Green Dentistry: Shielded Future

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Abstract: In the current era it is important to become green in our day to day practice including dentistry. Dentistry has a great impact on our environment and eco-system. So, the central theme of green dentistry is to conserve the water and energy, practice of non-toxic products, restricted waste production, waste controlling and extermination of high risk contagious that affect human race and their environment and also motivate green products.

Key Words: Green dentistry, Eco-system, Waste management

What is Green Dentistry?
Green dentistry is a relatively new term and an emerging concept in dentistry. It is part of a larger movement towards ecologically-sustainable health. The Eco-Dentistry Association (EDA) defines green dentistry as practice that: Reduces waste and pollution; Saves energy, water and money; Incorporates high-tech innovations and is wellness based. Green dentistry also described as eco friendly dentistry has been described by Dr. Alifrhani. It also encompasses a service model for dentistry that supports and maintains wellness. Eco-friendly dentistry is an approach to fulfill the necessities of patients and succors dental professionals to safeguard planetary and community well – being as well as financial health of their practices. The colour green helps in enhancing vision, stability and endurance. It also has healing power and is considered to be the most soothing and relaxing colour.

The vital concepts of a green dental practice encompass water and energy conservation, usage of non-toxic products, waste reduction and management, and abolition of high-risk contagions that adversely affect the human race as well as the environment, and encourage ‘green’ products.

Reasons to choose Green Dentistry
Green dentistry is just another step to living in a greener world. Just like other businesses and industries getting on to the band wagon, even dentistry can be helpful to the environment. There are numerous reasons to choose green dentistry:

1. Green dental practice includes 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.
2. Step towards high-tech dentistry
Typical dental offices use numerous disposables and chemicals in their day-to-day operation. While disposable are helpful in maintaining sterilization, the greener option is to avoid them, use high tech autoclaves and other non-hazardous techniques. Typical dental offices use numerous disposables and chemicals in their day-to-day operation. While disposable are helpful in maintaining sterilization, the greener option is to avoid them, use high tech autoclaves and other non-hazardous techniques.
3. Digital – x-rays instead use of paper
With no film chemicals required for x-rays and much less paper used, green dentistry is just another step to living in a greener world.
4. Stronger, more natural restoration
Mercury is a controversial nature and potential harm; metal is never used in any dental restorative options. Consequently, green dentist use ceramic and composite restorations, which naturally taken on the colour of teeth. Green dentistry is not a fad; it’s here to stay with more and more dental offices turning to energy-efficient and Patient safe options, it’s hard to call green dentistry a fad. As more Businesses and industries look to greener options, so too will dentistry Follow in these environmental footsteps for years to come.

How Dentistry is responsible for pollution?
Today environmental pollution is one of the most serious issues people are facing around the globe. Dental health care is devoted to endorsing and enhancing oral health and wellbeing and to achieve such goals, dentists use a diversity of materials and instruments, which can directly or indirectly affect the environment.

Major sources of pollution are:

Mercury – It is a hazardous material for human health and environment. Once mercury enters water or soil, bacteria convert it into methyl mercury which can cause brain, kidney and lung damage in humans, hence being neurotoxic and nephrotoxic.

Saliva Ejector (Dental vacuum system) - It is a crucial tool for dental office tend to utilize tremendous amount of water leading to water wastage and water pollution.

© 2023 IJRTI | Volume 8, Issue 10 | ISSN: 2456-3315
Fighting plastics - Different kinds of disposables used in dentistry are latex gloves, disposable patient's bibs, plastic clips, plastic pouches, plastic suction tip.\(^\text{10}\)

Film X-rays - All the conventional dental offices used traditional film x-rays. This technology has two significant environmental hazards: Silver and lead and Chemical waste (such as spent film developers, fixers, cleaning solutions of disinfectant)

Green Recommendation
Following Measures should be taken by the Dental Society to make environment more Eco-Friendly.

- Implement an eco-friendly newer sterilization program, which simultaneously eliminates the need for disposable autoclave wraps and disposable patient bibs.\(^\text{11}\)
- Install digital radiograph instead of traditional film-based X-rays. If using traditional X-rays, recycle the fixer and developer solutions and also recycle the lead foil from X-rays.\(^\text{12}\)
- Use fluorescent instead of halogen lighting.\(^\text{13}\)
- Use recycle bin and create a “green team” to bring items to recycle centres.\(^\text{14}\)
- Use Amalgam separators which is readily available, relatively inexpensive and a low maintenance piece of equipment.\(^\text{5}\)
- Use High tech, dry vacuum systems instead of Dental vacuum System because from Dry Vacuum System we can accomplish the same results yet use no water at all.
- Start using of CAD/CAM systems which reduces the greenhouse gases as patients and staff travel for multiple appointments is reduce.

Limitations to go Green
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.\(^\text{15}\)

Some of them are increased costs, improper waste disposal, considering recycling waste as an extra burden, lack of trained staff, and preferring convenience over responsibility toward the environment.\(^\text{16}\)

- 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.\(^\text{15}\)
  2. Participants in the survey revealed that they would prefer using reusable items in their dental practice for the reduction of waste. However, our results reveal low use of cloth mask, metal suction tips, steel/autoclavable drinking cups, and metal cartridges, most likely due to fear of disease transmission.
  3. About paper waste management, it is founded having low responses for switching to computer-based patient records. This could be because the participants may have to appoint an additional staff/train their assistant which could be an extra burden for them.
  4. Participants showed low response for the use waterless/dry vacuum system, water faucet sensor, and waterless hand sanitizers to conserve water. These systems could be used by fewer participants because of expensive costs in comparison to their conventional alternatives.\(^\text{16}\)
  5. Many Practitioners disposed of their biomedical waste by handling it to authorize clinical/hospital waste collection or to house-to-house waste collection. Unfortunately, participants revealed a lack of knowledge when asked to segregate a few waste products into their respective bags.\(^\text{17}\)
  6. Participants showed low response to correct disposal of lead foil and fixer solution; this may have occurred due to lack of knowledge about the same.\(^\text{18}\)

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.\(^\text{15}\)

Health professionals are on the leading edge of helping to heal our planet by introducing the four R’s
1 Rethink:
The first step toward environmental sustainability is to rethink how dentist offices are conducted.\(^\text{5}\)
  • Proper sun illumination and use florescent lighting
  • Promote indoor plantation
  • Inclined roof for water harvesting
  • Solar water heaters
2. Reduce: The easiest way to have more of a resource is to use less of it.8
• 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

3. 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.

