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Innovative House Calls for Patients with Cerebral Palsy

*“What pains you and why? Be gentle with yourself. Be gentle with others. Be willing to discover life, love and freedom beyond your pain even if you don’t know how to get there. Some of the greatest blessings brought to this earth have emerged through people moving through and seeing through their pain, and working to ease the pain of another in a similar situation.” -Michele, CP Daily Living*

I was amazed to learn that 30% to 50% of the population with mental retardation is likely to have been caused by cerebral palsy. It is essential for me as a dental hygienist to attempt to create a program that will add to the oral health care of patients with cerebral palsy. Everyone needs daily dental care especially people with developmental delays. There is extensive documentation of increased incidence of periodontal disease and gingivitis in the CP population. Is there a way to treat and thereby reduce this problem? Yes! I have devised a program to help these patients receive optimal dental hygiene care.

*“With tremendous burden often come enormous gifts. The trick is to identify the gifts, and glory in them.”- Dr. Maya Shetreat-Klein*

Rhonda G. a longtime friend of my family has an adopted daughter by the name of Kelly. Kelly was born on September 20, 1985. Kelly was diagnosed with cerebral palsy at 3 months old. In a phone conference I had with Kelly's care taker Rhonda G., Rhonda talked about her life with Kelly living in Queens, N.Y. Rhonda talked about Kelly's condition, the mile stones and the setbacks. Kelly was the daughter of two crack addicted parents. Rhonda was dating Kelly's father while he was still in a relationship with Kelly's drug addicted mother who was pregnant with Kelly. After Kelly's birth her parents abandoned her and Rhonda became Kelly's guardian. At 3 months old, Kelly's doctors revealed Kelly was born with brain damage which causes mental retardation and a seizure disorder. Coincidentally, I happen to be doing a research paper on oral healthcare of people with CP. I cannot wait to possibly help my friend Rhonda and her daughter Kelly in the future with my new aroma/massage therapy program. During our conversation, Rhonda expressed to me how proud she was of Kelly for learning to walk and learning to use the bathroom on her own, considering the fact that she has CP. Kelly learned to walk at 6 years old and to use the bathroom by herself at 18 years old. Kelly is 30 years old and has the mind of a 2 year old child. During our telephone conference, I asked Rhonda a series of questions about how she has managed taking care of her daughter Kelly over the years and what her feelings are about Kelly's condition. Rhonda informed me that Kelly had recently been to the dentist for treatment of four cavities. She also told me that the dentist always puts Kelly to sleep because Kelly will get excited and begin to have seizures. Rhonda during our telephone conversations shared details about Kelly's dental care. She explained that Kelly requires sedation in order to prevent her from becoming unmanageable and excited which will result in a seizure. Instead

of anesthetizing Kelly I would like to introduce aroma/massage therapy techniques. I would also like to circumvent Kelly being put to sleep for no invasive dental procedures such as exams and prophylaxis by calming her with aroma/massage therapy techniques.

*“What lies behind us & what lies before us are tiny matters compared to what lies within us.”* ~ Ralph Waldo Emerson

What do we know about Cerebral Palsy? “Palsy” means impairment of the ability to control movement, and cerebral palsy means a condition in which injury to parts of the brain has occurred prenatal, natal, or postnatal and has resulted in paralysis or disruption of motor parts. We know it may be caused by head injuries due to a fall or child abuse, preterm labor, an insufficient supply of oxygen to an infant’s or newborn’s brain during pregnancy or delivery , stroke and infection. In Kelly’s case the abuse of crack cocaine by her biological mother and the parent’s life style may have caused Kelly to have these disorders. Diagnosis requires a thorough physical examination and medical history review. Symptoms, which generally start to appear before two years of age, include stiff posture, excessive crying, trouble eating or hypotonia. Impairments with this disorder can range from mild to severe and include problems with articulation. Many individuals with this disorder face difficulties on a daily basis due to these impairments.

Cerebral palsy is divided into three major classifications athetoid/dyskinetic type, spastic type, and mixed type. These classifications are significant with different movement impairments and different areas of the brain are affected. Kelly has

mixed type which is a combination of several forms. The most common type of mixed cerebral palsy is spastic-dyskinetic cerebral palsy.

How does this disorder affect Kelly's oral health? It has been found that some people who suffer from cerebral palsy have severe brain damage and learning disabilities, and often exhibit destructive oral habits including:

- **Bruxism** – clenching and grinding of the teeth
- **Rumination** – re-chewing, regurgitating, and re-swallowing food that has already been ingested, which causes stomach acids to travel to the mouth resulting in the loss of tooth structure
- **Pouching** – keeping food or medicine in the cheek pocket for long periods, which may cause tooth decay
- **Pica** – compulsively ingesting non-edible substances leading to tooth destruction and damage of soft tissue

Individuals with CP have a high prevalence of Class II malocclusion with prominent maxillary incisors, incompetent lips, difficulty in ambulation and increased incidence of seizures; all these predispose the individual to dental trauma. Holan, found greatly increased incidence of dental trauma in CP population (57%). There are other studies that found the prevalence to be lesser (9.2-20%). Fracture of enamel and dentine was the most common type of injuries. Some studies suggested that the prevalence of traumatic dental injuries in individuals.

Dental care for Kelly, with cerebral palsy and developmental delays can be challenging due to her sometimes limited cognitive and physical abilities. Good oral hygiene habits may be difficult for individuals with cerebral palsy due to involuntary physical movements, orofacial motor dysfunction and spasticity in

masticatory muscles. The inability to hold a toothbrush or to floss effectively results in insufficient removal of and residual food. Patients with cerebral palsy may also have trouble with homecare due to their hyperactive gag reflex; results in gagging or vomiting. As we can see individuals with cerebral palsy are at a higher risk.

*“It can be one of parents’ most difficult jobs to walk the fine line between giving in to their children’s whims and punishing them for what are basically healthy attempts to discover who they are.”-Mister Rogers*

Caregivers for these individuals play a big role in performing daily homecare because caring for individuals with cerebral palsy can be stressful, oral hygiene is sometimes neglected. I asked Rhonda about Kelly’s oral health care routine; how often she brushes her teeth and how it affects her as the caregiver. Also, what is Kelly’s diet is like and whether she is aware of the high carries risk in patients with CP. Rhonda said that she tries brushing Kelly’s teeth everyday but Kelly gets feisty and doesn’t open her mouth to let her brush most days, but when she does have the chance to get in her mouth she felt she did pretty ok job. ” Yes”! Rhonda said aware of the high carries risk with Kelly; However Kelly is happy and easier to deal with when she has her treats. “Kelly’s happiness comes first”. Rhonda, a mom and caregiver to Kelly dedicated to serving and protecting Kelly everyday of her life, but I had to ask myself is she really serving and protecting Kelly. Rhonda so called “treat’s” for Kelly is pizza, Pepsi soda and other food and beverages full of sugar and sodium.

Rhonda gives Kelly these unhealthy foods to make Kelly happy, even when Rhonda knows that people with cerebral palsy are susceptible to caries and gum disease. The real question becomes, is Rhonda indulging Kelly because it makes Kelly happy and calm? Or does Rhonda feel the need to give Kelly these harmful treats because she is showing pity for Kelly and gives her the treats despite the oral health risk, because it makes her feel better? Rhonda as the guardian should make the right oral health choices for Kelly, however Rhonda's guilt and pity about Kelly's condition has clouded her judgment about what is best for Kelly, even about Kelly's physical and oral health care.

Adult CP populations have an incidence of periodontal disease estimated to be three times higher than the general population. In addition, diabetes has a correlation to periodontal disease and other systemic diseases; therefore Rhonda indulging Kelly with sugary, fatty foods can put Kelly whose health is already compromised at greater risk.

Children, who are chronically ill, physically challenged, or who suffer from learning difficulties need our RESPECT, not our PITY. When we pity children, we feel sorry for them, indulge them and in the process, actually show them disrespect. When faced with children's illnesses or birth defects, I understand parents can easily lose sight of their children's uniqueness and concentrate primarily on dealing with their medical "problem." In Rhonda's efforts to do the right thing, she became oblivious to Kelly's ordinary developmental and emotional needs.

But, isn't Rhonda having pity for her daughter Kelly the same as having compassion for her? No! Pitying Kelly, doesn't really allow Rhonda to see Kelly's needs. I have learned that parents allow their illness, or their handicap, of their child to blind them to their ordinary needs as human beings. When we have compassion for people, we understand them as individuals who have needs like us, not only those posed by their particular handicap. Guilt, in order to parent effectively, parents (whether their children are healthy or have special needs) must first recognize and understand their own feelings. Should parents like Rhonda remain blind to their children, they will be more likely to rely on "pity" when deciding how to respond to their children. It is natural for the parents of children who are born with a congenital defect, or who develop a chronic illness, to search for explanations about why such a tragedy befell them. "Did we do something to cause our child's problem? Perhaps we could have prevented it? Should we have called the doctor earlier or not gone out the night of the accident?" The questions are endless and the guilt overwhelming. If, in addition, the problem is hereditary, or was caused by an accident for which a parent was responsible, the pangs of guilt become unbearable. With time, guilt burrows deeply and causes no end of suffering. Indeed, it often causes us to "compensate" for our imagined or real role in causing or, at least, in not preventing our child's illness or impairment, therefore Rhonda has been expressing the emotions and feeling even though she is not the biological parent, however she still feels responsible. Parents must be honest and recognize their unexamined feelings regarding their special children. It is natural for Rhonda to feel anger at Kelly because of her special needs, or at the universe, because it is a natural, human reaction. I had to help Rhonda throw away is the guilt and

feelings of omnipotence that cause her to react in unnatural ways toward Kelly. Guilt only causes problems and omnipotence is a kind of arrogance.

*“Life is like riding a bicycle, in order to keep your balance you have to keep moving.”-Albert Einstein*

It is critical that I get Rhonda on track with moving forward with Kelly’s oral healthcare. I presented Rhonda with a treatment plan for Kelly involving my program of in house hygiene treatment and aroma/massage therapy regimen I created. I believe Kelly should have regular oral hygiene visits with me to insure that her oral health needs are being met. Kelly should also have aroma therapy treatments at home before visit to the dentist and before home visits from healthcare providers. I feel it’s important for Kelly to receive dental hygienist visits in her home routinely, to establish a comfort level and begin to trust me as her dental practitioner. This will help when Kelly has to come to my clinic for a visit she will be familiar with my face, mannerisms and style of treatment.

I recommend that as part of home dental care, aroma/massage therapy with natural oils as remedies, to relax the Kelly before a home visit from me her hygienist. While there are no actual cures for cerebral palsy, natural remedies can help support brain and muscle function. Likewise, a number of therapies use holistic approaches to treat CP. Some of the best treatments for cerebral palsy include Echinacea, fish oil, acupuncture, and physical therapy.

This I believe is the answer to people with cerebral palsy receiving optimal dental care well into their adulthood. It is important that people with cerebral palsy receive early exposure to massage/aroma treatments.



This is how my proposal for treatment with cp patients would work. I will use Rhonda and Kelly as examples. A licensed massage therapist would be called by me, in advance, to go to their home to start the process of a simple massage with oils made by Young Living Oils as a body rub and also as a vapor for aroma therapy. The massage therapist working with Kelly will be sensitive towards Kelly's non-verbal signals, facial expressions and breathing techniques. As time passes and the rapport improves, the therapist will learn how to make Kelly most comfortable and pick up cues on discomfort or pain. The human body contains 11 major organ systems; massage can manipulate these systems in differing ways, based on the momentary needs of the individual. Massage therapy uses the power of human touch for therapeutic purposes, as well as pampering and rejuvenation. Therapeutic benefits for individuals with cerebral palsy are wide ranging and include controlling stress level reducing pain, releasing muscular tension, improving digestion, stimulating sensory receptors, stimulating circulation, providing flexibility, and enhancing range of motion. These methods will relax the CP patient to help them gain control their body and alleviate some of the nervousness they may feel before the treatment. In this way successful for people with CP, however massage therapy carries some risk for CP in adults, as it does in children. Patients may use medications that impact our choices: Botox injections, muscle relaxants, pain relievers, and other substances require some adaptation for bodywork. CP patients may undergo surgery, and this also requires some adjustments. Of course, numbness and difficulty with communication always call for special sensitivity from a massage therapist.

I believe that having these treatments before seeing a dental practitioner can potentially prevent Kelly having to receive extensive treatments. Positive,

relaxing experiences without general anesthesia may result. These visits will also allow me to detect and chart any carries I find and to give that information to the dentist before Kelly's next appointment.

