

Protecting Health Through

# Health Care Waste Management

## Key Facts

- The UN Basel Convention considers health care waste as the second most dangerous wastes after nuclear wastes. (1) Health care waste can cause serious harm if not managed properly.
  - Health care waste includes all the waste generated by all health care establishments, health research facilities, and health-related laboratories. It also includes waste generated by home health care activities, such as dialysis, insulin injections, etc. (2) (3) (4)
  - Of the total amount of waste generated by health care activities, 75-80% are general waste that is comparable to domestic waste and the remaining 10-25% are considered hazardous and may pose environmental and health risks. (5)
  - Hazardous health care waste is composed of sharps, infectious wastes, pathological wastes (human tissues, organs or fluids), pharmaceutical wastes, cytotoxic wastes (waste containing drugs used for cancer treatment), chemical wastes, and radioactive wastes. (4)
- Developed countries generate on average up to 0.5 kg of hazardous health care waste per hospital bed per day; while low-income countries generate on average 0.2 kg of hazardous health care waste per hospital bed per day. (5)
- The management of health care waste is an integral part of a national health care system. However, it was found that between 20% and 60% of health care facilities in 22 developing countries in the Western Pacific Region do not have proper health care waste management systems (segregation at source, proper storage, collection, transportation, treatment and disposal of waste). (5)
- Harm caused by improper management of health care waste includes infections caused by injections using contaminated syringes (Hepatitis B, Hepatitis C, and HIV), radiation burns, injuries inflicted by sharps and poisons caused by toxic contents in wastewater and pharmaceutical products. (6)
- A holistic approach to health care waste management is essential for all countries in this region. WHO provides technical support to Member States to strengthen health care waste management which includes establishment of regulatory framework and national plans.

## Introduction



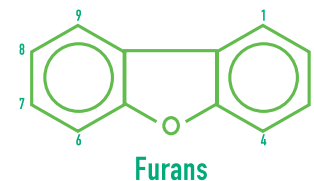
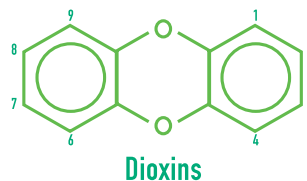
- Health care waste is produced by health care activities. It includes needles, body fluids, body parts, pharmaceuticals, radioactive materials, and cytotoxic drugs which are generated by health care establishments, health-related laboratories, and health research facilities. It also comprises waste generated by health care activities in the homes such as dialysis and insulin injections. (3)
- There are many potential hazards associated with handling health care waste, posing risks not only to the patients and health care workers, but also to the community and the environment. (5) The hazardous nature of health care waste is due to: (4)
  - presence of infectious agents
  - a genotoxic or cytotoxic chemical composition
  - presence of toxic or hazardous chemicals
  - presence of biologically aggressive pharmaceuticals
  - presence of radioactivity
  - presence of used sharps
- Health care workers and solid waste workers are with the most risk of injury or infection.
- The management of health care waste is an integral part of a national healthcare system. However, many countries do not have minimum standards or practices, particularly in developing countries. (5)

## Types of Health Care Waste

- Between 75% and 80% of the waste produced by health care establishments is general waste that is comparable to domestic waste. It comes mostly from administrative and housekeeping activities and maintenance of health care establishments. (4)
- The remaining 20-25 % of the waste produced by health care establishments is hazardous. (4)
  - Most harm is caused by infectious and pathological wastes (15%).
  - Another harmful health care waste are sharps (1%).
  - Chemicals and pharmaceuticals account for about 3% of hazardous health care waste.
  - Genotoxic waste, radioactive matter and heavy metal content represent 1% of the total hazardous health care waste.
- Infectious and pathological wastes are wastes suspected to contain pathogens, waste materials that are in contact with patients with infectious diseases. These wastes also include body parts and human tissues, organs or fluids and unused blood products. (4)
- Sharps include used and unused sharps such as hypodermic, intravenous or other needles, infusion sets, scalpels, knives and blades and broken glass.
- Pharmaceutical wastes include discarded pharmaceutical products, drugs, vaccines, and sera. (4)
- Chemical wastes consist of discarded solids, liquid, and gaseous chemicals used in diagnostic and experimental work, as well as cleaning, housekeeping and disinfecting procedures. Hazardous chemicals have the following properties: toxic, corrosive, flammable, reactive and oxidizing. (3)
- Radioactive wastes contain radioactive substances such as unused liquid from radiotherapy. (4)
- Genotoxic wastes are extremely hazardous even after disposal. This type of waste may have mutagenic, teratogenic, or carcinogenic properties and may include particular cytostatic drugs and excreta from patients treated with cytostatic drugs, chemicals, and radioactive materials. (4)

