Sustainable Solutions for Australia's Medical Waste: Challenges and Initiatives

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Medical waste is one of the biggest environmental and health concerns in Australian healthcare system. The health sector in Australia generates 35.8 million tonnes of carbon dioxide emissions annually, making it one of the highest per capita emitters globally (Rivera et al., 2024, Hava, 2024). Fossil fuels, energy use, transportation, and medical equipment manufacturing all contribute to the healthcare sector's carbon footprint (Rivera et al., 2024). Plastic production, a significant part of medical waste, accounts for a large share of emissions and is expected to rise from 4% in 2015 to 15% by 2050 (Ellen MacArthur Foundation et al., 2016). Without action, the sector's carbon footprint could triple by 2050, highlighting the urgent need for climate change solutions (Health Care Without Harm, 2021).

The main concern with medical waste is its proper management to prevent contamination and protect human health, the environment, and public safety. The healthcare sector produces large amounts of waste daily, as every visit to a hospital or clinic visit contributes significantly to the amount of waste generated from single-use items such as plastic gloves, needles, plastic packaging, medications, and medical equipment (AUSMED, 2024).

Figure 1. Medical waste sources. Source: unsplash.com by M. Zilles and P. Guillaume

An effective health care management is crucial to reduce health and environmental risks. Healthcare waste refers to any waste produced during clinical activities, is classified into four broad categories: general, infectious, hazardous, and radioactive (AUSMED, 2024). Despite most of it being classified as general waste, approximately 15% is considered hazardous which can pose a risk of infection, injury, or harm (WHO, 2024). The hazardous wastes include all items coming into contact with the body during healthcare activities, such as gloves, materials, and substances used in research, diagnosis, treatment, and medication administration. The most dangerous types of hazardous waste are infectious, hazardous, and radioactive waste since they can contain pathogens, chemicals, cytotoxic drugs, human body parts, pharmaceutical products, or radioactive substances. (WHO, 2024, Queensland Government 2022).

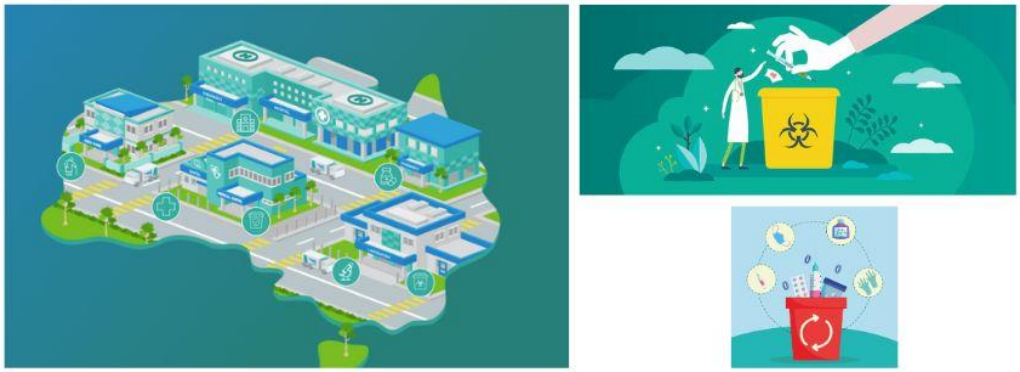

Figure 2. Healthcare waste. Source: by Cleamways Daniels, L. Wakelam and Stockgiu

Proper management of medical waste helps to avoid risks to healthcare workers, waste handlers, and the community. There are risks to infections, antimicrobial resistance, injuries from sharps, air pollution, thermal injuries, radiation burns, environmental contamination, and other forms of damage. Improper disposal can lead to the pollution of soil, air, and water. For example, incinerating medical waste can release harmful emissions like dioxins, and landfilling untreated medical waste can cause leachate contamination (Evreka).

Waste segregation is one effective way to minimise risks and reduce waste ensuring proper treatment for hazardous materials and preventing unnecessary waste from being sent to high-cost facilities (BUDAI, 2021). Sustainable disposal practices, such as autoclaving and chemical disinfection, are being explored to reduce reliance on incineration, although costs and logistical challenges, especially in remote areas, may lead to illegal dumping or unsafe practices (Queensland Government, 2022).

Australia has strict regulations in place for managing medical waste, with each state and territory having the responsibility for its waste management. The common principles include prioritising waste prevention, reuse, recycling, and transitioning toward a circular economy. Tracking systems monitor hazardous wastes to ensure proper handling and disposal (DCCEEW, 2022).

Safe medical waste management involves segregation, storage, transportation, treatment, and disposal to minimise harm (AUSMED, 2024). Waste should be segregated using a standard colour-coding system and handled according to its category - general, infectious, hazardous, or radioactive. Specific disposal methods are required for certain waste types, and storage and transportation must meet strict guidelines, ensuring safety and preventing exposure (Queensland Government, 2022).

Figure 3. Medical waste management – color-coded bins
Source: https://munglobal.com.au/knowledge-hub/sustainable-ppe-disposal-in-australian-hospitals/

Waste reduction initiatives involve limiting single-use plastics, exploring reusable alternatives, and promoting projects such as the Return Unwanted Medicines (RUM) project (Hava, 2024). Promoting regular staff training and waste audits help ensure compliance with regulations and the effectiveness of waste management systems (Evreka).

One of the biggest concerns in Australia is the environmental impact of medical waste. Many efforts have been made to reduce plastic waste, mitigate pollution, and decarbonise the healthcare sector (Rivera et al., 2024). Plastic waste continues to be a major concern, as it accounts for one-third of hospital waste, much of which ends up in landfills due to challenges with recycling (Hava, 2024). Improper disposal of hazardous waste can further harm the environment by contaminating soil and water. The common method of treatment applied is incineration which can lead to air pollution when not properly implemented.

Australia has introduced initiatives such as the National Health and Climate Strategy, aiming for a net-zero healthcare system by 2040 (Rivera et al., 2024). In addition, the government is promoting initiatives to address medical waste's environmental impact, such as reducing plastic waste from PPE, pioneering PVC recycling in Melbourne, and establishing the Australian Healthcare Carbon Lab (Rivera et al., 2024). There is also an

integration of climate and sustainability principles in medical education, and the use of reusable medical devices, such as soft mist inhalers, are gaining traction (Department of Health and Aged Care, 2023). Furthermore, the RUM project continues to encourage the safe disposal of unused medications, alongside efforts to expand blister pack recycling in pharmacies (Hava, 2024).

By addressing these concerns, Australia is working towards reducing the environmental impact of medical waste, promoting sustainability in the healthcare sector, and contributing to global efforts to combat climate change.

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