Evaluation of Aromatherapy

in

Institutional Elder Care Settings

Texas Long Term Care Institute

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Abstract

The purpose for conducting this study was to assess the effects of aromatherapy administered by patch application to people living in several Texas nursing homes. Specifically formulated blends of essential oils were evaluated regarding effects on people who inhaled the oils. Three different oil blends were tested. A total of 39 people participated in the study with a mean age of 79.8 A majority (72%) of the participants carried a diagnosis of Alzheimer's disease, dementia, or a mental health disorder.

Evaluation conducted before and after introduction of one of the blends, a combination of grapefruit and frankincense essential oils, demonstrated significant differences in specific behavioral characteristics exhibited by 13 persons suffering from dementia. Two people were able to stop taking psychotropic medications. One individual was no longer required to live on a locked unit. Additional oil blends, one containing rosemary and orange oils and another comprised of lavender and bergamot oils, yielded statistically insignificant results. However, strong anecdotal evidence was submitted from persons in a small rural home testing the rosemary/orange oil blend.

Potential areas impacted through these findings include an increase in the quality of life for the Elders, a more welcoming and reassuring atmosphere for staff members and visitors, a reduction in costs associated with medications, and decreased time and effort dealing with disruptive behavioral issues. All of these issues are dealt with daily in nursing homes throughout the county.

Introduction

Statement of the Problem

The purpose for conducting this study was to assess the introduction of aromatherapy in several Texas nursing homes. Specifically formulated blends of essential oils were evaluated regarding effects on people who inhaled the oils.

Research Question

Is there a significant difference in the dependent variables (weight, food intake, psychotropic medication usage, prevalence of falls, sleep disturbances, disruptive behavior, and incidence of sundowning) before and after the introduction and usage of the specific essential oil blends?

Significance of the Study

Anecdotal accounts regarding aromatherapy abound, yet few controlled studies have been conducted in a nursing home environment. A study that evaluates inhalation of essential oils and subsequent outcomes can provide a clear picture of the use of aromatherapy within the operational framework of long term care in North America. This study demonstrated significant differences in specific behavioral characteristics exhibited by persons suffering from dementia after introduction of the essential oil blend "*Restore Peace.*"

Potential areas impacted through these findings include an increase in the quality of life for the Elders, a more welcoming and reassuring atmosphere for staff members and visitors, a reduction in costs associated with medications, and decreased time and effort dealing with disruptive behavioral issues encountered within many nursing homes.

Background

Definition of Aromatherapy

Aromatherapy is the art and science of utilizing naturally extracted aromatic essences (essential oils) from plants to balance, harmonize, and promote the health of body, mind and spirit. Essential oils are extracted from the flowers, leaves, bark, fruit, resin, or roots of plants (Buckle, 2003). Essential oils are believed to have antibacterial, deodorizing, and antiviral properties. Calming, analgesic, uplifting, and stimulating effects have also been observed (Gilliland, 1999). The term aromatherapy carries different connotations depending on one's geographic reference. In the United States and the United Kingdom, for example, the emphasis is on inhalation or application on the skin. Essential oils are readily available to the general public. Aromatherapy in France and Germany involves medically qualified doctors; oils are prescribed and administered by many routes, including internal ingestion. (Lis-Blachin, 1997).

The mechanisms of action of aromatic essential oils take several forms. Psychological responses are related to an individual's perceptions of an odor and the individual's past association with specific odors. Personal experience with an odor may evoke an emotional response due to the prominence of afferent links from the olfactory bulb to the amygdala. Biological or pharmacological effects are thought to be unrelated to odor itself. These effects are due to chemical compounds that enter the body and act directly on the brain. The entry of the specific compounds can be through the skin into the bloodstream or through the olfactory mucosa and lungs by inhalation (Holmes and Ballard, 2004). Studies have shown that changes in cerebral blood flow occurred after inhaling essential oils, even in anosmic people (Lis-Balchin, 1997). This finding is supported by the discovery of EEG measures that occur when persons are not consciously aware of aromas (Gray and Clair, 2002).

Essential oils are lipid soluble. When applied externally to the skin, when inhaled, or when ingested their end-products are excreted through the urine or in expirations. Findings repeatedly demonstrate that essential oils are readily cleared and do not likely accumulate within body tissues (Maddocks-Jennings and Wilkinson, 2004).

Essential oils are distinctly different from perfumes. Essential oils are naturally extracted plant substances; perfumes can be manufactured and may contain unnatural chemicals. Essential oil extraction methods include distillation, expression, enfleurage, CO_2 extraction, and solvent extraction. Regardless of the method of extraction, the result is highly concentrated. Perfumes do not provide the therapeutic benefits attributed to the use of 100% pure essential oils, also known as therapeutic grade oils. Single oils or blends of several oils are believed to bring about specific physical and psychological effects (Buckle, 2003).

History of Essential Oils

Aromatherapy is within the domain of Complementary and Alternative Medicine (CAM), a field that for years was at best ignored and more likely disdained by conventional medicine in the United States. In the last decade, this attitude has changed. American medical schools have started to include complimentary medicine in their curricula. More than 40 percent of Americans are using CAM to maintain their health or to treat physical/psychological health conditions. An estimate from the World Health Organization is that between 65 and 80 percent of the global population rely on CAM as their primary form of health care. (Suzuki, 2004)

The use of aromatic plants as both healing and pleasurable treatments dates back over 6000 years to ancient Egypt, the Far East, and China (Thomas, 2002). Over 2,500 years old, Ayurveda, the traditional medicine of India, describes the rejuvenating and healing powers of aromatic oils. The Romans and the Greeks utilized botanicals in both religious rituals and medical interventions. Avicenna, a medieval physician, determined a method for

extracting essential oils from herbs and other plants (Thomas). The basis for research into essential oil preparation was initiated by Paracelsus in the 1400s. In his work *Quinta Essentia,* he advocated that the goal of pharmacy should be the isolation of the "sublime extractive" of each drug. The term essential oil was, thus, derived from his quintessential work (Gimelli, 2001).

According to Worwood (1991), the term aromatherapy was coined in the 1930's by a French chemist, René Maurice Gattefossé. His investigation of essential oils as a healing agent came about as the result of a personal accident. After burning his hand and plunging it in the nearest liquid, lavender oil, he discovered unexpected yet excellent healing powers. Essential oils were used for detoxification of wounds during World War I. In 1977, *The Art of Aromatherapy* was published in England and may have sparked the current popular usage of aromatherapy in conjunction with massage. Today aromatherapy and essential oils are viewed as a natural, non-invasive modality that involves the whole person. Use of essential oils supports the body's natural ability to balance, maintain, and heal itself.

Use of Aromatherapy in Elder Care

A search of the literature regarding studies pertaining to the use of aromatherapy in a clinical setting yields minimal supportive data. Many studies coupled aromatherapy with other modalities such as massage, reflexology, and counseling. Few controlled trials have been published. One such study took place in the United Kingdom during 2001 and followed a pre-test, post-test design during which 72 people were evaluated, 36 of whom were exposed to a placebo treatment . Sixty percent of the treatment group (those people exposed to treatment with Melissa essential oil) experienced a 30% reduction in agitation. Quality of life indices also improved (Ballard, Reichelt, and Perry, 2002).

Several studies suggest that aromatherapy can reduce agitation, anxiety, and insomnia in people suffering from dementia (Bowles, Cheras, Stevens, and Myers, 2005). A measurable sedative effect was demonstrated through the use

of aromatherapy massage in a controlled trial of twenty-one hospitalized people suffering from dementia (Smallwood, Brown, Coulter, Irvine, and Copland, 2001). A single case study yielded statistically significant results for one person suffering from dementia. Again, aromatherapy mixed with massage was the treatment modality (Brooker, Snape, Johnson, Ward, and Payne, 1997). Hours of sleep per each twenty-four hour period were recorded for four psychogeriatric patients before and after hypnotic drugs were discontinued. Ambient lavender oil was then introduced by odor diffuser and the amount of sleep time recorded. Sleep returned to the same number of hours as that experienced while persons were medicated with hypnotics (Hardy, Kirk-Smith, and Stretch, 1995). A trial involving nine residents showed consistent improvements in overall wakefulness during the day and increased percentages of time asleep at night after the placement of one drop of Lavender oil on each person's pillow at night. (Hudson, 1996) However, a controlled study testing whether smelling lavender oil decreased the frequency of agitated behaviors in persons with dementia found no support for the use of merely olfactory aromatherapy (Snow, Hovanes, & Brandt, 2004). Data collected through interviews and focus groups regarding a program of hand massage coupled with the use of essential oils reported "specific improvements for clients including increased alertness, self-hygiene, contentment, initiation of toileting, sleeping at night and reduced levels of agitation, withdrawal and wandering. The benefits of this treatment for nursing practice are that it is safe, effective, and easily administered by staff in any setting." (Kilstoff & Chenoweth, 1998, p.70).

Neuroleptic pharmaceuticals are often used in the treatment of Alzheimer's disease and related disorders. Widespread use of pharmacological agents may not be the most beneficial treatment for several reasons: problematic side effects, modest efficacy, and interactions with other medications (Holmes, Hopkins, Hensford, MacLaughlin, Wilkinson, and Rosenvinge, 2002). Two classes of drugs, antipsychotics and anxiolytics/sedatives/hypnotics were found to be significantly associated with 1560 falls leading to hospitalization of residents of one nursing home (Connell, Gompertz, Bennett, & Herzberg, 2001).

