

HEALTH LAW: PEER-REVIEWED ARTICLE

How Should Regulations Help Health Care Organizations Manage Waste?

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Abstract

Health care waste is a global problem. While most health care waste is harmless, some of it is hazardous. The volume of hazardous waste generated worldwide is enormous, and its disposal can be environmentally damaging. This article discusses how such waste disposal is regulated and the problems that currently exist with waste disposal regulation. The article also offers possible national and international regulatory solutions.

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Background

Health care waste is simply the waste “generated by health-care activities.”¹ Most health care waste is general or nonhazardous waste; only about 15% is classified as hazardous.¹ Hazardous health care waste may include infectious waste, chemical waste, pathological waste, and radioactive waste.¹ The volume of **hazardous waste** generated is quite large, with high-income countries generating “up to 0.5kg of hazardous waste per hospital bed per day” and low-income countries generating “on average 0.2kg” per bed per day.¹ The environmental impact of disposing this large volume of hazardous waste is profound and carries with it health risks. For example, “disposal of untreated health care wastes in landfills can lead to the contamination of drinking, surface, and ground waters.”¹ Incineration of waste is a common disposal method, although inadequate or improper incineration “results in the release of pollutants into the air and in the generation of ash residue” and may also release human carcinogens and toxic metals into the environment.¹

Internationally, the disposal of hazardous waste is governed by the Basel Convention, which focuses on “transboundary movements of hazardous wastes.”² Hazardous health care wastes are included under the convention, which stipulates that such waste should be reduced in an efficient manner that protects people and the environment. However, there are limitations to the effectiveness of the Basel Convention. While being a primary producer of worldwide waste, the United States has not ratified the treaty and therefore is not bound by it.^{3,4} Additionally, critics argue that, under the Basel Convention, some

countries have become “garbage dumps,” as lower-income countries with lower waste disposal costs become attractive places for richer countries to dispose of their waste. The ambiguous language of the convention allows for loopholes in its application—for example, the definitions of *waste* and *hazardous* are not uniform, and nation states are left to interpret such key provisions as they see fit.³ Such “shortcomings” under the Basel Convention are the result of the “unfair influence” that developed countries often hold over developing countries.³

In the United States, health care waste was regulated by the Environmental Protection Agency (EPA) from 1988 to 1991 under the Medical Waste Tracking Act (MWTa).⁵ The MWTa was created in response to “concern for the potential health hazards of medical wastes [that] grew in the 1980s after medical wastes were washing up on several east coast beaches.”⁵ However, the MWTa was only designed to last for 2 years, during which time the EPA gathered information on waste generation, concluding that “the disease-causing potential of medical waste is greatest at the point of generation and naturally tapers off after that point.”⁵ After the expiration of the MWTa in 1991, “states largely took on the role of regulating medical waste under the guidance developed from the two year program.”⁵ Funded by the EPA and informed by its findings, the guidance was published by the Council of State Governments,⁶ and, while some states have adopted some of these guidelines, there remain significant differences in how states have decided to regulate management of health care waste.⁵

Current Problems

There are a series of interlocking issues arising from the current patchwork of legal and regulatory regimes associated with health care waste management. The chief issues are (1) lack of a unified regulatory regime—both in the domestic and international context—with sufficient power to create and enforce reasonable and effective regulations and (2) the inefficient, environmentally damaging health care waste disposal methods that governments currently employ.

Lack of a unified regulatory regime. A key example of decentralization is the United States, where regulatory authority is largely delegated to the states. The resultant patchwork of legal structures lacks a single schema for how to deal with health care waste. Unnecessary complexity in regulation is inefficient and yields ineffective waste policy. Every state has different rules—for example, Alabama requires medical waste generators to register with the state whereas Colorado does not^{7,8}—allowing interstate commerce to become fraught and error prone, as waste technicians moving across state lines need to be retrained in order to be able to comply with their new home state’s regulations. Furthermore, a lack of a single regulatory framework makes it difficult for waste management programs to be scaled up because each state requires a particular program that is tailored to its particular set of rules; the first step to successful health care waste management is an integrated national policy,^{9,10} which the current lack of scalability prevents.

Regulatory concerns also persist in the international context, as there is no regulatory body that can deal with international health care waste. Despite the existence of the Basel Convention, there is no international regulatory body that can successfully train personnel, issue proper policies for health care waste management, and monitor performance. Such a lack of global oversight produces methods of dealing with health care waste that fall short of agreed-upon international standards, especially in developing countries.^{11,12,13,14,15,16} Furthermore, because developing countries lack the

resources to properly deal with health care waste, they are disproportionately impacted by the waste's negative consequences, further highlighting **global health equity** concerns.^{8,17,18,19} This inequity is compounded by the fact that, because of the aforementioned structural inequalities built into the Basel Convention, low-income and developing countries frequently absorb and handle the waste of developed and high-income countries as well.

