



## Green Dentistry: Need of the Hour

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### KEYWORDS

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### ABSTRACT:

The primary concern of the dentist is to provide better and satisfying dental care. Dentistry is developing gradually with latest techniques, materials and definitely the comfort provided to the patients. Green dentistry contrives practice that keeps resource usage in balance with the nature's economy, thus protecting the external environment through elimination or reduction of wastes. The concept of Green Dentistry revolves around the **4 R's: Reduce, Reuse, Recycle, and Rethink**. While some environmentally friendly changes require only minor adjustments to daily practices, others may demand additional effort or investment to implement sustainable solutions in dentistry. Globally, dental professionals are striving to minimize the ecological footprint of their practices. The commitment of each eco-conscious dental professional and sustainable dental practice is playing a vital role in reshaping the dental industry by embracing the principles of green dentistry.

### INTRODUCTION

Good oral health plays a major role for good overall health and but also influences self-esteem, quality of life, and performance at school and at work. Eco-friendly dentistry is an emerging and innovative concept that focuses on minimizing the environmental footprint of dental practices while promoting a more sustainable healthcare system. [1]This high-tech approach integrates environmentally conscious methods to enhance patient care while safeguarding community and planetary health. Additionally, it provides a model that supports overall well-being, benefiting both dental professionals and the financial stability of their practices.[2]

Dental procedures generate various types of biomedical waste, including sharps, disposable materials, infectious waste (such as blood-contaminated gauze and cotton), hazardous substances (like mercury and lead), and chemical waste (including used film developers, fixers, and disinfectants). Other disposable items commonly used in dentistry include latex gloves, plastic pouches, suction tips, syringes, headrest covers, and patient bibs. While office waste is generally non-hazardous—comprising paper, cardboard, aluminum, and plastics—the growing concern over proper waste management and

its environmental impact has led to increased research and discussions on sustainability in dentistry.[3]

### WHAT IS GREEN DENTISTRY?

The **ECO-DENTISTRY ASSOCIATION** defines **Green Dentistry** as: “Green dentistry is a high-tech approach that reduces the environmental impact of dental practices and encompasses a service model for dentistry that supports and maintains wellness.” [4]

To address these environmental challenges, the concept of “**4R**” – **Reduce, Reuse, Recycle, and Rethink** – has been introduced by Eco Dentistry Association as a framework for sustainable dental practices.[5]

Health professionals are on the leading edge of helping to heal our planet by introducing the four R's; Rethink, Reduce, Reuse, and Recycle.

**Rethink:** The first step toward environmental sustainability is to rethink how dentist offices are conducted. Proper sun illumination and use florescent lighting Promote indoor plantation Inclined roof for water harvesting. Solar water heaters. 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



sterilisable 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

**Re-Use:** To “re-use” is to use an item again after it is already used once. This manoeuvre boosts the extended use of an item; thus debarring the item from contributing to the waste in the landfills. Assigning a refreshing intent for an item prolongs its life and lessen the excess baggage on the landfills.

**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.



## Key Components of Green Dentistry [6]

Eco-friendly dentistry consists of four major components:

1. **Minimizing Dental Waste** – Reducing the use of disposable materials and implementing waste management strategies.
2. **Preventing Pollution** – Adopting techniques to limit hazardous emissions and contamination.
3. **Conserving Resources** – Efficient use of water, energy, and finances.
4. **Implementing High-Tech Solutions** – Utilizing advanced technologies to enhance sustainability.



## 10 Ways to Contribute to a Greener Dental Future [7]

Dental professionals can adopt various sustainable practices to reduce waste and pollution, such as:

1. Transitioning to digital imaging to replace traditional X-ray methods.
2. Using amalgam separators to prevent mercury contamination.
3. Opting for hospital-grade reusable sterilization materials and eliminating plastic-based patient barriers.
4. Reducing packaging waste by combining orders, which also minimizes shipping waste.
5. Recycling and repurposing old hand instruments instead of discarding them.
6. Choosing biodegradable and non-toxic disinfectants and surface cleaners.
7. Bulk ordering frequently used materials to cut down on packaging waste and costs.



8. Utilizing stainless steel reusable or compostable impression trays as an eco-friendly alternative.

9. Disinfect the water lines regularly using biodegradable or enzymatic cleaners and never use chlorine bleach because it can release airborne mercury.

10. Avoid the use of toxic cold sterilization solutions such as glutaraldehyde, which is a powerful lung and skin irritant.



