

Eco-friendly Dentistry- Need of the Hour

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Abstract

Traditional dentistry produces waste materials that are very hard to dispose off and toxic dental materials, causing harm to the soil and to the biosphere. To reduce this damage, the field of dentistry is budging towards eco-friendly dental practices, which is the need of the hour. Eco-dentistry or "green dentistry" refers to the delivery of oral health care and dental treatments using technologies, procedures and materials that promote environmental and planetary health. This paper provides useful suggestions for reducing the impact of our profession on the environment.

Keywords: Green Dentistry, Bio-Hazard, Environment

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Introduction

The condition of our environment is getting worse day by day because of the industrialization, deforestation, technological development, global warming, pollution, etc. Unfortunately dental profession also aids in the production and release of wastes that can potentially damage the environment. As health professionals, we the dentists should be concerned with promoting not only human health and well-being but also that of the environment. Being in a healing profession, it is not only our duty to provide dental services, but also our social responsibility and moral obligation to lessen the environmental impact.

Traditional dentistry produces waste materials that are very hard to dispose off and toxic dental materials causing harm to the soil and to the biosphere.¹ To reduce this damage, the field of dentistry is budging towards eco-friendly dental practices. Dr. Malden Kralj, the founder of Oral Dental Studio, America's first green dental group coined the term "eco-friendly dentistry".² "Eco-friendly" dentistry is an idea that implements sustainable practices in dentistry by keeping resource consumption in balance with nature's economy and protecting the external environment by eliminating and reducing the amount of outgoing wastes and by promoting the well being of

all those in the clinical environment by consciously keeping chemicals out of the air that we breathe.³

There are two main avenues for implementing eco-friendly dentistry: (1) appropriate policy development and implementation and (2) dentists taking responsibility/ ownership in the absence of policies and regulations. Worldwide, various organizations have recognized the need to regulate and monitor the dental offices on an environmental basis. Leadership in Energy and Environmental Design (LEED) was developed in 2000 by the US Green Building Council. In June 2009, the eco- friendly dentistry association was launched internationally.²

Benefits Of Eco-Friendly Dentistry¹

1. Minimize dental waste and pollution
2. Step toward high-tech dentistry
3. Saves energy, water and money
4. Pillar to wellness and lifestyle

Why should we care?

The alarming numbers: per annum dental waste production from a conventional dental clinic is as follows:⁴

- 4.8 million lead foils

- 28 million liters of toxic x-ray fixers
- 3.7 tons of mercury waste
- 1.7 billion sterilization pouches
- 680 million chair barriers, light handle covers and patient bibs.

How to Bring a Change?

Change, something that has never been easy and it always demands efforts. As dental professionals we should lead an effort for change as a team and make sure that each member knows the importance of each step and has a general acceptance of the initiative. It is necessary to involve the entire dental healthcare team in green initiatives. Making the initiative important, fun and reasonably convenient is critical to a successful outcome.⁵

Initial Steps includes⁵

- Appoint a coordinator.
- Develop ideas for the best way to incorporate the initiative.
- Assign specific staff to tasks (i.e. office recycling team).
- Take before and after pictures of initiatives.
- Include information on the efforts in the practice newsletter and website.
- Get local press coverage of the initiatives.

Waste Reduction; Adopt 4 R's Agenda^{5,6,7,8}

Eco-friendly dentistry uses a sustainable approach to encourage dentists to implement new strategies to try and reduce the energy being consumed and the large amount of waste being produced by the industry. Health professionals are on the leading edge of helping to heal our planet by introducing the four R's; Rethink, Reduce, Reuse, and Recycle. By implementing these four easy steps, dentists are beginning to transform the dental industry into a more sustainable one.

Rethink

Redeveloping a mindset is a strategy for change. Environmentalism and sustainability are both considered states of mind. Rethinking the way that dentist offices are run is the initial step towards environmental stewardship.

