest that it has been used safely and effectively by a number of pregnant women who suffer from NVP, helping the majority feel "less nauseated" and "less stressed". A few respondents indicated it was the only thing that helped ease their nausea.

No evidence exists that suggests any of the essential oils used in QueaseEASE™ are unsafe for use in pregnancy, and the fact that they are inhaled, rather than applied or ingested, give them an extra degree of safety. Peppermint, Spearmint and Ginger essential oils are found in common items such as mints, toothpaste, chewing gum and food products, with no restriction placed on their use during pregnancy. Lavender is also one of the most commonly used essential oils, found in candles, air freshener body lotion and perfumes, none of which are contraindicated during pregnancy.

## CHEMOTHERAPY INDUCED NAUSEA AND VOMITING (CINV)

It is estimated that if not treated with anti-emetic medications prior to chemotherapy, 60-80% of patients will experience nausea and/or vomiting [43]. Among the most serious effects of prolonged CINV are dehydration and electrolyte imbalances which can affect the function of the heart [44]. Prolonged CINV can lead to malnutrition and weight loss which could adversely affect the patients' survival.

A class of anti-emetic drugs called the 5-HT3s has greatly decreased the occurrence of vomiting in patients experiencing CINV, but has been less successful with treating nausea [45].

The drug-free and all natural aspect of QueaseEASE™ adds additional benefit for the patient receiving chemotherapy. Often, multiple medications are being taken to treat the symptoms experienced by the cancer patient, sometimes causing drug interactions. A drug-free product such as QueaseEASE™ may provide relief without the unwanted side effects.

You can contact me:

[wendy@soothing-scents.com](mailto:wendy@soothing-scents.com)



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