Acta Bioethica 2025; 31(1): 101-108

SUSTAINABLE ORAL HEALTHCARE FROM ETHICAL STANDPOINT

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Abstract: Sustainability refers to the efficient and balanced use of resources, considering the needs of future generations. Sustainable development and sustainability address the most significant and complex challenges humanity has ever faced. Sustainable healthcare systems consider the long-term social and environmental impacts of health services, utilizing existing resources effectively, and concurrently addressing the health rights of the population. The key components of such systems include reducing, recycling, and reusing medical waste, energy efficiency, minimally invasive practices, and reduced carbon footprint by eco-friendly principles. Oral healthcare, integral to overall well-being, must align with sustainability. Ethical delivery of oral healthcare demands a delicate balance between current patient needs and preserving resources for future generations. Professionals in the field increasingly recognize the imperative to minimize environmental footprints while upholding standards of care. Eco-friendly dentistry emphasizes waste reduction, energy conservation, and the adoption of innovative, sustainable materials and practices. Environmental ethics underscore the interconnectedness of human health and environmental well-being. They advocate for strategies to mitigate environmental health risks and promote sustainable practices in oral healthcare. By embracing sustainability, oral healthcare professionals contribute to a healthier planet and ensure the longevity of their practice for generations to come.

Keywords: dental practice, eco-friendly dentistry, environmental ethics, oral healthcare, sustainability

Atención sanitaria bucal sostenible desde el punto de vista ético

Resumen: La sustentabilidad se refiere al uso eficiente y equilibrado de los recursos, considerando las necesidades de las generaciones futuras. El desarrollo sustentable y la sustentabilidad abordan los desafíos más significativos y complejos que la humanidad haya enfrentado jamás. Los sistemas de atención de salud sustentables consideran los impactos sociales y ambientales a largo plazo de los servicios de salud, utilizando los recursos existentes de manera efectiva y al mismo tiempo abordando los derechos de salud de la población. Los componentes clave de tales sistemas incluyen la reducción, el reciclaje y la reutilización de los desechos médicos, la eficiencia energética, las prácticas mínimamente invasivas y la reducción de la huella de carbono mediante principios ecológicos. La atención de salud bucal, integral para el bienestar general, debe alinearse con los principios de sustentabilidad. La prestación ética de la atención de salud bucal exige un delicado equilibrio entre las necesidades actuales de los pacientes y la preservación de los recursos para las generaciones futuras. Los profesionales en el campo reconocen cada vez más el imperativo de minimizar las huellas ambientales al tiempo que se mantienen los estándares de atención. La odontología ecológica enfatiza la reducción de desechos, la conservación de la energía y la adopción de materiales y prácticas innovadores y sostenibles. La ética ambiental subraya la interconexión de la salud humana y el bienestar ambiental. Aboga por estrategias para mitigar los riesgos para la salud ambiental y promover prácticas sostenibles en la atención de salud bucal. Al adoptar la sostenibilidad, los profesionales de la salud bucal contribuyen a un planeta más saludable y garantizan la longevidad de su práctica para las generaciones futuras.

Palabras clave: práctica dental, odontología ecológica, ética ambiental, salud bucal, sostenibilidad

Cuidados de saúde oral sustentáveis de um ponto de vista ético

Resumo: Sustentabilidade refere-se ao uso eficiente e equilibrado dos recursos, tendo em conta as necessidades das gerações futuras. Os sistemas de cuidados de saúde sustentáveis são aqueles que consideram os impactos sociais e ambientais a longo prazo dos serviços de saúde, utilizando os recursos existentes de forma eficaz e abordando simultaneamente os direitos de saúde da população. Os componentes-chave de tais sistemas incluem a redução, reciclagem e reutilização de resíduos médicos, eficiência energética, práticas minimamente invasivas, redução da pegada de carbono de acordo com os princípios ecológicos. Os cuidados de saúde oral, fundamentais para o bem-estar geral, devem estar alinhados com os princípios de sustentabilidade. A prestação ética de cuidados de saúde oral exige um delicado equilíbrio entre as necessidades atuais dos pacientes e a preservação de recursos para as gerações futuras. Os profissionais do campo reconhecem cada vez mais a imperiosa necessidade de minimizar as pegadas ambientais ao mesmo tempo que mantêm os padrões de cuidado. A odontologia ecológica enfatiza a redução de resíduos, a conservação de energia e a adoção de materiais e práticas inovadoras e sustentáveis. A ética ambiental sublinha a interconexão entre a saúde humana e o bem-estar ambiental. Ao adotar a sustentabilidade, os profissionais de saúde oral contribuem para um planeta mais saudável e garantem a longevidade de sua prática para as gerações futuras.