Aromatherapy is an alternative with few side effects and has a distinct role to play in the field of geriatrics (Kyle, 1998).

While not specific to elder care, two studies showed statistically significant reduction in anxiety in palliative care settings. Chamomile essential oil was coupled with massages given to cancer patients. Pre- and post-test comparisons revealed significant improvements on physical, psychological, quality of life, severe physical, and severe psychological subscales (Wilkinson, Aldridge, Salmon, Cain, and Wilson, 1999). Researchers concluded that aromatherapy massage reduced psychological distress and improved cancer control at a London cancer center (Kite, et al., 1998). It must be noted, however, that individuals in the sample were self-reporting pertaining to their symptomatology. Oils most frequently used included, among others, lavender and bergamot.

Essential Oils Used in this Study

This project is an extension of preliminary research done by Jackie Farnell, Certified Aromatherapist, and documented by Patricia Bishop, Alzheimer's Program Coordinator, at the Mattie C. Hall Nursing Home in Aiken, South Carolina. Ms. Farnell's informal research relates to Alzheimer's patients and cites a marked decline in the number of people experiencing detrimental weight loss and a decrease in the usage of psychotropic medications after the introduction of an aromatherapy protocol at Mattie Hall.

Ms. Farnell has developed a "nursing home kit" comprised of specific oil blends and a diffuser. At the time of this writing, the kit is currently in use in over 100 nursing homes throughout the United States. Reports, though anecdotal, are highly favorable.

Individual essential oils used in this study include lavender, bergamot, rosemary, frankincense, grapefruit, and sweet orange. Pairings of the oils that constitute the specific blends are provided within the Methods section. A brief overview of the use and reported benefits of these oils follows.

Lavender (*Lavender vera)*

Lavender oil is considered by aromatherapists to be the most versatile of the essential oils. The oil is extracted by steam distillation from the fresh flowering tops of this evergreen shrub. The list of properties assigned to lavender oil is extensive and includes, among others, analgesic, antiseptic, calming, and sedative. It has been shown to accelerate healing of burns and is generally deemed a healing agent with many surface skin problems. It has been said to have a balancing effect and to be helpful with mood swings (Walters, 1998). Lavender oil is believed to stimulate the immune system and to stimulate cells of a wound to regenerate quickly. The main terpenoid complements of lavender oil have been observed to suppress cell electrical activity thereby producing a light sedative effect (Kirk-Smith, 2002). Lavender oil has been found to have sedative effects similar to nitrazepam and chlorpromazine but without the consequent lethargy. (Von Toller & Dodd, 1998). Major countries of origin for Lavender oil are England, France, Tasmania, and Yugoslavia (Worwood, 1991).

Bergamot (*Citrus bergamia)*

The bergamot orange is produced from a small tree indigenous to Italy, Morocco, and Guinea. The essential oil is obtained from the rinds of the small yellow fruits (Worwood, 1991). Properties include analgesic, antidepressant, sedative, and vulnerary (Walters, 1998). Bergamot, by virtue of its linalyl acetate component, is considered to have antiviral properties (Schnaubelt, 1998).

Rosemary (*Rosmarinus officinalis)*

Rosemary oil can be extracted from either the needle-like leaves or the fresh flowering tops of this flowering shrub. Some of the actions that have been, historically, assigned to Rosemary oil include analgesic, antiseptic, antispasmodic, stimulant, diaphoretic, and tonic (Lawless, 1997). It has been used to ease muscular pain, headaches, and fatigue. It has been attributed beneficial in memory loss. This oil stimulates the brain and helps dissolve mental

fatigue (Farnell, 2006). Rosemary is produced in Croatia and Corsica (Schnaubelt, 1998).

Frankincense (*Boswellia carteri)*

Frankincense is distilled from gum resin obtained from the bark of a small tree and is harvested in Somalia, China, Ethiopia, and Southern Arabia. It has been used in many cultures to purify body and soul. It is said to enable one to slow down and deepen breathing and is, thus, conducive to meditation and prayer. It is soothing to the respiratory system and eases shortness of breath. Actions described include anti-inflammatory, astringent, vulnerary, tonic, relaxing, and sedative (Lawless, 1997).

Grapefruit (*Citrus paradisi)*

Grapefruit essential oil is cold-expressed from the fresh peel of the grapefruit. Primary geographic sources are Israel and the United States. Grapefruit oil is reported to be antiseptic, diuretic, cleansing, and tonic to the central nervous system and the sympathetic nervous system. Emotional use relates to its uplifting and reviving qualities. It is used for depression, nervous exhaustion, and stress (Sheppard-Hanger, 2000).

Sweet orange (*Citrus sinensis)*

The evergreen tree that produces the sweet orange is smaller than the bitter variety with which most people are familiar. The oil is extracted by cold expression or steam distillation of the ripe outer peel. Major suppliers of Orange oil include Cyprus and Portugal (Price, 1993). Reputed qualities include tonic to the central nervous system, refreshing, warming, uplifting, soothing, and comforting (Lawless, 1997).

Methods

Repeated measures analysis of variance for each dependent variable was utilized to evaluate the effectiveness of inhalation of essential oil blends. A

repeated measures design provides a view of the treatment in reference to each variable both before the initiation of the treatment and after the treatment had been in effect for twelve weeks.

Dependent variables selected for the study were weight, food intake, psychotropic medication usage, prevalence of falls, sleep disturbances, disruptive behavior, and incidence of sundowning.

The Independent variable, received aromatherapy per protocol, was evaluated with the following frequency of measurement:

Four weeks before treatment

Twelve weeks after treatment initiation

Four weeks after treatment discontinuation.

Residents from nursing facilities, a majority Elders, constituted the population for this study. The study investigated these individuals' responses to aromatherapy. Modern day essential oils are very potent, and the aroma dispersal is quite extensive when applied topically to fabric patches. Due to the nature of the independent variable (specified oil blends) and the method of introducing the variable (patch application), indicators were analyzed before, during, and after the "treatment".

The research employed the use of essential oil blends developed by Ms. Jackie Farnell and utilized in her preliminary research. The oil blends used were "*Helps Relieve Insomnia and Pain*", "*Restore Peace*", and "*Promote Alertness*".

1. *Restore Peace,* a blend of frankincense and grapefruit, was developed to alleviate symptoms of depression and sun-downing as well as emotional verbal and nonverbal behavior indicating discomfort or stress. Examples of nonverbal conduct include yelling, cursing, biting, hitting, scratching, kicking, crying, repetitive motion, attempts to leave, wandering, and sundowning.

2. *Helps Relieve Insomnia and Pain* has been used to assist in pain management and to reduce insomnia. It is comprised of lavender and bergamot essential oils.

3. *Promote Alertness,* constituted from orange and rosemary oils, has

been reported to increase alertness and verbal responsiveness.

Each oil blend has been formulated to bring about a specific effect. In order to ascertain the relationship between a given effect and the specific blend, each participating home introduced one of the three blends. Data collected at each location included enumeration for all dependent variables and relevant demographic information.

Prior to the initiation of the study in participating facilities, a small pilot study took place in one home. The oil used during the pilot was *Restore Peace*, a blend of grapefruit and frankincense oils. The pilot study took place over a period of three months. Month One constituted a baseline; no oils were used. Data were collected over Months Two and Three with oils administered by patch application. The purpose of conducting a pilot study was to test and refine protocols to be used in the larger study.

After completion of the pilot study, facilities were selected for the larger project. Eleven homes in Texas initially agreed to participate in the study. One to two people from each facility attended a one-day training session with the researchers and Ms. Farnell. Each facility was given a copy of the *Scentsible Solutions Aromatherapy Program Training Manual.* Procedures for use of the oil blends, timelines, and data collection were explained. Upon return to their facilities, the trained individuals obtained authorization from participating elders or their representatives. See appendices for data collection tools, procedures, and consent forms.

The initial study design was to have a "treatment neighborhood" and a "control neighborhood" within each of the participating nursing homes. Due to the small number of eligible persons at each facility and the smaller number of residents living in the rural nursing homes, this did not always occur. It was not possible to provide separate areas within the homes for a control group and a treatment group. Instead, dependent variables were measured before, during, and after the introduction of a specific oil blend in each facility.

Results

Pilot Study

Twenty-six people participated in the pilot study. The mean age for participants was 85.5. There were 13 males and 13 females. Mean age of men was 84.45; mean age of women was 86.3. All individuals were Caucasian. Educational levels were reported as: 31% attended high school or graduated from high school, 23% attended college or received an associate degree, and 46% held a college degree. Equal percentages were reported as widowed or married (46%) while 8% had never been married. The majority, 65%, of the participants were ambulatory.

Most people (77%) were diagnosed as suffering with Alzheimer's disease, dementia, or a mental disorder. All of those in the study carried a diagnosis of cardiovascular disease. Individuals were also under treatment for a variety of other chronic illnesses. The mean number of diagnoses per individual was 7.3. The disorders included (in addition to those already mentioned) endocrine, nutritional, neoplastic, neurogenic, digestive, genitourinary, musculoskeletal, and congenital disorders.

