Review Article

ECO DENTISTRY: A NEW WAVE OF THE FUTURE DENTAL PRACTICE

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Abstract

Environmental pollution is the most important issue at present that deserves everybody's attention to save the planet Earth whose existence is imperilled. We as dentists must come to grips with the fact that the waste that leaves our practices doesn't go away unattended. Dentists employ a variety of materials and equipment in practice that possess potential challenges to the environment. 'Eco dentistry' is an answer to the problem. It is an innovative way of practicing dentistry which is environment friendly besides conserving money and time by reducing waste, conserving energy and decreasing pollution with the use of latest techniques and procedures. This review deals with the practice of dentistry in such a manner that it is neither hazardous to the environment nor to the patients.

Key words: Environment, Green Dentistry, Recycle, Reduce, Reuse.

Introduction

Eco-friendly dentistry is a recent advancement in the field of dentistry. It is a part of a movement towards ecologically-sustainable healthcare.[1,2] The key concepts of eco dentistry also known as green dental practice include conservation of water and energy, use of non-toxic products, reduction of waste and elimination of hazardous toxins that negatively affect patients and the environment and promote 'green' products.[3] Among various other field, Dentistry is one of the fields that contribute to climate change and pollution of the environment. Though, the refused trash generated by the dentists is very less, but the accumulated waste that is produced can have marked deleterious effect on the environment.[4] The Canadian Dental Association, in the year 2007 explained the term "eco-friendly dentistry" as the branch that can limit the industry's harmful and undesirable effect on the environment by promoting environmental awareness and sustainability to patients.[5] Eco dentistry is a new approach towards dentistry that supports dental practices by limiting the consumption of resources and waste. Eco dentistry also makes an effort to increase the health of patients by limiting the chemical use in the dental clinics and encourages the use of low volatile products. The office of Eco-friendly dentist considers various aspects such as volume of patients, dental resources consumption, usage of electricity, energy, chemical and water. Waste disposal is also considered as an important part of the office .Alternatives that is eco-friendly should be executed in the dental office. A model for eco-friendly dentist has been developed by The Eco-Dentistry Association (EDA), and educational-and membership association for green dental professionals, (www.ecodentistry.org).[5,6] This model is environmental friendly and wellness based that helps the dentist to protect the environment by integrating dental services that advance preventive dentistry and serving-the needs of green dentistry consumers.[5,7] The EDA defines-green dentistry as: Reducing waste and pollution saving-energy, water, and money-incorporating high-tech-wellness-based.[8]

ECO-FRIENDLY RECOMMENDATIONS

- Here is a list of recommendations Dr.Farahani has for making the dental office more eco-friendly.[9]
- An eco-friendly sterilization program should be implemented, which concurrently eliminates the need for disposable autoclave wraps and disposable patient bibs.
- Use a community's existing recycling program to separately recycle the paper and plastic halves of autoclave bags.
- Use a dry dental vacuum pump, instead of a wet one.
- If traditional x-rays are used, fixer and developer solutions should be recycled as well as lead foil from x-rays are to be recycled.
- Consider using less harmful surface disinfectants in dental offices, such as tea tree oil and thyme.
- Use reusable and biodegradable laundries wherever possible:
  - reusable operating room cotton towels instead of disposable plastic or paper patient bibs should be used
  - reusable stainless steel high- and low-volume, surgical/ endodontic suction tips as an alternative to disposable plastic
  - reusable glass irrigation syringe as a substitute for disposable plastic
  - biodegradable disposable cups instead of regular paper cups
  - Chlorine-free, high post-consumer recycled paper products instead of traditional paper products.
- Use stainless steel prophy cups instead of disposable prophy-containing cups. This means purchasing prophy paste in tubes or tubs. This also allows you to use only the amount of paste that is needed versus a predetermined amount, which is often more than you need, and thus wasteful and costly.
- Use disposable, plastic or paper barriers only as truly needed. An effective exercise would be for each office to do a one-day consumption analysis exclusively for barriers and then calculate how many barriers are used per week, month and year, and throughout one's dental career.

- Use an Energy Star washer and dryer, where applicable.
- Use fluorescent instead of halogen lighting, where practical.
- Use liquid crystal display (LCD) instead of cathode ray tube (CRT) computer monitors.
- Use linoleum, a more environmentally friendly choice for flooring.
- Use ultra-low volatile organic compound (VOC) paint
- Hire an environmentally friendly landscape company that uses natural growth product and procedures as an alternative to harmful pesticides to care for your office's lawn.

