

## **How Can the Clinical Practice and Science of Periodontology be Developed to Ensure Environmental Sustainability?**

In the year 2022 planet Earth is in worse shape than ever before. World pandemic, war and starvation rages, and global warming and environmental disasters threaten the entire public health and force people to leave their homes and their loved ones. Some of these events occur because of the lack of environmental resources and sanitary means and drive not only people but world leaders to extreme measures. The Paris Agreement signed in 2016 by nearly all of the world's countries aims to strengthen the global climate change response and hold global warming well below 2 degrees Celsius (United Nations,2022). Yet, it is expected that between the years 2030 and 2050, climate change will cause 250 000 additional deaths per year (World Health Organization, 2022).

How do these environmental and humanitarian crises concern the clinical practice and science of periodontology? Well, the health care sector answers for 4,4% of the total global emissions (Karliner et al, 2019) and periodontal care has the opportunity to improve those numbers and to take a leading stand in the task of making the health care sector sustainable and environmentally friendly. We educate the periodontal patients on the benefits of keeping their dentition, now it is also time to educate, not just the patient, but also coworkers, leaders, and stakeholders on the benefits of keeping the environment. It is time that periodontal caregivers and scientists not only make a "worst-case scenario" based on the patients' oral prerequisites but a "worst-case scenario" based on the environmental impact the health care actually causes all of us. Periodontal care and dentistry overall can contribute to improving several factors that have a great impact on environmental health.

As a start education for undergraduate and postgraduates should incorporate sustainability, (Duane et al, 2020b) and raise awareness about global warming, climate changes, and the consequences of emptying the resources of the Earth.

Transports and traveling back and forth to the clinic should be minimized to reduce emissions. As a suggestion, the caregiver should make the most of every single appointment, for example, a patient scheduled for scaling could be treated sidewise instead of quadrant wise to reduce the amount of traveling even if it requires a longer visit. Longer, but fewer visits, would also benefit the patient and the clinic financially. With fewer visits, the patients can cut back their traveling expenses and the clinic saves single-use materials, energy, and water from cleaning, packaging, and the sterilization of the periodontal instruments. Digital conferences or digital consultations will also keep the emission caused by traveling at a low level and save both time and money into the bargain. Bulk ordering of dental products could also

decrease packaging and lowering emissions if the clinic could afford to hold a stock of products (Mulimani, 2017).

A thorough periodontal examination includes radiographs, often full-mouth sets. By taking the radiographs with a digital sensor the amount of lead foil in films reduces, (Mallya and Lam, 2019, p.40) and the radiation exposure to the patient decreases together with reduced risk of molecular changes that might lead to mutations in the patient's body (Mallya and Lam, 2019, p.16).

Implementing environmentally friendly chemicals that are used to sanitize the chair, unit, or the treatment room and recycle the bottles after use is one way to reduce plastic waste (Mulimani, 2017). Recycling single-use plastic materials, empty bottles, and paper will help reduce the carbon footprint (Duane et al, 2020a).

An average person washes the hands about nine times per day. Health care workers wash even more frequently. Diminishing the water usage by, for example turning off the faucet while lathering the hands will save approximately six gallons or corresponding twenty-two liters per month (Davies, 2022). Making sure to only start the dishwasher when it is full is also a simple but energy- and money-saving measure. Another way to save energy is to turn out the lights when you leave the treatment room for a break and to make sure the computers are completely turned off when you leave the practice for the day. Replace old bulbs with new low-energy lamps such as diode light bulbs to become even more energy-efficient (Duane et al, 2020b).

Polymers in for example interdental brushes are non-degradable (Mulimani, 2017) but utterly necessary for most of the patients with periodontitis (Lang and Lindhe, 2017, p.718). The manufacturer should strive to fabricate these brushes in more environmentally friendly ways, for example, change the polymer handle to a handle in sustainable bamboo or fabricate refillable bristles that could be inserted in the handle. The metal thread that holds the bristles could be exchanged into plastics which makes the brush fully recyclable without having to separate the bristles from the metal thread.

Several longitudinal studies show that smoking increases the risk of periodontitis significantly (Lang and Lindhe, 2017, p.149). Encouragement to stop smoking should be made not only regarding the patient's oral health but also for the surrounding environment. Every year trillions of cigarette filters are leftovers and approximately 2,2 trillion filters are left out in nature. Disposed of in nature not only plastic but also heavy metals, nicotine, and hazardous chemicals are released into the surroundings (Root, 2019). Sometimes it is easier to motivate a change if awareness is raised upon how a behavior, such as smoking, affects the surroundings instead of how it affects not just the oral cavity and aggravates the periodontal disease,

but also could lead to severe health consequences in the entire body (Lang and Lindhe, 2017, p.278).

The prospect of achieving an environmental change depends on involving all of us, dentists, periodontists, scientists, manufacturers, stakeholders, world leaders, and not to forget, the patients. In the mission of making the Earth healthy again all of our matters, from the school children to the world leaders, all of us must contribute and make an effort the matter of improving our world and help one another to understand the importance of a healthy environment and being humble about the fact that we are each other's surroundings. In the end, it all comes down to knowledge, because knowledge is power, power to improve and change things for the better and to achieve this improvement it all starts with education.

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