## Risks Associated with Health Care Waste Disposal

- Landfills can contaminate drinking water if they are not properly constructed or maintained. (8)
- There are potential occupational risks at disposal facilities that are not well designed, run, or maintained. (8)
- Incineration of wastes containing chlorine results in the release of pollutants into the air (dioxins and furans) both of which are human carcinogens and have been found to cause detrimental health effects. (9)
- Incineration of heavy metals or materials with high metal content (in particular lead, mercury and cadmium) can lead to the spread of toxic metals in the environment and may lead to bioaccumulation. (9)
- There is a possibility of ingestion of metals by humans when incinerators are present in areas where animals graze. (9)
- Chemicals used in waste treatment are potential sources of water pollution via the sewer system. (10)



## Dioxins, Furans and Co-Planar PCBs

- In recent years, there has been growing controversy regarding the use of incineration for health care wastes due to the production of dioxins, furans, and co-planar polychlorobiphenyls (PCBs) in the process. (8)
- Dioxins, furans, and co-planar PCBs are toxic and hazardous by-products of various industrial processes produced as emissions or fly ash during incineration at temperatures lower than 800 degrees Celsius. (8)
- Dioxins and furans have varying toxicity levels with some types posing no threat at all. However, these are persistent substances which have high resistance to degradation and can bioaccumulate in the food chain. (8)
- It has not yet been possible to estimate the worldwide burden of mortality and morbidity from exposure to dioxins and furans due to insufficient data on the exposure and risk assessment of such. (8)
- Rigorous emission standards for dioxins and furans in many countries have significantly reduced the release of these substances into the environment. (8)

## Health Impact

- Health care waste is a potential reservoir of harmful organisms which can lead to the transmission of pathogens and cause serious public health consequences. (6)
- These waste products can cause injuries such as radiation burns, sharps-inflicted injuries and poisoning through toxic elements, wastewater and pharmaceutical products. (6)
- It is estimated that injections with contaminated syringes resulted to 21 million Hepatitis B virus infections with 32% being new infections. (5)
- Transport to centralized disposal facilities may produce health hazards to health care waste handlers when not properly managed. (6)
- Expired medications can be collected and resold and may cause public health risks if not properly disposed. (6)
- Long-term, low-level exposure to dioxins and furans may lead to the impairment of the immune system, the endocrine system and the reproductive functions, which only appear after long exposure periods. (11)
- Short-term, high-level exposure to these wastes may result in skin lesions and altered liver function. (11)

## What to Focus On

- There are insufficient research materials that will aid in the development of alternative technologies for health care waste management apart from incineration. (12)
- There is a need to closely monitor newly developed waste management methods and the emissions/wastes that are produced such as in the use of genetically modified microorganisms. (12)
- Many countries have developed guidelines for health care waste management, however, no organization is directly tasked to enforce implementation. (12)
- The lack of training among health care personnel and the observance of unsafe practices such as the reuse of syringes remain to be challenges in developing countries. (12)
- In the identification and recommendation of best practices in health care waste management, international organizations must include sustainable development as one of their guiding principles. (12)

## WHO Response

- Due to the health hazards posed by health care wastes among health care workers, waste handlers and the community, WHO aims to facilitate and implement health care waste management in the following ways (13):
  - a. Developing technical guidance materials for evaluating the quantities and types of waste produced in different facilities
  - b. Creating national action plans and developing national health care waste management guidelines
  - c. Building capacity at the national level to enhance the way health care waste is managed in low-income countries
- A WHO guideline was drafted to assist administrators in choosing the most appropriate method for the management of health care wastes which are generated by primary health care centers in developing countries. The guide takes into consideration the relevant local conditions, the safety of the workers and the general public as well as the environmental conditions. (14)
- WHO in collaboration with United Nations Development Programme (UNDP) has assisted several countries in the development of best health care waste management practices. (15) It aims to protect the public and the global environment from the effects of hazardous and toxic wastes in the following ways:
  - a. Establishing model facilities and programs to exemplify best practices in health care waste management
  - b. Deploying and evaluating commercially available, non-incineration health care waste treatment technologies appropriate to the needs of each country
  - c. Developing, testing, manufacturing and deploying affordable, small-scale non-incineration technologies for use
  - d. Introducing and evaluating the use of mercury-free devices in model facilities
  - e. Establishing or enhancing training programs to build capacity for the implementation of best practices and technologies both within and beyond the model facilities and programs
  - f. Reviewing and updating relevant policies
  - g. Disseminating project results and best practices to stakeholders for dissemination and scaling-up regionally and globally
- WHO has supported member countries of the Western Pacific Region in developing and implementing national environmental health policies and actions for the management of health care wastes. (16)

# WHO Recommendations

## To Improve Health Care Waste Management

- WHO has developed core principles for sustainable management of health care waste that require all sectors and groups associated with supporting health care activities to provide for the costs of handling health care waste. (17)
 

The WHO core principles for sustainable management of health care waste recommend that (17):