By adaptation of high technology and the use of good common sense, we can be a part of dentistry's clean, green and highly beneficial future. This can be achieved by the use of these simple things like:[10]

Using digital dental technology

CAD/CAM Systems is very convenient as it helps in completion of lab-quality restorations in single appointment. It also reduces greenhouse gases produced from travelling by staff and patients for multiple appointments. The impressions and final restorations require shipping, sometimes as far as overseas. Hence the CAD/CAM systems are useful for the patient as well as the environment. Some of the latest digital technologies are:-

- Digital Impressions.
- Digital Oral Cancer Screening.
- Digital Patient Charting
- Digital imaging (x rays) are preferred over old x-ray machines which has instant image availability, better image quality, improved diagnostic efficacy and minimal radiation.
- On-site Biomedical Waste Disposal Systems
- Oral Detoxification with Laser Hygiene Technologies.

Management of amalgam toxicity

- Always precapsulated amalgam should be used instead of manual manipulations.
- After use the capsules should be recapped and stored in closed containers for recycling.
- Contact of the skin with mercury or freshly mixed amalgam should be strictly avoided. During finishing or removing amalgam restorations high-volume evacuation systems must be avoided.
- The scrap should be collected after condensation and stored in a tightly capped jar filled with water, glycerine or X - Ray fixer.
- To reduce the vapour released during removal of old amalgam restorations, Rubber dams, high volume evacuation and water cooling equipments should be employed.
- Amalgam scrap should be either disposed off cautiously as it is a hazardous waste or should be sent to a recycler. Waste mercury is disposed similarly.
- Amalgam scrap should never be disposed where the waste is incinerated because amalgam decomposes on heating.
- Installation of Amalgam separators that comply with the International Organization for Standardization (ISO) 11143 is yet another option. When used with traps and vacuum pump filters can achieve better than 95% amalgam removal efficiency.
- Glass ionomers, dental ceramic, gold alloys, composites etc are alternative restorative materials that can be used instead of silver amalgam.

Using hospital-grade, reusable sterilization items and patient barriers free from plastic

Plastics in the dental clinics are used in various forms like disposable syringes, bottles, surgical gloves etc. Plastics are posing a serious environmental and health threat due to its non-biodegradable nature. Dioxin and furan are released when a plastic is burnt. These by products are carcinogens. Hence designing eco-friendly, biodegradable plastic is the need of the hour.

Recycling old hand instruments, giving them new life as other metal items

- Recycle bottles, cans, batteries, and paper as much as possible.
- Glasses and mugs should be used instead of disposable plastic cups.
- Use of laundering cloth bibs instead of using disposable paper ones.

Using nontoxic, biodegradable, approved surface disinfectants and cleaners

Certain chemical cleaning products can release VOCs (volatile organic compounds) in the clinic environment. VOCs are not good for the health of the patient as well as dental personnel health. Eco-friendly cleaning products should be used to reduce or eliminate VOCs. In addition, one should consider using low-VOC or no-VOC paints when putting that fresh coat of paint on the clinic.

Buying in bulk

- Instructing dental suppliers to combine the orders. This will reduce packaging as well as shipping waste.
- Whatever material is bought, should be bought in bulk; e.g., prophy paste impression materials, restorative materials etc.
- Using reusable stainless steel or compostable impression trays.
- Use re-usable face shields.
- Re-use lab and shipping boxes.

Cleaning water lines regularly

Biodegradable or enzymatic cleaners should be used. Chlorine bleach, which can release airborne mercury in the clinic, should be strictly avoided. Toxic cold sterilization solutions, like those containing Glutaraldehyde should be eliminated, as it is a powerful lung and skin irritant.

