CHAPTER 18
Sustainable Operating Room Practices

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Highlights

- Climate change is a threat to public health, and reducing carbon emissions should be a priority for the health care system.
- Millions of cataract surgeries are performed every year, with many single-use materials discarded at the end of each case.
- Surgeons have a responsibility to reduce the waste produced on the local, national, and global levels.
- Liability concerns and institutional and governmental regulations can hamper waste reduction in the operating room.
- Surgeons can advocate for sustainable operating room practices in a variety of ways, including raising awareness, promoting reuse of multidose topical medications, choosing reusable instruments and smaller surgical drapes, and becoming involved in political advocacy for change.

Cataract surgery is the most commonly performed surgical procedure in the world, with almost 4 million surgeries performed each year in the United States and more than 20 million worldwide. The prevalence of cataract surgery is expected to increase with the aging global population. In a 2021 statement, the World Health Organization warned that climate change is “the biggest health threat facing humanity.” The health care industry is responsible for 10% of all greenhouse gas emissions in the US, and cataract surgeons can and should take steps to ensure that the process is more sustainable at a local, national, and global level.

Cataract Surgery Carbon Footprint

The term carbon footprint refers to the emissions associated with the full life cycle of a product or event and is measured in carbon dioxide equivalents (CO₂-eq). The carbon footprint of cataract surgery can range from 6 kg CO₂-eq in a center in India to
181.9 kg CO₂-eq in the United Kingdom. In the UK, this is equivalent to 1.16 million metric tons of CO₂-eq each year, or almost 250,000 cars driven for one year, and would require 30 million trees planted and grown for a decade to capture and store the carbon released.

The footprint is a systemic issue; it includes all facets involved in surgery, and surgeons can look at almost any part to reduce waste, such as patient/provider travel, building power and energy, and water use. However, over 50% of greenhouse gas emissions come from supply procurement for materials used for surgery: eye drops, surgical supplies (phacoemulsification tips, tubing, surgical markers, single-use and multiuse surgical tools, packaging), other medical equipment, and laundry (Fig 18-1). A specific example of waste includes the paper instructions for use (IFU) included in intraocular lens (IOL) packaging. This booklet includes information about the safety and use of the IOL and can weigh up to 64 g, while the IOL itself weighs less than 1 g. Many companies and countries have implemented use of an electronic IFU; however, this is not widespread (Fig 18-2).

Low-resource and high-innovation health care sectors, such as the Aravind Eye Care System in southern India, have significantly reduced their emissions from cataract surgery to 5% of the UK carbon footprint. Their efficient model of multiuse of surgical eye drops, multiuse and flash sterilization of surgical instruments, and energy-efficient buildings generate only 250 g of waste, most of which is recycled, for each cataract surgery performed. Of this 250 g, 20% is the sterile facial drape and 25% is the IOL packaging.
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Barriers to Sustainable Practices

Sustainable models in other parts of the world prove that the waste produced by cataract surgery in higher-resource countries is needless. How can surgeons implement sustainable practices in their own operating rooms (ORs)? The main barriers include lack of general awareness and support of the need for sustainability and concerns about patient safety.

The first barrier—lack of awareness—is easily overcome. With a 5-fold increase in extreme weather events in the past 50 years, issues of climate change and sustainability are more prevalent in the global news than ever before. Data show that 90% of cataract surgeons and nurses are concerned about global warming, 93% believe that cataract surgery waste is excessive and should be reduced, and 78% support the reuse of more supplies during surgery. To raise awareness of the need for sustainable practices, leaders in ophthalmology have formed organizations (EyeSustain.org) and task forces (the American Academy of Ophthalmology Task Force on Sustainability) to promote the need for surgical waste reduction and provide resources and solutions for surgeons.

The safety and care of the patient are the most important component of cataract surgery and should be the primary focus of the surgeon. Regulations exist at governmental and institutional levels to decrease liability and rates of infection. Single-use items are prevalent in cataract surgery, and their use may be motivated by the perception of lower risk of infection and greater patient safety.

At the Aravind Eye Hospital, most of the surgical instruments (cannulas, blades, phacoemulsification tubing), cloth surgical gowns, masks, and caps are reused; and surgeons and staff retain their gloves and gowns for multiple cases, sterilizing their gloves after each case (Fig 18-3). The endophthalmitis rate at Aravind is 0.01% with routine