My proposal also calls for extensive nutritional counseling with me Kelly's hygienist, at home for both Rhonda and Kelly. As a dental hygienist I will visit Kelly's home monthly to prevent the decline in Kelly's oral health. I will examine Kelly's oral cavity and perform a routine prophylaxis to insure Kelly's teeth and oral cavity is healthy. This prevents Kelly from having excessive dental procedures. I will use my knowledge of nutrition to help Rhonda to manage Kelly's sugar intake. Through home visits, oral hygiene instruction and nutritional counseling Rhonda and I will create a dietary regimen designed specifically for Kelly. I will teach Rhonda how to read food labels and measure Kelly's food portions. I will also teach Rhonda that fruit smoothies and carbonated flavored water are great substitute for milk shakes and soda. Kelly may benefit from this proposal and plan for treatment. This method of using aroma/message therapy is best for patients in early stage of cerebral palsy. Early intervention is the key for all people who are diagnosed as being developmentally delayed. Since Kelly is retarded and also has a seizure disorder, this presents a challenge for my program. However, I am confident that home dental hygiene, massage, aroma therapy and nutritional guidance are ideal for patients like Kelly and others with the same or similar developmental disorders, even in their adult years.

*"Tolerance is not really a lived virtue; it's more of a cerebral ascent".*

- Krista Tippett

I will make monthly home visit with Kelly. I will also instruct Rhonda to follow this plan on an everyday bases for brushing and flossing, Kelly's teeth and for positioning herself so that she is efficient when removing plaque. I will give Kelly time to adjust to dental care. I will remain patient so that Kelly learns to trust me working in and around her mouth and using these steps in her home. I will use my voice and body to communicate that I care and give positive feedback often to reinforce good behavior.

My philosophy for dental care is: to use the same technique at the same time and place every month and my suggestion to Rhonda is to brush Kelly's teeth daily the same time and place using aroma therapy. Many people with developmental disabilities accept dental care when it's familiar. A routine might soothe fears or help eliminate problem behavior. I will be creative and I will allow Kelly to hold a favorite toy or special item for comfort. I will also make dental care a game or play Kelly's favorite music. If none of these ideas help, I will ask Rhonda for her assistance. This is the home care protocol that visiting home hygienist should follow with patients with CP.

## **Getting Started**

**Location:** The bathroom isn't the only place to brush someone's teeth. For example, the kitchen or dining room may be more comfortable. Instead of standing next to a bathroom sink, allow the person to sit at a table. Place the toothbrush, toothpaste, floss, and a bowl and glass of water on the table within easy reach.

No matter what location you choose, make sure you have good light. You cannot help someone brush unless you can see inside that person's mouth. I also have ideas on how to sit or stand when you help someone brush and floss.

**Behavior:** Problem behavior can make dental care difficult. Try these ideas and see what works for you. Use the "tell-show-do" approach to deal with this natural reaction. **Tell** your patient about each step before you do it. For example, explain how you'll help him or her brush and what it feels like. **Show** how you're going to do each step before you do it. Also, it might help to let your client hold and feel the toothbrush and floss. **Do** the steps in the same way that you've explained them.

### **Three Steps to a Healthy Mouth**

Like everyone else, people with developmental disabilities can have a healthy mouth if these three steps are followed:

#### **Step 1. Brush Every Day**

If the person you care for is unable to brush, these suggestions might be helpful. First, wash your hands and put on disposable gloves. Sit or stand where you can see all of the surfaces of the teeth. Be sure to use a regular or power toothbrush with soft bristles. Use a pea-size amount of toothpaste with fluoride, or none at all. Toothpaste bothers people who have swallowing problems. If this is the case for the person you care for, brush with water instead. Brush the front, back, and top of each tooth. Gently brush back and forth in short strokes. Gently brush the tongue after you brush the teeth.

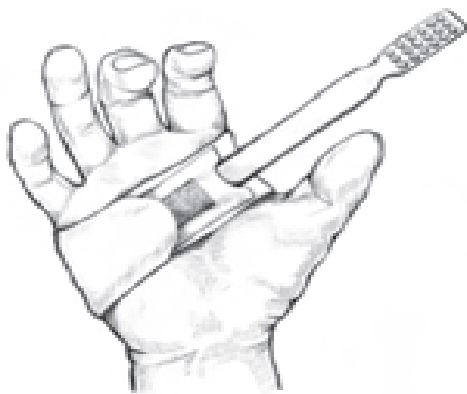
Help the person rinse with plain water. Give people who can't rinse a drink of water or consider sweeping the mouth with a finger wrapped in gauze.

Get a new toothbrush with soft bristles every 3 months, after a contagious illness, or when the bristles are worn. If the person you care for can brush but needs some help, the ideas listed on the next page might work for you. You may think of other creative ways to solve brushing problems based on your client's special needs.



Angle the brush at the gum line and brush gently.

### **Make the toothbrush easier to hold**



The same kind of Velcro® strap used to hold food utensils is helpful for some people.



Others attach the brush to the hand with a wide elastic or rubber band. Make sure the band isn't too tight.

You can buy a toothbrush with a large handle, or you can slide a bicycle grip onto the handle. Attaching foam tubing, available from home health care catalogs, is also helpful.

### **Make the toothbrush handle bigger.**

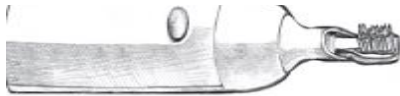


You can also cut a small slit in the side of a tennis ball and slide it onto the handle of the toothbrush.



You can buy a toothbrush with a large handle, or you can slide a bicycle grip onto the handle. Attaching foam tubing, available from home health care catalogs, is also helpful.

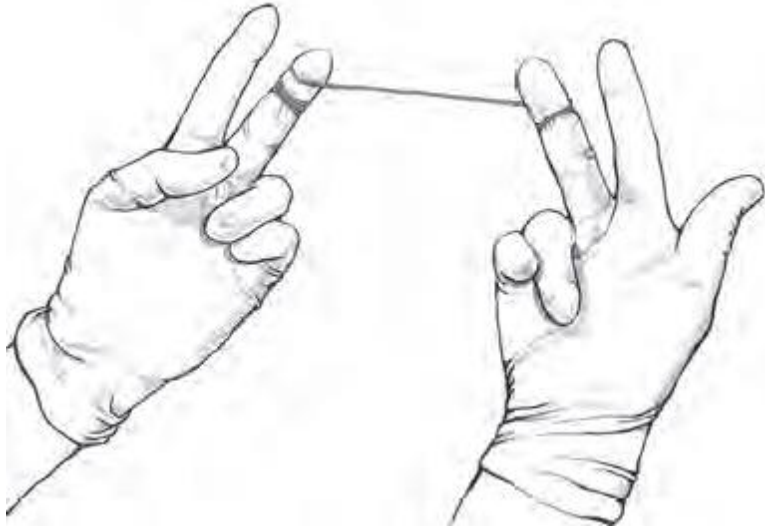
### **Try other toothbrush options. Guide the toothbrush.**



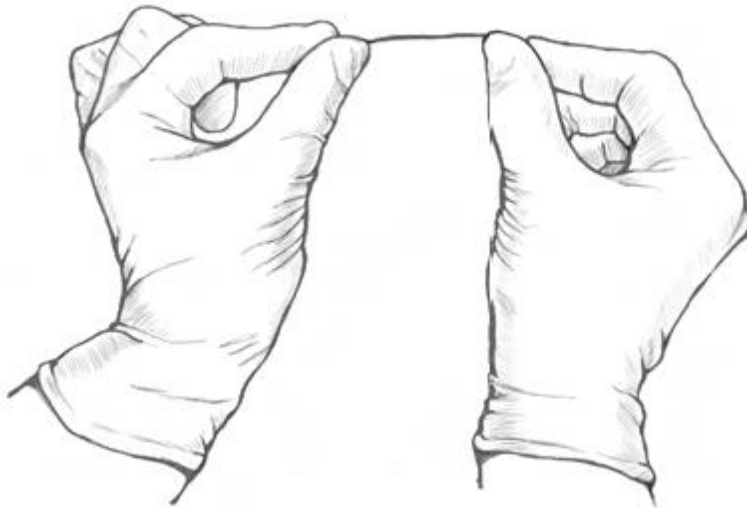
A power toothbrush might make brushing easier. Take the time to help your patient get used to one. Help brush by placing your hand very gently over your patient's hand and guiding the toothbrush. If that doesn't work, you may need to brush the teeth yourself.

## **Step 2. Floss every day**

Flossing cleans between the teeth where a toothbrush can't reach. Many people with disabilities need a caregiver to help them floss. Flossing is a tough job that takes a lot of practice. Waxed, un-waxed, flavored, or plain floss all do the same thing. The person you care for might like one more than another, or a certain type might be easier to use. This was a very important step; I had to teach Rhonda to help Kelly remove food from the inter-proximal surface of her teeth. After a few attempts Rhonda was able to roll the floss around her fingers with ease.



Use a string of floss 18 inches long. Wrap that piece around the middle finger of each hand.



Grip the floss between the thumb and index finger of each hand. Start with the lower front teeth, and then floss the upper front teeth. Next, work your way around to all the other teeth. Work the floss gently between the teeth until it reaches the gum line. Curve the floss around each tooth and slip it under

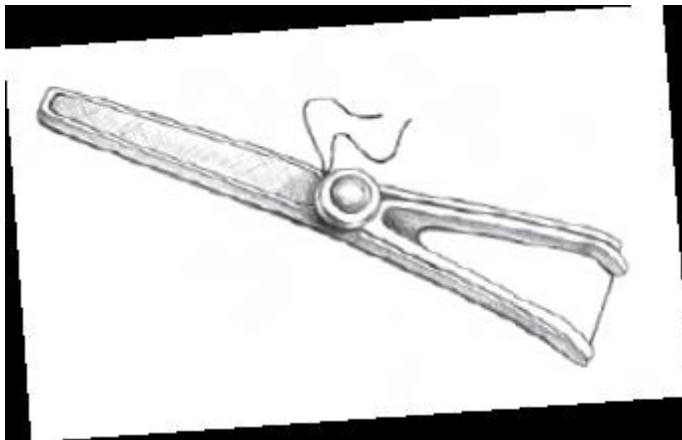


the gum. Slide the floss up and down. Do this for both sides of every tooth, one side at a time.



Adjust the floss a little as you move from tooth to tooth so the floss is clean for each one.

### **Try a floss holder**



If you have trouble flossing, try using a floss holder instead of holding the floss with your fingers.

The dentist may prescribe a special rinse for your client. Fluoride rinses can help prevent cavities. Chlorhexidine rinses fight germs that cause gum disease. Follow

the dentist's instructions and tell your client not to swallow any of the rinse. Ask the dentist for creative ways to use rinses for a client with swallowing problems.

### **Positioning Your Body: Where To Sit or Stand**

Keeping people safe when you clean their mouth is important. Experts in providing dental care for people with developmental disabilities recommend the following positions for caregivers.



Stand behind the person you're helping is in a wheelchair, sit behind it. Lock the wheels, and then tilt the chair into your lap.



Stand behind the person or lean against a wall for additional support. Use your arm to hold the person's head gently against your body.

### **Step 3. Visit a Dentist Regularly**

Your client should have regular dental appointments. Professional cleanings are just as important as brushing and flossing every day. Regular examinations can identify problems before they cause unnecessary pain.

As is the case with dental care at home, it may take time for the person you care for to become comfortable at the dental office. A “get acquainted” visit with no treatment provided might help: The person can meet the dental team, sit in the dental chair if he or she wishes, and receive instructions on how to brush and floss. Such a visit can go a long way toward making dental appointments easier.

### **Prepare for Every Dental Visit: Your Role**

Be prepared for every appointment. You're an important source of information for the dentist. If you have questions about what the dentist will need to know, call the office before the appointment. Make sure you establish date, time, place of the appointment with the massage therapist.

### **Know the person's dental history.**

Keep a record of what happens at each visit. Talk to the dentist about what occurred at the last appointment. Remind the dental team of what worked and what didn't.

### **Bring a complete medical history.**

The dentist needs each patient's medical history before treatment can begin. Bring a list of all the medications the person you care for is taking and all known allergies.

### **Bring all insurance, billing, and legal information.**

Know who is responsible for payment. The dentist may need permission, or legal consent, before treatment can begin. Know who can legally give consent.

