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Ecodentistry- the art and science of sustainable dentistry

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Abstract

In today’s world, it is necessary to understand the importance of being eco-friendly in every facet of our life, including the dental practice. Eco-dentistry is a newly evolving practice of dentistry, which encompasses a simultaneous devotion to sustainability, prevention, precaution, and a minimally invasive patient-centric as well as global-centric treatment philosophy. It is an emerging concept which is worthwhile to the environment and has taken the dental profession far away from the stage of preventing pollution to a juncture of encouraging sustainability. It majorly focuses on waste reduction, energy conservation, and pollution prevention. This article provides an insight on green dentistry and commends discursive methods to lay the foundation of a dental practice with is environment friendly.

Keywords: Eco-dentistry, eco-friendly dentistry, green dentistry, dental waste.

Introduction

"The ultimate purpose of business is not, or should not be, simply to make money. Nor is it merely a system of making and selling things. The promise of business is to increase the general well-being of humankind through service, a creative invention and ethical philosophy". - Paul Hawken

Since decades, the influence of human practices on the environment has been a major concern globally. As stated by the statistics given by WHO, SouthEast Asia Regional Office; production of hazardous and non-hazardous waste by a total of 11 SouthEast Asian countries come to a total of about 1000 tons per day and approximately 35000 tons of health care waste per year.

Dentistry as a profession has an exuberant endeavour in the health care waste. Though the individual dentist yields dental waste on a small scale, the overall accrued wastage may have a prodigious result on the environment. Ergo, it is the call of the clock for the dentists to become environmentally sensible and direct themselves to an eco-friendly dental practice. Eco-friendly dentistry is relatively a virgin concept in dental practice. It is a part of a bigger picture of the ecologically-sustainable healthcare system.

The Eco-Dentistry Association (EDA) defines Green Dentistry as: “A high-tech approach that reduces the

environmental impact of dental practices and encompasses a service model for dentistry that supports and maintains wellness".

According to EDA, the prime worth of switching to the eco friendly dentistry is as follows:

- It is high-tech
- Reduces waste and pollution
- Saves time, energy, and money
- Promotes wellness

History

The idea of "green dentistry" stems back to the 5th European Dental Students' Association Congress of Belgrade, Serbia, in March 2003, when the Greek delegation set the outline and proposed the adoption of the project by the assembly. Currently, the countries which have adapted this project are Croatia, Sweden, the Netherland, the UK, and Greece. Its main domains are:

1. Increased environmental awareness and sensitivity among the dental professionals
2. Encouragement of procedures/regulations/policies compatible with sustainable development strategy of EU
3. Establishment of a network of cooperation, exchange information, and opinions concerning the environmentally friendly dental practice in Europe and internationally.

In today's world, the term "eco-dentistry" has been adapted which has gone beyond the point of preventing pollution and is now concerned with promoting sustainability.

The first international reference to eco-friendly dentistry was published in the study done by Dr. Ali Farahani and Mittale Suchak on April 3, 2007. In this study, they defined eco-friendly dentistry as an approach to dentistry that implements sustainable practices by keeping resource consumption in line with nature's economy, by safeguarding the environment through means which will help in eliminating or reducing outgoing wastes and by promoting the well-being of all personals in the clinical environment by conscious reduction of the chemicals in the breathable air.

In 2008, the EDA was co-founded by Dr. Fred Pockrass and his wife, Ina Pockrass. The EDA provides education, standards, and connection to patients and dentists who practice green dentistry. The EDA aims to help dentists by suggesting some safe and reusable alternatives that lower their operating cost, for example, replacing paper with digital media whenever possible.

On December 22, 2009, Dr. Steven Koos trademarked and officially defined eco-friendly dentistry.

Cardinal points in eco-dentistry

A. Waste reduction

According to the ballpark figure provided by Environment Protection Agency (EPA), annual turnover of mercury containing waste amounts to be approximately 3.7 tons, which forms the dead weight on the local waste-water treatment plan, or is incinerated with the other trash.

Majority of the dental waste is contributed by an estimate of 65% - 75% dental clinics that uses conventional X-ray systems which requires the disposal of 4.8 million lead foils and about 28 million litres of X-ray fixers yearly; ultimately burdening the biodiversity. Dentistry can limit its burden on the environment by employing the "Four R"s of Going Green," namely, "Re-think, Reduce, Reuse, and Recycle".

Re-think

Implementing small and affordable changes can make a significant impact on long term environmental sustainability. "GO GREEN", Environmentalism, etc. is a state of mind, and reincarnating the demeanor towards dentistry is the key to transformation. Rethinking is the first of the four R's and is of utmost importance. It

includes re-thinking about the dental procedures, construction, and administration of a dental clinic, in accordance to the dogma of eco-friendly dentistry as a paradigm.