- Proper sun illumination and use florescent lighting
- Promote indoor plantation
- Inclined roof for water harvesting

- Solar water heaters
- Use paint that does not include Volatile Organic Compounds (VOCs)
- Use eco-friendly office cleaning products like tea tree oil and thyme in dental office.
- Carpool to work with colleagues

Reduce

The easiest way to have more of a resource is to use less of it.

- Substitute autoclave wraps with sterilizable cassettes and plastic syringes with glass syringes
- Use of biodegradable disposable cups
- Steam sterilization over chemical sterilization
- Use biodegradable or enzymatic cleaners instead of chlorine bleach for cleaning water lines
- Proper disposal of amalgam
- Dry Dental vacuum
- LED lights with motion detectors

Re-Use

By reusing items instead of throwing them away, resources and energy necessary to manufacture new products are saved

- Switch to cloth sterilization bags & patient barriers
- Wear cloth apron instead of paper ones
- Switch to stainless steel impression trays and suction tips
- Provide glass or ceramic "rinse & swish" cups
- Use reusable glass irrigation syringe as a substitute for disposable plastic
- Use rechargeable batteries

Recycle

Recycling products is a viable way to reduce overall contamination of the environment. It is a crucial component of the management of waste hierarchy. Always segregate the waste and recycle.

- Use a sharps disposal service that recycles them into building materials
- Exercise recycling bins in dental clinics
- Instrument recycling program
- Recycle x-rays fixer and developer solution and lead foil from x-rays

- Recycle computer parts and electronics

How to green our dental practice?

Being responsible professionals, it is our obligation to our patients and our planet to take every possible measure to help protect our environment, our resources, and our neighbours.

The following are some of the High-Tech, Eco-Friendly, Wellness-Based Dental Technologies which also aid in waste reduction:⁹

- Oral Detoxification with Laser Hygiene Technologies
- Digital Oral Cancer Screening Digital Impressions
- Digital Patient Charting
- On-site Biomedical Waste Disposal Systems
- CAD/CAM Systems in office laboratory restorations
- Use liquid crystal display (LCD) instead of cathode ray tube (CRT) computer monitors.

USE DIGITAL X-RAYS: By switching to digital x-rays, you can use less film and reduce waste from chemicals and lead-lined film packets. Digital x-ray systems are well known to reduce patient exposure levels of radiation. The systems use less energy and can reduce your monthly expenses.¹⁰

Recycling Of Dental Material

DENTAL WAXES: About 80 – 90 % of wax can be recycled without affecting their properties using a simple laboratory procedure of removing the impurities. As this is an in vitro procedure, no biocompatibility issues exist.¹¹

GYP SUM: In U.K., gypsum to gypsum recycling projects have been started which include demolition waste and other gypsum products. It is claimed that the recycled gypsum powder is 99 per cent as good as virgin gypsum.¹¹

CASTING ALLOYS: Wasted materials can be effectively reused for fabricating new restorations or appliances by proper cleaning techniques (sand blasting, electro polishing). There is only 5 - 10% decrease in their mechanical properties even after 20th recast, thus these materials can be redirected to other engineering areas for the fabrication of cutting tools, valves, etc.¹¹

AMALGAM WASTE: Currently it has been estimated that dentists contribute between 3 and 70% of the total mercury load entering waste water treatment facilities.⁸ However few authors raised doubts on that and believe that over the past decades the use of dental amalgam has declined and considered dental mercury as a minor world polluter.¹² The dental professionals are encouraged to use new dental materials that do not contain mercury, or to switch to precapsulated dental amalgam to prevent the release of mercury in dental amalgam into the environment. "Mercury spill kit" should be used if there is a spill of elemental mercury. React unused elemental mercury with silver alloy to form scrap amalgam. Elemental mercury should never be washed down the drain. Use a sponge type mercury disposal container to store the scrap amalgam, which can be recycled. Use an amalgam separator on the suction lines to remove over 95% of the contact amalgam prior to entering the sewer system. Amalgam separators pull the mercury out of our vacuum waste and prevent it from going down the drain and contaminating our waste water or the water bodies in our areas and also reducing the chance of biomagnifications of mercury and hence protecting biosphere.^{2,5,6}