### **Be on time.**

When a patient is seen in the dental office, the operatory will be filled with the vapors of the aroma therapy that the CP patient is use to having at home. This will help the patient to relax by smelling the same familiar aroma vapors that the patient is being treated with at home. The dental hygienist should be present to help the patient feel more comfortable also.

When seeing one of these children/adults for dental examination or treatment, the dentist must bear in mind the problems that may lead to adjustment of his approach. These are:

1. Apprehension: Many of these children are not used to meet strangers (which is why my proposal calls for monthly home visits that also may include the dentist every 3 months so that the patient is also familiar with the dentist as well )
2. Difficulty of communication: If there is an auditory, visual or speech defect, chair side communication must be modified accordingly. (This is also the reason home visits are need so that the dental practitioner is familiar with their CP patient's mannerisms).
3. Low intelligence: This can contribute to difficulty of cooperation. (The familiarity of the aroma therapy will help with the connection of the care in touches of the monthly home visits and may put the patient at easy).
4. Poor concentration: This may be an inherent aspect of the cerebral dysfunction, trivial things distracting the attention.( In my proposal I find that having the patient connect with a favorite object from home would help the patient relax along with the aroma therapy).
5. Convulsions: These are not common in the dental surgery as the child/adult will be receiving drugs to control such episodes.
6. Posture: Ataxic patients need to have the dental chair tipped well back to give stability and support, while the spastic and athetoid may need more manual support and control in the chair.
7. Ability to cooperate: If the patient can sit in the chair and open his/her mouth, he/she can be treated as a normal patient. Those with less physical control need further help. Confidence and relaxation can overcome the problem in some (Yes! This is what my proposal is built on and hopes to bring out of these patients who need dental health care desperately).

*“You gain strength, courage and confidence by every experience in which you really stop to look fear in the face. You are able to say to yourself, ‘I lived through this horror. I can take the next thing that comes along.’ . . . You must do the thing you think you cannot do.”*  
*-Eleanor Roosevelt*

The profession of dental hygiene has taught me to work hard to service the community in the fight of oral healthcare prevention. I have decided to bring awareness about developmentally delayed people with cerebral palsy and their battle with oral hygiene. My proposal for aroma/massage therapy prior to dental treatment and incorporating at home dental hygiene visits will overall increase the quality of life for the patients living with cerebral palsy.

*“Placing one foot in front of the other, I’ve climbed to higher lengths. Reaching beyond my own limitations, to show my inner strength. No obstacle too hard, for this warrior to overcome. I’m just a man on a mission, to prove my disability hasn’t won.” - Robert M. Hensel*

The massage aspect of my proposal for Kelly and other CP patients before dental treatment is an important part of these patients being able to receive the best dental care that can be provided for them. People with CP and caregivers of these people must push forward to achieve better oral health despite their disability that they struggle with daily.

People with cerebral palsy require some special adjustments in the way massage therapy is administered. The damage for a person who has CP does not begin in the muscle and connective tissues, although this is where we feel the tightening of the connective tissue wrappings around muscles. The contractures themselves

are simply a symptom-a complication of a problem deep in the brain. Therefore, massage therapy can be a welcome relief, clinically proven and wide-ranging. Massage therapy is manipulation of soft body tissues applied in a painless and comforting way to treat, heal and balance the mind, body and soul. Massage is deemed a complement to conventional medicine used primarily for well-being, comfort, pleasure, healing, relaxation and pain relief. There is no question that massage therapy can have a valuable role in improving the quality of life of a person with CP. Most people with CP get best results if massages focuses on indirectly affecting muscle tone through craniosacral work, gentle rocking, slow range of motion exercises, and manipulation of the arms and legs that engages the patient in ways he or she doesn't automatically resist. This often means going with the direction of muscle shortening in order to disengage the reflex. Ultimately, the therapist will have to experiment with lots of different approaches, often accompanied by extremely supportive bolstering, in order to find what techniques allow their clients to relax and enjoy their massage.

The benefits of massage to CP patients are undeniable. Such as:

- may reduce spasticity
- may encourage muscle flexibility
- may increase or reduce muscle tone
- may encourage motor function
- may encourage more positive social interaction

**Adaptations:**

- children with Cerebral Palsy may have a combination of both “high tone” and “low tone” in their muscles

- for increased muscle tone (hypertonia) – strokes should be slow, rhythmic and move away from the
- heart
- for decreased muscle tone (hypotonia) – strokes should be quicker, stimulating strokes and move
- towards the heart
- increase pressure as necessary, while being mindful of the child’s comfort
- gently jostle or rock the limbs to help them to release
- use passive ranges of motion to help maintain and even increase flexibility
- practice care not to provide “rolling” strokes near or on the joints
- cradle & rock occiput (base of skull at the back of the head).
- Improves sleep and sleep patterns (helps children sleep through the night)
- May increase or reduce muscle tone (high tone or low tone depending on how you apply massage)
- May help child relax which encourages and eases breathing patterns
- May improved digestion and relieve constipation
- May reduce spasticity
- May encourage muscle flexibility
- May encourage motor function
- May encourage more positive social interaction
- May help to loosen tight muscles which hold bones and joints in a particular position
- Range of motion may be increased following massage therapy
- May help to relax child easing muscle tension and stiffness (lessening muscle spasms)



If physical therapy is used to stretch and strengthen skeletal muscles, massage will also be a safe choice. The only caution is that people with very severe CP may not be able to communicate their wants or concerns clearly. If a massage therapist works with a client who cannot speak, other modes of communication, including nonverbal signals, become especially important. It is the responsibility of the massage therapist to make sure that his or her work is welcome and freely accepted at all times.

Children with CP have better access to all kinds of health-care interventions than adults, including massage therapy. Surveys indicate that most children with CP receive massage either from a professional or a family member. This early intervention is one of the key components to preparing a person with cerebral palsy for dental visits at home or in office.



With over a decade of service to children and families, Tina Allen, founder of health and nurturing touch organization Liddle Kidz™ Foundation have become a respected international lecturer, author and authority on infant and pediatric massage. She is a Pediatric Massage Master Teacher, Developmental Baby Massage Teacher, a Licensed Massage Therapist with specialized training in providing massage therapy for infants and children with special healthcare needs. Ms. Allen understands the varied physical and emotional needs of hospitalized and medically complex infants, children and their families. Because of her dedication to the well-being of the entire family, she has studied and become certified in pregnancy massage and is a Trainer of Peaceful Touch®, which implements a healthy touch approach for children in school based environments. Ms. Allen managed the United States first comprehensive pediatric massage program at Children's Hospital Los Angeles (CHLA), where she trained volunteer massage therapists and medical professionals to work with hospitalized Rehabilitation patients, medically complex infants in the Center for Newborn and Infant Critical Care (CNICC), Neonatal Intensive Care Unit (NICU), Children with Retinoblastoma, Spina Bifida and Cerebral Palsy. She developed pediatric massage programs at Mattel Children's Hospital at UCLA and Cedars-Sinai Medical Center, as well as developed a program focusing on introducing gentle compassionate touch to women and children who have survived domestic abuse. She is currently consulting on the development of comprehensive pediatric massage programs for The Mayo Clinic, Nemours/Alfred I. DuPont Hospital for Children, Connecticut Children's Medical Center, Shriner's Hospital and Sutton Children's Medical Center.

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Her innovative approach to children's health has allowed her the unique opportunity to educate families and professionals throughout the world in the many benefits of nurturing touch. At personal request, Ms. Allen has taught in England, France, Sweden, Canada, Japan, Thailand and Vietna.<sup>1</sup>

This approach created by Ms. Allen is the protocol I would insist the therapist that I work with in the patients with CP homes use in their practices with my patients.

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### ***Massage Techniques***

#### **How to get started:**

- Take a moment to relax yourself
- Help the child to get very comfortable (use pillows, blankets, towels)
- Ask the child's permission
- Begin where the child welcomes massage & nurturing touch
- Begin with Nurturing Touch and then follow with the remaining strokes on each area of the body where the child welcomes touch.

#### **Nurturing Touch**

Loving and still – this nurturing stroke introduces our touch to the area where we will begin.

#### **Gentle Warming Glide**

With warm open palms, gently stroke the body in motions moving towards the heart. "Swedish Effleurage".

#### **Open Heart**

Draw "Heart" shapes on the area you are working. Vary the size of the hearts from little to big, depending on the size of the area.

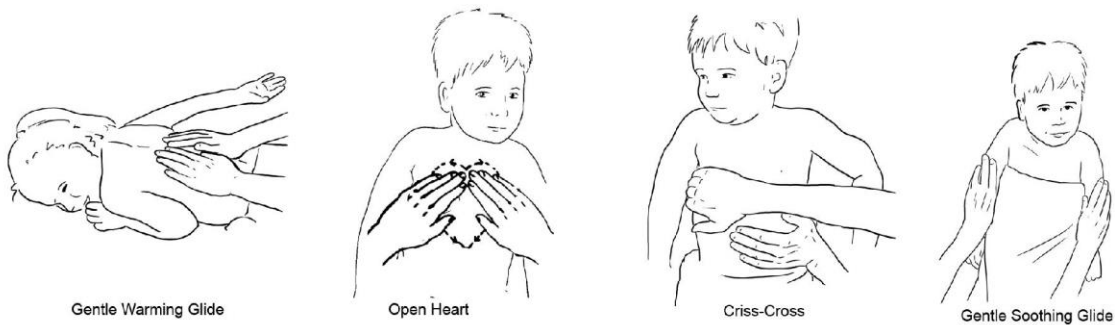
### **Criss-Cross**

Alternating hands, glide them back and forth across the area you are working. On the back, chest and other larger areas you may also draw “X’s” with your finger pads and palms.

### **Gentle Soothing Glide**

With warm palms, gently stroke the body area in a direction away from the heart. This gliding stroke lets the child know the therapist has finished with this area <sup>12,20</sup>

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Using Tina Allen’s Program as model for the therapist I plan to work with to improve the comfort levels of CP patients before encountering their dental providers and dental hygienist will definitely become a factor in improving the long term treatment success in these individuals. This along with the aroma therapy and homecare will eventually become the future of how a dental practitioner take care of special needs patients.

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*“Contrary to what some might say, we’re not given what we can handle. We’re opening to handle what we’re given.” -Elizabeth Aquino, blogger at “a moon, worn as if it had been a shell”*

The use of aromatherapy, especially in combination with massage, can be extremely helpful for individuals (all ages) suffering from any kind of handicap. Aromatherapy combines healing massage with oils that have the medicinal properties of plants. Essential oils are extracted from the roots, flowers, fruits, leaves and stalks of plants and certain trees. They contain various chemical compounds such as alcohols, esters, ketones, aldehydes, and terpenes. Depending on the oils chemistry, they can be uplifting or have a relaxing and calming effect. They have anti pain, inflammation, antiseptic, antibacterial and antidepressant properties.

The scents released in aromatherapy stimulate the hypothalamus, the area of the brain influencing the body's hormone system. It is not well understood how the oil molecules actually enter the bloodstream, but the psychological effects have been well studied. A range of oils is used during a session (some are not appropriate in pregnancy, for young children or for certain conditions). Trained aromatherapists use high-quality, natural oils diluted in a "carrier" oil or blended into a cream. Lower dilutions are used for sensitive skin and in pregnancy. Practitioners should only use oils that are organic and bought from reputable companies.

Aromatherapy massage techniques are based on Swedish massage which aims to relieve tension in the body and to improve circulation as well as stimulating the lymphatic system to eliminate toxins from the body. Aromatherapists can

recommend other ways of using the oils such as in inhalations by adding a few drops on a handkerchief or in a bowl of hot water, or by using compresses and baths. Light bulb, candle lit or electric diffusers are also popular and relatively safe.

Essential oils should not be used neat on the skin or applied near the eyes.

Rosemary, hyssop, sweet fennel, sage and wormwood should be avoided by epileptics while peppermint and thyme must not be given to small children.

Peppermint and chamomile block the therapeutic effects of homeopathy. These oils should be used at least half an hour before taking homeopathy. A qualified practitioner is used to dealing with pregnant women, children and individuals with various conditions and will know which oils are suitable for each client.

### **Fostering the education and practice of the professional holistic aromatherapist.**

When treating the patients with aromatherapy it is important to have knowledge and an understanding the science behind the treatment of aromatherapy to achieve the best results and outcome for the patient and the intended goal of the treatment. To bring my proposal to fruition, through research I was able to find Lora Cantele an aromatherapist. Lora Cantele is registered and certified to bring the issue of how education in aromatherapy is on the rise in helping patients with cerebral palsy and other disorders achieve goals; like being able to connect with the soothing of aromas to help a patient relax and receive dental treatment.

