

CASE AND COMMENTARY: PEER-REVIEWED ARTICLE

What Would It Mean for Health Care Organizations to Justly Manage Their Waste?

Genevieve S. Silva and Cassandra Thiel, PhD

Abstract

Waste generated by health care includes harmful emissions and often disproportionately affects already vulnerable communities. Justly restructuring health care waste management involves better understanding key drivers of waste production, using sustainability as an ethical value to guide disposal decisions and practices, and reducing overall disposal quantity. Restructuring can be facilitated by making existing waste audit data transparent, incorporating waste accounting into social responsibility metrics used to evaluate health care organizational performance, and implementing policies that prioritize frontline workers' safety.

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Case

Prior to the COVID-19 pandemic, US hospitals produced 29 pounds of waste per bed per day—over 14 000 tons of waste per day.¹ Increasing numbers of clinicians, trainees, and students in a regional university academic health center have anonymously reported (via a hotline maintained by the organization's risk managers) inappropriate disposal of recyclable items, common refuse items, and red bag items (ie, medical waste, hazardous waste). Many students have also noted that applying disinfectant, donning personal protective equipment (eg, masks, gloves, gowns), and using high-volumes of water to thoroughly wash their hands and arms (colloquially known as “scrubbing in”) is wasteful when they are seeming sufficiently distant from a sterile field protecting a surgical patient in an operating theater.

Health care organizations pay to decontaminate red bag waste to make it safe for disposal (ie, by microwave or steam sterilization, chemical disinfection, or other processes) and must comply with federal, state, and local regulations about how disposal is done.^{2,3} Some hotline reporters have noted that incorrect placement of recyclable or municipal waste in red bags incurs unnecessary costs to organizations and that processing (primary) red waste generates (secondary) air- and waterborne emissions that inequitably influence health outcomes in minoritized communities;

nationally, people of color are exposed to 38% higher levels of outdoor nitrogen dioxide than White people.⁴

Two risk managers who field hotline concerns and inquiries also regularly apprise the organization's senior managers about these concerns and offer recommendations on how to respond. They wonder which recommendations to offer senior managers to help protect the short- and long-term interests of the organization.

Commentary

In addition to generating a significant amount of waste, the health care sector directly emits an estimated 7% of the United States' greenhouse gases.⁵ Members of the medical community have grown increasingly uncomfortable with pollution's socioenvironmental impacts, with attempts being made to enact environmentally responsible change at the level of individual practices, medical specialist organizations, and medical education programs.^{6,7,8} However, the power to most significantly decrease emissions and waste generation lies with large health care systems, which have become a focus of advocacy and sustainability efforts.

Aside from health care's contribution to climate change, the escalating ramifications of which already threaten **global public health**, the waste generated by health care systems exacts a more local toll on already disadvantaged populations. There is evidence that health care waste ends up in landfills disproportionately sited in communities with lower average incomes and higher percentages of residents identifying as minorities.^{9,10} These marginalized populations often lack appropriate resources to advocate for more stringent environmental safety regulations in their neighborhoods and consequently face increased health hazards.¹¹ For example, poor air quality and associated increased asthma rates have been documented adjacent to land used in the Bronx to house waste transfer stations for solid waste and sharps from some New York City health care facilities.^{12,13}

The medical profession is morally bound by the Hippocratic Oath to protect health and "do no harm," yet the very patient populations that large health care systems serve are often those that are inordinately harmed downstream by the byproducts and waste generated from medical care. This consequence is in direct conflict with the principles of justice and nonmaleficence, 2 of the 4 foundational tenets of medical ethics.¹⁴ It is therefore in the interest of health care organizations to address their waste-associated environmental inequities.

What would it mean for health care organizations to ethically manage waste? Waste management that centers justice would seek to both minimize the quantity of waste generated and more sustainably dispose of unavoidable waste. Successfully enacting these steps requires better understanding of the technical, administrative, and cultural drivers of current waste production. Furthermore, equitably implementing these steps requires accounting for the health and safety of essential workers who handle hospital waste and ensuring that any workflow restructuring incorporates their perspectives.