Of the 26 participants, 13 served as controls and were not exposed to the oil blend. The oil blend used during the pilot study was *Restore Peace* (Frankincense and Grapefruit oils). There were no significant findings regarding either group. Of the variables being measured (yelling, cursing, biting, hitting, scratching, kicking, crying), very few occurred over the three-month period. Table One shows all incidents (20) occurring for all 26 residents within 3 months. Of these 20 reported incidents, 12 were attributed to one gentleman (*). The pilot study was utilized to establish protocols for the full study. However, the population, as a whole, experienced too few incidents to note whether or not any trends regarding changes in incidents may have occurred through introduction of aromatherapy.

Table 1. Pilot Study – Tabulation of Incidents

	Number of Residents	Number of Incidents	Type of Incident
Month 1 Baseline No Oils	1 1 1 1*	1 1 1 1	Yelling Crying Yelling Yelling
Month 2 Oils	1 1 1*	1 1 4	Yelling Crying Yelling/Cursing
Month 3 Oils	1 1* 1	2 7 1	Hitting/Kicking Yelling/Cursing Yelling

Full Study

Four facilities participated in the full study. An explanation of the attrition from 12 facilities as planned to the actual 4 homes that participated is provided in the Discussion Section. Three different oil blends were tested in these homes. One blend, *Restore Peace*, was tested in two of the homes. Of the remaining two facilities, one tested *Helps Insomnia and Pain* and one tested *Promote Alertness*. The time table followed the protocol described on page 9..

Demographics

A total of 39 people participated in the study. The mean age was 79.8 with a range of 41 to 90. A breakdown by decade is provided in Table 2.

Table 2 – Age of participants

Age by decade	Percent
40s	5%
60s	5%
70s	15%
80s	54%
90s	8%
Unknown	13%

Females comprised 66.7%; males, 25.6%. Gender was not reported in 7.7% of the sample. Marital status was reported as 23.1% of the persons were married at the time of the study; 53.8% were widowed; 2.6% divorced; 7.7% never married; and 12.8% not reported. Of the people in the study Caucasians accounted for 79.5%; Black, 5.1%; and Hispanic 10.3% with 5.1% non-reporting. Just over half (56.4%) of the participants were non-ambulatory. The distributions vary within each individual facility; these variations will be noted as findings in each home are discussed.

A majority (72%) of the participants carried a diagnosis of Alzheimer's disease, dementia, or a mental health disorder. 36% of that majority had a diagnosis of Alzheimer's or dementia along with psychiatric disorders (from 1 to 5 additional diagnoses). Most people also had chronic illnesses such as diabetes, endocrine disorders, cardiovascular problems, respiratory illnesses, digestive disorders, infections, and genitourinary complaints.

Oil Blends

Helps Relieve Insomnia and Pain

Helps Relieve Insomnia and Pain, a blend of lavender and bergamot, was used in one nursing home. Of the seventeen people who were present at the initiation of the study, eleven remained until the conclusion of the study. Participants were individuals with a history of insomnia. A demographic overview is provided in Table 3. Demographic information was not provided to the researchers for 2 individuals who participated in the study.

Table 3 – Demographics *Help Relieve Insomnia and Pain*

Age (Mean)	85.8		
Gender	Male = 3	Female = 6	
Ethnicity	Caucasian = 9		
Marital Status	Married = 3	Widowed = 6	
Ambulation	Ambulatory = 1	Non-ambulatory = 8	
Education Level	High School = 1	Some college = 6	Coll. Grad. = 2

Of the nine people for whom diagnostic information was supplied, 78% (7 individuals) were diagnosed with Alzheimer's disease, dementia, or mental disorders. Six of those seven people were also under treatment for cardiovascular conditions. Eight of the nine people had digestive disorders including peptic ulcer, esophagitis and gastric hemorrhage. Additionally, all people had multiple diagnoses of a variety of chronic illnesses including endocrine, nutritional respiratory, genitourinary, and musculoskeletal disorders.

Detailed records were maintained for five months during the evening and night shifts. The nursing staff recorded the "number of times awake during nocturnal hours." This number ranged from a low of 0 times per night to a high of 6 times per night. Most people awakened 1-3 times each night. This number remained constant throughout the 5 months of the study. When viewed from a weekly perspective, the number of times awake per week ranged from six to forty-five times per week. Linear regression revealed no significant changes for nine of eleven people. Findings for two people were significant; however, these people became more wakeful as time went on. Upon questioning the nurses regarding these two people, it was noted that one person developed an intractable urinary tract infection and the other individual was hospitalized several times over the course of the study period. A urinary tract infection and disruption in familiar behavior patterns due to frequent hospitalizations could affect sleep patterns and increase nocturnal awakenings.

Restore Peace

Restore Peace, a blend of frankincense and grapefruit oils, was tested in two homes. Data were examined utilizing linear regression, descriptive analyses, comparison of means, bivariate correlation, and Wilcoxin signed ranks nonparametric testing of all variables on both a monthly and weekly basis. Cumulative results by facility (all participants) and by individual participant were also researched.

Facility One

Demographic information about the participants from the first facility are presented in Table 4.

Table 4. Demographics Facility One

Age (Mean)	81		
Gender	Male = 3	Female = 10	
Ethnicity	Caucasian = 13		
Marital Status*	Married = 3	Widowed = 6	Divorced = 1
Ambulation	Ambulatory = 13		

*3 not reported

Other than cardiovascular ailments (present in 69%), this group did not experience the array of chronic illnesses exhibited at the other facilities. Although individuals carried many diagnoses (ranging from 3 to 8), the majority of those diagnoses were coded mental or nervous system disorders. Of the thirteen participants, 92% were diagnosed with Alzheimer's disease, dementia, or mental disorders. Within this group 69% were diagnosed with both Alzheimer's disease and a psychiatric illness. Additionally a relatively high number (38%) were dysphagic.

Examination of data based on monthly averages reveals that of thirteen people completing the study, improvements occurred in some aspect of his or her life for **each** participant. Examples of the more profound changes are presented in Table 5.

Table 5. Monthly Incidents – Comparison by Person

Person A	Wandering	Yelling
Mean per month without essential oil	45	50
Mean per month with Restore Peace	36	22
Person B	Attempts to leave	Repetitive Motion
Mean per month without essential oil	30	22
Mean per month with Restore Peace	5	0
Person C	Attempts to leave	Repetitive Motion
Mean per month without essential oil	45	46
Mean per month with Restore Peace	18	32
	Wandering	Crying
	46	52
	28	28
Person D	Attempts to leave	
Mean per month without essential oil	17	
Mean per month with Restore Peace	1	
Person E	Attempts to leave	Hitting
Mean per month without essential oil	33	9
Mean per month with Restore Peace	18	5
Person F	Attempts to leave	
Mean per month without essential oil	18	
Mean per month with Restore Peace	7	
Person G	Repetitive Motion	Hitting
Mean per month without essential oil	14	7
Mean per month with Restore Peace	0	0

Paired samples correlations yield significant differences in cumulative incidents by type based on monthly averages (all participants included). Table 6 illustrates these findings.

Table 6. Paired Samples Correlations*

Behavior	Correlation	Significance
Yelling	.999	.000
Cursing	.959	.000
Kicking	.979	.000
Attempts to Leave	.814	.001
Repetitive Motion	.833	.001
Wandering/Sundowning	.594	.042
Crying	1.00	.000
Other**	.925	.000

* All incidents are paired with and without oils.

**Stays in bed; beating on windows; stays in room

No significant differences occurred upon examination of the following incidents: biting, hitting, scratching, and falls.

A two-tailed t -Test of all incident categories across all participants comparing the mean for 2 months using no oils with the mean of 3 months with oils was significant at .004 indicating fewer incidents occurring during the months when essential oils were used.

Plotting the means of the 5 months of the data collection period provided too few data points to conduct linear regression. Therefore, data were plotted over the course of the study on a *weekly* basis. Table 7 reveals significant findings regarding individual participants' behavioral changes over 21 weeks. Significant improvements were recorded for 6 of 12 people at Facility One.

Table 7. Weekly Behavioral Changes – Facility One

Participant ID	Variable	Significance
11	Attempts to leave	.011
	Wandering/Sundowning	.031
12	Attempts to leave	.000
	Wandering/Sundowning	.001
	Crying	.002
	Total of all tracked variables	.010
13	Wandering/Sundowning	.000
	Total of all tracked variables	.001
14	Attempts to leave	.000
	Wandering/Sundowning	.000
	Total of all tracked variables	.000
16	Attempts to leave	.000
	Wandering/Sundowning	.000
	Total of all tracked variables	.000
25	Repetitive motion	.000
	Wandering/Sundowning	.001
	Total of all tracked variables	.000

Figure 1 provides a plot of the number of times each week that Participant #11 attempted to leave the facility. Weeks 1-4 provide a baseline; no essential oils were used. *Restore Peace* was used during weeks 5 – 17. Again, no oils were uses during weeks 18 – 21. Other variables listed in Table 7 yield similar graphs.

