# Green Pitch- Be the Part of Solution

**Nandhini V[1], Gayathri S[1], Sumathi H Rao[2], .P. B.Anand[3], T. Geetha[4],**

*[1]Reader, [2]Professor, [3]Professor & H.O.D, [4]Tutor, Sathyabama Dental College and Hospital*

## Abstract:

Pursuing "Green" has become the new drive for organisations on the quest towards growth, competitiveness and global excellence. Environmental issues have gained importance in business as well as in public life throughout the world. Green dentistry is a part of strategy to promote our practise by employing environmental credibility. In growing concern of global warming, switching our practice over to green is the need of hour as it involves abundant utilization of natural energy and also produces large amount of biomedical waste at the same time, creating a huge environmental impact. We cannot deny the fact intelligence is the ability to adapt to change. This article speaks about the various concepts of how to go for eco-friendly dental practise.

***Key-words:*** *sustainability, Renewable energy, Biomedical waste.*

## Introduction

Modern health care facilities are highly resource intensive. Unsustainable and inefficient buildings, unsafe disposal of hospital waste and untreated sewage, heavy reliance on processed foods and a fleet of fuel guzzling vehicles are just a few factors that increase the health sector's carbon footprint, thus making the environment sick. According to the annual report of Central Pollution Control Board (CPCB) in 2016 the quantity of Bio Medical waste generated is approximately 517 tonnes per day and it increased to 550 TPD in 2018 and is proposed to increase to 775 TPD in 2022.[1] Dentistry as profession has got a major role toward the health care waste. On exploring the possibilities to counter these issues, we arrived at the idea of "Green hospitals". Indian Green Building Council approved by US Green Building Council defined Green Hospital as "The hospital which enhances patient wellbeing, aids the curative process, while utilizing natural resources in an efficient, environment-friendly manner".[2] The concept of green hospital comprises of factors such as building design that focuses on providing the proper lighting, improvising the indoor air quality, minimising the unfriendly waste generated either by reducing or recycling, reducing the pollution and conserving the natural energy resources.[3] Research team from IGBC propose that by implementing these green strategies in dental clinics/ Hospitals buildings can have positive impact on patients and staff by eliminating the "Sick Building Syndrome" and also provide economic co benefits by reducing the finance required to maintain the practise over a period of time.

**Corresponding Author:**
**Dr V. Nandhini**
Reader, Department of Periodontics
Sathyabama Dental College and Hospital, Chennai
Ph no: 91+ 9176702131
E-mail – drsanthoshdentalorg@gmail.com

### Importance of Green Dentistry:

Eco-friendly dentistry is relatively a new concept in dental practice, where as in hospitals it has started its way in 2010. India's first green hospital was built in Ahmadabad in 2010 and in a more appreciable way, by 2018 with the help of Health and Environment Leadership Programme around 5600 Hospitals and health systems in and around country showed their interest in fulfilling the Global Green Health Hospital agenda.[4] Green Dentistry is a part of a bigger picture of the ecologically-sustainable healthcare system. It provides

- Positive impact on the environment & promote environmental awareness & sustainability to the patients.

- It helps prevent the world's biggest problem – "GLOBAL WARMING".

- It forms the vital step in maintaining a balanced

environment.\

**What is Green Dentistry???**

Green Dentistry includes the following categories of green practice, providing a comprehensive, eco-friendly model for the dental office. Green dentistry can be simply concised to 4 Rs.[5]

- Rethink
- Reduce and replace.
- Recycle
- Reuse.

Let us discuss how we can approach these 4 Rs in our dental practise

Architectural design of Dental clinic

The architectural planning and designing of the dental clinic takes care of the major deal in switching to ecological side. The prime concern factors in designing are lighting, indoor air quality, construction and maintenance of the building with ecologically accepted material. The construction involves efficient floor plated design, glazing facades to improvise lighting, permanent entry way system with HEC, indoor environmental air quality improvised by zero Volatile organic compound materials and some indoor plants which absorbs the VOC material from air.[6,7]

**Energy management**

Good energy management structure not only helps us in bringing the energy efficient culture but also reduces the cost of energy expenses. Major electricity consumers in hospitals are air conditions, waterpumps, aircompressors, lighting and autoclave. The eco model of hospital should maximize the day lighting and optimize the artificial lighting. According to ASHRAE 90.1-2007 ideal lighting power density in a patient waiting room and treatment room should be 0.4- 2.2 respectively. IGBC suggested few design aspects to increase light efficacy such as using Low energy LED lights rather than halogen bulbs, use of task lights in the consultation room and occupancy sensor in passageways and maximizing the day.