Palavras-chave: prática odontológica, odontologia ecologicamente correta, ética ambiental, saúde bucal, sustentabilidade

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Introduction

In today's world, many environmental issues have become more severe and pressing than ever before. These include such problems as air pollution, freshwater shortages, deforestation, species extinction, climate change, heatwaves, floods, droughts, forest fires, the spread of infectious diseases, environmental migration, and more. All these problems significantly affect people's health, livelihoods, and overall well-being. Human health is intrinsically linked to the environment and similarly the well-being of the environment is closely related to the sustainability of healthcare services. Such a mutual interaction places a responsibility on healthcare professionals to address diseases caused by adverse environmental conditions on one hand, and simultaneously to make efforts to ensure that healthcare services do not adversely affect the environment, reflecting a bioethical maturity and responsibility*(1-3)*. The environmental influences of healthcare practices and the complicated challenge of sustainability give rise to ethical inquiries concerning the environmental stewardship of healthcare. The well-being of the Earth's ecosystems underscores the imperative for healthcare institutions and practitioners to reevaluate their methods, striving to mitigate or eradicate adverse effects. Simultaneously, they must navigate a delicate equilibrium between their environmental responsibilities and their duty to promptly address the pressing needs of patients. Tackling this balance necessitates a thoughtful integration of principles from both medical ethics and environmental ethics*(1)*.

Sustainable Development and Sustainability

Sustainable refers to the level at which a resource can be utilized or depleted without compromising its ability to regenerate itself indefinitely*(4)*. It was initially introduced in 1980 in the World Conservation Strategy Report, marking the first international document on living resource conservation crafted through collaboration among governments, non-governmental organizations, and various experts. The report advocates that for development to be sustainable, it must actively support conservation rather than impede it. It is tailored for policymakers, conservationists, and development practitioners, emphasizing key principles such as the protection of ecological processes and life-support systems, the preservation of genetic diversity, and the sustainable utilization of species and ecosystems. This influential report played a pivotal role in shaping "Our Common Future", also known as the "Brundtland Report" (1987), laying the groundwork for defining the principle of sustainable development. According to this report, "sustainable development is a development that meets the needs of the present without compromising the ability of future generations to meet their own needs"*(5)*.

Based on the information gathered from various sources, it is possible to make the following definition for sustainability*(3-6)*. Sustainability is a concept describing mankind's ability to create a world for humans and non-humans that environmentally, socially, and economically provides for a current population's needs without damaging the ability of future generations to take care of themselves. Sustainability is also a gauge of the extent to which policies and management align with the principles and philosophies of sustainable development. It can also be envisioned as an idealized realm or goal where all essential criteria are fulfilled to support ecosystems and uphold human well-being*(4)*.

In healthcare, the term "sustainability" encompasses concepts of renewability, energy efficiency, non-toxicity, minimally invasive practices, reduced carbon footprint, effective waste management, and the design of hospitals and offices in alignment with eco-friendly principles*(4,7)*.

Sustainable Oral Healthcare

All sustainable healthcare systems consider the long-term social and environmental impacts of health services using available resources effectively and addressing the health rights and needs of future generations*(4,7)*. The fundamental elements of sustainable healthcare are low-carbon care models, eco-friendly transportation, healthcare facilities with green buildings, the reduction, recycling, and reuse of medical waste, as well as the procurement of low-carbon products and services, which include pharmaceuticals and medical equipment. Such systems aim to provide healthcare services with an environmentally, socially, economically, and ethically responsible approach*(4,6)*.