Lora Cantele is a Registered Clinical Aroma therapist through the Aromatherapy Registration Council (ARC) and a Certified Swiss Reflex Therapy (SRT) practitioner and instructor through its creator, Shirley Price. Her work as former president of

Alliance of International Aromatherapists (AIA) has helped the organization flourish to become a leading voice in advancing an ethical practice of aromatherapy for personal as well as clinical use. During her tenure at the AIA (2006-2012) she successfully led the development and implementation of AIA's aromatherapy educational standards to take the level of aromatherapy education in the USA to new heights. In 2009 and 2010, she brought her professional expertise to a pilot program aimed at providing a better quality of life to children with life-limiting illnesses including; hypoxic-ischemic encephalopathy, cerebral palsy and muscular dystrophy. As an aromatherapy educator, writer, and international speaker Ms. Cantele continues to unite and inspire her colleagues to speak out about the importance of this work within an integrative health and wellness program. She is the editor/publisher of the peer-reviewed *International Journal of Professional Holistic Aromatherapy (IJPHA)* and the co-author of *The Complete Aromatherapy & Essential Oils Handbook for Everyday Wellness*. Contact<sup>21</sup>.

The accomplishments and programs created by Lora Cantele gives rise and substance to my proposal and gives my program the approval to introduce a new way of helping patients with cerebral palsy receive optimal treatment. As a Dental hygienist I have to practice the core values of ethics. Changing the way patients with cp are prepared before in countering their dental practitioners to help them learn to trust and relax with the hygienist or the dentist. Most dentists today would debate my proposal because of time management; however the core value of ethics, justice and fairness should over shadow time management of a dentist or hygienist schedule during a home visit or in the dental office should covers the full spectrum of theory and practice from essential oil science and the

foundations of practice to the application of aromatherapy for specific conditions. This book provides a clear and authoritative introduction to aromatherapy as practiced in modern health care settings, which is what my proposal is about. It gives valuable information for any dental hygienist professional wishing to develop their understanding of the subject, providing the in-depth knowledge needed to use essential oils in their treatment and practice environment. In this new Fourth edition two new chapters, this book provides valuable additions to the bases of my hygiene. The chapter 'Aromas, Mind and Body' has been enhanced. Several new essential oils giving properties, indications and cautions have been added. This book provides case histories illustrate the practical application of theory and techniques on how aroma therapy effects individual patients. The book is supported by a CD-ROM of ancillary tables covering essential oils for general use in health-care settings including indications for safe, therapeutic uses of essential oils; those to be used with caution; and essential oil definitions <sup>21</sup>.

As I move forward with my research and debate creating a program to treat CP patients in their homes with aroma/massage therapy; the exploration of this proposal and the outcome that has help patients receiving these types of treatments will bring a full understanding and awareness to the fact that this can change the live of patients living with CP in the world of dentistry.

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“We Are the grand daughters of the witches you weren’t able to burn”-  
unknown.whosay.com



Anna Dannfelt a professional aromatherapist since early 1990’s and a mother of four children, has work with people on a one-on-one basis as well as holding trainings and workshops for groups. Anna shares one of her rewarding experiences treating one of her clients, who is suffering from cerebral palsy with her expertise in aromatherapy. Anna describes her client Jane’s condition and the effect the treatment had on Jane her client and the care givers Jane’s parents.

I want to tell you about Jane, one of my clients some years ago. She was, at the time, aged 24 and suffered from *hypotonic cerebral palsy (CP)*. She was living at home except for some holidays and her parents were wonderful and loving people, doing all they could to make her comfortable. Jane was in a wheelchair, unable to move at all which had, over the years, made her skeletal structure crooked and brittle so she had been through surgery a few times to be able to stay in the wheelchair. She had no communication-possibilities at all since she had no control over her face or body. Her respiratory system was very weak resulting in repeated bouts of pneumonia when she would have to spend time at the

hospital. Her digestive system was also weak, and sometimes she wouldn't take nutrition so then she would go to the hospital for feeding. She was also given medicine to help with the cramping.

When I saw her the first time she was strapped in her wheelchair, hands tightly clasped against her chest. She kept moving her head from side to side, gnawing her teeth. I sat with her and her mother for some time, chatting and bringing out the oils. I made a selection of oils for Jane to smell. I could see by the way she moved her head what oils were interesting to her, they made the motion of her head slow down. In this way she chose:

**Orange** (*citrus sinensis*) 14 dr, **Lemongrass** (*cymbopogon citratus*) 8 dr and **Lavender** (*lavendula augustifolia*) 10 dr. Blended in 100 ml blended vegetable oil + 50ml macerated oil of **Marigold** (*Calendula officinalis*)

Together with her mother, we massaged her hands and arms, one hand each. Soon she started relaxing her fists, allowing her hands to lie open in her lap. Once the hand-massage was finished, the hand massaged by her mother stayed relaxed and open longer. I then massaged her legs, showing the mother how to enhance circulation. By this time Jane was meeting my eyes and her head was stiller. I just had this flash that she was suffering from headaches (constant gnawing of her teeth) so I asked her. Tears started rolling down her cheeks and I made an oil-blend for her face and neck which I massaged her with; feeling the tension leave her head as I massaged her scalp.

In a blend of 25 ml veg.oil blend + 5 ml of infused **Teebalm** (*monarda fistulosa*) + 3 dr of Neroli (*citrus aurantium ssp amara var. pumilla*).

I showed her mother and father the massage and made oils for them to use: Massage of legs, feet and stomach every morning, massage of face, head and hands 3-5 times during the day. A month later I visited again and Jane, was visibly happy to see me again. She basically stayed with the oil-blends above with small changes in the essential oils to help with circulation and relaxation. When I left Sweden I referred her to another very good aromatherapist in the area. Jane is still doing fine on the oils, her life (and that of her parents) a little bit easier. Over time her respiratory and digestive problems have lessened with a lot less traumatic days in the hospital.

Her movements are involuntary, which makes the observations very interesting, proving that massage (and) essential oils have an impact on the central nervous system.

The experience that Anna had with her client was a break through. This is the outcome and results I am confident my program can achieve with dental patients with CP.

Aroma/Massage therapy have also be the subject of case studies to surveys to further evaluate the effectiveness of using this alternative method to help CP patients have a develop a way to have a better quality of life.



Conventional medicine and complementary and alternative medicine (CAM) are merging into the broader field of “integrative medicine.” Integrative medicine has been defined as healing-oriented medicine that re-emphasizes the relationship between patient and physician and that integrates the best of CAM with the best of conventional medicine<sup>1</sup>. Some therapies traditionally considered to be CAM have been validated and, having become evidence-based, are being embraced by traditional medicine; others are being ignored by conventional medicine because science does not yet support their use.

One intervention that is clearly gaining favor in the conventional medical arena is massage therapy. Today, massage is no longer considered CAM in some conventional medical circles. Numerous rigorous scientific studies of massage have been conducted since 2000, and many of them have shown benefit<sup>2</sup>. For example, evidence in support of massage for musculoskeletal back pain in adults is so great that physicians really should at least consider it a potential therapeutic option<sup>3</sup>.

The Institutional Review Board of Seattle Children's Hospital approved the study. Written informed consent and approval to review medical records were obtained from subjects willing to participate in the survey. Informed assent was obtained from the child with CP whenever the child was 14 years of age or older and able to communicate understanding and an opinion.

The only randomized trial of massage for patients with CP involved 20 infants with CP. In the treatment group, 10 children reportedly benefited from massage<sup>7</sup>. Specifically, the authors reported that massage was associated with decreased spasticity; improved muscle tone, range of motion, and cognition; improved fine and gross motor skills; and improved social functioning. However, a subsequent review of the pediatric massage literature found only modest support for improvement of muscle tone with massage, and no support for improvement of range of motion, function, or spasticity with massage<sup>2</sup>.

Pain and sleep disturbances in children with CP are especially challenging and pressing problems. Of the surveyed parents who are seeking and using massage for their child with CP, 86% believed that massage helps to relax muscles, and 71% believed that it improves quality of life. This information will be valuable for the design of future studies of massage for children with CP.

Their results suggest that, compared with children having mild disease, those more severely affected are massaged more often. There are many possible reasons that use of massage might vary with symptom severity. Complications of CP are often a result of chronic overstimulation of muscle and lack of normal movement. Children with more severe CP are more likely to look and feel worse.

More severely affected patients are more likely to suffer from constipation, sleep problems, agitation, and muscle spasms—all the reasons for which parents say massage is performed.

In another study journal by Perianesthesia Nursing, Effectiveness of the Essential Oils Lavender and Ginger in Promoting Children's Comfort in a Perianesthesia Setting by Nord, Belew. A randomized, controlled, blinded study examined the effectiveness of an aromatherapy intervention on the reduction of children's distress in a perianesthesia setting. The sample included children with and without developmental disabilities (n = 94). Subjects in the intervention group received an aromatherapy intervention of lavender and ginger essential oils. The control group received a placebo intervention of jojoba oil. Distress was measured at two times: before induction and in the PACU, using the Faces, Legs, Arms, Cry and Consolability (FLACC) scale. The mean distress level was lower for the children in the essential oil group, but the effect was not statistically significant (P = .055). Parents' responses to survey questions about satisfaction with aromatherapy did not differ between groups, although open-ended comments indicated a more positive opinion of the benefits of the intervention in the aromatherapy group.

The research I have provided reveals the benefit to my proposal for incorporating aromatherapy to help CP patients coop with dental hygiene and dental intervention, it also establishes how long aromatherapy has be an option to assist CP patients for years and could have been used to prevent the decline in dental care for CP patients for years. Why is there no connection to using this method already being implemented into oral health care? The world of oral health care is

built on time management. In an interview with Dr. Sconzo DMD, Director of New York Methodist Hospital, Dental Residence program we discussed the how implementing my proposal would affect the dentist and the hygienist time management and the over pros, cons and over all benefits of my program and why it is the future in treating CP patients.

*“Do all the good you can. By all the means you can. In all the ways you can. In all the places you can. At all the times you can. To all the people you can. As long as ever you can”. \_John Wesley*

Introducing new and innovative ideas in a profession that has been operating with the same standards that it had been created centuries ago, is difficult but not impossible. Dentistry has evolved into an amazing medical service, with new ways from regenerate bone to help patients in need of dental implants, to new treatments to prevent periodontal disease However patients with Cerebral Palsy and mental disabilities have been left out of the evolution.

In a brief telephone conference with Dr.Sconzo DDS, The Director of New York Methodist Hospital, we discussed the options of in home dental hygiene and non invasive dental treatments for cerebral palsy patient.

KN: Dr.Sconzo: What do you think of the idea of at home treatments for CP patients?

Dr. Sconzo : I think the concept and the Idea is wonderful! I believe a program that would allow CP patients to be treated in the comfort of their own home is great ways to have the patient feel safe when receiving their dental treatment.

However, you would probably have to get funding for this idea from the city and state or even the government which can be difficult. There are also regulations that the ADA, HIPPA and the ADHA would have to investigate and create regulations and rules to protect the patients and the practioners.

KN: How do you feel about the idea of the fusion of aroma/message therapy in the homes and in office if needed for CP patients before their dental are administered?

Dr. Sconzo: I think is great, as long as it is safe and you have the approval of the primary physician and the time is managed properly. To perform this type of service you would have to block out a significant amount of time treat the patient. Not managing time effectively can cost money and unsatisfactory results in production rate of treatment. In my residency program here at New York Methodist Hospital, if I were to bring this type of treatment to my clinic it would be a separate program from my regular Dental program. I would incorporate this treatment in to my program as a requirement for completion of my program and assign a patient to on resident and hygienist. I do think that my residents would benefit from this aroma/message therapy treatment program and learning how to help patients suffering from CP in their own practices. I do believe that if planned efficiently with the proper guide lines and safety measures, this could be the future in treatment for cerebral palsy patients everywhere.

Dr. Sconzo insisted that everything should be planned out, in order and organized was a very insightful. There are organization details that need to be put into place to strengthen my program. After further research I discovered a dentist and a hygienist that use aromatherapy in both their offices. I also agree that this



program and treatment must be safe, cost effective as well as effective for the patients. After further reach I discover a dentist who uses and practices aroma therapy in her office and has figured out the plan for safe treatment and ways to administer essential oils to her patients. I would adopt her methods of treatment and safety measure as a part of my proposal.