Reduce

The most efficient element of the waste hierarchy is minimizing the waste created and the obvious approach to have an abundance of a resource is to use less of it. Under mentioned are a few key measures to reduce the onus on the environment

1. Saving water : Some ways in which dental office can help in saving water includes the following:

- Follow Centre for Disease Control hand sanitation guidelines and use hand sanitizer instead of hand-washing when appropriate.
- When hand-washing is required, turn off the water while lathering.
- Participate in the "Save 90 A Day" Campaign educating patients to turn off the water while brushing.
- Use a dry dental vacuum pump, instead of a wet one.
- Only run full loads when using sterilization equipment or the practice laundry machines. Low flow aerators can be installed on all sink faucets.
- Check for leaks throughout the office every 6 months.

2. Reducing the consumption of disposable items used in dentistry would help in the preservation of the environment.
3. The ultimate way to reduce in the dental office is to go "paperless". Going paperless involves the office using computer and digital technology whenever possible to create, use, and store office records.
4. Eliminate the use of plastic bags by using paper when possible.

Reuse

This maneuver boosts the extended use of an item; thus debaring the item from contributing to the waste in the landfills. Few ways to implement “re-using” in the dental office are:

1. Reusable operating room cotton towels instead of disposable plastic or paper patient bibs,
2. Reusable stainless steel high- and low-volume, surgical/endodontic suction tips as an alternative to disposable plastic,
3. Reusable glass irrigation syringe as a substitute for disposable plastic,
4. Biodegradable disposable cups instead of regular paper cups,
5. Chlorine-free, high postconsumer recycled paper products instead of traditional paper products, and
6. Reuse paper when appropriate. Shred used paper to use as packing and/or reuse packaging materials.

Recycle

Recycling triangle is made up of the three green arrows. “Collecting materials” to be recycled is the first arrow in the recycling triangle. "Remanufacturing", or making something new out of the recycled materials, is represented by the second arrow and "resale," or offering for-sale items created from recycled materials is represented by the third. Recycling reduces the exhaustion of potentially commodious materials, energy consumption, air pollution and water pollution (from landfills), thereby reducing the demand for “stereotyped” waste disposal system and lowering the emission of greenhouse gases. Various ways of recycling are as follows:

1. Capture and recycle**:** Dentists can collect and store all contact and non contact scrap amalgam for recycling. This waste must be sent to an approved recycler that is able to reprocess the mercury.

2. Installing an amalgam separator not only keeps this mercury-containing material out of the water system, but recycling waste amalgam means that more of the material does not have to be created.
3. If using traditional x-rays, recycle fixer and developer solutions and recycle lead foil from x-rays.
4. In the office rest room, discontinue the use of disposal kitchenware or make sure to only use biodegradable plastic ware. Washing and reusing basic kitchenware will reduce plastic waste.
5. Another way to recycle is to always use recycled toner and inkjet cartridges and it is a great cost saving measure for the practice.
6. Use of recycled materials such as toilet tissue, paper towels, and office furniture, when possible
7. Buy rechargeable batteries for digital cameras and flashlights, and retip or transform broken instruments for other purposes also aid in recycling efforts.
8. Hand instruments: For over 12 years, Hu-Friedy has offered a program called Environdent, which allows practitioners to recycle old hand instruments and receive a free instrument for helping the planet.
9. Use a community's existing recycling program to separately recycle the paper and plastic halves of autoclave bags.

B. Energy conservation

The various ways of conserving energy include the following:

1. Green office:

a) Using concrete as an alternative to bricks, which improves the thermal efficacy by reducing the heating and cooling load.

b) Make use of double walled glass in the windows as it reduces the direct gain of heat while maximizing the sunlight entering the office.

c) Use eco-friendly nontoxic paints instead of traditional paints that contains VOCs that contributes to the carbon footprints.

d) An eco-friendly choice of flooring in the dental office is linoleum.

2. Water heaters- Lowering the temperature on water heaters is a quick and easy step for energy conservation.

3. Programmable thermostat - The thermostat(s) can be programmed to run on different temperatures at different times of the day. Depending on the outside temperature, adjust the temperature while the office is closed to conserve electricity.

4. Maintenance - It includes the following

- Up-to-date maintenance on the high-volume evacuation (HVE) system, autoclave and handpieces.
- Permanent filters should be cleaned according to a schedule and replaceable filters should be changed out every two months, or according to manufacturer's instructions
- The temperature of the supply and personal refrigerators can be monitored to ensure that they are running efficiently.

5. Appliances - Preserve upto 1/3rd of energy cost by using an ENERGY STAR® rated appliance in dental offices.

6. Computer and electronic equipment - It is advised to:

- Use light emitting diode monitors as it can cut energy consumption in half.
- Turn off computers at night to save electricity consumption.
- Items plugged into surge protectors draw a small amount of energy all the time, so turn them off to save even more energy.

7. Lights- It is advised to:

- Turn off light as it is an easy way to conserve energy.

- Convert high-energy consuming office lights to energy-efficient fluorescent lighting.