Oral healthcare is essential for overall health, well-being, and quality of life. This needs to be delivered ethically, with high levels of quality and safety and be environmentally sustainable. In this way, the healthcare opportunities of current and future generations are respected and protected by actively minimizing negative environmental impacts*(8).* Sustainable oral healthcare involves maintaining optimal oral health while mitigating the adverse environmental and societal effects linked to dental care. This principle is closely connected to the overarching field of sustainable healthcare, highlighting the significance of delivering healthcare services in a manner that diminishes waste, lowers the carbon footprint, and fosters fair access to care*(8,9).*

In the delivery of oral healthcare, four domains "preventive care", "operative care", "integrated care" and "ownership of care" have great importance. By engaging with these four domains, oral health professionals can provide effective, high-quality, and environmentally sustainable care*(8,10).*

The dental practice consumes many resources with an environmental impact, such as the energy and water used by the equipment. Also, this practice produces large quantities of plastic waste more x-ray radiation, and the waste from products involving metals like mercury. However, dentists are increasingly recognizing the need to provide care sustainably, by minimizing the impact on natural resources and contributing to the transition to an eco-friendly practice*(11-13).* Climate change and environmental pollution are among the greatest health threats affecting the planet, humanity and biodiversity. This is recognized in the 2030 United Nations Agenda for Sustainable Development, which includes an urgent call for action from all sectors. The entire oral healthcare community, including clinical professionals and industry, recognizes that there is a responsibility to deliver products and interventions sustainably improve oral health. With "Sustainability in Dentistry" project, FDI-World Dental Federation supports the provision of eco-friendly dental care and an environmentally sustainable practice. Eco-friendly dentistry (or green dentistry) mainly focuses on reducing waste and pollution, conserving energy, water, and money, using reusable and biodegradable materials, and promoting increased use of hightechnologies in dental clinics*(8,14-16).*

Sustainability is about the sensible and responsible use of natural resources to avoid depletion and maintain an ecological balance. From a sustainability perspective, the dental team should ensure that waste is dealt with in the most ecologically sound way. Ensuring clinical waste is kept to a minimum will reduce the carbon emissions associated with incineration. Recycling will help reduce the depletion of natural resources in terms of paper, plastic and glass products, with associated lower carbon emissions than landfill. Reduction of these materials is best achieved through the delivery (by clinicians) and maintenance of good oral health, focused on prevention and high-quality interventions. The dental team have legal and professional responsibilities to ensure that waste is correctly managed in a way that does not cause pollution of the environment or harm to human health*(10-13,17).*

Many dentists are indeed placing a significant emphasis on sustainability, implementing practices such as utilizing environmentally friendly dental supplies and equipment or renovating their clinics to be more energy efficient*(18,19).* These efforts not only contribute to reducing environmental impact but also align with the goal of providing sustainable oral healthcare. Furthermore, advancements in oral health and overall well-being can be achieved through a proactive approach that includes preventive measures, regular screening, and monitoring of systemic health conditions. By integrating environmentally friendly practices into these aspects of care, dental professionals can promote both oral health and environmental sustainability simultaneously. Sustainability in dentistry represents a broader commitment to social and environmental responsibility. Dentists play a crucial role in safeguarding the well-being of future generations by respecting the right to a world with sufficient natural resources. By embracing sustainability as a core principle, oral health professionals can contribute to creating a healthier and more sustainable future for all*(8,14).*

In accordance with the FDI Vision 2030 document which calls for urgent action on oral health, the principal goal of oral health professionals is to

promote universal oral health for diseases that are largely preventable and/or treatable in the early stages. The provision of oral healthcare, in the form of prevention, therapeutic interventions, or long-term maintenance, creates pollution and a significant carbon footprint. Oral healthcare providers have an ethical and moral responsibility to manage the impact of dental activities on the environment and ensure that they do so in a sustainable manner*(10,17).*