4. 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.21

Color coding for biological waste management

• According to the new updated colour coding for Biomedical Waste Management– 2016, waste should be disposed in suitable colour bags as under:

1. Yellow: Collected in coloured non – chlorinated plastic bags or containers.
   Human anatomical waste: Human tissues, body parts, organs.
   Soiled waste: items contaminated with blood, plaster casts, cotton swabs, bag containing residual or discarded blood.
   Expired or discarded medicines: pharmaceutical waste including ampoules and vials.
   Chemical liquid waste: X-ray film developing liquid
   Microbiology, Biotechnology and other laboratory waste

2. Red: Collected in red coloured non-chlorinated plastic bags or containers.
   Polluted Waste resulting from use and throw articles such as tubes, bottles, intravenous tubes, catheters, urine bags, syringes etc.

   Needles, syringes having immovable needles, needles from tip cutter or burner, scalpels, blades, or any other infected needle-like object.

4. Blue: Collected in cardboard boxes with blue coloured markings.
   Glassware: Broken or discarded and adulterated glass objects including medicine vials and ampoules except those contaminated with cytotoxic wastes.
   Metallic body implants

Waste management

The term biomedical waste has been defined as any waste that is generated during the diagnosis treatment or immunization of human beings or animals or in the research activities pertaining to all or in the production of testing of biological and includes categories mention in schedule one of the medical Waste rules 1998.19

The World Bank healthcare waste management guidance note 4 steps 2 healthcare waste management.19
1. Segregation
2. Transportation
3. Treatment

• Waste segregation and packaging
  - The key to minimization and effective management of healthcare waste is segregation or separation and identification of waste.
  - Segregation should always be the responsibility of the waste producer. The most appropriate way is by sorting waste into colour coded plastic bags or containers.20

• Transportation
  ➢ One within the hospital
    a) Waste roots must be designated to avoid the passengers of waste through patient area.
    b) Should be transported by means of wheeled trolleys, containers or cart
c) Easy to load and unload

d) No sharp edges that could avoid damage to bags.

e) Easy to clean and disinfect

- Outside the hospital
  a) Proper guidelines should be followed
  b) Hazardous biomedical waste should be kept in container and should have levelled during transport
  c) Transport is to be done through dedicated vehicles. Driver’s compartment should be separated from load compartment.
  d) The containers for transportation must be labelled as given in schedule.\textsuperscript{20}

- Treatment
  - General waste (non hazardous, non toxic and non infection)
    o 90% waste
    o Safe disposal
  - Biomedical waste
    o Incineration
    o Deep burials
    o Autoclave and microwave treatment
    o shredding plastic shops should be shredded.
    o secured landfills\textsuperscript{20}

Actions taken by Government/ private health agencies to go green

The government has taken initiatives for green dentistry such as: initiative in reducing waste by inculcating the waste disposal in specific colour dustbins i.e., Blue colour dustbin for wet wastage and green colour for dry waste stuff. The use of plastic has been banned by the government and replaced with the paper bags and paper disposal glasses.

Recently government has introduced vehicles to collect the wastage from door to door.

- In a study conducted by Kallakuri P et al., it was seen that only 45% practitioners were in favour of using the LED lights bulbs.
- 67.4% participants used Glass Ionomer Cement and composite was used as a filling material by 61.5% participants as an alternative to amalgam for restoration.
- In a study conducted by Ramesh KK et al., it was observed that amalgam remnants were disposed along with other routine wastes by 19.33% practitioners, tight containers for amalgam disposal were used by 22% participants and only 16% of practitioners disposed amalgam waste separately.
- International Academy of Oral Medicine and Toxicology recommended SMART i.e., Safe Mercury Amalgam Removal Technique for the routine practice of safe mercury disposable that helps in reducing the risk of mercury exposure faced by the patient and practitioner.
- According to Popa D et al., recycling, in the long run, would be more cost-effective and can help by saving money energy and natural resource.
- Study done in Lucknow by Rahman H et al., stated in this regard that we must reduce the consumption of paper and initiate the use of electronic and digital methods which will also reduce deforestation and will retard global warming.
- A study reveals if electrical appliances are unplugged, they save 5-10% on your electricity bill.
- In article by Farahani D et al., digital system was used and 12,600 papers were saved annually which also eliminated the need for X-ray films, fixing and developer solutions for taking radiographs.

CONCLUSION

Green dentistry is a modern methodology that decreases the environmental effect of dental practice and includes a safe model for dentistry that cares and preserves wellness. Green dentistry preserve environment, promote health and favours eco-friendly production and waste management. It also conserve water and energy to protect community health and wellbeing. As health practitioners, we should be concerned with encouraging not only human healthiness and welfare but also that of the environment. So, lets “GO Green” for the betterment of life and also protect our mother Earth from biohazards.

References

20. Handling, storage and transportation of health care waste.