We Can't Control What We Can't Measure: Waste Audits and Their Implications

Waste audits are a critical tool—with currently underutilized potential—for understanding the multifactor drivers of medical waste generation. They also represent a promising mechanism for leveraging systemwide change. In this discussion, we will use the term *waste audit* to refer to reviews of health care organizational waste management

protocols and high-level accounting of categories and quantities of waste. This approach is distinct from *detailed* waste audits, which involve individuals sifting through trash bins to conduct manual counts and sorting and weighing waste.¹⁵

At present, waste audit data is collected by all major health care systems for legal, contractual, and taxation purposes. The regulations of the Resource Conservation and Recovery Act of 1976 stipulate that hospitals must ensure proper disposal of their hazardous or infectious waste, although interpretation and enforcement of the regulations is delegated to the state level.¹⁶ States also utilize guidance from the Environmental Protection Agency (EPA) and the Centers for Disease Control and Prevention as the Medical Waste Tracking Act of 1988, which authorized the EPA to promulgate and enforce regulations, expired in 1991.^{17,18} Some states or local municipalities require hospitals to report total quantities of waste generated annually to monitor waste management. Hospitals may be required to pay annual state taxes based upon these reported quantities (eg, New York University medical center's waste is taxed by the New York State Department of Environmental Conservation¹⁹). Although most health care systems track total quantities of waste generation, the data are typically not publicly available or even accessible upon request for research purposes. In some instances, such as in the case of hazardous chemical wastes, contracts between health care systems and waste haulers may stipulate that haulers may not share hospital disposal data with anyone (J. Kang, email, August 18, 2021).

The existing data collected by all health systems represent a wealth of untapped information that could aid researchers and policymakers in designing strategies for waste reduction. For example, audit information could demonstrate correlations between the ratio of red bag waste (which is more energy- and emissions-intensive to process) to white bag waste and numbers of patients or staff members, existence of staff training programs, supply expenses, acuity of patient care, or volumes of types of procedures performed. Such insights could inform targeted interventions at the hospital level, such as updating red or white bag guidelines and implementing additional training in departments with the greatest ratio of red to white bag waste generation. Differences between audit scores of floors with comparable acuity of patient care could be used to incentivize more sustainable practices, much as how metrics for preventable nosocomial infections by floor are leveraged to improve care. On a broader scale, understanding average waste generation of health care facilities by level of acuity or volume of procedure type could motivate accrediting bodies to reward systems of comparable size that produce lower volumes of waste. Therefore, more just waste management might involve loosening contractual limitations on data sharing, implementing laws requiring transparency of health systems' waste data, and incentivizing voluntary reporting in an accessible database. Doing so would not only facilitate development of research-backed strategies for waste reduction policy, but also allow health care systems to be rewarded for responsible waste management.

Most hospitals' waste reduction efforts are motivated solely by legal and financial obligations; however, some pioneering US health care systems have integrated environmental sustainability and social justice into their **strategic priorities**, making them more intrinsically motivated to reduce waste. Such systems embody the medical ethical principle of beneficence, which goes beyond nonmaleficence by not only avoiding harm but also actively promoting well-being by removing conditions that cause harm.¹⁴ These health care systems are recognized for their sustainability milestones through organizations such as Practice Greenhealth.²⁰ However, equitable waste management

requires that patient populations across the country and all health care districts receive the benefits of health care systems' sustainable practices. Public health benefits should not be limited to those communities served by internally motivated **green health care systems**.

With access to waste data from all major US health care systems, Practice Greenhealth's Environmental Excellence Awards, for example, could be converted into a standardized metric considered by accrediting bodies like the Joint Commission, to which all hospitals are beholden. A "just waste management score" or "socioenvironmental sustainability score" could join respected standards like the Center for Medicare and Medicaid Services' Overall Hospital Quality Star Rating system or the American Hospital Association Annual Survey.^{21,22} Such a metric could initially be based on data that hospitals already collect. It could eventually incorporate factors such as whether hospitals contract with sustainable waste haulers, invest in offsets, or advocate for the **health of communities** that receive their hazardous waste. Using existing waste audit data would be an excellent starting point for implementing just health care waste management that would not require a significant change in workstream.