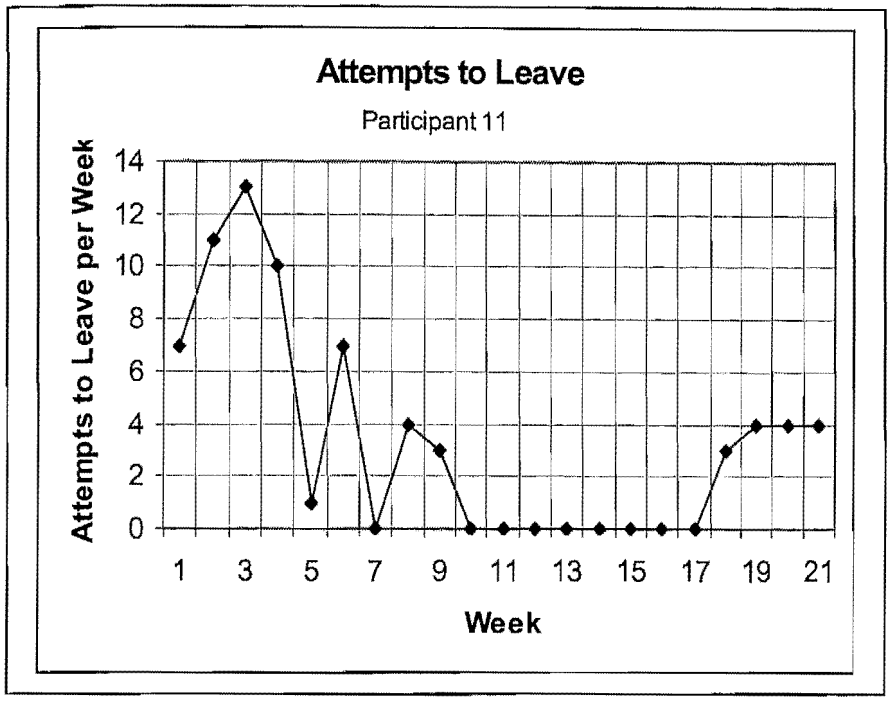


Figure 1

Of the remaining 6 participants at Facility One, regression results were not significant. Exceptions include significant findings of a *reversed* direction for specific behavior of 4 people. Table 8 gives these findings.

Table 8. Reversed Behavioral Changes

Participant ID	Variable	Significance
17	Repetitive Motion	.022
21	Wandering/Sundowning	.033
21	Cursing	.033
22	Repetitive Motion	.011
23	Repetitive Motion	.003

Over the course of analyses of data collected at Facility One, it became apparent that a definitive pattern was occurring among most of the participants. During the fourth month of the study, a month during which oils were administered, behavioral incidents spiked. In view of the decline in overall cumulative events,

this pattern was not only noticeable but unanticipated. Consider patterns of similarity depicted on the graphs in figures 2 – 4. Note the marked increase in incidents for participants 10, 12, 16, 17, 21, 22, 23, and 24. Upon questioning the staff of Facility One, it was discovered that the bottle of oil that was used during month 4 was not the blend *Restore Peace.* It was, in fact, a bottle of pure carrier oil – the oil that was to be used as a control. The bottle contained no essential oils.

Figure 2

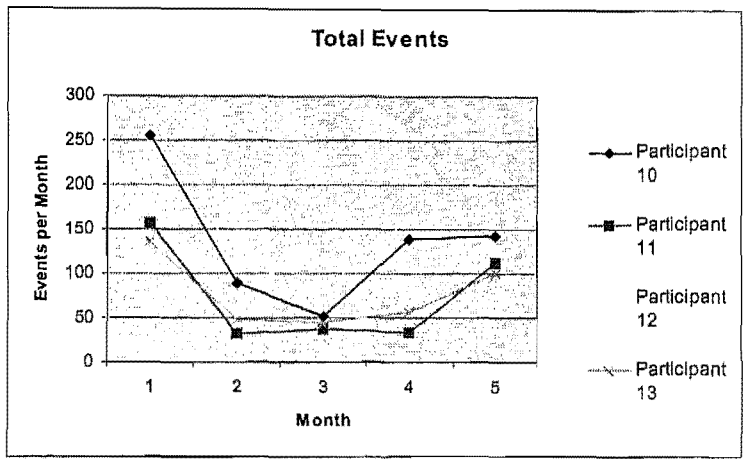


Figure 3

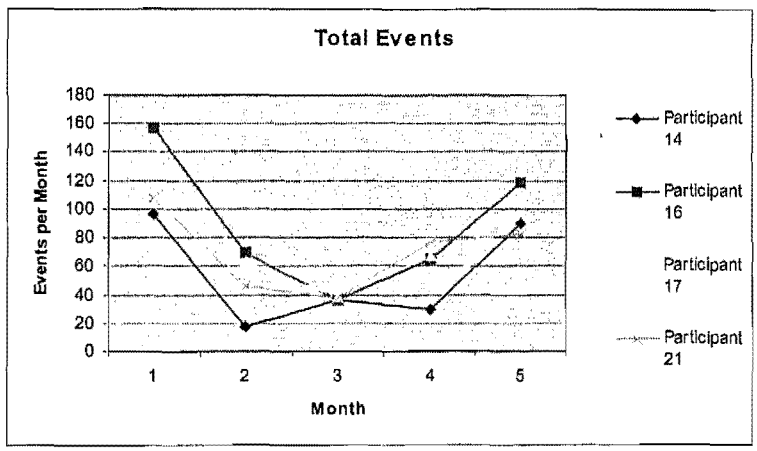
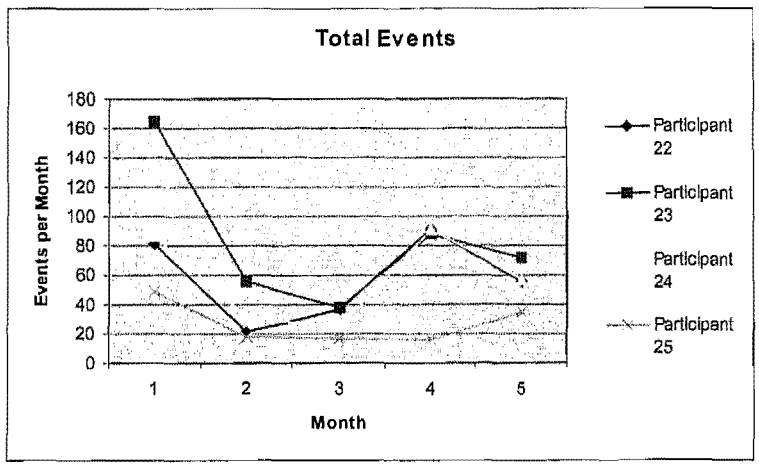


Figure 4



An additional chart shows all reported events for all participants. (Figure 5) Here, again, the downward trend noted between the baseline and the second month of the trial period is abruptly interrupted by an increase of events during the third month of the trial period.)This month is identified as Month 4 in Figures 2 – 4.) The actual figures are presented in Table 9.

Another unit at Facility One served, loosely, as a control. Documentation was not maintained on people living there. The nursing staff reported that incidents of the type being tracked by the study were "out the roof."

Figure 5. Cumulative Events – Facility One

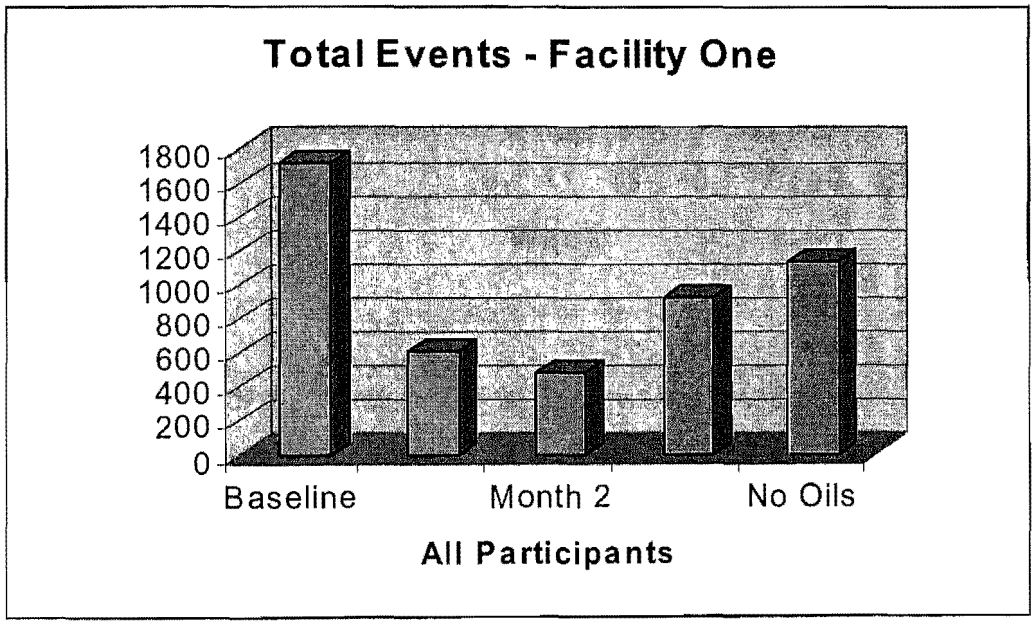


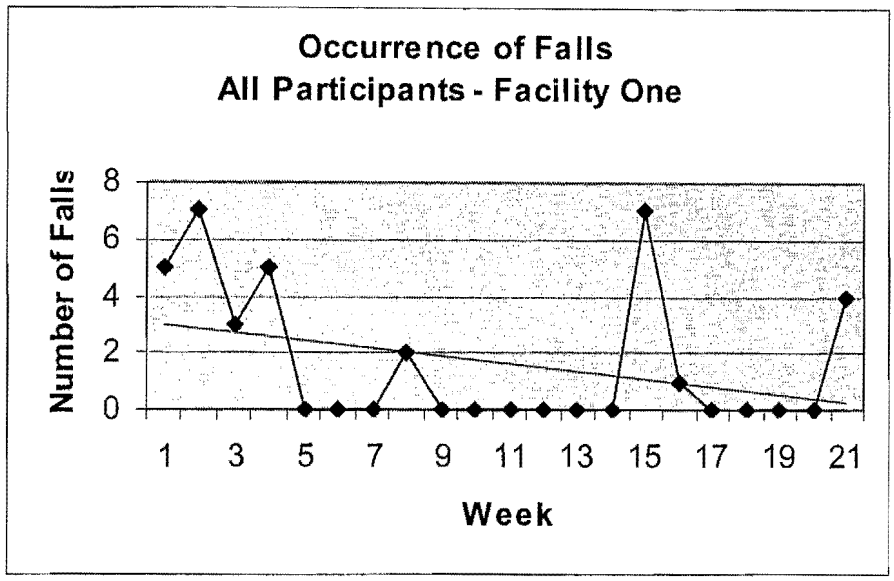
Table 9. Total Events – Facility One

Baseline	1718
Month 1	604
Month 2	481
Month 3	918
No Oils	1132

The nursing staff reported that there were fewer falls during the time that *Restore Peace* was utilized. Figure 6 reveals a distinct downward trend in the number of falls until week 15. The sharp increase in week 15 corresponds with