OTHER HEAVY METALS: Silver is another heavy metal that can enter our water system via improper disposal of dental office waste, mainly as a component in radiographic fixer. The best way to manage silver waste is through recovery and recycling. Dentists can install in-house silver recovery units to salvage the silver.¹³

LEAD: By product of traditional radiography is the lead shields contained in each film packet. Dental practitioners can reduce environmental lead contamination by recycling which is an inexpensive and easy task. The lead shields from film packets merely have to be collected and returned periodically to the manufacturer for recycling. Unfortunately, some manufacturing companies report that only about 5% of products sold are returned. In part, it appears that this is due to a lack of awareness of the offered service.¹³

Disposal of E-Waste: Reusing and recycling raw materials from obsolete electronic products is the only way to reduce air and water pollution. Companies like Dell and HP accept used/waste computers and other electronics for recycling.

Reduce water usage: Water is wasted by letting it run when doing something and leaving it running while they dry their hands instead of turning it off. So it's important to turn the water off when it is not in use.

To remind everyone, it is good to put a sign at each sink in the office which says "Please turn off the water when not in use". Hand washing sink with motion activated sensor taps. Steam-based sterilization equipment uses less water. Participate in the "Save 90 A Day" Campaign. Educate the patients to turn off the water while brushing. Use a water free hand disinfectant to clean brush.^{1, 4, 14}

Go for less Chemical Contamination and Fewer Disposables: Green dental practices also use high-quality, biodegradable disinfectants and steam sterilization methods that don't require ventilation for chemical vapour, or a hazardous waste permit for disposal of toxic chemicals into a water supply.¹

Go paperless: By switching to digital patient files and billing, we can increase staff efficiency and reduce the material costs of folders, labels, and pre-printed forms. We can also try using electronic forms on which patients can enter information. When paper cannot be avoided, use recycled paper products and this protect environment from exploitation.¹ Patients should be advised to use bulk-prophy paste to reduce the waste from single-serving packaging. Encourage local purchase over online shopping which reduces the packaging materials used.

Reduce phantom energy: switching off the lights when not in use. Use a programmable thermostat that is inexpensive and easily installed. Install solar or tinted window shades. Purchasing appliances that have an ENERGY STAR® label and rating, will conserve energy and save the practice up to 1/3 on energy costs. Lights can be motion activated to turn on when someone enters the room. Replace incandescent bulbs with Compact Fluorescent Light (CFL) bulbs. Use high-efficiency T-8 or T-5 fluorescents. Purchase computers based on the Electronic Product Environmental Assessment Tool (EPEAT). Light Emitting Diode (LED) Monitors can cut energy consumption in half. Turn off computers at night to save on electricity consumption, as computers in sleep mode still use energy. Replace the old 30-gallon hot water heater with an efficient ten gallon.^{4,5,7}

While establishing an eco-friendly dental workplace, the dentist needs to assess his choices in planning the infrastructure and purchasing of equipment and dental materials which require little extra efforts and money too. Although the commitment of one small dental clinic cannot save the planet, but collective

efforts of many small dental clinics, hospital and colleges can ensure to make the dentistry green or eco-friendly. General dental practitioner can start with small steps that work on any budget and don't require a lot of effort!

Conclusion

Reducing waste, improving treatment technique, reducing the exploitation of resources and limiting the amount of adverse chemicals and waste materials entering the environment whether it is dental office or outside are achievable and realistic goals. We as dentist should take a leading role in society by implementing "eco-friendly" initiatives to lessen the inflict on the environment. All we need to do is to start the "green" journey with little efforts and planning on a daily basis to make sure we are environmentally friendly while meeting the primary goal of providing excellent dental care as "the future will either be Green or not at all".

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