VIEWPOINT

CLIMATE CHANGE AND HEALTH

Health Care Actions for Reducing Plastic Use and Pollution

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Multimedia

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Plastic products pollute the environment and harm human health.[1] On July 19, 2024, the US federal government released a government-wide strategy to target plastic pollution throughout the plastics life cycle (PLC; production, processing, use, and disposal).[2] The United Nations Global Plastics Treaty calls for international cooperation and comprehensive policies to mitigate plastic pollution. However, none of these initiatives target health care, in which plastics are ubiquitous and overused. Nearly a quarter of the 14 000 tons of waste generated daily by US hospitals is plastic,[3] much of it single-use plastics (SUPs) such as syringes, masks, and gloves. These SUPs end up in landfills or infiltrate the environment, contributing to harmful chemicals and microplastics in humans.[1] Furthermore, 98% of chemicals in plastics are derived from fossil fuels, and plastics are projected to account for an increasing share of oil and gas consumption. Of global greenhouse gas emissions, plastics production accounts for 3.7%, which is expected to increase.[1] With the rationale that health care should lead in protecting health, we propose a comprehensive sociotechnical approach[4] spanning the entire PLC to reduce plastic use and pollution in health care.

The production, use, and disposal of plastics introduce more than 13 000 chemicals into the environment, some of which lead to adverse health outcomes, including infertility, congenital disorders, and increased cancer risk.[1] Plastic fragments do not decompose, thus forming microplastics and nanoplastics, which pervade the environment. Microplastics have been detected in various organ systems and cause oxidative stress, cellular damage, and inflammatory responses. Patients with microplastics and nanoplastics in carotid artery plaques face an increased risk of myocardial infarction, stroke, or death.[5] Leaching from intravenous, enteric, and endotracheal tubing and blood bags can result in entry of chemicals into patients' bloodstreams. In the US, annual health costs of plastic production and associated chemicals are estimated at $250 billion and $920 billion, respectively,[1] including expenses for treating conditions caused by plastic exposure and societal costs of reduced productivity and diminished quality of life.

A sociotechnical approach with interrelated technical and nontechnical interventions can inform mitigation strategies across the PLC. Strategies can focus on reducing use and waste generation in clinical care or address other aspects of the PLC (ie, reuse, recycle, research, and redesign to reduce reliance on fossil fuel plastics).[6] Strategy implementation requires collective action by clinicians and health care organizations (HCOs) who use plastics and by manufacturers, policymakers, professional societies, and the research community. To facilitate design and implementation, we propose stakeholder coleaders for each strategy we discuss.

Organizational Strategies (HCOs, Clinicians)

An organizational plastic use and waste audit can determine where SUPs are unnecessary and inform solutions for reducing, replacing, and detoxifying plastics (eg, evaluating pharmaceutical waste from multiuse vs single-use vials could inform actions to reduce plastic waste from packaging and syringes). Health care organizations can create interdisciplinary teams to evaluate which materials and devices have safe, reusable alternatives. By conducting an audit of product compositions, they can replace plastics containing endocrine disruptors such as polyvinyl chloride.

Nonsterile gloves are the most frequently purchased and disposed-of SUPs. By providing staff with guidelines on appropriate glove use, HCOs can significantly reduce unnecessary use. Many SUPs can be replaced with reusable and reprocessable metal- or glass-based medical devices and equipment (eg, reusable metal-based vs disposable kidney basins in surgical procedures).

Clinician Engagement (Clinicians, HCOs)

Sustainable practices must be normalized and considered akin to delivering high-quality care. Therefore, HCOs' administrative leadership (medical, strategic sourcing, environmental services, and sustainability) must help clinicians (physicians, nurses, allied health professionals, pharmacists, and dentists) understand harm from SUPs. As users of SUPs, clinicians can provide insights to translate evidence-based information into practice. Many procedural and surgical kits and custom packs are wrapped in SUP packaging and contain SUPs that go unused and need disposal (eg, many items in single-use laceration repair kits are unused by clinicians). Health care organizations can obtain feedback from clinicians to optimize material use by implementing "minimal" starter surgeon preference cards and regularly reevaluating custom medical packs and stocking practices.