the switch to a carrier oil. While the findings are not significant (p =.130) for the 21 week study period, a regression analysis of weeks 1 – 14 is significant (p = .002)

Figure 6. Cumulative Falls



Perceptions of the nursing staff at Facility One are highly favorable regarding the use of aromatherapy. In the words of the RN responsible for the data collection: "Overall there was a sense of calmness. I feel that the study was successful. The residents seemed happier, quieter, calmer, and much more relaxed." Her notes regarding the study are delineated below:

- Decrease in use of antipsychotic drug use. Two residents were able to have their psychotropic medications discontinued.
- Decrease in resident to resident confrontations – only had one while study going on and 3 since conclusion of study.
- Decreased agitation of the entire group of residents involved in the study.
- Decrease in sundowning.
- Decrease in repetitive behavior and verbalization.
- Decrease in refusal of ADL's.

- Increase in heightened awareness. People were able to finish programs. Attention span seemed longer.
- Decreased falls over study period
- Less pacing noted.

Perhaps the most powerful information to come from Facility One is the story of an elder we will call Sally. Sally, described by the staff as a sweetheart, "hollered" non-stop. The only time she was not yelling (loudly), was when she was sleeping. Within one week after Restore Peace was introduced, her screaming decreased by 50%. By the end of the second week, it had stopped completely. Even after the completion of the study, she shrieks only occasionally. She no longer takes Respiridol, an antipsychotic medication, and she was able to move off the "dementia unit" into another part of the facility.

Facility Two

Restore Peace was also tested at Facility Two. Six people participated. Four persons were exposed to the oil blend following the patch application protocol; two people were exposed to a carrier oil by the same protocol and served as a control factor. Participants' demographic data are presented in Table 10.

Table 10. Demographics Facility Two

Age (Mean)	75	(Includes one 41 years old)	
Gender	Male = 0	Female = 6	
Ethnicity	Caucasian = 1	Black = 2	Hispanic = 3
Marital Status	Never Married = 2	Widowed = 2	Unknown = 2
Ambulation	Ambulatory = 0	Non-ambulatory = 6	
Education Level	Not documented		

Contrasting the demographics of the two homes testing *Restore Peace* (Tables 4 and 10), we note greater ethnic diversity at Facility Two (all white at Facility One: White, Black, Hispanic at Facility Two), one-third males at Facility Two (all females at Facility Two), and all ambulatory (Facility One) versus all nonambulatory (Facility Two). All persons at Facility Two were diagnosed with some form of dementia or mental illness. Mental disorders counted for 1 – 5 diagnoses per person. Additionally, 67% had endocrine disorders (hypothyroidism, diabetes).

There were no significant findings based on data tracked on an individual weekly or monthly basis at Facility Two.

Promote Alertness

Promote Alertness is constituted of orange and rosemary essential oils. This oil blend was tested in one small rural home. A demographic profile of the people participating is shown in Table 11.

Table 11. Demographics *Promote Alertness*

Age (Mean)	75.5	(Includes one 43 year old)	
Gender	Male =4	Female = 5	
Ethnicity	Caucasian = 8	Hispanic = 1	
Marital Status	Married = 3	Widowed = 5	Never Married = 1
Ambulation	Ambulatory = 1	Non-ambulatory = 8	
Education Level	Not documented		

The people living in this facility who participated in the study carried an assortment of diagnoses. Seven were diagnosed with cardiovascular ailments. Of those seven people, two were diagnosed with psychiatric disorders; two with Alzheimer's, and three with diabetes. Of the remaining 2 people, one had muscular dystrophy and one had renal disease and diabetes. The diagnoses listed above are the primary diagnoses. Most individuals were saddled with several additional diagnoses. The average number was 3 within the group ranging from 1 to 6.

Five people received patch application inhalation and four people received a carrier oil by the same method, thus serving as a control group. Data regarding vital statistics, medications, physical and verbal aggression, movement, falls, emotional incidents, sleep patterns, and meal intake were recorded for all individuals.

There were no significant differences pertaining to any of these data. However, this specific oil blend was designed to promote alertness. None of the aforementioned variables provide a clear indicator of an alert mental status. That designation is highly subjective on the part of the observer and varies from one observer to the next. A clear numerical analysis of alertness was not defined during the study. However, anecdotal information regarding two of the five participants (40%) offers some insight into the perceived success of using the oils.

Mrs. B always remained in bed before the aromatherapy program started. She refused to leave her room and participated in no activities. She offered many complaints throughout the day about the place she is living and about her life in general. After being introduced to the Promote Alertness oil, a staff member gave the following description of Mrs. B: "She is now a completely different person. She is out of her room a lot and enjoys almost every activity that is offered. She no longer complains very much. She is doing very well."

As shared by staff, "Mr. S. was always very tired and always sleeping. He had no energy to do anything. Now he has lots of energy and goes out with his family. His wife takes him out for three days, and she says he does real good when he is at home. He walks now; before he didn't. He is more alert now. So he is doing real good."

These words were written by Mr. S.'s wife: "I thank God for person or persons like you for going all the way out to make someone like my husband and others to do better. And I can tell in my husband that he is doing better, a lot better. At first he was sleeping a lot, angry, didn't want to do anything. He'd want me to do everything for him when I took him home for a visit. But now he's more alert, we made plans to renew our wedding vows, a week before, and I

asked him what are we going to do Saturday, he'd say getting married, which other times he'd forget right away. I asked him do you want me to push you in the wheelchair at church, he told me no I'll walk, and he did. He used to play the accordion and the guitar, but after all that he's been through; he had lost the ability and interest to play. Now he's trying to play again. Thank you very much."

Discussion and Recommendations

Results of this study warrant further investigation into the efficacy of using aromatherapy in a long term care setting. The profound benefit described for a number of the participants, particularly those living at "Facility One" adds support to previous studies.

Multiple methodological problems plagued the study. The lack of consistent control groups in two of the four facilities eliminated the possibility of comparison groups. Essential oils have characteristic odors. Individuals who are administering the oils know the fragrance of the oils under study. In many cases, the elders are also aware of the specific odor. Thus blinding for the treatment is not an option.

As stated previously, eleven facilities elected to participate in the study. A total of 200 individuals were selected to take part in the research: 100 subjects, and 100 controls. A designated person in charge of the study at each facility determined which oil blend was most appropriate for each particular population. Their choices were based on the prevalence of the specific issues to be "treated" by each blend included in the study. The initial study plan follows:

		Subjects	Controls
Helps Relieve Insomnia and Pain	3 homes	20	20
Restore Peace	3 homes	30	30
Promote Alertness	2 home	20	20
Appetite Stimulant	3 homes	30	30

After the initiation of the study, at various time intervals, seven homes dropped out for a variety of reasons. Four cancelled due to lack of administrative support (i.e. the corporation that initially approved the project never signed the requisite contract). In one facility in which the study was well underway the Director of Nursing (D.O.N.) stopped the study because she didn't like the odor of the oils. In another facility, all data had been collected. However, the D.O.N. resigned her position at the facility. It is the researchers' understanding that she maintained possession of the data, and all attempts to contact her have been unsuccessful. The remaining two homes gave no reason or explanation for their decisions not to participate.

Thus sample sizes that began as borderline from the perspective of each oil blend being evaluated individually became very small; too small to conduct a trial with sufficient statistical power. A larger study is recommended, one in which each single oil blend is evaluated at several sites.

Comments about the results regarding each facility are offered below:

Promote Alertness: Quantitative results were not statistically significant. However, anecdotal evidence was powerful. A very small sample size occurred. The data collection form utilized for this study did not capture alertness. A more effective method of tracking and measuring alertness needs to be developed for any future studies.

Helps Relieve Insomnia and Pain: Again, the small sample size precludes dependable results. Additionally, the quantifying variable, number of times awake, is not a good way to determine effectiveness of this oil blend. The "number of times awake during nocturnal hours" ranged from a low of 0 times per night to a high of 6 times per night. Most people awakened 1-3 times each night. With this particular population arising 1-2 times a night could be considered a norm. A better indicator might be a measurement of alertness and attentiveness during waking hours. However, as stated above, this instrument needs to be developed. Another factor for consideration when investigating insomnia should be the attention that has been given by the administration to providing a

transformative environment. This home has been well entrenched in the culture change movement and has been an Eden Alternative© home for many years.