  - Governments allocate a budget to cover the costs of establishment and maintenance of sound health care waste management systems, request donors, partners and other sources of external financing to include an adequate contribution towards the management of waste associated with their interventions, implement and monitor sound health care waste management systems, support capacity building, and ensure worker and community health.
  - Donors and partners include a provision in their health program assistance to cover the costs of sound health care waste management systems.
  - Non-governmental organizations (NGOs) include the promotion of sound health care waste management in their advocacy, and undertake programs and activities that contribute to sound health care waste management.
  - The private sector take responsibility for the sound management of health care waste associated with the products and services they provide, including the design of products and packaging.
- WHO also recommends that all concerned institutions and organizations promote proper health care waste management, establish innovative solutions to reduce the production and dangers of health care waste and ensure that global health programs involve health care waste management. (17)



## References

1. WHO Western Pacific & South-East Asia. Environmental Trends. In Asia WWP&SE. Health in Asia and the Pacific.; 2008.
2. WHO. Western Pacific Country Health Information Profiles. Country Profile. Manila: WHO, WPRO; 2011. Report No.: ISBN.
3. Nwachukwu NC, Orji FA, Ugbogu OC. Health Care Waste Management ñ Public Health Benefits, and the Need for Effective Environmental Regulatory Surveillance in Federal Republic of Nigeria. In Rodríguez-Morales A, editor. Current Topics in Public Health.: InTech; 2013.
4. WHO. Definition and characterization of health-care waste. In Chartier Y, Emmanuel J, Pieper U, Pr,ss A, Rushbrook P, Stringer R, et al., editors. Safe management of wastes from health-care activities: 2nd edition.: WHO Press; 2014.
5. WHO. Waste from Health Care Activities. [Online].; 2011 [cited 2015 March 12. Available from: <http://www.who.int/mediacentre/factsheets/fs253/en/> .
6. USAID | DELIVER PROJECT. Guide to Health Care Waste Management for the Community Health Worker Virginia; 2011.
7. Diaz L, Savage G. Risks and Costs Associated with the Management of Infectious Wastes. [Online].; 2003 [cited 2015 March 28. Available from: [http://www.wpro.who.int/environmental\\_health/documents/docs/LFDRiskassessmentDec03Final.pdf](http://www.wpro.who.int/environmental_health/documents/docs/LFDRiskassessmentDec03Final.pdf).
8. WHO. Health-care Waste Management. [Online].; 2011 [cited 2015 March 10. Available from: <http://www.who.int/mediacentre/factsheets/fs281/en/>
9. Health Protection Agency. The Impact on Health of Emissions to Air from Municipal Waste Incinerators. [Online].; 2010 [cited 2015 March 10. Available from: [http://www.plymouth.gov.uk/hpa\\_impact\\_on\\_health\\_of\\_emissions\\_to\\_air.pdf](http://www.plymouth.gov.uk/hpa_impact_on_health_of_emissions_to_air.pdf)
10. Rushton L. Health Hazards and Waste Management. Impact of environmental pollution on health: Balancing risk. 2003 December; 68(1): p. 183-197.
11. WHO. Safe health-care waste management : Policy paper. [Online].; 2015 [cited 2015 March 10. Available from: [http://www.who.int/water\\_sanitation\\_health/medicalwaste/hcwmpolicy/en/](http://www.who.int/water_sanitation_health/medicalwaste/hcwmpolicy/en/).
12. K T. Healthcare Waste Management: Policies, Legislations, Principles and Technical Guidelines. [Online].; 2014 [cited 2015 March 11. Available from: <http://www.waste-management-world.com/articles/print/volume-10/issue-4/features/healthcare-waste-management-policies-legislations-principles-and-technical-guidelines.html>.
13. WHO. Safe management of wastes for health-care activities. Second Edition ed. Chartier Y, Emmanuel J, Pieper U, Prüss A, Rushbrook P, Stringer R, et al., editors. Geneva: WHO Press; 2014.
14. WHO Immunization, Vaccines and Biologicals (IVB) and Protection of the Human Environment (PHE) Departments. Management of solid health-care waste at primary health-care centers: A decision-making guide; 2005.
15. United Nations Development Program (UNDP), Global Environment Facility (GEF), WHO, Health Care Without Harm (HCWH). UNDP Project Document. [Online].; 2007 [cited 2015 March 10. Available from: [www.undp.org/content/dam/./Project%20Document%20-%2058540.doc](http://www.undp.org/content/dam/./Project%20Document%20-%2058540.doc) .
16. GEF. Global Healthcare Waste Project. [Online].; 2008 [cited 2015 March 10. Available from: <http://gefmedwaste.org/section.php?id=3>
17. WHO. WHO core principles for achieving safe and sustainable management of health-care waste. [Online].; 2007 [cited 2015 May 19. Available from: [http://www.who.int/water\\_sanitation\\_health/medicalwaste/hcwprinciples.pdf?ua=1](http://www.who.int/water_sanitation_health/medicalwaste/hcwprinciples.pdf?ua=1) .