Sustainable Oral Healthcare from Ethical Standpoint

The environmental footprint of healthcare and the complexity of sustainability raises ethical dilemmas concerning healthcare's environmental guardianship. The commitment to the well-being of the Earth's ecosystems suggests that healthcare institutions and professionals need an appropriate ethical approach to mitigate or eliminate possible harmful effects*(1).* Ethics provides the foundation on which a principled framework for building a holistically healthier world can rest*(20).* Sustainability in healthcare from an ethical perspective involves balancing the current needs of patients and communities with the long-term preservation of resources, environmental health, and social equity. This approach acknowledges that healthcare systems must not only deliver quality care to individuals but also address the broader impact of their actions on society and the environment*(9,21).*

In 1927, Fritz Jahr introduced the concept of bioethics (German: bio-ethik), emphasizing moral responsibilities extending beyond humans to encompass all life forms. Nearly half a century later, in 1971, Van Rensselaer Potter adopted the term "bioethics" in English to articulate a life-ethic suited for an industrialized society within a fragile ecosystem. Potter envisioned bioethics as inherently practical, grounded in ecologically sustainable living that embraces the interconnectedness of Earth and its inhabitants. Despite its environmental roots, the trajectory of bioethics shifted notably after Beauchamp and Childress proposed "biomedical ethics" in 1979. Their framework, centered on the patient-physician relationship and delineated by principles of autonomy, beneficence, non-maleficence, and justice, became widely adopted. This approach led to a conflation of "bioethics" with "biomedical ethics", overshadowing its ecological underpinnings. This oversight prompted the emergence of a distinct field known as environmental ethics, seeking to reassert the ecological origins of bioethics*(22-24).*

Bosworth et al. argue that the prevailing paradigm concerning human-nature relations tends to be anthropocentric. However, contemporary perspectives advocate for a more holistic understanding of our relationship with nature, favoring an ecocentric approach over an anthropocentric one. Within this framework, the concept of bioethics has expanded to encompass environmental ethics, reflecting a broader commitment to respecting all forms of life. This entails moving beyond solely anthropocentric viewpoints to incorporate biocentric and environmentally centered worldviews. Unlike anthropocentric approaches, which primarily focus on human interests, environmental ethics recognize the intrinsic value of nonhuman nature and advocate for the protection and preservation of ecosystems*(25).*

Environmental ethics emphasizes the interconnectedness of human health, environmental integrity, and the ethical considerations necessary for ensuring the well-being of all life forms on Earth. Environmental ethics is the disciplined study of the morality of the relationship between human beings and the environment, including especially other living things (plants and animals) and natural resources vital to the well-being of living things, such as the quality of air and water. An important connection between environmental ethics and bioethics is ethical reasoning about the impact of changes in the environment -both natural changes and changes resulting from human behavior- on health*(26).* Contemporary environmental ethics go beyond simply extending moral principles intended for human use to encompass other living beings, ecological systems, and the planet. They offer frameworks for considering nonhuman nature, humans, animals, the future, and the planet in interconnected ways that acknowledge the complex web of life. At the core of environmental ethics is the recognition of species interdependence, the interconnectedness of ecologies, and the threats to their survival. Understanding these relationships is fundamental to determining the "worth" of actions and entities within environ-

mental ethics. Environmental ethics expanded its scope to encompass a wide array of topics, including sustainability, deep ecology, social ecology, and ecofeminism. Environmental ethics not only delves into theoretical aspects but also has practical applications, influencing the management and use of natural resources*(20,27).*

The environmental ethics in oral healthcare sustainability include many important key aspects. For instance, oral healthcare facilities can reduce their environmental footprint by implementing energy-efficient practices, reducing waste generation, and adopting sustainable procurement policies. Environmental ethics in oral healthcare advocate for the adoption of eco-friendly dental practices, such as using renewable energy sources, implementing green building designs, and reducing the use of harmful chemicals and pollutants. Oral healthcare providers have a responsibility to prevent pollution and minimize environmental harm associated with dental procedures, waste disposal, and the use of pharmaceuticals. Environmental ethics in oral healthcare recognize the impact of environmental factors on human health and advocate for strategies to address environmental health risks. Dental professionals and organizations can advocate for policies that promote environmental sustainability and protect public oral health, including supporting legislation to reduce greenhouse gas emissions and strengthen environmental regulations*(10,17,28).*

