

## <Material>

# Management of infectious wastes at medical institutions in Japan

Motonobu MIYAZAKI<sup>1)</sup>

(Department of Hygiene and Preventive Medicine, School of Medicine, Fukuoka University)

Tatsuya AOKI<sup>2)</sup>

(Planning Division, Water Supply and Environmental Sanitation Department, Ministry of Health and Welfare)

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Infectious wastes from medical institutions sometimes happen to cause the environmental problem in Japan. The Japanese Waste Disposal and Public Cleansing Law was amended, and waste under special control, which is one of the hazardous wastes, is defined as having the following characteristics: toxicity, infectivity, and other qualities that may damage public health. Infectious wastes are discharged from medical institutions and have the potential to contain pathogenic microorganisms. Special rules apply to their handling. We discuss the management of infectious wastes in medical institutions in Japan, including the rules that apply to waste control managers.

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## Introduction

Waste management is carried out in Japan in accordance with the Waste Disposal and Public Cleansing Law (the Waste Disposal Law). This law was amended in 1991 and 1997. The 1991 amendment made new provisions for wastes under special control including infectious wastes which are one of the hazardous wastes. The Ministry of Health and Welfare (MHW) arranges instruction about management of infectious wastes for medical institutions (1).

In this paper, we discuss the basic concepts of the management of infectious waste in medical institutions in Japan.

## Classification of infectious wastes

The Waste Disposal Law has defined solid or liquid wastes or refuse, such as bulky refuse, cinders, sludge, excreta, waste oil, waste acids, waste alkalis, dead animal and other foul or disused materials. Excluded are radioactive wastes or wastes contaminated by radioactivity because these wastes are regulated by the Science and Technology Agency. Wastes are classified as industrial and general (Table 1). The law specifies

nineteen types of industrial wastes generated as the result of industrial activities. Under the law general wastes refer to wastes other than industrial wastes.

Wastes from medical institutions are divided into infectious and noninfectious wastes. Infectious wastes are classified into general infectious wastes and industrial infectious ones (Table 2). Infectious wastes become noninfectious after they have lost infectivity through intermediate treatment, such as incineration, melting, sterilization, or disinfection.

## Discussion

In Japan, wastes are categorized as municipal solid waste which includes household waste, commercial and business waste, and industrial waste. The term "hazardous wastes" is not defined under the law, but this term applies to cinder, sludge, waste acid, waste alkali, slag and dust, found by extraction test to be above the prescribed hazard limit. We think that the infectious waste is included one of the hazardous wastes in Japan.

The World Health Organization (2), U.S. Environmental Protection Agency (3,4), and Centers for Disease Control and Prevention in the U.S. (5) have already described the management of infectious wastes from medical institutions. In Japan, infectious wastes are defined by the law as wastes generated in medical institutions as the result of medical care or research that contain pathogenic microorganisms which have the

1) 福岡大学医学部 2) 厚生省生活衛生局水道環境部  
〔キーワード〕 感染性廃棄物, 医療機関, 管理, 日本  
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Table 1. Classification of Waste in the Wastes Disposal and Public Cleansing Law

I. Industrial Wastes		
1. Combustion residues (burned coal waste from thermoelectric power plants, etc.)		
2. Sludge (muddy matter produced from factory waste treatment and product manufacturing processes)		
3. Waste oil (used or discarded lubrication oils and washing oils)		
4. Waste acids (waste acid liquids)		
5. Waste alkalis (waste alkaline liquids)		
6. Waste plastics		
7. Waste paper (discharged from specific industries, such as papermills and book binderies)		
8. Waste wood (discharged from specific industries, such as sawmills and wooden structure demolishers)		
9. Waste textile (discharged from textile industry)		
10. Residue of animals and plants (waste from animals or plants used as raw materials)		
11. Waste gum		
12. Scrap metal		
13. Waste glass and ceramics		
14. Slag (residues in ironworks' furnaces, etc.)		
15. Construction demolish waste (concrete scraps of demolished buildings, etc.)		
16. Excreta of animal (from livestock farmers)		
17. Dead animal (from livestock farmers)		
18. Dust (produced in treating exhaust gas from factories)		
19. Material produced as a result of treating the above 18 types of industrial waste (concrete solids, etc.)		
II. General Wastes (Industrial Refuse and Home Refuse)		
1. Bulky refuse		
(1) Refrigerators, TV sets, washing machines and other home appliances, pianos, mattresses, etc.		
(2) Desks, tables, chests of drawers, and other furniture		
(3) Cars, bicycles, etc.		
(4) Tatami mats, kitchen utensils, etc.		
2. General refuse		
a. Combustible refuse		
(1) Paper		
(2) Garbage		
(3) Fibrous materials (clothing, etc.)		
(4) Plastics		
b. Incombustible or unsuitable refuse		
(1) Plastics		
(2) Rubber		
(3) Metal (cans, etc.)		
(4) Glass (bottles) and ceramic		
(5) Batteries		
(6) Miscellaneous		

