

3. 5 Penalties

Strict penal regulations are imposed on inappropriate waste management. Social punishment including media's report would be undertaken for such inappropriate act.

Also, if a medical facility defies obligation as a waste generator or entrusts waste treatment to a disposer at very low prices and leads to the disposer's illegal dumping, the medical facility is also responsible to pay costs to restore the original state before the illegal dumping.

Examples of Penal Regulation

Imprison under 5 years or Fine under JPY 10,000,000 or less

- Dump waste illegally
- Entrust waste management to unauthorized waste business

Imprison under 3 years or Fine under JPY 3,000,000 or less

- Entrust waste management to waste disposal agents without concluding contracts on paper

Fine under JPY 300,000 or less

- Entrust waste management to waste disposal agents without manifest

- All infectious Waste are treated based on "Waste Management and Public and Public Cleansing Law" and the "Disposal Manual for Infectious Waste" in Japan.
- There is the ordinary manual and no emergency manual in medical waste management.

JW's efforts for the promotion of appropriate infectious waste management

- Management and operation of the e-Manifest for the infectious waste
- Education and training for proper industrial waste management
 - For the infectious waste supervisor
 - For waste management contractors
- Assessment of performance of containers for infectious waste

Session 1-3

Bio-Medical Waste Mgt in Taiwan

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Bio-medical Waste Management in Taiwan

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Oct. 2015

Outline

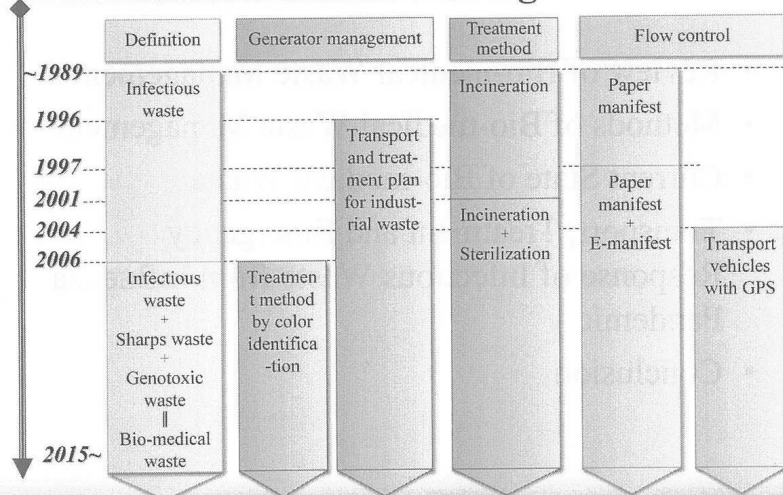
- Review of Bio-medical Waste Management
- Methods of Bio-medical Waste Management
- Current State of Bio-medical Waste
- Transport, Treatment and Emergency Response of Infectious Waste from Influenza Pandemic
- Conclusion



Review of Bio-medical Waste Management

Methods of Bio-medical Waste Management

Review of MW Management



Definition of Bio-medical Waste

- Refers to infectious waste, sharps waste and genotoxic waste (identified via listing) generated by Bio-medical treatment, Bio-medical inspection, autopsy, quarantine, research or the processes of drug and biomaterial manufacturing by Bio-medical institutes, Bio-medical inspection centers, Bio-medical laboratories, industrial and research institutes of level 2 or higher level biosafety, laboratories engaged in genetic or biotechnological research, or biotechnology and pharmaceutical plants.

Locations

- ✓ Bio-medical institutes
- ✓ Bio-medical inspection centers
- ✓ Bio-medical and biological laboratories
- ✓ Biotechnological plants
- ✓ Pharmaceutical plants

Behaviors

- ✓ Bio-medical treatment
- ✓ Bio-medical inspection
- ✓ Autopsy
- ✓ Quarantine
- ✓ Research
- ✓ Drug manufacturing

Listed items

- ✓ Infectious waste
- ✓ Sharps waste
- ✓ Genotoxic waste

Types of Bio-medical Waste

Infectious waste
Blood and pathological waste, body fluid- and blood-contaminated waste, quarantine waste, dialysis waste, etc.