Research and Data (Research Community, HCOs)

Research and data-driven implementation efforts are essential to reduce plastic use and waste. Typically, SUPs claim they are better for safety and infection control without robust data to support claims. Comprehensive data on infection rates associated with single-use items vs reusable ones could guide safety comparisons. Environmental claims should be supported through life cycle assessments or similar comprehensive analyses. Developing and implementing waste avoidance and diversion metrics can help gauge plastic reduction initiatives' success and establish benchmarks that leverage peer influence to drive behavioral change. Metrics could facilitate waste audits and aggregation of national hospital waste-hauling data to provide feedback to HCOs about their plastic use and waste.

Culture Change (HCOs, Professional Societies)

Our current culture sustains SUPs without adequate questioning. A cultural shift requires addressing concerns about infection prevention, which requires revising current infection prevention guidelines to determine when it is appropriate to use single-use vs reusable items and standardizing device-associated infection reporting systems.[7] Professional societies could help develop guidance and disseminate best practices to enable a culture in which sustainability is valued. For instance, societies focused on infection prevention could develop guidelines for clinicians and HCOs on reducing SUPs while maintaining high safety standards; HCOs can create and implement unambiguous guidance to override cultural beliefs, integrate sustainability metrics into performance evaluations, and reward waste-reduction efforts to build accountability.

Circular Infrastructure (Policymakers, Manufacturers, HCOs)

A circular economy approach can reduce SUPs and pollution by using durable medical devices and reusing, repairing, and recycling materials. This approach involves designing products for longevity, implementing robust sterilization and reprocessing protocols, and establishing take-back programs for reprocessable SUPs and medical equipment. Circularity could be incentivized through federal, state, and local institutional policies, procurement contracts, and collaborations between the government, HCOs, and manufacturers. For instance, manufacturers could be incentivized to reduce their SUP product lines and invest in research and development of durable and fossil fuel–free or plastic-free medical devices and materials. Implementing closed-loop recycling systems for plastic waste can ensure materials are continuously repurposed, reducing the need for plastic creation.

Policy Reforms (Policymakers, HCOs)

Policies must influence the entire PLC. Health care organization procurement policies can deprioritize SUPs and incentivize manufacturers to innovate by establishing rigorous guidelines that favor reusable, sustainable alternatives. Extending warranties and service contracts for durable medical equipment can support "reduce and reuse" plastic reduction initiatives. The Food and Drug Administration can guide industry to catalyze innovation in materials and medical product design, prioritize reusables, and develop safer, nonplastic alternatives.[7] The Environmental Protection Agency can set guidelines to eliminate or reduce specific toxic chemicals used in health care plastic products. The Centers for Disease Control and Prevention can update infection prevention guidelines to provide better guidance on reusables. Policies must support implementing more precise reporting standards nationally to collect comprehensive data on infections related to single-use vs reprocessed products.[7] Payers can incentivize reprocessing and circular practices, making sustainable options more economically feasible. The US Department of Health and Human Services could align itself with the United Nations and coordinate health care efforts with global organizations such as the Plastic Pollution Coalition.

Technology and Materials Development (Manufacturers, Policymakers)

Alternatives for fossil fuel–derived SUPs must be developed to meet remaining single-use demands. Medical supply companies are developing alternative materials and product designs, including plastics from renewable sources, bioplastics, and compostable plastics and materials. However, safety and effectiveness data and transparency are needed before they are implemented as truly "sustainable" solutions. Recognizing that effective, innovative products may have higher initial costs, policymakers and HCOs must negotiate prices with manufacturers to increase market penetration. Federal programs and adoption of products through group purchasing organizations can also enable market penetration.

A global plastic crisis tightly linked to climate change, fossil fuel consumption, and harm to human health calls for health care to transition away from SUPs, which requires a sociotechnical systems transformation approach across the PLC. Collective actions proposed herein should be used to drive urgent systemic change for a more sustainable future for health care and the planet.

ARTICLE INFORMATION

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