Bringing Sustainability Into Focus: The Case for Contact Lens Recycling

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As we move toward a more sustainable future, it is crucial to consider the environmental waste implications of everyday items. The contact lens industry serves as a prime example. A single person using daily disposable contact lenses generates waste from over 700 lenses and associated packaging annually. In the United States alone, there are approximately 45 million contact lens users according to the Centers for Disease Control and Prevention.[1] The majority of soft contact lenses are made of a soft, hydrophilic plastic polymer known as poly(2-hydroxyethyl methacrylate), or hydrogel, and silicone-hydrogel.[2,3] Hydrogel and silicone hydrogel contact lenses are either daily disposable or planned replacement. Some planned replacement lenses are labeled for extended wear, but most are removed for nightly disinfection and disposed of at a recommended interval. As plastics, contact lenses are not biodegradable or compostable; most are discarded as waste and end up in landfills.

Approximately 21% of consumers improperly dispose of their used contact lenses by flushing them down the drain.[4] This practice is particularly problematic, as it introduces contact lenses into wastewater systems and leads to microplastic and nanoplastic pollution in our waterways.[4–6] Defined by the National Oceanic and Atmospheric Administration as "small plastic pieces less than 5 millimeters long," microplastics have gained recent attention due to their detection and accumulation in the bloodstream and various organ systems of mammals, including humans.[7–13] Microplastics have similarly been found in fish and other seafood consumed by humans, while larger plastics have been known for decades to pose serious threats to marine life.[7,14–17]

Contact lens recycling efforts face unique challenges, as standard recycling facilities cannot process contact lenses and related products due to presorting requirements and a paucity of clear recycling pathways for consumers.[5] Specialized recycling facilities are required to clean, sort, process, and convert contact lenses into raw materials for manufacturers to recycle into new products. These can include outdoor furniture and decking, plastic shipping pallets, storage containers and bins, flooring tiles, and playground surface covers.[5] TerraCycle is one example of a company working globally with businesses and individuals alike to keep everyday waste from landfills and incinerators. Programs such as TerraCycle's partnership with Bausch & Lomb in the United States and Johnson & Johnson in the United Kingdom, as well as CooperVision's commitment to net plastic neutrality, have begun to address the environmental footprint of contact lenses.[5,18–20] While these programs facilitate the recycling of contact lenses and blister packs, widespread adoption and consumer awareness are still lacking. Estimates report that 93% of contact lens users do not recycle their lenses, and 58% are unaware of recycling options.[19,21] Fortunately, the majority of contact lens users surveyed consider themselves environmentally conscious, highlighting an opportunity to promote sustainable practices among consumers.[22]

Founded in 2022 and cosponsored by the American Academy of Ophthalmology, American Society of Cataract and Refractive Surgeons, and European Society of Cataract and Refractive Surgeons, EyeSustain is a global consortium of eye societies and ophthalmologists committed to increasing sustainability in ophthalmic clinical and surgical practice through research, education, and advocacy.[23] In July 2024, EyeSustain launched EyeRecycle, a pilot recycling program for contact lenses, blister packs, and related eye care products in ophthalmology clinics at academic institutions across the United States. Waste is gathered at each site through collection bins placed at established drop-off locations. When a collection period ends or a collection bin fills, the waste is then shipped to specialized facilities for processing and recycling. This initiative aims to increase awareness and promote sustainable practices within the ophthalmology community among both patients and providers, leveraging the enthusiasm and dedication of medical students, ophthalmologists, optometrists, and other clinic staff involved at each location.

Several alternatives can be considered to reduce the waste from contact lens use. In a life cycle analysis comparing daily disposable contact lenses with reusable monthly replacement lenses, daily disposables were found to produce 1.06 kg of annual waste, while reusable monthly lenses produced 0.8 kg of annual waste. Switching from daily disposable to monthly replacement lenses with overnight disinfection is estimated to produce 27% less waste annually, even when accounting for the plastic from multipurpose solution bottles and contact lens cases.[24] However, the reduction in waste from monthly replacement lenses must be balanced against evidence showing that daily disposable lenses are the safest option for lens wear.[25] Laser vision correction offers an attractive alternative for those eager to be free of corrective lenses, though the costs and risks of the procedure must be considered. A greater

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environmental impact could be achieved if the leading contact lens manufacturers adopted more sustainable production methods and packaging designs, but financial and regulatory challenges pose significant obstacles to such changes. Early initiatives by companies such as Menicon and Hubble show promise, with their innovative, ultra-slim "flat pack" soft contact lens package.[26,27] Reported to be eight times thinner than conventional blister packs, the flat packs not only reduce waste by 80% but also minimize the amount of raw materials needed for manufacturing upstream.[27]

With contact lens products contributing an estimated 0.5% of total environmental waste, recycling represents a relatively small fraction of plastic waste processing.[5,24,28] Nevertheless, it is a simple action that environmentally responsible individuals can take immediately. Involving medical students and ancillary staff in recycling programs can cultivate environmental stewardship practices for years to come. Through education and community engagement, efforts to reduce the environmental impact of contact lenses contribute to the improved sustainability of ophthalmic practice as a whole.

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