C. High-Tech Innovations In Dentistry

Today's high-tech innovations make the practice of dentistry more reliable, easier, and more cost-effective. Almost all high-tech innovations in dentistry have some environmental benefits also, for example, computer-aided design/computer-aided manufacturing systems. It eliminates the need of impression material which means less need for its disposal. It reduces the number of patient's appointments which means low-carbon emission because of reduced travel by the patient . The following similar high-tech innovations are part of dentistry's green future:

- Digital imaging
- Esthetic restorations eliminating the use of amalgam
- In-office sharps disposal equipment
- Steam sterilizers that eliminate the use of harmful chemicals
- Use of computers for the storage of patient records
- Digital patient communications such as appointment reminders through E-mail reduce paper and saving staff time
- Diode lasers, which eliminate the need for retraction cords
- Use of a web site as a primary marketing tool
- Oil-free compressors.

D.Wellness Practices

Nowadays, every branch of medicine including dentistry is following a wellness-based model that is centered upon prevention, early detection, and minimally invasive treatment option for patients.

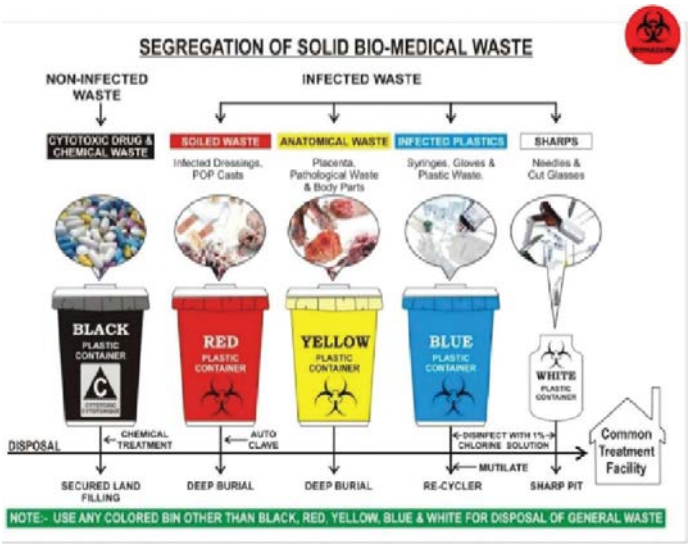
Few wellness-based modalities that are part of dentistry's green future are

- Laser diagnostic tools that enable to see caries earlier than with the naked eye
- Oral cancer diagnostics
- Salivary testing to determine genetic predisposition to periodontal disease and identify pathogenic bacteria
- Laser treatment of periodontal disease
- Homeopathic modalities which promote reduced swelling and bruising after dental procedures, with no drug interaction
- Live, green plants in the operatory, increasing oxygenation
- Ultraviolet germicidal, in-operatory air purifiers to remove particulates from air.

Biomedical Waste Management

It is important that the dental community should be aware of the environmental hazards of poor waste management in their practice.

The authorities have defined the specific color-coded containers for disposal of waste



American Dental Association Suggestions For Going Green

The Council on Dental Practice of the American Dental Association has framed list of their top ten ways to go green in the dental office.

1. Install an amalgam separator
2. Turn off equipment when not in use
3. Reuse paper scraps

4. Utilize recycle bins and create a "Green Team" to bring items to recycle centers
5. Recycle shredded confidential patient information
6. Convert to digital technology; for example, digital radiography
7. Install solar or tinted shades
8. Install locked or programmable thermostats
9. Install high efficiency light bulbs
10. Use nontoxic cleaners and do not use too much disinfectant.

Barriers in the implementation of eco-friendly dentistry

Despite the many benefits offered by the eco-friendly approach, dentistry as a whole has been slow to catch on to the trend. It is still a work in progress and it meets certain barriers in its implementation. Few of the shortcomings in this regard are as follows:

1. The first and foremost barrier in the implementation of eco-friendly dentistry is the “UNAWARENESS” of the concept among the concerned professionals. Green dentistry being a „new“, budding notion, is still doing rounds just on the internet, and a very few have worked on the concept.

2. The consideration of building a “Green Office” is one of the prerequisites in green dentistry. But those already with a conventional dental clinic would give a difficult time in getting convinced to re-build their offices according to the guidelines of green dentistry because it would be a costly affair and high costs may also be a deterrent for some dentists. Moreover, it is a time consuming pursuit to switch from conventional practice to green practice.

3. Over-exploitation of the natural resources

Conclusion

The going green movement, which is rapidly becoming a worldwide priority, seeks to address environmental contamination and other critical environmental issues. Dentistry can lessen the combined environmental impact by utilizing the Four R's of going green (recycle, reduce, reuse, and rethink). An eco-friendly dentist need not be an environmentalist, just a rethinker. It is a matter of choice for the dentist to choose eco-friendly products and practices and save as much paper, water, material, and energy as possible. Dentistry is such a noble profession that our efforts should always aim toward the betterment of the society. In developing countries like India, it is important that we realize the importance of being environment-friendly and understand that the efforts of each individual count. More research and funds are required to regulate and promote eco-friendly practices. Dental practitioners should be trained in Workplace Hazardous Materials Information System.

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