Health care waste disposal methods. Currently, the most common waste disposal method globally is incineration.²⁰ However, in developing countries, incinerator malfunctions release large amounts of environmental pollutants, such as dioxins, furans, and antineoplastics, which are known carcinogens.^{20,21} The risk to public health is profound considering that, in the United States, 49% to 60% of medical waste is incinerated and that incinerators are located in heavily populated areas.^{21,22} This risk is an especially trenchant concern, given that 79% of all municipal solid waste incinerators in the United States are located in areas with low-income communities and communities of color.²³

Landfills offer an alternative to incineration and are deemed both cheaper and safer, insofar as they are specifically engineered not to release polluted water and gases into the local environment.^{24,25} However, a concern about landfills leaking pollutants into the surrounding environment remains a potential point of failure.²⁶ This concern is not unwarranted, as the EPA itself has concluded that all landfills will eventually leak due to the deterioration of their liners.²⁷ Finally, it is important to note that landfills—while possibly being better for the environment than incineration—are not the best solution for health waste disposal and possess their own unique environmental risks and harms.^{28,29,30} Studies have shown that there are significant health issues associated with proximity to waste disposal sites, including reproductive problems, cancer, heart and neural tube defects and chromosomal anomalies in offspring, and congenital malformations and anomalies.^{31,32,33,34,35,36,37,38}

Other methods of dealing with health care waste—such as autoclaving, pyrolysis, and using a steam augur—are superior to incineration or landfills. These alternatives do not lead to the emission of large amounts of carcinogens and allow the waste to be dealt with through the regular solid waste treatment system. However, because they may involve higher up-front costs, dedicated facilities cannot be located in hospitals, and they do not always reduce the actual amount of solid waste to be landfilled.^{21,39} Hence, these more environmentally friendly measures are not always feasible or favored options.

Interlocking divergent and inconsistent regulations—at state, federal, and international government levels—complicate waste disposal procedures. For example, some states allow the use of landfills for disposing of medical waste and others do not.²⁴ Moreover, developing countries may not have the resources to adequately invest in the construction and regulation of medical waste landfills, which leads to disproportionately negative public health outcomes in poorer countries.^{40,41,42}

Solutions

A possible solution to the current patchwork of regulation and enforcement is a single national organization—eg, a federal agency—that handles regulation and enforcement of health care waste management and a single international organization that would do the same on a global scale. The organizations could interface to produce reasonable

rules that are standardized in order to minimize confusion and complexity yet specific to the circumstances of the country in which the national agency is located. For example, an international organization managing health care waste would ideally focus on developing intelligible, communicable, and enforceable rules in order to minimize confusion and mismanagement, as well as on training waste disposal technicians and clinicians in understanding and implementing these rules, as this kind of training has been shown to lead to much higher levels of efficiency in waste management.^{43,44}

This kind of international organization could operate under the auspices of the United Nations in a manner similar to the World Health Organization (perhaps as a subagency of the latter) and would therefore be subject to international democratic oversight, facilitate international cooperation, and ensure that the goals of justice are served by advancing the voices of developing countries, which currently bear a disproportionate burden of medical waste.

Such an international organization and analogous national organizations would ideally jointly commit to investment in dealing with waste in environmentally conscious ways. Creating one global framework could create dedicated, safe facilities for dealing with waste in efficient and environmentally sound ways, such as autoclaving facilities, and furthermore allow for such environmentally friendly measures to operate at scale, thus obviating the need for landfills and incinerators. This global framework would also serve the goals of environmental justice, as the pooling of resources for such a framework would lighten the burden on developing and disadvantaged countries, which bear a disproportionate burden of negative health effects due to improper waste disposal.

Alternatively, to avoid the need to craft such an international organization from scratch with little in the way of example, a “test run” could be conducted in the United States, where an organization, perhaps even the EPA itself, would play a lead role in standardizing the current patchwork **regulatory regime** in order to facilitate economies of scale, address concerns of distributive justice, and so on. Such a system would serve as an example of how a more global system could be organized; furthermore, a more efficiently run health care waste management system in the United States would allow for more domestic handling of such waste, which would lessen the burden on developing countries. Finally, this kind of trial run would allow for research on what kinds of regulatory regimes do and don’t work and on which policies are most effective for reducing both the amount and the hazards of medical waste, which could later be applied in a global framework.

Conclusion

In response to the current regulatory deficiencies of health care waste management, several important measures could be taken to improve current policies: simplify the regulatory regime and unify it globally; invest in developing countries to aid them with managing their health care waste; and fund environmentally cleaner disposal methods that reduce public health threats. While practically implementing these suggested measures may be difficult or impossible in some instances due to the challenges of global politics, these measures can provide a starting point for policymakers to consider. Global governmental investment in these key measures may help resolve the gaps and deficiencies that exist in current regulatory policies.

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