Hi-tech dentistry The last component of green dentistry is high-tech practice. Here are 10 high-tech innovations that are part of dentistry’s green future:[8]

1. Digital imaging system
2. CAD/CAM systems



3. In-office sharps disposal equipment that renders sharps inert
4. Steam sterilizers that eliminate the use of chemicals
5. Digital patient charting, scheduling, and billing
6. Digital paperless patient communication system such as E-mail appointments, reminders, and saving staff time
7. Use of diode lasers instead of packing cords
8. Use of website to promote and as a primary marketing tool
9. Switch to electronic patient record format
10. Use of oil-free compressors

According to the **Eco-Dentistry Association**, green dentistry prioritizes waste reduction, pollution control,



energy and water conservation, and cost efficiency, while incorporating high-tech advancements and wellness-focused care. By adopting these principles, dental professionals can contribute to a more sustainable and responsible future in healthcare. [9]



### Green Dentistry – Wellness-Based Dentistry [10,11]

#### Early Oral Cancer Detection with VELscope

Despite significant advancements in treatment options, the mortality and morbidity rates of oral cancer remain a major concern. Research indicates that approximately 60% of cases are diagnosed at advanced stages (Stage 3 or 4), which significantly impacts patient outcomes. The most effective approach to managing oral cancer is early detection, and devices like VELscope have gained popularity due to their non-invasive, quick, and highly effective screening capabilities.

#### Laser Technology for Early Caries Detection

Lasers have revolutionized early dental caries detection, offering a highly accurate and non-invasive method for identifying lesions before they become extensive. Unlike traditional radiographs, laser-based systems can precisely detect caries in deep grooves and provide valuable insights into the location and extent of decay, enhancing treatment precision.

#### Digital Radiography for Diagnosis and Treatment Planning



Modern imaging techniques such as RVG (Radiovisiography) and CBCT (Cone Beam Computed Tomography) have significantly improved diagnostic accuracy and treatment planning in dentistry. These advanced imaging tools provide high-resolution, three-dimensional views, assisting in precise evaluations of dental and maxillofacial structures.

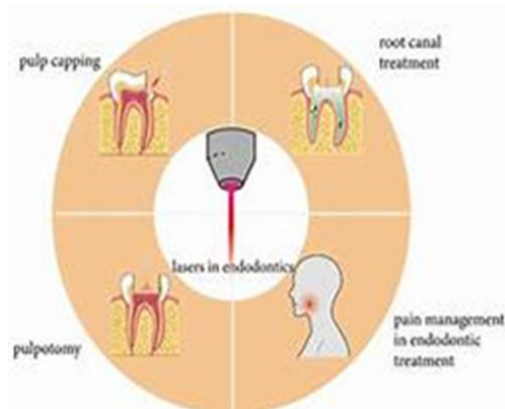
#### Salivary Testing for Risk Assessment

Salivary diagnostics are emerging as a promising tool in determining predisposing factors for various oral diseases, including caries and periodontal conditions. These tests offer a non-invasive method for assessing a patient's oral health status and potential risk factors.

#### Laser Applications in Endodontics

Lasers have become an integral part of root canal treatment, pulp capping, pulpotomy, dentinal hypersensitivity management, and pain relief in pulp and periradicular diseases. The most commonly

used lasers in endodontics include Er:YAG, Nd:YAG, and diode lasers, known for their efficiency in disinfection, debris removal, and improved treatment outcomes.





### Herbs in Endodontics

In endodontics, there is a growing shift towards utilizing biologically derived medications from natural plant sources due to concerns over the cytotoxic effects associated with many commercially available intracanal medicaments and irrigants. Additionally, these conventional agents often fail to achieve complete bacterial elimination from dentinal tubules. As a result, various herbal alternatives have been explored for use as endodontic irrigants, and intracanal medicaments including tea tree oil, ginger, clove, turmeric, neem, thyme, aloe vera, and garlic, which possess antimicrobial and biocompatible properties. [7]



### Conclusion

As the saying goes, “An ounce of prevention is worth a pound of cure.” Green dentistry is not just a passing trend but a necessary shift towards a more sustainable and responsible way of practicing oral healthcare. By reducing waste, conserving resources, and embracing high-tech, eco-friendly alternatives, we can protect both our patients and the planet. Just as “we do not inherit the Earth from our ancestors, we borrow it from our children,” it is our duty as dental professionals to adopt practices that minimize environmental harm. Small changes—such as using digital imaging, biodegradable materials, and energy-efficient technologies—can create a lasting impact.

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