Sustainable oral healthcare from an environmental ethics perspective involves some important principles which that focus on promoting oral health while minimizing negative impacts on the environment and fostering equitable access to dental care. Here are some key ethical considerations related to sustainable dentistry*(1,8,15,16,18,19,28-31)*:

1.Responsibility to future generations: Ethical considerations in oral healthcare sustainability encompass the duty to preserve resources. Embracing sustainability demonstrates a commitment to using resources efficiently and ensuring they are available for future generations.

2. Health Equity: Sustainable dental clinics prioritize preventive care and community education, promoting better oral health for all. This aligns with ethical principles of fairness and social justice by improving access to dental care and reducing health disparities.

3. Equitable Access to Dental Care: Ensuring equitable access to dental care is an ethical imperative in sustainable dentistry. Dental professionals should strive to provide care to underserved and vulnerable populations, advocating for policies that promote oral health equity and reducing disparities in dental care access.

4. Preventive Care: Emphasizing preventive dental care aligns with ethical principles in sustainable dentistry. Preventing dental issues through patient education and regular check-ups reduces the need for more resource-intensive and potentially harmful interventions.

5. Continuing Education: Dental professionals have an ethical responsibility to stay updated on sustainable dental practices. Participating in continuing education programs that highlight environmentally responsible techniques and materials helps foster ethical practices.

6. Patient-Centered Care: Ethical sustainable dentistry places patients at the center of dental care decisions. It involves informed consent, respect for patient autonomy, and providing education to patients about sustainable oral health practices they can adopt at home.

7. Waste Reduction and Recycling: Reducing waste in healthcare is both ethically and environmentally important. Sustainable dentistry promotes waste reduction and recycling efforts within dental offices. Implementing strategies to minimize single-use plastic waste and recycling dental materials whenever possible are essential. Waste reduction includes not only minimizing physical waste but also avoiding unnecessary tests, treatments, and prescriptions that may have adverse effects on patients and contribute to rising healthcare costs.

8. Resource allocation: Healthcare institutions face challenges in allocating finite resources, such as medical supplies, energy, and water. Ethical decision-making in resource allocation requires prioritizing those treatments and interventions

that provide the greatest health benefits while considering the environmental impact of resource consumption.

9. Environmental impact: Sustainable healthcare aims to minimize its environmental footprint. From reducing greenhouse gas emissions and hazardous waste to adopting eco-friendly practices in hospital operations, healthcare systems should prioritize environmental stewardship to protect public health and ecosystems. Dental professionals should strive to use dental materials that are biocompatible and have a lower impact on the environment.

Conclusion

Adopting a sustainable approach to healthcare from an ethical perspective requires a holistic view that balances short-term patient needs with long-term environmental and societal impacts. By integrating these ethical considerations into oral healthcare decision-making, dental professionals can contribute to a more sustainable and socially responsible approach to oral healthcare, promoting positive impacts on patients, communities, and the environment. Concern for the health of the earth's ecosystems suggests that healthcare institutions and practitioners should reassess their practices to soften or eliminate harmful effects. At the same time, they should balance their environmental responsibilities with their obligations to serve the immediate needs of patients. Addressing the issue of balance requires combining considerations from both healthcare ethics and environmental ethics. Sustainable oral healthcare is the provision of equitable, ethical, high-quality, inclusive, and safe care with appropriate, effective and efficient use of resources. Through this, the healthcare opportunities of current and future generations are respected and protected by actively minimizing negative environmental impacts.

Financial support and sponsorship: None

Conflicts of interest: None

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Received: May 22, 2024
Accepted: June 25, 2024