Restore Peace: This oil blend was tested in two homes with seemingly opposite outcomes in terms of statistical significance. As noted previously, all participants at Facility One were ambulatory, and all participants at Facility Two were not. High percentages of individuals suffering from Alzheimer's disease or dementia lived at both homes. The fact the people at Facility Two were not ambulatory may be indicative of late stages of Alzheimer's disease. This factor may have influenced the seeming lack of effectiveness of the oil blend observed in the data that were collected. The words of the RN in charge of the study at Facility One further support the statistical outcomes: "Overall there was a sense of calmness. I feel that the study was successful. The residents seemed happier, quieter, calmer, and much more relaxed. We had no more resident-to-resident confrontations. It is just so much more peaceful. The more relaxed atmosphere on the unit greatly affected the staff who work there."

In view of growing concern regarding the widespread use of pharmaceuticals in treating long term care residents and associated problems (questionable efficacy, interaction with various drugs prescribed for chronic illnesses, and side effects) a sage alternative could be the use of aromatherapy. It could alleviate these issues for many, many people. Costs associated with essential oils are minimal compared to pharmaceuticals. Quantitative and qualitative research that supports the effectiveness of aromatherapy provides an avenue of treatment that has the potential for huge cost reductions for both individuals and government providers.

The most important reason, however, to continue investigation into the use of aromatherapy in long term care settings involves the possibility of better quality of life for elders and caregivers. While controlled studies remain few and, in some cases, inconclusive, anecdotal testimony is abundant. Researchers must continue to explore all avenues.

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Appendix A
Definitions

Amygdala – an almond-shaped mass of gray matter in the front part of the temporal lobe of the cerebrum that is part of the limbic system and is involved in the processing and expression of emotions, especially anger and fear

Analgesic – a remedy that relieves or allays pain

Anosmic – absence or loss of the sense of smell

Antipsychotic – counteracting or diminishing the symptoms of psychotic disorders, such as schizophrenia, paranoia, and bipolar disorder

Antispasmodic – capable of preventing or relieving spasms or convulsions

Anxiolytic – a drug that relieves anxiety

Cardiovascular – of, pertaining to, or affecting the heart and blood vessels

Chlorpromazine – a drug (trade name Thorazine) derived from phenothiazine that has antipsychotic effects and is used as a sedative and tranquilize

Congenital – of or pertaining to a condition present at birth, whether inherited or caused by the environment

Diaphoretic – producing or increasing perspiration

Digestive – pertaining to the digestive system (esophagus, stomach, intestines)

EEG – electroencephalogram - a graphic record of the electrical activity of the brain

Efferent – conveying or conducting away from an organ or part

Endocrine – the secretion of an endocrine gland (hormone) or relating to an endocrine gland

Enfleurage – a process of extracting fragrance by exposing inodorous oils or fats to the exhalations of flowers

Esophagitis – inflammation of the esophagus

Gastric – pertaining to the stomach

Genitourinary – pertaining to the genitals and urinary tract

Hemmorhage – profuse bleeding, externally or internally

Hypnotic – an agent or drug that produces sleep; sedative

Limbic system – a group of interconnected deep brain structures, common to all mammals, and involved in olfaction, emotion, motivation, behavior, and various autonomic functions

Linalyl acetate – a colorless, water-insoluble liquid, $C_{12}H_{20}O_2$, having a pleasant odor: used chiefly in perfumes, cosmetics, toilet water, and soap

Lipid – any of a group of organic compounds that are greasy to the touch, insoluble in water, and soluble in alcohol and ether: lipids comprise the fats and

other esters with analogous properties and constitute, with proteins and carbohydrates, the chief structural components of living cell

Mucosa – mucus-secreting membrane lining all body cavities or passages that communicate with the exterior

Musculoskeletal – concerning, involving, or made up of both the muscles and the bones

Neoplastic – pertaining to an abnormal growth of tissue in animals or plants Neoplasms can be benign or malignant. Also called tumor

Neurogenic – originating in the nerves or nervous tissue or caused or affected by the nerves or nervous system

Neurolytic – pertaining to the disintegration of nerve tissue

Nitrazepam – a powerful hypnotic drug which possesses strong sedative, anxiolytic, amnesic, anticonvulsant, and skeletal muscle relaxant properties

Olfactory – of or pertaining to the sense of smell

Sedative – An agent or a drug having a soothing, calming, or tranquilizing effect

Sundowning – The onset or exacerbation of delirium during the evening or night with improvement or disappearance during the day; most often seen in mid and later stages of dementia disorders, such as Alzheimer's disease

Tonic – An agent, such as a medication, that restores or increases body tone

Vulnerary – a remedy used in healing or treating wounds

Appendix B

Data Collection Forms

Data Collection Instructions

Blood Pressure/Weight

Please record weekly.

Medications (Include standing and p.r.n. medications)

Put name of medication in parenthesis. Only chart a change in the normal pattern of medications administered. If no changes, leave blank.

Please use the following scale:

1. Increase in dose
2. Decrease in dose
3. discontinuation of medication
4. PRN dose given

Verbal Aggression/Physical Aggression/Movement

Record number of occurrences in 24 hour time period. If no occurrences, leave blank.

Emotional Incidents

Record number of occurrences in 24 hour time period. Please write the type of incident if other than those listed.

Meal Intake

Record only on people who are at risk. Record percentage intakes for each meal.

Demographic Intake Form

Resident	
RI Code	
Admission Date	
Age	
Gender	Male_____ Female_____
Ethnicity	White ____ Black____ Hispanic____ Asian and Asian American____ American Indian____ Other____
Marital Status	Married_____ Widowed _____Divorced_____Never Married_____
Highest Level of Education	Less than 8th grade____Completed 8th grade____ Attended high school____ High school graduate or equivalent____ Attended college and or associate degree____ College graduate____ Post graduate work_____
Ambulatory	Yes _____ No_____
Diagnosis Codes* ICD-9	1_____ 2_____ 3_____ 4_____
Diagnosis Codes* ICD-9	5_____ 6_____ 7_____8_____
If Alzheimer's diagnosis, please denote stage	

Aroma Alternatives: Use of Essential Oils in Nursing Homes —— Data Sheet

Description of Entry	Days of the Month																													
Vital Statistics	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Weight (Record Weekly)																															
Blood Pressure (Record Weekly)																															
Psychotropic & PRN Medications	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1.																															
2.																															
3.																															
Verbal Aggression	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1. Yelling																															
2. Cursing																															
Physical Aggression	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1. Biting																															
2. Hitting																															
3. Scratching																															
4. Kicking																															
Movement	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1. Attempts to leave																															
2. Repetitive motion																															
3. Wandering/Sundowning																															
4. Falls																															
Emotional Incidents	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1. Crying																															
2. Bath anxiety																															
3. Other																															
Sleep Patterns	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Number of times awake during noc.																															
Meal Intake	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Breakfast																															
Lunch																															
Supper																															

Resident Name:	Resident Identification Code:	Facility Name:	Month:

Use of Essential Oils in Nursing Homes - Consent Form

You are invited to participate in a research study that will examine the effects of using essential oils in a nursing home. A specific blend of oils (Frankincense and Grapefruit) will be applied to a patch that is attached to the your clothing.

Sandy Ransom, RN, MSHP - Director of the Texas Long Term Care Institute at Texas State University-San Marcos and Jackie Farnell, LMT, LE – co-owner of the Farnell Clinic, LLC in Aiken, South Carolina are conducting this study.

Procedure: If the resident decides to participate, he or she will be asked to do the following:

1. Sign this consent form or have this consent form signed by his/her legal representative
2. Allow the aromatherapy patch to be applied to his/her clothing on a daily basis during the research
3. Permit the nursing facility to complete the data collection tool with personal information.

Information will be collected over the period of three months to determine any changes that might occur. The information that will be analyzed includes the following: Weight, Falls, Blood Pressure, number of Psychotropic Medications, Food Intake percentages, Disturbed Sleep incidents, Disruptive or Combative incidents, and Sundowning incidents

Risks and Benefits: This research has minimal potential of risk. You will be free to continue or discontinue your participation in this study at any time.

Confidentiality: The records of this study will be kept private. In any report that is written or published, it will not be possible to identify any particular individual or facility. All information will be reported as overall results. No one will be able to connect any information with you.

Voluntary Nature of the Inquiry: You are under no obligation to participate in this study. Your decision whether or not to participate will not influence your future relations with Texas State University. If you decide to participate, you are free to discontinue participation at any time.

Contacts and Questions: If you have any questions, please contact: Sandy Ransom, at 512-245-8234 or Ransom@txstate.edu or the Texas Long Term Care Institute, at 512-245-8234 or TLC-Institute@txstate.edu or IRB Contact, Office of Sponsored Programs Texas State University, at 512-245-2314. You will be provided with a copy of this form for your records.

You are making a decision whether or not to participate. Your signature indicates that you have read the information provided above and have decided to participate.