Such efforts could lay the groundwork for embarking on detailed waste audits, which are significantly more resource- and labor-intensive. However, for accrediting or government bodies to require periodic detailed audits would be unfair to under-resourced health care systems, especially if the audit data were incorporated into a hospital grade that affected patient retention. Instead, detailed waste audits could be implemented within health care systems based upon findings of higher level audits. Moreover, the burden of conducting these detailed audits should not simply fall upon the building services staff, who are often poorly compensated and have little role in generating the waste to which they would be exposed while sorting.²³ An ethical distribution of labor might involve a multidisciplinary committee structure in which hospital staff across all levels of a department participate in sorting and weighing the waste. This arrangement would elevate the importance of waste analysis, increase intradepartmental engagement, and encourage everyone to consider their respective responsibilities and the potential impacts of their practices.

Doing Better

Data collected from waste audits would help eliminate unnecessary consumption and disposal by providing valuable insights and facts to inform policy and process changes. Internally, health care systems could use the data to motivate the reduction of extraneous supply waste from poor stocking practices, inefficient inventory rotation resulting in expired supplies, and outdated preference cards or surgical packs that consistently waste unused items, for example.^{24,25}

It is inevitable that some waste will necessarily be generated during health care delivery. Beyond examining disposal alternatives to high emissions-generating landfills and waste incineration, such as electropyrolysis and chemical-mechanical systems, reusability should be a primary focus. This commitment can begin with stocking products already designed for reuse, such as washable isolation and surgical gowns. Most hospitals already use reusable-designated surgical instruments that are routinely disinfected in-house and reused after applying techniques like thermal microwave treatment and steam autoclaving. Furthermore, single-use disposable (SUD) medical devices may be reused after disinfection by third-party contractors; the reuse of SUDs is an expanding market and the subject of ongoing debate.^{26,27,28}

Some eschew the reuse of SUDs and even reusable devices over concerns for patient safety due to infection risk and possible delays in care delivery.²⁹ It would certainly be unethical to significantly increase the risk of hospital-acquired infection in the name of waste reduction. However, concerns about insufficient sterility may be assuaged by the US Food and Drug Administration's (FDA's) oversight of and requirements for third-party SUD reprocessors.³⁰ SUD reprocessors test every single product that leaves their production line, whereas original manufacturers typically conduct batch testing (ie, sampling a small number of SUDs in a large batch). Manufacturers' use of long and complicated supply chains can result in safety oversights for individual products (such as surgical instruments that are sterile but not clean), not to mention potentially dangerous and unethical working conditions for those manufacturing SUDs.^{31,32,33} In-house oversight of reusable medical device sterilization and quality control of SUD reprocessing arguably produce more consistent quality and safety in reusable supplies and reprocessed SUDs compared to many single-use items. Yet one may posit that increasing reliance on SUDs in the name of safety parallels the trend of overuse of medical care; overuse of testing and treatment in some contexts can lead to net patient harm.³⁴ Very few studies exist to justify the safety benefits of SUDs in light of their financial costs. However, recent studies in specific surgical specialties show that lower resource settings are safely and effectively reusing many medical supplies by systematically following specific safety and sterility protocols.^{35,36}

These protocols, as well as supply chain flow, are important for hospitals to consider when planning SUD reusability. For example, operating room schedules can be thrown off when equipment kits are unavailable due to reprocessing delays, leading to later procedure start times or patients remaining intubated and under anesthesia longer than necessary while the required equipment is located. One must also consider that implementing a new workflow for reprocessing and reusability might initially worsen the quality of life of nursing and house staff and others who would be directly impacted by the change. To prevent staff dissatisfaction, reduced compliance with new policies, and resulting risk of detriment to patient care, early planning for reusability implementation must include delegates from all hospital stakeholder groups. It is critical to foster enthusiasm and to educate all hospital staff about the underlying motivation for implementing changes to workflow—to protect the health of local communities and to take responsibility for reducing the impact of escalating climate change, which was recently projected to lead to 83 million excess deaths by 2100.³⁷