In an Oral Health Group Article “ Introduction to the Use of Essential Oils for Dental Practitioners” *By: Janice Goodman 2007-03-01*

Dr Janice Goodman has used essential oils in her dental office for fun and say’s it is useful. I started using essential oils in my general dental practice after taking a rigorous program of study. I feel it is not necessary for a dental practitioner to have a certificate of study, to include essential oils in a practice, but, must be aware of the potential safety issues and the chemical properties of the oils that are being used.

Dr. Goodman suggests that dentist take short courses that are offered that would be very helpful to get you a dentist or a hygienist into aromatherapy. This would be a solution to helping my proposal in a cost effective manner. This could be a solution to cutting the cost of having a message therapist that includes aroma therapy, with these course that are suggested practioners would be able to provide their own aroma therapy.

Dr. Goodman lists the ways that she uses essential oils in my own practice. “There are no set parameters for their use specifically in dental offices and I have implemented these uses with the advice of aromatic advisors and am sharing them here.”

While I keep over 70 different essential oils at my home for personal use, I seldom have more than four or five different bottles at the office at any one time. Keeping the selection to a minimum at the office is safer. It gives you good control on their use as they will be in the hands of staff that may not be educated of their dangers.

Aromatherapy is not synonymous with environmental fragrancing. Environmental fragrancing is enhancing the mood of a clinical setting with smells of commercial air fresheners, spices, potpourri, scented candles, baking bread or cookies, etc. Aromatherapy involves scientific use of pure essential oils to produce pharmacodynamic effects. In both cases, it must be pointed out that individuals react differently to the same odors because smell is controlled largely by the primitive limbic part of our brains and our reactions to smell is largely dependent on our memories that have been connected to that smell from past life experiences.

In recent research from Brown University, Dr. Rachel Herz reports that, "experience and not genes, determines our emotional reactions to scents." Dr. Serge Marchand, who has studied physical reactions to scent at the University of Quebec, also points out that scent, when attached to memories of a positive experience, can play a role in affecting mood, pain and aid in the healing process.<sup>7</sup>

My favorite way to use essential oils in the office is by "misting" the air. I do this using a clean dark spray bottle with 40mls of distilled water and add up to 20 drops of an antiseptic oil or blend of oils. I often simply use lemon essential oil -- it is very inexpensive, antiseptic and stimulating/ uplifting. Just walk around the

office spraying the mist occasionally and you are assured to get some smiles for the effort. It can be used instead of a commercial air deodorizer, and may be used in a limited number of humidifiers. (Use only in recommended cold humidifiers.)

Danielle Sade owner of Healing Fragrances School of Aromatherapy suggests a number of other nice blends for misting: "Mists of Awakenings" = Peppermint (6 drops) + Mandarin (10 drops) + Ginger (4 drops) or try "Mists of Calmness" = Lavender (10 drops) + Geranium Rose (5 drops) + Sweet Marjoram (5 drops).<sup>6</sup> (Note: adding glycerin +/- or honey to a mist makes a great skin toner, too.)

I do not use aromatic candles or oil burners in the office. Use a salt lamp for effect if you want a soft light, it is safer than using candles. I have a number of well situated electric diffusers that have very quiet fans. They are positioned behind the receptionist and in each of the operatories. I do not think that it is fair to put a particular scent in the waiting room because everyone reacts differently to scent and there is not a universally pleasant scent that I would like to impose on everyone. My receptionist enjoys the effects of a blend of fresh orange smells, which are good for anxiety (e.g. Neroli, Petitgrain and Sweet Orange), which we often complement by having a bowl of mandarin oranges on the counter and offering an orange flavored tea (Blood Orange Tea by Tea in the Sahara).

The combination of tasting, seeing and smelling something similar has a stronger effect than just using one sense alone. The use of orange scent in a dental waiting room has actually been tested and reported.<sup>5</sup> Stores often use orange colors and smells as they are thought to encourage spending by shoppers. Slightly different research was done using a clove (eugenol) smell in the waiting room and the

effect differed according to the patients' past dental experiences.<sup>7</sup> I change the blend occasionally and do not allow the diffusers to be on constantly to prevent sensitization to the smell. To mix it up, I also like both Frankincense and/or Cinnamon to blend with orange.

I try to make patients aware that I am using aromatherapy when the diffusers are on. I basically use oils that I love and keep me calm and relaxed, but, you should get feedback from the patient and assistant that they are enjoying the experience as well. Everyone reacts differently to scent and they will let you know if it is offensive to them. Essential oils dissipate very quickly after the diffuser is turned off. Using too much of the same oil can lead to sensitization to the chemicals in that oil, so know what chemical groups are in the oils you use and mix them up.

A word of caution about using the ever popular lavender oils: lavender comes in several different chemotypes. High altitude lavender (*Lavendula augustifolia*) (\$\$\$) is relaxing whereas lavender (*Lavendula x intermedia*-usually less expensive, but, far more available) is a stimulant!! Spike lavender (*Lavendula spica*) is not appropriate to use in the dental office as a relaxant because of the high camphor and 1,8 cineole levels. Spike lavender can also be neurotoxic. Also, to further complicate matters, the more expensive high altitude, true lavender, is commonly adulterated with lavender, or by adding synthetic linalool and linalyl acetate.

At the American Association of Cosmetic Dentistry conference in 2004 (in Vancouver), placing drops of lavender (type not specified) on a patient's bib was suggested as a relaxation technique. If high altitude, true lavender was being used, both the dentist and assistant could be feeling very sleepy after inhaling it

throughout a lengthy procedure, which is unwise. Sometimes petit-grain is used instead of lavender.

Essential oils are recognized and used in dentistry. Many commercial products use them for flavor and their antiseptic properties. Cinnamon, spearmint, peppermint, and tea-tree, are commonly found in toothpastes. Listerine is an essential oil mouth rinse that uses menthol, eucalyptol and thymol as active ingredients. Box's periopak, a variation of which is still in use in some dental offices uses eugenol (from clove). Zinc-oxide and eugenol is another tried and true combination still in use in some dental offices.

She has also creative was to use essential oils in dentistry that can also be used in the home that can be used to ad in the comfort and relaxation of CP patients.

1. Handkerchief technique: put a few drops of essential oil(s) onto a Kleenex, cotton buff or gauze square and the patient can inhale the aroma when they feel the urge. This is better technique than putting the oils on the patients' bib as the practitioner is not as affected by the scent and it is not constant.

2. Using them in combination with vinegar, Borax or Baking Soda to make your own cleaning products for outside the operatory, in the washroom, reception, on glass and mirrors. Use distilled water and clean containers/bottles.

3. Make individualized mouth rinses and tooth powders depending on the patient's need. Denture wearers may want to soak their dentures in a home made natural antifungal, disinfecting solution rather than the commercial ones. Recipes are readily available on the internet and in some of my references.

4. Make your own lip moisturizers to give to patients for use during their treatment and for take home. Same goes for novel take home giveaways e.g. scented bath salts (see 11 below), or hand lotions which are especially appreciated in holiday seasons. Soap is difficult and somewhat dangerous to make (due to caustic ingredients), start with something easier.

5. I make my own essential oil scented hand cream and keep it on the reception desk for patient/staff use. If you do not use preservatives, mark an expiry date (but, it will be long gone before that date).

6. Warm, essential oil misted face wipes for cleanup after treatment are a treat. Several companies will custom make these for you or you can make them yourself. Your office can have its own "signature scent." They can be warmed in the microwave or commercially available units.

7. "Breatheasy" mixtures of essential oils can be inhaled to help alleviate respiratory tract and sinus congestion. If you've tried them, you know how fast and effective these cineole-rich oils can be. Patients appreciate when you use them during cold and flu season. If you are making your own, you should be aware of the different types.

The choice of the type or blend of essential oils used in dentistry will be dependent on the oils' known pharmacodynamic properties. Intended uses can include: central nervous system effects (CNS sedation or stimulant; SNS stimulant); antispasmodic effects; anti inflammatory effects; analgesia and antimicrobial activities.

There are many issues to cover when dealing with safety of essential oils. Practitioners must be aware of the potential dangers that can be inherent in even some of the "safest" oils. That being said, I would not want to discourage their uses, which are very valuable to the dental profession, but, I would like to see more education and possibly controls to make sure that they are used safely and responsibly. Which is why having a licensed aroma therapist should be a part of helping develop a program concerning essential oils.

All popular essential oils have Material Safety Data Sheets (MSDS). The Food and Cosmetics Toxicology journals from 1973 to 1991 have valuable information from work done on rats and rabbits.<sup>2</sup> It is because of this existing data that companies can make the "not tested on animals" claim. The results of these worldwide animal tests have been extrapolated to humans to estimate safe doses for oral and dermal doses. The LD50 represents the dose at which 50% of the test subjects died. The acute lethal dose is represented, not the chronic accumulated dose... or rather the dose that may cause organ damage or distress.

Sometimes these estimates have been grossly underestimated. For example, animal tests indicate that a probable lethal dose for Eucalyptus globulus (often used in respiratory blends and dental products), is at 34mls. In fact, the literature reports a child's death after only 5mls! Since this essential oil is sold over-the-counter and often in 10ml bottles there is a great concern for public safety for many of these products.

The scope of this article is too narrow to cover safety issues fully, but there are some topics that I would like to bring attention to:

1. Storage and dilution are both very important. Exposure to light and heat will cause the oils to oxidize and deteriorate, changing their therapeutic values and sometimes making them dangerous to use. Use smaller bottles with safety lids whenever possible and store essential oils in the fridge. Throw out any oils that smell even slightly rancid and any hydrosols after one year.
2. Essential oil exposure to operators can be an issue: vary oils used frequently to prevent yourself and staff from developing a sensitization to oil. Very few oils can be used neat on the skin and recommending internal use should be avoided.
3. Knowledge of absorption routes and rates. There are many misconceptions with regard to absorption through skin, partly because of the aromatic massage therapy movement's popularity. The fact is, that skin absorption, especially on the palms of hands and soles of feet, is one of the least effective methods of absorption. On the other hand, inhalation can get essential oil molecules into the brain and blood almost instantaneously and mucous membrane absorption is much more rapid than topical use on skin.
4. Phototoxicity is a potential danger of a number of oils, including most citrus oils, ginger and fennel. After using these oils (even if not administered on the exposed skin), it is recommended to avoid the sun for 12-24 hours. This could be a serious issue -- a case of bergamot phototoxicity killed a woman in England who had been drinking large amounts of Earl Grey tea!!
5. Chemistry of the individual oils -- know that the lighter monoterpene oils (e.g. lemon) will evaporate much faster than heavier more complex aromatic oils such as the phenols (e.g. clove). Monoterpenes will also be eliminated quicker in the



body and burden the liver and kidneys less. Some of the oils require the body to work much harder at breaking them down (often decreasing p450 enzyme availability in the liver and skin) and sometimes necessitating a second pass before elimination, and therefore are active for longer durations. Often it is the metabolites produced to eliminate the oils which are the most dangerous.

6. Medical History -- Patients with medical histories of liver or kidney disease, on blood thinners (some oils are blood thinners e.g. eugenol), clotting disorders, high blood pressure medication, asthma, epilepsy, psychoses, on antiprostoglandins or are pregnant need special consideration.

7. Children, the elderly and medically compromised individuals -- if you feel confident using the oils with these individuals, a good rule of thumb is to at least half the dose. If there are infants under two or pets nearby, avoid them completely!

8. Oral use of essential oils requires good know knowledge of potential dangers.

9. Essential oil/drug interactions: Essential oils are drug absorption enhancers. If a patient is wearing a medicinal patch avoid use of the oils especially in the area of the patch. Essential oils can also increase the bioactivity of other chemicals and keep them in the body longer. Menthol from peppermint is known to increase the bioactivity of nicotine and might lead to higher risk of developing cancer. (e.g. note the dangers of menthol cigarettes or the common habit of having a peppermint to freshen breath after smoking).

There are many other known interactions of drugs and essential oils including fennel and Ciprofloxacin; essential oils and chemotherapy medications; and the

contraceptive pill. Grapefruit oil may affect carbamazepine, estrogen, statin drugs and calcium channel blockers although it is considered safe for external use.<sup>1</sup>

Oils that could cause significant damage to mucous membranes: Birch, Camphour, Cassia, Cinnamon bark, Clove, Eucalyptus, Ginger, Juniper, Peppermint, Spearmint, Pepper, Pimento, Rosemary, Sage, Savory, Tansy, Thyme.

Oils that could cause significant damage if applied neat to skin: Birch, Boldo, Camphour, Cassia, Cinnamon bark, Clove, Ginger, Juniper, Peppermint, Spearmint, Pepper, Pimento, Thyme.