_____ _____

Signature of Participant (Person Providing Consent) Date

_____ _____

Signature of Legal Representative (In lieu of Participant) Date

_____ _____

Signature of Investigator (Person Obtaining Consent) Date

Appendix C

Procedures

Aroma Alternatives: Use of Essential Oils in Nursing Homes

PROCEDURE

The use of essential oils will be included in the resident's Care Plan and monitored for effectiveness especially in coordination with reduction of drug therapy (ies), weight loss, and palliative care.

Each essential oil used individually or in a blend of two or more oils shall be added to facility's MSDS documentation as required by state and federal regulations.

Residents who wish to participate in this program must sign the Aroma Alternatives Consent Form.

PROTOCOL FOR THERAPEUTIC ESSENTIAL OIL USAGE

- **Weight Gain Stimulation:**

  Appetite Stimulant (grapefruit, clove)
  Place 1-2 drops on the pre-glued felt cut out, adhere to collar.

- **Sun-Downing, Disruptive Behaviors, Depression:**

  Restore Peace (grapefruit, frankincense)
  Place 1-2 drops on the pre-glued felt cut out, adhere to collar.

- **Insomnia, Pain, Bath Anxiety:**

  Helps Relieve Insomnia & Pain (lavender, bergamot)
  Insomnia: place 1 drop on the pillowcase.
  Pain: place 1 drop on a tissue, allow resident to inhale.
  Bath anxiety: place 1 drop on warm, wet wash cloth, allow resident to inhale.

- **Stimulant for Activity or Memory Work:**
  Promote Alertness (orange—rosemary)
  Place 3-4 drops on the Fan Fuser pad or place 1 drop on tissue and inhale.
  Avoid with Epilepsy and High Blood pressure

CARING & CAUTION FOR YOUR OILS

- **Some essential oils or blends of oils may be toxic, never take orally or use internally.**
- **Tea Tree and Lavender may be used on the skin. No other oils can be applied directly to the skin may result in burning of the skin.**
- **Essential oils are volatile (evaporate in air) therefore, caps must be kept closed.**
- **Do not leave your oils in sunlight or the car. Heat will destroy effectiveness.**
- **Lemon and Orange are photosensitive (may cause sunburn).**
- **Do not use the essential oil if you are allergic to the plant.**
- **Keep oils out of the reach of children or those that might be confused about their usage.**

OTHER CONSIDERATIONS

Women who are or may become pregnant should contact the Administrator or Director of Nursing for a full list of oils that should be avoided during pregnancy.

- **Safety Guidelines for Pregnant Women:**
  - Use 1-1 ½ % dilution of essential oils to mixing oils/lotions during pregnancy.
  - Avoid **all** essential oils during the first trimester if miscarriage is a concern or has been a concern in past pregnancies.

Policy/Procedures Reviewed/Revised	
	Date:_____ By: Quality Mgmt Committee _____
	Date:_____ By: Quality Mgmt Committee _____
	Date:_____ By: Quality Mgmt Committee _____
	Date:_____ By: Quality Mgmt Committee _____

Appendix D
Material Safety Data Sheets

Material Safety Data Sheet
Scents-ible Solutions, LLC 218 York St. SE Aiken, SC 29801 803-642-0018

I. IDENTIFICATION: BERGAMOT OIL (Citrus bergamia)
Fema #: 2153 CAS# 8007-75-8 ***" HELPS RELIEVE INSOMNIA-PAIN"***

II. II. PHYSICAL DATA:
Odor and Appearance:_____ green to olive liquid with characteristic odor
Specific Gravity:_____ 0.880-0.910
Boiling Point:_____ N/F Not Found
Melting Point:_____ N/F
Vapor Pressure:_____ N/F
Optical Rotation:_____ N/F
Refractive Index:_____ N/F
Solubility in Water:_____ not soluble
Solubility in Alcohol:_____ N/F

III. III. FIRE EXPLOSION AND REACTIVITY:
Flash Point:_____ 55^0C
Stability:_____ Stable under normal conditions
Extinguishing Media:_____ ___Water/Fog, _X_Carbon Dioxide, _X_Foam, _X_Dry Chemical
Special Procedures:_____ none
Hazardous Combustion/Decomposition Products: Burning liberates Carbon monoxide, Carbon dioxide, Water and Smoke.
Hazardous Polymerization:_____ Will not occur.
Conditions and Materials to avoid:_____ Avoid Heat and Flames.

IV. PROTECTION INFORMATION:
Respiratory Protection:_____ Not usually required.
Eye Protection:_____ Wear chemical safety goggles.
Skin Protection:_____ Wear oil/solvent resistant gloves.
Ventilation:_____ Mechanical.
Other: _____ Follow good manufacturing procedures.

V. HEALTH HAZARD DATA:
Health Hazard Determination:_____ N/F
Threshold Limit Value (TLV):_____ N/F
OSHA Permissible Exposure Limit (PEL):_ N/F
Has Substance been listed as a Carcinogen:_____YES ___X__NO

VI. VI. EMERGENCY AND FIRST AID PROCEDURES:
Inhalation:_____ Remove to fresh air and call physician.
Eye Contact:_____ Remove contact lenses, clean eye with cooking or fixed oil, then irrigate with water for at least 15 minutes. If irritation persists, get medical advice.
Skin Contact:_____ Wash with soap and water. If irritation persists, obtain medical advice.
Ingestion:_____ Rinse mouth with water and obtain medical advice.

VII. SPILLS, LEAKS AND DISPOSAL PROCEDURES:
If material is spilled or released:_____ Remove source of ignition, absorb free material on saw-dust or other absorbent material. Dispose in approved manner.
Waste disposal methods:_____ Incinerate or remove to landfill in accordance with local state and federal regulations.

Material Safety Data Sheet

Scents-ible Solutions, 218 York St. SE Aiken, SC 803-642-0018

I. IDENTIFICATION: FRANKINCENSE ESSENTIAL OIL (Ollibanum Carterii)
Fema #: 2816 CAS #: 8016-36-**2** **"Restore Peace"**

II. II. PHYSICAL DATA:

Odor and Appearance:_____ Balsamic odor w faint lemon note, pale yellow oil
Specific Gravity:_____ 0.862-0.889
Boiling Point:_____ N/F **N**ot **F**ound
Melting Point:_____ N/F
Vapor Pressure:_____ N/F
Optical Rotation:_____ N/F
Refractive Index:_____ N/F
Solubility in Water:_____ insoluble
Solubility in Alcohol:_____ N/F

III. III. FIRE, EXPLOSION AND REACTIVITY:

Flash Point: CLOSED CUP_____ 95^0F
Stability:_____ Stable under normal conditions
Extingulshing Media:_____ ___Water/Fog, _X_Carbon Dioxide, _X_Foam, _X_Dry Chemical
Special Procedures:_____ none
Hazardous Combustion/Decomposition Products: Burning liberates Carbon monoxide, Carbon dioxide, Water and Smoke.
Hazardous Polymerization:_____ Will not occur.
Conditions and Materials to avoid:_____ Avoid Heat and Flames.

IV. PROTECTION INFORMATION:

Respiratory Protection:_____ Not usually required.
Eye Protection:_____ Wear chemical safety goggles.
Skin Protection:_____ Wear oil/solvent resistant gloves.
Ventilation:_____ Mechanical.
Other: _____ Follow good manufacturing procedures.

V. HEALTH HAZARD DATA:

Health Hazard Determination:_____ N/F
Threshold Limit Value (TLV):_____ N/F
OSHA Permissible Exposure Limit (PEL):_ N/F
Has Substance been listed as a Carcinogen:_____YES ___X__NO

VI. VI. EMERGENCY AND FIRST AID PROCEDURES:

Inhalation:_____ Remove to fresh air and call physician.
Eye Contact:_____ Remove contact lenses, clean eyes with cooking or fixed oil,irrigate with water for at least 15 minutes. If irritation persists, obtain medical advice
Skin Contact:_____ Wash with soap and water. If irritation persists, obtain medical advice.
Ingestion:_____ Rinse mouth with water and obtain medical advice.

VII. VII. SPILLS, LEAKS AND DISPOSAL PROCEDURES:

If material is spilled or released:_____ Remove source of ignition, absorb free material on saw-dust or other absorbent material. Dispose in approved manner.

Waste disposal methods:_____ Incinerate or remove to landfill in accordance with local state and federal regulations.

Material Safety Data Sheet

Scentsible Solutions, 218 York St. SE, Aiken, SC 29801 803-642-0018

I. IDENTIFICATION: GRAPEFRUIT DOMESTIC

Fema #: 2530 CASE # 8016-20-4 **"Appetite Stimulant & Restore Peace"**

II. II. PHYSICAL DATA:

Odor and Appearance:_____ yellowish to reddish liquid with grape fruit peel odor.
Specific Gravity:_____ 0.848-0.856
Boiling Point:_____ N/F **N**ot **F**ound
Melting Point:_____ N/F
Vapor Pressure:_____ N/F
Optical Rotation:_____ N/F
Refractive Index:_____ N/F
Solubility in Water:_____ insoluble
Solubility in Alcohol:_____ N/F

III. III. **FIRE EXPLOSION AND REACTIVITY:**

Flash Point:_____ 111^0F
Stability:_____ Stable under normal conditions
Extinguishing Media:_____ ___Water/Fog, _X_Carbon Dioxide, _X_Foam, _X_Dry Chemical
Special Procedures:_____ none
Hazardous Combustion/Decomposition Products: Burning liberates Carbon monoxide, Carbon dioxide, Water and Smoke.
Hazardous Polymerization:_____ Will not occur.
Conditions and Materials to avoid:_____ Avoid Heat and Flames.