Table 2. Classification of Infectious Wastes: With Examples of Infectious General Wastes and Infectious Industrial Wastes

Classification	Infectious general wastes	Infectious industrial wastes
Blood	_____	Blood, blood serum, plasma, body fluid, blood products
Pathologic wastes produced from operations	Organs, tissues	_____
Wastes having sharp edges stained with blood	_____	Injection needles, injectors, test tubes, glass waste
Test equipment and culture medium used for testing and inspections relating to pathogens	Culture medium used for testing and inspection, carcasses	Testing equipment such as test tubes
Other wastes stained with blood	Sanitary cotton, gauze, and bandages stained with blood	Rubber gloves stained with blood, etc, used for operation

potential to cause infectious diseases.

The management of hazardous wastes is one of the most important problem in medical institutions (6-8), and infectious wastes are included into one of hazardous wastes. Infectious wastes need to be handled with careful consideration to prevent the spread of pathogens and to protect public health in addition to be sorting from other wastes. Infectious wastes are put in a container that can be hermetically sealed and is protected against damage when they are collected or transported.

Waste materials with sharp edges stained with blood are handled as infectible ones from the viewpoint of both biological and mechanical hazards, even if they have been stained with only a small quantity of blood. Included in such wastes are not only those with sharp edges, like injection needles, but also those that may become sharp-edged if broken. The potential of causing infectious diseases varies greatly with the degree of blood staining and with the shape and quality of blood-stained wastes. However, any wastes stained with blood should be handled as infectious to secure the fullest extent of safety.

The law makes it obligatory for managers of medical institutions to improve the waste management. Medical doctors, nurses, and those who have completed the lecture courses authorized by the MHW can become such control managers. A control manager for infectious wastes copes with ranging from sorting to the intermediate treatment, according to the plan of disposal and control rules. In addition, he/she makes the plan and rules widely known to the people concerned, such as medical staff and cleaning workers.

The plan of disposal is worked out so that infectious wastes are disposal properly. Waste-generating facilities and the amount of each kind of infectious waste generated are made clear through a survey. The disposal plan is printed in a booklet that is distributed among the persons concerned in the medical institutions. The rules clearly specify the handling of infectious wastes and the cautions to be taken for each kind. Moreover, a manager need to know that infectious wastes are being disposed of properly and maintain records.

As regards storage, it is preferable to separate infectious wastes from other wastes to prevent the spread of infection. Fluid or sludge-containing infectious wastes are separated from solid infectious ones. Wastes with sharp edges are separated from other ones. Infectious wastes are placed in a tightly lidded container when they are transported in a medical institution. A container is moved by a cart to reduce the risk of direct contact. A notice stating the kind of waste and the

precautions to be followed needs to be placed on each container before transportation. Infectious wastes should be kept in the storage area for the shortest period possible. Only the persons concerned are permitted to enter that area. In addition, these wastes are stored separately from others. A sign stating "infectious wastes" and the precautions to be exercised needs to be easily visible in the storage area. Measures for preventing putrefaction should be taken. If infectious wastes are stored unavoidably for a long time, they are required to be put into a tightly closed container and refrigerated.

With regard to containers, the law specifies that the waste-discharging enterprise has to consider wastes as its own responsibility. Consignment of waste disposal can be entrusted only to those who are authorized by prefectural governments as a business to collect, transport, or dispose of hazardous wastes produced. A medical institution needs to notify the contractor of kinds, quantity, quality, shape of packing, and cautions for handling the infectious wastes. The amended Waste Disposal Law mandates using a manifest for hazardous wastes.

Infectious wastes need to be placed in the container so as not to injure human or damage the environment when they are being collected and transported. Further, contractors should not store infectious wastes, except in the case of transshipping. A vehicle constructed to prevent packing containers from falling or from leaking offensive odors is used to transport infectious wastes. Preferably, infectious wastes are transported directly to the disposal site and incinerated soon after collection. However, they may be transshipped if there is a sufficient reason; for example, the incineration plant is far away, or transport efficiency is low because the quantity of collected wastes is small. In such case, certain precautions need to be taken before transshipment: (a) the place to which the wastes will be transported after being transshipped has been assigned; (b) the quantity of infectious wastes carried does not exceed that which can be stored in the place of transshipping; (c) the infectious wastes delivered can be removed before they putrefy; (d) transshipping can be done before the quality of the infectious wastes changes.

### Conclusion

With the increase in quantity and diversified quality of hazardous wastes, their management becomes increasingly important in protecting public health. In Japan, the infectious waste is one of the hazardous wastes and controlled under the Waste Disposal Law. The MHW provides guideline on infectious wastes.

Proper treatment and disposal on these wastes need to be promoted in close cooperation with medical institutions.

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