Solar-powered medical autoclaves can be an appropriate alternate for off-grid sterilization of medical and dental instruments.[8] Using nanofluid Ni- Gly-water as a base in the solar autoclave setup , ideal autoclaving temperature and pressure can be attained rapidly attributing to its thermophysical properties.[9]

**Water management:**

Dental clinics utilise water for both core and noncore functions. Speaking on water resource management we need to focus on two factors,

- minimizing the water consumption and
- Dental clinic waste water management.

Dental vacuum systems can use as much as 360 gallons of water per day. Conventional wet suction in dental practice utilizes fresh clean ½ gallons of water per minute per horse power also the oil in suction contaminates the immediate environment.[10, 11] Dry vacuum system eliminates the need of use water for suction purpose and the carbon fibervanes replaces the use of oil thereby making it more environmentally sustainable.[12] It is a known fact that medical grade autoclaves are water consumptive. We can overcome this by installing ejectors in autoclave. It creates vacuum inside the pressure vessel allowing thorough penetration of vapour during the sterilization cycle and speed up steam evacuation system.[13] Scaling and cavity preparations by conventional scalers and aerotors take up 20- 40 ml of water per minute. Embracing the use of ER: YAG LASER for scaling, cavity preparation and crown cutting produces desirable clinical effect with water conservation. The other ways of reducing the water waste is to install a low flow faucets, dual flush system and recycled water which can be used for potable purposes.

**Water Waste management**

Dental clinic waterlines constitutes hazardous waste such as mercury, lead and silver containing particles and non-hazardous waste such as hand wash, sterilents etc. They enter the sewer system through the chairside and the suction trap. Mercury from dental offices contributes significantly to the overall mercury contamination in wastewater.[14] Amalgam separators are devices designed to remove amalgam particles from dental office wastewater through sedimentation, filtration, centrifugation, chemical removal by ion exchange or a combination of these mechanisms. According to the effluent guidelines of waste management amalgam separator should be installed in all the dental office

by December 2019. The collected amalgam from the separator can be collected and recycled.[15]

The unused chemical wastes differ in their degree of risk. P-listed chemicals are acutely toxic cause irreversible damage and death at low dose whereas U-listed chemicals are relatively less toxic, but are still considered hazardous. Though we don't use P- listed chemicals in dental practise, mercury comes under U category. Tree oil or thyme can be can viable alternative to the surface disinfectant.

**Radiographic waste**

Radiation exposure associated with dentistry represents a minor contribution to the total exposure from all sources, including natural and man-made. Threat not only involves the radiation exposure but also the materials and the components used for the conventional radiographs such as lead, silver and silver thiosulfate complex in the developer solution. These materials pose various environmental and human health damages. It can be best managed by electrolyte recovery and metallic replacement treatment and more wisely it could be dealt by switching over to digital radiography.[16]

**Recycling biomedical waste:**

Biomedical waste is a lethal highly polluting and cannot be disposed through land filling and incineration. Though proper waste management reduces pollution to a larger extent, it still have a major impact on the environment through eutrophication and dioxin gas.[17] Atmospheric concentration of carbon dioxide, sulphur dioxide and nitrous oxide is increased by incineration which in turn causes global warming.. Methane is mostly released from landfills and can absorb 23 times as much infrared radiation as carbon dioxide, warming the earth's surface.

More that reducing waste, sustainable development requires recycling it or, even better, assessing it as an energy resource Bio waste when anaerobically digested with the poultry yields high quality biogas. Biological fuel cells have increased its importance in recent years due to its implacability in implantable medical devices. The glucose components in the blood and saliva will be oxidised quickly and henceforth been considered as primary energy source of electrical energy among the dental waste.[18]

**Going Green with the treatment**

Dental diseases are among the major public health problems in the global level affecting man kind. The need for alternative prevention and treatment options and products for oral diseases that are safe, effective and economical comes from the rise in disease incidence, increased resistance of pathogenic bacteria to currently used antibiotics and chemotherapeutics, opportunistic infections in immune compromised individuals and financial considerations in developing countries. The herbal medicine has an edge over conventional antibiotic treatment with high benefit to low-risk ratio.

Aloe Vera, Bloodroot, Caraway, Chamomile, Clove, Cranberry, Evening Primrose, Garlic, Zingiber officinalis, Syzygium aromaticum gel, Eucalyptus globules, ethyl acetate extracts of Piper betle plants, Mimusops elengi L. and Punica granarum L. seed Green Tea, Haritaki, Liquorice, Myrrh, Neem, Peppermint, Propolis, Purple Coneflower, Rosemary, Sage, Thyme, Turmeric, Tulsi, Triphala, represent summary of herbs used in treatment of oral diseases.

**Challenges in implementation of Green Dentistry!**

The most painful barrier in the implementing the concept is unawareness among our professionals about the over exploitation of the resources. The important prerequisite is the green building design which demands financial affair. Lack of incentives from the government demotivates the dentist to adapt to the change. Cost of initial equipment installation will be high. But green dentistry cannot be an option anymore. Challenges have always been faced with every technology revolution. Green marketing is gaining importance in India for various issues concerning sustainable development. Some of the concepts of green dentistry have been made mandatory by 'Clinical Establishment Act 2018". This presents us with window of opportunity to make our practise more reliable and efficient with environmental credibility.