Essential oils vs. commercial drugs:

Historically, essential oils and plants have had a big influence on the drugs in our armamentarium. The production of Aspirin by Dr. Bayer (ASA) has origins in Salicylic Acid which was originally discovered by observing native Indians who used Willow bark to treat pain and fever. The chemicals were isolated and synthetically reproduced, but, it took years before the actual anti-inflammatory mechanism was discovered and reported.<sup>4</sup> More and more, the active ingredients in essential oils were available as synthetic chemicals, sometimes leading to other compounds and sometimes becoming popular drugs.

While essential oils have always played a part in pharmacology, they are not reproducible in synthetic form as they sometimes contain a hundred different molecules and the composition in the plant varies with so many harvesting factors such as time of day, climate and altitude. Chemotypes of essential oils vary from batch to batch whereas drugs are consistent. With drugs you are assured of the amount of any active ingredient. There are so many chemicals in each essential

oil, gas chromatography and mass spectrometry are necessary to assay every batch of oil to yield estimates of the identifiable chemical components.

Sometimes a chemical is isolated from the natural plant and used in the production of a drug. The drug Tamiflu (used for Avian flu) is made from an isolate of star anise. Although star anise is readily available, the drug is not, as the process is complicated and expensive.

It is largely the molecular chemistry of the essential oil molecules that allow them to be biologically active in the body and attribute their individual therapeutic uses and liken them to other drugs. For starters, most drugs weigh in, in the range of 100MW (molecular weight) units to 1000MW units. Essential oil molecule weights are typically from the smaller ones like limonene (C<sub>10</sub>H<sub>16</sub>) at 136MW units, as in many citrus oils to the heavier sclareol (C<sub>20</sub>H<sub>36</sub>O<sub>2</sub>) at 308 MW units, as in the oil, Clary Sage. For comparison, the estrogen molecule weighs in at about 360MW units.

Molecular size is important as it allows access to the receptor sites and potential to react. Other features such as electrical charge, lipophylicity, 3-D shape of the molecule and polarity also play roles in receptor binding. Commercial drugs will tend to target certain receptor sites to accomplish their intended purpose, whereas, when an essential oil circulates in the body, because of the number of different chemicals in the mix, often other receptors other than just the target receptors will become bound.<sup>4</sup>

To further complicate the aforementioned, certain drugs will act differently; depending on the organ the receptor is in e.g. Tamoxifen is a drug that binds to

estrogen receptors. It is an agonist of estrogen receptors in bone and the uterus, but an antagonist to receptors in the breast. Care must be taken as essential oil molecules may act in a similar fashion. For example, clove bud or eugenol essential oil is a mucous membrane irritant, and anesthetic externally, but acts as an anti-inflammatory inside the body.<sup>4</sup>

There is a growing interest in incorporating complementary therapies in the dental field and aromatherapy is certainly one of the more popular ones. There is a body of evidence-based research that validates some of the claims of reached therapeutic values of the oils and many very credible institutions continue to add to this data bank. Because "natural" does not always mean "safe," and in the interest of public protection, I urge dentists to be well informed of the safety and suitability of their choices of essential oils and modes of administration.

*Dr. Goodman is an editorial board member for Oral Health journal. She can be for consultation on dental aromatherapy at [jangoodman@rogers.com](mailto:jangoodman@rogers.com) or [www.mitzvahspa.com](http://www.mitzvahspa.com)*

Dr. Goodman's article gave descriptive information on how to use essential oils in dentistry safely and effectively. In addition to the office this is the approach I would implement into my program for home care as well. Although my proposal does not mention that the practitioners take courses to become aroma therapist, it is still an option for practitioners who would desire to extend their knowledge and use of essential oils if they are interested but it is not required in my program.

In response to my interview with Dr. Sconzo there are dentist using this method to help treat their patient and even their staff in some cases. It seems that there

is a way to make my program affordable for patients and their families. It also appears that time management can be managed appropriately.

I uncovered a dental hygienist who has added aroma therapy in to her treatment of her patients as well. She agrees with Dr. Goodman that aromatherapy is no longer being used just for spa treatments and cosmetic products. It has found a valuable place in the dental office for stress-relief, quelling anxiety, enhancing productivity, and uplifting the mood. It has become more mainstream and widespread as consumers of essential oils are starting to recognize the. Dental offices now use aromatherapy to calm anxious patients and, more importantly, to relax dentists and hygienists while performing procedures.

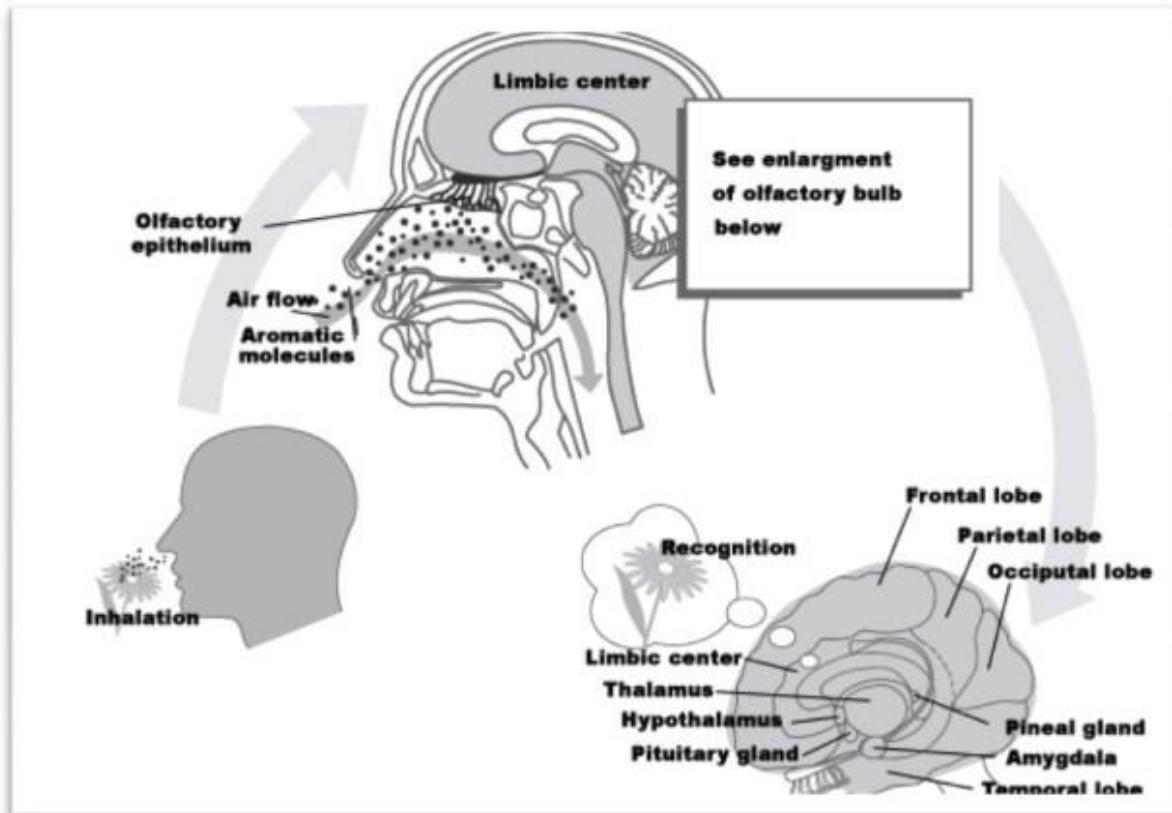
It is such a relaxing and calming experience for the patient when warm lavender scented towels are applied. But what about the staff?! They are the workhorses hunched over at least eight patients a day, feeling tight in the shoulders, and maintaining stiff hands. They are the ones in dire need of relaxation!

Cara Schurman, a dental hygienist, utilizes aromatherapy in her operatory room and says, "I feel as though I am in a spa every day. It really helps me to drop my shoulders and relax while performing the procedures."

Specific essential oils can truly help calm the mind (lavender or clary sage), balance the mood (geranium or mandarin), and enhance productivity, focus, and concentration (rosemary or peppermint). Many oils can also help to counteract mental fatigue, apprehension, fear, anxiety, irritability, tension, and stress.

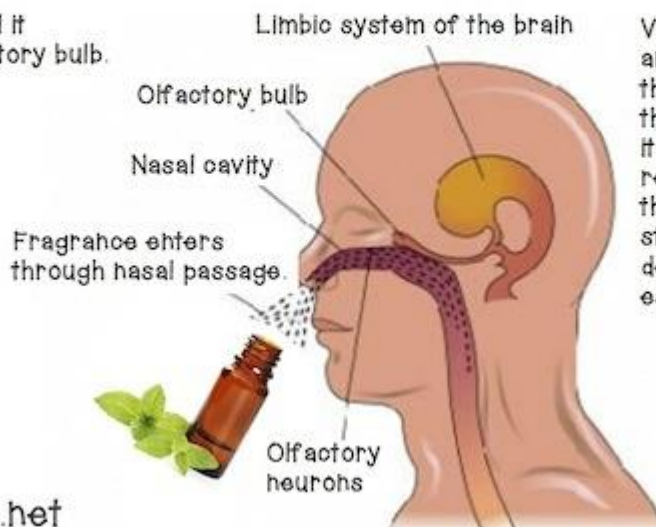
In the dental office, aromatherapy can be experienced by using a maintenance-friendly Aroma-Stream vaporizer or an Aroma-Stone diffuser. A few drops of an essential oil or essential oil blend are applied to the diffuser or vaporizer. Those few drops can scent an 800 square foot space. This method is a simple, affordable, and safe way to help relieve daily stress and enhance work performance. Essential oils enjoy the feeling of well-being and productivity by using essential oils or essential oil blends for your patients.

All this talk of aroma therapy, how does it work on the patients? What sensors of the body do the oils affect? In a controlled study, aroma treatment has been tested to investigate the effect of aromatherapy with essential oil of orange on child anxiety during dental treatment it seems that the use of aromatherapy with natural essential oil of orange could reduce salivary cortisol and pulse rate due to child anxiety state. Patients with CP have trouble controlling their saliva. This study helps further endorse using aroma/massage therapy for my proposal. This also is another aspect of safety in regards to treating these patients with the right oils to stimulate the right reactions. In the results portion of the control study it states that the ( inhalation of scented oils, volatile molecules of the oil reach the lungs and rapidly diffuse into the blood, causing brain activation via systemic circulation.<sup>34</sup> However, these molecules also bind to olfactory receptors, creating an electrophysiological response which reaches the brain. Neocortex activation is expected to occur by this response, which has an effect on perception of odors and reaches the limbic system regions including amygdale and hypothalamus, the areas where levels of hormone and emotions are controlled.<sup>35,36</sup> Thus, the salivary cortisol level and pulse rate decrease as mentioned above, following aromatherapy,



## Essential Oils and the Olfactory System

Scent travels until it reaches the olfactory bulb.



Via the olfactory bulb, the aroma is sent directly to the center of the brain, to the limbic system, where it is processed and releases neurochemicals that can be relaxing, stimulating, sedative, etc. depending on the essential oil being used.

# Effect of aromatherapy with orange essential oil on salivary cortisol and pulse rate in children during dental treatment: A randomized controlled clinical trial

[Mehdi Jafarzadeh, Soroor Arman,<sup>1</sup> and Fatemeh Farahbakhsh Pour<sup>2</sup>Author information ►](#)  
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## **Background:**

Essential oils have been used as an alternative and complementary treatment in medicine. Citrus fragrance has been used by aromatherapists for the treatment of anxiety symptoms. Based on this claim, the aim of present study was to



investigate the effect of aromatherapy with essential oil of orange on child anxiety during dental treatment

### **Materials and Methods:**

Thirty children (10 boys, 20 girls) aged 6-9 years participated in a crossover intervention study, according to the inclusion criteria, among patients who attended the pediatric department of Isfahan Dental School in 2011. Every child underwent two dental treatment appointments including dental prophylaxis and fissure-sealant therapy under orange aroma in one session (intervention) and without any aroma (control) in another one. Child anxiety level was measured using salivary cortisol and pulse rate before and after treatment in each visit. The data were analyzed using *t*-test by SPSS software version 18.

### **Results:**

The mean  $\pm$  SD and mean difference of salivary cortisol levels and pulse rate were calculated in each group before and completion of treatment in each visit. The difference in means of salivary cortisol and pulse rate between treatment under orange odor and treatment without aroma was  $1.047 \pm 2.198$  nmol/l and  $6.73 \pm 12.3$  (in minutes), which was statistically significant using paired *t*-test ( $P = 0.014$ ,  $P = 0.005$ , respectively).