Go Paperless

Going paperless is truly a revolutionary approach. Using computers and other devices to maintain all records and digital patient communications helps not only save paper but also staff time.[11]

THE FOUR R'S OF ECO- FRIENDLY DENTISTRY

The Health professionals are trying their level best to deal with the waste management to heal our planet earth by introducing the 4 'R's- Re think, Reduce, Reuse and Recycle. Implementation of these four steps by dental professionals is beginning to transform the medical industry to a more liveable one. Pockrass *et al* discussed the four R's of ecofriendly dentistry i.e. Rethink, Reduce, Reuse and Recycle.[12]

Rethink

Redevelopment of a mind-set is essential to make every decision. This requires a change in the process of thinking. Environmentalism or environmental rights is a broad philosophy, ideology, and social movement regarding concerns for environmental protection and improvement of the health of the environment, particularly as the measure for this health seeks to incorporate the concerns of non-human elements. It is a very important thing to be considered. The initial step is Rethinking-the way that dentist offices are run. Mobile dental van should be considered as it is a desirable mode of clinical practice in an unconventional setup for the outreach programs.[13,14] This will be the first step to change the modern practice. Some basic and important changes can be implemented, like reduction of - energy and water consumption

Reduce

The wastage of earth's resources can be decreased by intelligently consuming them. People should understand the importance of this and must limit their consumption. For example mobile dental clinics should be established because this will reduce huge amount of capital required for the establishment of Dental operatories and Primary health centres. Hence the traditional setting requires to be modified.[14] Packaging generates 33% of waste; it is recommended that one should purchase products with minimum packaging and use of reusable plastic containers.[15] Another option that should be considered to reduce the cost and wastage of resources like petrol, paper etc is Teledentistry.

Teledentistry has the potential ability to provide better access to oral health care, improve its delivery system and lower its costs for the underserved population.[16] Through this approach, the Internet and similar telecommunication medium are combined with digital imaging and electronic recordkeeping tools and then employed to link dental health care providers in rural or remote communities with specialists in centers of excellence.[17] This will help in setting up of paper free dental practice.

Afforestation and reforestation is the need of the hour, as this will help in bringing down of global warming. The consumption of paper and production of waste should be brought down in order to limit cutting down of trees. Example

- Combining orders to reduce shipping waste.
- Buy whatever you can in bulk; e.g., prophy paste and impression materials
- Printing should be done double sided with single space so that the amount of paper required can be reduced.
- Eliminating toxic cold sterilization solutions, that contain glutaraldehyde, a powerful lung and skin irritant

Reuse

This strategy supports the idea of extending the use of an item. This will reduce the waste contribution being put in landfills. Reinventing the purpose for an item will prolong its life and decrease the contributions to landfills. By reusing items, the demand can be efficiently reduced. This will decrease the pressure off of natural resources; hence the reuse of items should be strongly encouraged. The amount of energy required to produce new products can be reduced by reusing the existing products. Example

- using, reusable sterilization items and patient barriers in the clinics and hospitals that are free from plastic.
- using reusable stainless steel or compostable impression trays.
- instead of using disposable plastic or paper patient bibs, reusable operating room cotton towels.
- as an alternative to disposable plastic ,reusable stainless steel high- and low-volume, surgical/ endodontic suction tips should be used.
- disposable plastic syringes can be substituted for reusable glass irrigation syringes
- usage of biodegradable disposable cups instead of regular paper and plastic cups

Recycle

The waste that is generated is dumped in the landfills. Such waste can be reprocessed and recycled into a fresh product. The wastage of useful products can be limited by reducing the waste of raw materials. This will reduce the energy required to extract the raw materials. This will in turn result in the reduction of water pollution and air pollution from incinerators and landfills respectively. One of the most practical and feasible way to reduce contamination of the environment is to promote recycling of products.[18] Example

- Use of post-consumer recycled paper products that is chlorine free. This paper is produced when the

material or finished product has served its intended use. It is rerouted or retrieved from the waste intended for disposal. Hence it is considered "post-consumer. This will discourage the use of traditional paper products.

- Old hand instruments can be recycled, giving them new life as other metal items.
- Fixer and developer solutions should be recycled if traditional x-rays are being used. Lead foil from x-rays can also be recycled.

Conclusion

Dentistry is the paramount and foremost therapeutic profession. In today's world, it is very necessary to understand the importance of being eco-friendly in every aspect of our lives, including dental practice which has a massive impact on the environment because of large amount of metallic waste that is produced by numerous dental procedures. Green dentistry is an ingenious way of dental practice which prevents the wasteful overuse of money and time by conserving energy and limiting pollution with the use of advanced techniques and procedures. It is also environment friendly, hence it safeguards the environment and living things from the hazards of expeditious urbanisation in developing countries. This review article identifies the wastes produced by dental professionals in the clinics. It also recommends various methods for reducing the waste and its impact on the environment. This will help to safeguard the patient and workers. This will ensure to protect our air, water and land from the detrimental effects of the waste disposal.

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