## Conclusion

After years of warnings from scientists, environmental groups and the ecologically conscious people, the ramifications of not caring for the health of the planet finally seem to have crept into our awareness. With increasing eco consciousness we are now driven to the trend of 'green'. In order to be environmentally-friendly, health sector can deploy some basic measures

like: improvement of hospital design, introduction of sustainable waste-reduction and management strategies, sustainable use of natural resources such as water and energy, and utilization and purchase of such products and chemicals, which have a minimal impact on the environment.

**Ethical Cleaarance:** NIL

Not required as it is a review article.

## References


1. Capoor MR, Bhowmik KT Current perspectives on biomedical waste management: Rules, conventions and treatment technologies. Indian J Med Microbiol. 2017 Apr-Jun;35(2):157-164.
2. Srinivas S. Technical Bulletin: Green Hospitals. Availablefrom: https://igbc.in/igbc/html_pdfs/technical/Green%20Hospitals.pdf. [Google Scholar]
3. Vardeep Singh Dhillon[1] and Dilpreet Kaur Green Hospital and Climate Change: Their Interrelationship and the Way Forward J Clin Diagn Res. 2015 Dec; 9(12): LE01–LE05
4. Energy practical guide: Buereau of Energy Efficiency; 2009. Available from https://beeindia.gov.in/sites/default/files/HospitalEnergyEfficiencyBestPracticesGuide.pdf
5. F. Pockrass, I. Pockrass. The four "R's" of eco-friendly dentistry. 2008; 22:18-21.
6. Robert G, Guenther R. Improving healthcare with better building design. Health Administration Press; 2005. Environmentally responsible hospitals. In: Marberry SD, editor. [Google Scholar]
7. Wu Z. Evaluation of a sustainable hospital design based on its social and environmental outcomes (MSc Thesis) Ithaka, New York: Cornell University; 2011. Available from:http://iwsp.human.cornell.edu/files/2013/09/Ziqi-Wu-2011-19cxn60.pdf. [Google Scholar]
8. Kaseman Boubour , Schuler DA. Validation of the efficacy of a solar-thermal powered autoclave system for off-grid medical instrument wet sterilization. Am J Trop Med Hyg 2012; 87: 602–7.
9. Ahmadi MH, Mirlohi A, Nazari MA. A review of thermal conductivity of various nanofluids. J Mol Liq 2018.
10 S. Al Rakayan, C. Arcuri, And R. Condò Dental unit wastewater, a current environmental problem: a sistematic review. Oral Implantol (Rome). 2017 Oct-Dec; 10(4): 354–359.
11. Bhaskar Agarwal, Saumyendra Vikram Singh, Sumit Bhansali,[1] and Srishti Agarwal Waste Management in Dental Office. Indian J Community Med. 2012 Jul-Sep; 37(3): 201–202
12. Varun Rastogi, Rachna Sharma, Lalita Yadav, Pranali Satpute, and Vandana Sharma Green Dentistry, A Metamorphosis Towards an Eco-Friendly Dentistry: A Short Communication J Clin Diagn Res. 2014 Jul; 8(7): ZM01–ZM02
13. McGain F, Moore G, Black J Hospital steam sterilizer usage: could we switch off to save electricity and water? J Health Serv Res Policy. 2016 Jul;21 (3):166-71.
14. Al-Khatib IA, Darwish R Assessment of waste amalgam management in dental clinics in Ramallah and al-Bireh cities in Palestine. Int J Environ Health Res. 2004 Jun; 14(3):179-83.
15. Pollution, prevention and Compliance assisted information for the health care industry. Available from http://www.hercenter.org/dental/wastewater.html .
16., Rajul Vivek, Environmental Friendly and Waste Management in Dental Clinic – A Review, International Journal of Medical Science and Clinical Inventions 4(6): 3027-3029, 2017.
17. Abhay Kumar Sharma, R.K. RanJan, Surendra Singh, Best Energy from Lethal Bio-Medical Waste International Journal of Scientific Research Engineering & Technology. 2012 Vol 1(5): 073-078.
18. Arcuri C, Luciani F, Piva P, Bartuli FN, Ottria L, Mecheri B, Licoccia S Medical waste to energy: experimental study. Oral Implantol 2014 May 19;6(4):83-8.
19. G. Saraswathy et al, Green Dentistry. Int J Dent & Oral Heal. 2018. 4:9, 145- 155.
20. Radhakrishnan M, Priyadarshini A. Green dentistry: The future. J Int Clin Dent Res Orga n 2017;59-61.