### **Conclusion:**

It seems that the use of aromatherapy with natural essential oil of orange could reduce salivary cortisol and pulse rate due to child anxiety state.

**Keywords:** Aromatherapy, children, dental anxiety, orange essential oil, salivary cortisol

## **INTRODUCTION**

Dental fear and anxiety have been perceived as a source of complication in managing pediatric patients.[1] A long-term avoidance of dental treatment due to dental anxiety may decline the state of oral health,[2] resulting in pain and distress.[3] Incidence of dental caries can be predicted by dental anxiety.[4] In addition, anxious patients are more sensitive to pain.[5] Helping patients overcome fear and anxiety may increase regular and scheduled dental visits[6] and may ultimately improve the quality of life.[7,8]

There are anxiety-provoking factors in a dental setting, such as the sights (needles), sounds (drilling), smells (cut dentine, eugenol), and sensation (high-frequency vibration).[3,9] According to several researches, odors can modulate cognition,[10] mood,[11] and behavior.[12] There is a powerful connection between odors and memories, especially those from the distant past, charged with emotional significance due to major anatomical connections existing between brain structures such as the hypothalamus and limbic system which are involved in emotion and memory.[13] The smell of the dental office was found to be highly effective in a study evaluating dental fear and anxiety.[14] In another study, this item has shown high scores in patients with dental phobia.[15]

Recently, contemporary and alternative medicine approaches such as aromatherapy (use of essential oils, scented, volatile liquid substances for therapeutic purposes) have been considered in dental[16,17,18,19] and medical

settings.[20,21,22,23] This method is supporting the concept that common oils can produce positive pharmacological and physiological effect by the sense of smell.[24] For instance, the parasympathetic nervous system activity is increased by 12% and sympathetic activity is decreased by 16% with orange oil.[25] Faturi *et al.* declared an acute anxiolytic effect of sweet orange essence in rats, and in order to discard the possibility that this effect was a result of exposure to any other odor, the behavioral response to another *Melaleuca alternifolia* essential oil was also assessed. They supported the use of orange essential oil by aromatherapists as a tranquilizer.[26]

The effect of aromatherapy on dental anxiety has been assessed in a few studies. Lehrner *et al.* studied the effect of orange odor and reported improved mood and less anxiety only in females.[18] Five years later, in another study, they compared the effect of orange and lavender odor with a music condition and a control condition and demonstrated that odors are capable of reducing anxiety and altering emotional states in dental patients.[19] In a cluster randomized controlled trial, Kritsidima *et al.* explained reduced state of anxiety with lavender scent in dental patients.[17] Ndao *et al.* studied the effect of inhalation aromatherapy and stated that respiratory administration of bergamot essential oil did not decrease anxiety, nausea, and pain when added to standard supportive care.[22] Muzzarelli *et al.* recommended that aromatherapy can be more useful at a moderate level of anxiety;[27] however, in a study conducted by Toet *et al.*, the use of orange and apple odors did not reduce anticipatory anxiety and did not improve mood of patients waiting for scheduled visits in large dental clinics.[28] In a study performed by Maura *et al.*, the effect of gender and ethnicity on preferences and attitudes in children was investigated. They reported that

children are very different from adults in their odors and taste preferences and they are likely to use essential oils which they find pleasant. They found aromatherapy appealing and acceptable for school age children. They concluded that specific essential oils are accepted by children, such as sweet orange or lemon.[29]

It is admitted that psychological stress can largely influence physiological systems such as autonomic system and the hypothalamus–pituitary adrenal axis (HPA axis) stimuli. The HPA axis activity enhances *in situations* including anxiety and pain which result in increasing cortisol secretion. Dental stimuli have the potential of inducing anxiety.[30] Cortisol is released from the cortex of the adrenal and diffused to all body fluids. It can be discovered in urine, serum, and saliva.[31] Salivary samples have many advantages such as noninvasiveness, stability at room temperature up to a week, and independency of its concentration on salivary flow rate,[30] and also pulse rate recording is simple and practical, which are the reasons for selecting salivary cortisol and pulse rate for child anxiety assessment.[32]

Because of the importance of anxiety control, the inconsistency in studies conducted so far, the lack of investigations in pediatric population, and property of aromatherapy that is inexpensive and noninvasive, we designed a randomized controlled clinical trial to evaluate the effect of aromatherapy with essential oil of orange on salivary cortisol and pulse rate as indicators for child anxiety during dental treatment.

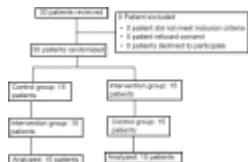
## MATERIALS AND METHODS

In a randomized controlled clinical trial, the effects of orange odor on child anxiety during dental treatment were evaluated. This study has been registered under Iranian Registry for Clinical Trials (IRCT: 201201258821N1).

Thirty children (10 boys, 20 girls), aged between 6 and 9 years, were selected among patients who attended the pediatric department of dental school in 2011 by convenient sampling according to the following criteria. The inclusion criteria used for selecting the patients were: children aged 6–9 years, who had two permanent molars which needed fissure-sealant therapy and were Frankle + in cooperation (children who accept treatment with cautious behavior at times; willing to comply with the dentist, at times with reservation, but follow the dentist's direction cooperatively are Frankle +),[\[33\]](#) with the absence of any systemic problems, physical and mental disabilities, and those who did not have any previous dental visit. Children with common cold and allergy were excluded from this study. Prior to the session, an informed consent was obtained from parents or legal guardians and they completed a form containing children's medical information.

In this crossover design study, participants were assigned into two groups by even–odd method by a dental practice secretary who was blind to the aim and design of study. Half of the children were treated without any odor (control) initially and received orange aroma in the second session (intervention). Another 15 children received treatment under orange aroma in the first encounter

(intervention) and treated without any aroma at the second visit (control). [Figure 1]



[Figure 1](#)

Patients who entered the study were divided into the study groups and analyzed

The natural essential oil of orange (*Citrus sinensis*) supplied by Giah essence corporation (Gorgan, Iran) was used. The main components of essential oil were determined by gas chromatography, which were found to be limonene 92%, myrcene 3%, and other components 5%, and most of them were  $\alpha$ -pinene,  $\beta$ -pinene, *p*-cymene, linalool, and geraniol. This data was provided by the delivering company.

Aftab electrical aroma diffuser (Rayehe pardazan pishtaz, Tehran, Iran) was used to pass a stream of air driven by a fan to diffuse essential oils, while it was out of sight of the participants. Considering the size of the operating room which was 10 m<sup>2</sup>, based on the clinical experience and in order to receive orange odor with constant intermediate concentration, 2 ml of orange essence was stored in an identical glass bottle that was placed under a small fan in a dispenser and the timer was set so that it was activated for 2 min every 10 min. All the actions were performed half an hour before the first patient's arrival in aromatherapy days. The control groups were scheduled on different days and water was stored in the diffuser instead of aromatic oil.

Every child needed two treatment appointments and all children were treated between 8 and 9 a.m. and the second visit was in the following week at the same time. During each visit, first the child was separated from his/her parents by a nurse and carried to a room. After 5 min, a nurse who was trained and calibrated for sampling recorded the pulse rate by a finger type pulse oximeter (Nonin, Chicago, USA) and also collected unstimulated saliva by placing an absorbent cotton pellet (Salivette, Sarstedt Inc., Newton, NC, Chicago, USA) sublingually. After 5 min, it was taken out and placed in a polypropylene coated tube and was numbered as the first sample of that child. Then, the child was taken to the operating room. We used the same dental procedure in both appointments, which was a routine fissure-sealant therapy performed by a senior postgraduate student of pediatric dentistry, consisting of the tooth being cleaned with a low-speed dental hand piece and a rotary bristle brush and then performing fissure-sealant therapy for one of the permanent first molars. After the completion of treatment, the nurse sampled saliva and recorded pulse rate and labeled it as the second sample. Two samplings of each visit took place in different locations and there was about 20 m distance between them in order to omit the effect of ambient odor on the first sampling. In the other visit, dental treatment was done and sample was taken following the same procedure, and third and fourth samples were collected. By collecting four samples of each child, a total of 120 samples were obtained. At the end of each appointment, the samples were sent to the laboratory. Saliva samples were centrifuged and stored frozen at  $-20^{\circ}\text{C}$  until adequate samples were ready for analysis. The salivary cortisol level was detected using Immunoassay cortisol kit by Elecsys cortisol assay (ECLIA-68298, Roche diagnostic GMBH-BD, Sandhofer, Germany).

Paired *t*-test was considered for main effect analysis; carryover effect and period effect were analyzed using Student's *t*-test by the SPSS statistical package (Version 18, SPSS Inc., Chicago, IL, USA). *P*-value <0.05 was considered as the level of significance.

## RESULTS

Thirty children with the mean age of  $7.66 \pm 0.84$  years participated in this study. They were assigned randomly in two groups according to crossover design. The first group consisted of 15 children (9 girls and 6 boys) with the mean age of  $7.80 \pm 0.86$  years, who were treated in the absence of orange aroma in the first session (control) and under orange aroma in the second one (intervention). The second group consisted of 11 girls and 4 boys, with the mean age of  $7.53 \pm 0.83$  years, who were treated under orange aroma in the first encounter (intervention) and without odor in the second one (control). There was no statistically significant difference in age between the two groups ( $P = 0.396$ ). Also, there was no statistically significant difference in number of boys and girls in this study ( $P = 0.439$ )

Anxiety of children was assessed with salivary cortisol level and pulse rate before and on completion of each dental appointment. The mean  $\pm$  SD of salivary cortisol levels were calculated in each group before and on completion of treatment in each visit. In addition, the mean difference of salivary cortisol level was obtained by calculating the difference in cortisol level values before treatment and on completion of treatment in each visit (end of treatment – before treatment), which are presented in [Table 1](#).



Table 1: Mean, standard deviation (SD), and mean difference of salivary cortisol levels (nmol/l) at stages, groups, and time of assessment

Assessment time	Stage	Group	Before treatment	After treatment	Mean difference
			Mean(SD)	Mean(SD)	Mean(SD)
Salivary cortisol	1	Control	32.76(2.85)	34.48(2.54)	2.86(2.80)
		Intervention	32.36(4.36)	33.02(4.28)	0.69(4.68)
	2	Control	11.43(3.87)	30.10(3.34)	18.68(3.86)
		Intervention	32.48(2.91)	36.32(2.72)	3.72(3.07)
Pulse rate	1	Control	99.86(11.68)	99.60(12.80)	-0.26(12.07)
		Intervention	926.10(45.42)	96.73(47.23)	-1394.02
	2	Control	98.91(12.75)	98.33(14.42)	-0.58(12.58)
		Intervention	93.81(12.85)	93.20(12.83)	-0.61(12.63)

The main effect of this study was obtained by calculating the difference of salivary cortisol means between treatment under orange aroma and treatment without aroma, which was  $1.047 \pm 2.198$  nmol/l and statistically significant using paired *t*-test ( $P = 0.014$ ) [Table 1].

Table 1 shows the mean  $\pm$  SD of pulse rate before and after treatment in both stages and visits. In addition, the mean difference of pulse rate was obtained by calculating the pulse rate differences before and after treatment (end of treatment – before treatment).

The other main effect of this study was obtained by the calculating difference of pulse rate means between treatment under orange aroma and without aroma, which was  $6.73 \pm 12.3$  (in minutes) and statistically significant using paired *t*-test ( $P = 0.005$ ) [Table 1].

The difference between before and after treatment (intra group) of salivary cortisol level and pulse rate (after treatment in the presence of orange aroma – after treatment in the absence of orange aroma) in patients treated under orange aroma that was followed by the absence of aroma, and also in patients treated in the absence of aroma that was followed by orange aroma were obtained [Table 2].

Difference outcome*	Intervention followed by control (in %)		
Salivary cortisol	After intervention - after no intervention	1.45	
	SD	3.44	
	P value		0.5
Pulse rate	After intervention + after no intervention	3.85	
	SD	11.12	
	P value		0.77

\*Difference between before and after treatment (intra group SD, standard deviation)

Period effect was not statistically significant in salivary cortisol level and pulse rate ( $P = 0.328$  and  $0.794$ , respectively). It shows that there was no statistically significant difference between salivary cortisol levels and pulse rates of children who were treated under orange aroma in the first visit and without intervention at the second one and those who were treated without orange aroma in the first visit and with intervention at the second one.