IV. PROTECTION INFORMATION:

Respiratory Protection:_____ Not usually required.
Eye Protection:_____ Wear chemical safety goggles.
Skin Protection:_____ Wear oil/solvent resistant gloves.
Ventilation:_____ Mechanical.
Other: _____ Follow good manufacturing procedures.

V. HEALTH HAZARD DATA:

Health Hazard Determination:_____ N/F
Threshold Limit Value (TLV):_____ N/F
OSHA Permissible Exposure Limit (PEL):_ N/F
Has Substance been listed as a Carcinogen:_____YES ___X__NO

VI. VI. EMERGENCY AND FIRST AID PROCEDURES:

Inhalation:_____ Remove to fresh air and call physician.
Eye Contact:_____ Remove Contact lenses, irrigate with water for at least 15 minutes. If irritation persists, obtain medical advice
Skin Contact:_____ Wash with soap and water. If irritation persists, obtain medical advice.
Ingestion:_____ Rinse mouth with water and obtain medical advice.

VII. VII. SPILLS, LEAKS AND DISPOSAL PROCEDURES:

If material is spilled or released:_____ Remove source of ignition, absorb free material on saw-dust or other absorbent material. Dispose in approved manner.

Waste disposal methods:_____ Incinerate or remove to landfill in accordance with local state and federal regulations.

Material Safety Data Sheet

Scents-ible Solutions, 218 York St. SE, Aiken, SC 29801 803-642-0018

I. IDENTIFICATION: LAVENDER ESSENTIAL OIL
Fema #: 2622 Case# 8000-28-_____ **"Helps Relieve Insomnia-Pain"**

II. II. PHYSICAL DATA:
Odor and Appearance:_____ clear to yellowish liquid with ty[ocal odor.
Specific Gravity:_____ 0.89
Boiling Point:_____ N/F Not Found
Melting Point:_____ N/F
Vapor Pressure:_____ N/F
Optical Rotation:_____ N/F
Refractive Index:_____ 1.46
Solubility in Water:_____ insoluble
Solubility in Alcohol:_____ N/F

III. III. FIRE, EXPLOSION AND REACTIVITY:
Flash Point: closed cup_____ 62^0C or 144^0F
Stability:_____ Stable under normal conditions
Extinguishing Media:_____ ___Water/Fog, _X_Carbon Dioxide, _X_Foam, _X_Dry Chemical
Special Procedures:_____ none
Hazardous Combustion/Decomposition Products: Burning liberates Carbon monoxide, Carbon dioxide, Water and Smoke.
Hazardous Polymerization:_____ Will not occur.
Conditions and Materials to avoid:_____ Avoid Heat and Flames.

IV. PROTECTION INFORMATION:
Respiratory Protection:_____ Not usually required.
Eye Protection:_____ Wear chemical safety goggles.
Skin Protection:_____ Wear oil/solvent resistant gloves.
Ventilation:_____ Mechanical.
Other: _____ Follow good manufacturing procedures.

V. HEALTH HAZARD DATA:
Health Hazard Determination:_____ N/F
Threshold Limit Value (TLV):_____ N/F
OSHA Permissible Exposure Limit (PEL):_ N/F
Has Substance been listed as a Carcinogen:_____YES ___X__NO

VI. VI. EMERGENCY AND FIRST AID PROCEDURES:
Inhalation:_____ Remove to fresh air and call physician.
Eye Contact:_____ Remove contact lenses, clean eye with cooking or fixed oil, then irrigate with water for at least 15 minutes. If irritation persists, get medical advice
Skin Contact:_____ Wash with soap and water. If irritation persists, get medical advice.
Ingestion:_____ Rinse mouth with water and obtain medical advice.

VII. VII. SPILLS, LEAKS AND DISPOSAL PROCEDURES:
If material is spilled or released:_____ Remove source of ignition, absorb free material on saw-dust or other absorbent material. Dispose in approved manner.
Waste disposal methods:_____ Incinerate or remove to landfill in accordance with local state and federal regulations.

Material Safety Data Sheet

Scents-ible Solutions, 218 York St. SE Aiken, SC 29801 803-642-0018

I. IDENTIFICATION: ORANGE CALIFORNIA
Fema #: 2825 #: 8008-57-9 **"Care Giver Relief & Promote Alertness"**

II. II. PHYSICAL DATA:
Odor and Appearance:_____ YELLOW-ORANGE LIQUID WITH TYPICAL ODOR
Specific Gravity:_____ 0.842-0.846
Boiling Point:_____ N/F **N**ot **F**ound
Melting Point:_____ N/F
Vapor Pressure:_____ N/F
Optical Rotation:_____ N/F
Refractive Index:_____ N/F
Solubility in Water:_____ NOT SOLUBLE
Solubility in Alcohol:_____ N/F

III. III. **FIRE EXPLOSION AND REACTIVITY**:
Flash Point:_____ 115^{0}F
Stability:_____ Stable under normal conditions
Extinguishing Media:_____ ___Water/Fog, _X_Carbon Dioxide, _X_Foam, _X_Dry Chemical
Hazardous Combustion/Decomposition Products: Burning liberates Carbon monoxide, Carbon dioxide, Water and Smoke.
Hazardous Polymerization: _____ Will not occur.
Conditions and Materials to avoid: _____ Avoid Heat and Flames.

IV. PROTECTION INFORMATION:
Respiratory Protection:_____ Not usually required.
Eye Protection:_____ Wear chemical safety goggles.
Skin Protection:_____ Wear oil/solvent resistant gloves.
Ventilation:_____ Mechanical.
Other: _____ Follow good manufacturing procedures.

V. HEALTH HAZARD DATA:
Health Hazard Determination:_____ N/F
Threshold Limit Value (TLV):_____ N/F
OSHA Permissible Exposure Limit (PEL):_ N/F
Has Substance been listed as a Carcinogen: _____YES ___X__NO?

VI. VI. EMERGENCY AND FIRST AID PROCEDURES:
Inhalation: _____ Remove to fresh air and call physician.
Eye Contact: _____ Remove Contact lenses, irrigate with water for at least 15 minutes. If irritation persists, obtain medical advice
Skin Contact: _____ Wash with soap and water. If irritation persists, obtain medical advice.
Ingestion: _____ Administer water or milk to dilute and obtain medical advice.

VII. VII. SPILLS, LEAKS AND DISPOSAL PROCEDURES:
If material is spilled or released:_____ Remove source of ignition, absorb free material on saw-dust or other absorbent material. Dispose in approved manner.

Waste disposal methods:_____ Incinerate or remove to landfill in accordance with local state and federal regulations.

Material Safety Data Sheet

Scents-ible Solutions, 218 York St. SE Aiken, SC 29801 803-642-0018

I. IDENTIFICATION: ROSEMARY ESSENTIAL OIL
Fema #: N/F CASE #: 8000-25-7 **"Promote Alertness"**

II. II. PHYSICAL DATA:
Odor and Appearance:_____ Clear yellowish liquid with typical odor
Specific Gravity:_____ 0.900
Boiling Point:_____ N/F **N**ot **F**ound
Melting Point:_____ N/F
Vapor Pressure:_____ N/F
Optical Rotation:_____ N/F
Refractive Index:_____ 1.468
Solubility in Water:_____ insoluble
Solubility in Alcohol:_____ N/F

III. III. FIRE, EXPLOSION AND REACTIVITY:
Flash Point: closed cup_____ 43^{0}C or 110^{0}F
Stability:_____ Stable under normal conditions
Extinguishing Media:_____ ___Water/Fog, _X_Carbon Dioxide, _X_Foam, _X_Dry Chemical
Special Procedures:_____ none
Hazardous Combustion/Decomposition Products: Burning liberates Carbon monoxide, Carbon dioxide, Water and Smoke.
Hazardous Polymerization:_____ Will not occur.
Conditions and Materials to avoid:_____ Avoid Heat and Flames.

IV. PROTECTION INFORMATION:
Respiratory Protection:_____ Not usually required.
Eye Protection:_____ Wear chemical safety goggles.
Skin Protection:_____ Wear oil/solvent resistant gloves.
Ventilation:_____ Mechanical.
Other: _____ Follow good manufacturing procedures.

V. HEALTH HAZARD DATA:
Health Hazard Determination:_____ N/F
Threshold Limit Value (TLV):_____ N/F
OSHA Permissible Exposure Limit (PEL):_ N/F
Has Substance been listed as a Carcinogen:_____YES ___X__NO

VI. VI. EMERGENCY AND FIRST AID PROCEDURES:
Inhalation:_____ Remove to fresh air and call physician.
Eye Contact:_____ Remove Contact lenses, clean eye with cooking or fixed oil, then irrigate with water for at least 15 minutes. If irritation persists, get medical advice
Skin Contact:_____ Wash with soap and water. If irritation persists, get medical advice.
Ingestion:_____ Rinse mouth with water and obtain medical advice.

VII. VII. SPILLS, LEAKS AND DISPOSAL PROCEDURES:
If material is spilled or released:_____ Remove source of ignition, absorb free material on saw-dust or other absorbent material. Dispose in approved manner.
Waste disposal methods:_____ Incinerate or remove to landfill in accordance with local state and federal regulations.