The importance of reusability has been further highlighted by the COVID-19 pandemic, which exacerbated environmental injustices and inequities in health care delivery. Health care-associated waste generation has increased globally during the pandemic and has overwhelmed waste treatment facilities, especially in countries under-resourced at baseline, leading to increased uptake of alternative disposal strategies that may release harmful byproducts.³⁸ Moreover, shortages of single-use personal protective equipment during the pandemic led to failure to protect health care workers from dangerous exposures.³⁹ Both of these problems could have been prevented by reusable supplies, although the rollback of single-use plastic restrictions in the United States during the pandemic contributed to increased waste.⁴⁰

Finally, recycling supplies and equipment rather than disposing of them helps to divert medical waste from landfills. However, if done improperly, recycling can exacerbate health inequities.⁴¹ Following similar transportation routes as other waste streams,

recycling can contribute to air pollution at local waste transfer stations, and nonrecyclable wastes frequently contaminate recycling streams.¹³ These nonrecyclable products are often inappropriately dumped in lower-income countries that have purchased the recyclable materials, contributing to waste-related environmental injustice internationally.⁴² This injustice makes it all the more imperative that health care systems look for opportunities to justly engage in a circular economy and advocate for ethical practices even in the context of large-scale processes that do not account for local inequities.⁴³ Some have begun evaluating the idea of responsible redistribution, in which unused, discarded supplies from larger centers that are safe and suitable for use may be given to health care systems in need.⁴⁴

Engaging in Policy Change

While health care systems and individuals working in the health care space have some control over what they consume, ultimately, the impact of their supply chains and waste streams depends upon how those industries are designed. Health care systems should use their purchasing power and community influence to demand more equitable and sustainable modifications to those industries. They should encourage local, state, and federal policymakers to create and enforce legislation that helps reduce or eliminate health care-related waste and emissions and, more broadly, encourages the adoption of a circular and low-carbon economy. For example, we should encourage policies to electrify a local municipality's waste collection fleet, which would reduce air pollution in communities where transfer stations are located.

In addition, health care systems and the individuals within them can challenge product representatives and existing hospital policies that blindly support the increased adoption and use of SUDs.⁴⁵ An example is the recent editorial written by the FDA's director of the Division of Ophthalmology, Wiley Chambers, which supports using multidose topical ophthalmic drugs on multiple patients until the expiration date on the bottle, even in an operating room.⁴⁶ The publication of this editorial followed Chambers' discussion with members of various US ophthalmology societies who disagreed with existing hospital policies to dispose of multidose topical drugs after each patient,⁴⁷ which still results in nearly 66% of eyedrops being wasted.^{48,49} This example illustrates the critical role of ethics-guided advocacy within systems governed by sweeping policies that may leave practical gaps or overlook downstream effects at the ground level.

Conclusion

In an era of escalating climate change and businesses reckoning with environmental sustainability, the health care industry faces a unique conundrum: the volume of waste it generates in caring for patients paradoxically damages the health of the populations it seeks to serve. Determining how to justly manage health care waste is complex but must start with greater transparency concerning current waste trends to inform high-impact policies moving forward and to allow organizations to be recognized and held accountable for environmental sustainability. To be successful, processes of waste reduction, reuse, and sustainable disposal must ultimately achieve buy-in from stakeholders across the health care system and involve diverse perspectives in their implementation.

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Conflict of Interest Disclosure

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The people and events in this case are fictional. Resemblance to real events or to names of people, living or dead, is entirely coincidental. The viewpoints expressed in this article are those of the author(s) and do not necessarily reflect the views and policies of the AMA.

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