[Table 3](#) shows the mean difference between before and after treatment (intra group) of salivary cortisol level and pulse rate in treatment under orange aroma that followed by the absence of aroma and also, in treatment in the absence of aroma that followed by orange aroma (after intervention + after no intervention)/2). Carry over effect were not statistically significant for salivary cortisol level and pulse rate. ( $P$  value =  $0.715$  and  $0.833$  respectively). It declared that wash out period was convenient.

Mean outcome*	Intervention followed by control (in %)	
Salivary cortisol	After intervention + after no intervention/2	1.45
	SD	3.57
	P value	
Pulse rate	After intervention + after no intervention/2	-3.87
	SD	8.14
	P value	

\*Difference between before and after treatment (intra group SD, standard deviation)

## DISCUSSION

This study had a new approach toward aromatherapy that was accompanied with dental treatment in children, based upon the anxiolytic effect of orange odor. The

results of this study showed that the salivary cortisol level and pulse rate decreased in intervention groups by using aromatherapy and that these differences were statistically significant.

On inhalation of scented oils, volatile molecules of the oil reach the lungs and rapidly diffuse into the blood, causing brain activation via systemic circulation.[\[34\]](#) However, these molecules also bind to olfactory receptors, creating an electrophysiological response which reaches the brain. Neocortex activation is expected to occur by this response, which has an effect on perception of odors and reaches the limbic system regions including amygdala and hypothalamus, the areas where levels of hormone and emotions are controlled.[\[35,36\]](#) Thus, the salivary cortisol level and pulse rate decrease as mentioned above, following aromatherapy.

The result of the present study is in agreement with the results obtained in the 2000 and 2005 studies by Lehrner *et al.* and 2010 study by Kritsidima *et al.*[\[17,18,19\]](#)

While choosing a stressor, dental treatment including oral prophylaxis and fissure-sealant therapy were selected because of their convenience, noninvasiveness, and ethical nature. Because these two procedures are painless, it was supposed that any changes in salivary cortisol and pulse rate might be as a result of stress and not because of pain.

Limonene was the main component of this natural essential oil of orange, as determined by gas chromatography. This was near to limonene concentration in orange essential oil used in studies by Lehrer *et al.* and the animal study by Future

*et al.*[[18,19,26](#)] It is possible that limonene is responsible for reducing anxiety in these studies.

Salivary cortisol was measured in studies by Kanegane *et al.* in assessing dental anxiety before urgent dental care, Toda *et al.* for evaluating the effect of lavender aroma on endocrinological stress markers, and Atsumi *et al.* in investigating smelling lavender and rosemary.[[37,38,39](#)] Pulse rate was recorded in previous studies by Westra *et al.* in evaluating discomfort in children who underwent unседated magnetic resonance imaging (MRI) and by Chang and Shen in assessing aromatherapy on elementary school teachers.[[32,40](#)]

All aromatherapy studies in dental environments so far conducted in waiting rooms and the anticipatory anxiety of patients was evaluated. These studies included adults of a wide age range and anxiety was assessed by questionnaires.[[17,18,19](#)] Because of the parallel design of these studies, case and control groups could be different at baseline, and also, they presented for different dental treatments (dental cleaning, drilling, root canal therapy). In addition, it is not clear that reduced anxiety in waiting room due to aromatherapy can be effective on anxiety during seating on a dental chair.

However, the present study is different from the results reported by Toet *et al.*, Ndao *et al.*, Nord and Belew, and also by Holm and Fitzmaurice.[[22,23,28,41](#)] Toet *et al.* reported that additional distraction sources in the waiting rooms of large dental clinics, such as great background activity and continuous going and coming of patients, might influence the outcome.[[28](#)]

Ndao *et al.* used bergamot essential oil in children and adolescents who underwent stem cell infusion. Bergamot essential oil induced dose-related sequence of sedative and stimulatory behavior effect in animal models.[22] It was possible that the administered dose in this study induced more stimulatory rather than sedating effect. Also, patients with different diagnosis and treatment histories were included in this study. Nord and Belew reported that the children's comfort in a perianesthesia setting was enhanced by using lavender and ginger essential oils, which was not statistically significant. The samples in this study included children with and without developmental disabilities. Faces, Legs, Arms, Cry, and Consolability (FLACC) scale was used in this study, which was performed by parents. As a strategy for blinding, parents were not trained for this scale. Thus, their reports were not reliable.[23] Holm and Fitzmaurice stated that anxiety of adults who accompanied children to a pediatric emergency department decreased by music compared with aromatherapy. This might be due to imprecise application of the aromatherapy or environmental conditions.[41]

According to the cognitive and developmental alterations and aging effects on children's preferences, focus on an age group should be taken into consideration. This study was the first to investigate the anxiolytic effect of aromatherapy on children during dental treatments. Only 6–9-year-old children who are nearly in concrete operation of Piaget's stage participated in this study.[29] Some consistency was obtained in development by selecting this age range and this investigation was made comparable with other studies. As parental anxiety may affect the children's anxiety and alter under aromatherapy,[42] we did not permit parents to accompany their children.

## CONCLUSION

It has been reported by some studies that the smell of eugenol which is present in the dental environment may influence dental care in some patients and produce strong unpleasant feelings like fear and anxiety.[\[15\]](#) According to our inclusion criteria, the children selected had lack of any previous dental visit; therefore, the need for masking the smell of eugenol was not felt in other study.

To create my program I must prove that my concept of hygiene/dental care at home with aroma therapy to insure optimal oral hygiene for patients with cerebral palsy can exist and by doing so I have researched case studies and that complement my goals for ideas. I have also researched and documented programs and dentists that do travel to homes to perform oral healthcare to prove that my proposal will be the best option for the future in dental care for CP patients.

National Foundation of Dentistry for the Handicapped (NFDH)

Although a significant number of people live full lives with disabilities, others find themselves underserved in the dental community. Their medical conditions and/or disabilities often exhaust all of their financial resources, and dental care through public programs is scarce for adults.

### **Serving Indigent Disabled, Elderly and Medically Compromised People**

Realizing the lack of care for the needy disabled, the National Foundation of Dentistry for the Handicapped was created to provide dental services to needy **disabled, elderly or medically compromised individuals**. Also known as the

NFDH, the Foundation collaborates with dental professionals to provide volunteer dental care for truly indigent patients with special needs. As a charitable affiliate of the American Dental Association, NFDH has earned a strong reputation through its outreach programs.

#### NFDH Services

The National Foundation of Dentistry for the Handicapped has three established programs designed to improve the oral health of the disabled:

- **Donated Dental Services (DDS) Program** -- NFDH uses volunteers to provide dental treatment and appliances to special needs patients who cannot afford treatment, yet do not qualify for public aid. Over 13,000 dentists and 3,000 dental laboratories are enrolled in the program. So dentists and laboratories can focus on what they do best, a DDS Coordinator acts as a liaison between the patient and the volunteer.

- **Bridge/Campaign of Concern (New Jersey and Colorado only)** -- This outreach program is focused on providing services to people who are developmentally disabled. In New Jersey, it brings dental hygienists to schools, vocational centers and group homes. Bridge helps reduce the possibility of dental disease by providing preventive educational services and oral screenings to determine the need for treatment. In Colorado, activity is focused on providing training to caregivers of developmentally disabled people in order to help them prevent dental disease from occurring.

**- Dental HouseCalls (Colorado, Illinois and New Jersey only)** -- Disabled and elderly patients who are housebound may not be getting the professional dental care they need, and the results can be devastating. Those who cannot be accommodated at a dental office often benefit from dental visits at home. A portable dental office is transported by van to homes, nursing homes, daycare programs or residential centers and set up in-house by a full-time coordinator, who also schedules the appointments. Through this program, dentists are able to provide a wide range of dental services for free or at a reduced fee.

Fortunately, there are many resources to help indigent special needs patients get the dental care they need. Many dental offices are able to accommodate disabled patients, and public aid programs offer assistance to those who qualify. If these resources are unable to meet your needs, the National Foundation of Dentistry for the Handicapped may be of assistance. For more information, visit the NFDH website at [www.nfdh.org/joomla\\_nfdh](http://www.nfdh.org/joomla_nfdh).

**Dr. Rafael Mosery**  
**A Brooklyn Dentist that makes home visits**

Dr. Rafael Mosery has been practicing dentistry since 1984. He received his B.A. in 1980 from NYU and went on to receive his Doctor of Dental Surgery (D.D.S.) from NYU College of Dentistry. Since then he has been dedicated to constantly keeping abreast of dental advances through ongoing participation in continuing education. Dr. Mosery has been awarded a Fellowship by the International Congress of Oral Implantology. In addition, Dr. Mosery has completed two years of implant surgical and prosthetic training at NYU. Dr. Mosery was appointed and served as clinical



assistant in the Department of Implantology. This commitment to learning has resulted in a practice that can offer the latest University proven techniques and improvements in Dentistry.

Professional Affiliations and Membership include:

- International Congress of Oral Implantology
- American Dental Association
- Dental Society of the State of New York
- Second District Dental Society
- Dental “Expert” featured on Allexperts.com

The home dental patient presents with unique needs that may differ from the routine dental care experienced in an office setting.

Services provided for the home dental patient include but are not limited to

- Dental Exams
- Cleanings
- Extractions
- Dentures
- Mobile x rays

Although these dentist and organization are practicing in the homes of elderly and the medically disabled, dental Hygienists are not allowed to practice without a dentist being present at this time. This is the reason why my program is required. My proposal will make a change in dentistry and in the lives of CP patients. Dental Hygienist is the front lines of dentistry. We pride ourselves on preventive

dentistry and the promotion of excellent oral health education for all, to prevent the disease in the oral cavity such as caries, periodontal disease and cancer. I predict in the near future dental hygienist will evolve and be given the right and the privilege to practice in their own dental establishments and in the home's of mentally disabled patients on our own merit.

Professionals that are detrimental and have a important role in caring and providing a service in my proposal as well as the dentist are:

### Hygienist

Dental hygienists are preventive oral health professionals who have graduated from an accredited dental hygiene program in an institution of higher education, licensed in dental hygiene to provide educational, clinical, research, administrative and therapeutic services supporting total health through the promotion of optimum oral health.

### Physical therapists

Health care professionals who diagnose and treat individuals of all ages, from newborns to the very oldest, who have medical problems or other health-related conditions that limit their abilities to move and perform functional activities in their daily lives.

PTs examine each individual and develop a plan using treatment techniques to promote the ability to move, reduce pain, restore function, and prevent disability. In addition, PTs work with individuals to prevent the loss of mobility before it

occurs by developing fitness- and wellness-oriented programs for healthier and more active lifestyles.

Physical therapists provide care for people in a variety of settings, including hospitals, private practices, outpatient clinics, home health agencies, schools, sports and fitness facilities, work settings, and nursing homes. State licensure is required in each state in which a physical therapist practices.

### Aromatherapy

Aromatherapy is the systematic use of essential oils in holistic treatments to improve physical and emotional well-being. Essential oils, extracted from plants, possess distinctive therapeutic properties, which can be utilized to improve health and prevent disease. Aromatherapy is an especially effective treatment for stress related problems and a variety of chronic conditions.

For further information

The Aromatherapy Council – [www.aromatherapycouncil.co.uk](http://www.aromatherapycouncil.co.uk)

The International Federation of Aromatherapists – [www.ifaroma.org](http://www.ifaroma.org)

### Massage

A hands-on technique used to stimulate the body through the skin. Massage boosts the circulatory and immune systems and can induce feelings of comfort, relaxation and well-being. There are various forms of massage therapy but Swedish Massage is the most gentle. In children and adults with cerebral palsy massage may help to stretch muscles and ease stiff joints, improving mobility.

For further information:

The Guild of Infant and Child Massage – [www.gicm.org.uk](http://www.gicm.org.uk)

General Council for Massage Therapy – [www.gcmt.org.uk](http://www.gcmt.org.uk)

### Occupational therapy

An occupational therapist can advise on equipment for disabled children and adults, and adaptations to the home and undertake functional assessments. Usually based in a hospital, school, community clinic or health centre, referral is through a health professional.

With all the research presented the conclusion of my prognosis ends with bring all of my information together to create my program called “Hygieromapy “ Hygiene/Aroma/massage therapy, which may be performed in the homes of CP patients. Preventive dentistry in this population of people is imperative. This program produces the possibility to eliminate trauma to this population caused by lack of proper dental care due to the elements that plague people living with CP.

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