Blood waste Pathological waste Body fluid contaminated waste Quarantine waste Dialysis waste

Sharps waste
e.g. hypodermic needles, surgical knife and bone nails

Hypodermic needles Bone nail Surgical knife

Genotoxic waste
Oncogenic or potentially oncogenic cytotoxins or drugs

Anticancer drugs

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Management of Source, Transport, Treatment Institutes

Generator

- Transport and treatment plan of industrial waste
- Technician
- Manifest reporting
- Storage, classification

Transport facility

- Transport permit
- Technician
- Manifest reporting
- Operation record
- GPS

Treatment facility

- Treatment permit
- Technician
- Manifest reporting
- Operation record
- CCTV

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Codes for Bio-medical Waste

Bio-medical waste	Infectious waste	Infectious waste (pathological) e.g. blood and pathological waste	C-0513
		Infectious waste e.g. body fluid- and blood-contaminated waste, dialysis waste	C-0514
		Mixtures of infectious waste	C-0599
	Sharps waste	C-0504	
Genotoxic waste	C-0512		

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Storage Rules

Warning: Post the warning at the entrance

Low temp refrigeration: Reduce microbial activity
 >5 °C → store life is 1th day limit
 0~5 °C → store life is 7th day limit
 <0 °C → store life is 30th day limit

Color identification: Reduce infection from unpacking

Airtight package: Block the route of infection

Labeling: Label waste information and marks

Warning!
! Bio-medical waste storage facility.

Incineration

Sterilization

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Transport Rules of Collection Vehicles

- > 58 qualified companies
- > 187 vehicles
- Mark and symbol
- Equipped with GPS
- Refrigeration equipment
- Airtight
- Containers with different colors and treat separately

Name of transport facility: Safety ECO Company
 Tel. of transport facility: 03-1234567
 Transport permit No.: Huan-Shu-Fei-Jia-Zi No. 00000
 Name of waste: Bio-medical waste

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Treatment Methods and Techniques

Infectious waste (items, tools, etc.)

Infectious waste (Pathological, blood) ✗

Sharps waste

Genotoxic waste ✗

Incineration

- Temp. > 1000 °C
- DRE > 99.9%
- Gas retention time > 1 seconds

Bottom ash landfill

Sterilization (Autoclave)

- Biological and chemical tests
- 121 °C, 1.06 kg/cm², 60 min
- 135 °C, 2.18 kg/cm², 45 min

Crush and damage the original shape

Final disposal

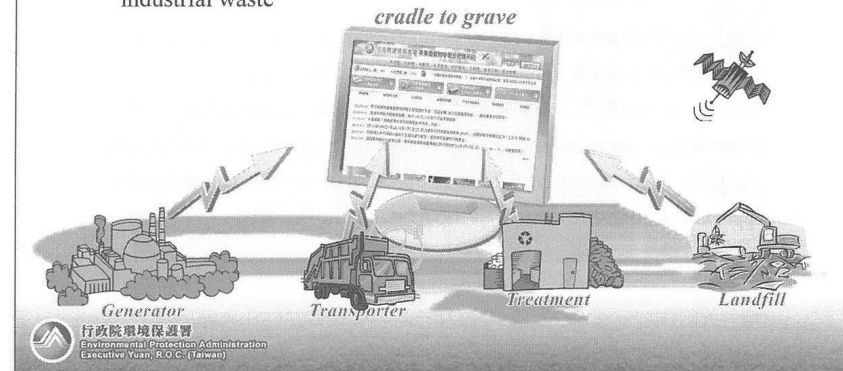
plastic materials and product

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Bio-medical Waste Control and Tracking

• Online Reporting of Waste Treatment Activity

- The Industrial Waste Control Center: Established in October 1997
- Using electronic system with state-of-the-art technology to track industrial waste



Current State of Bio-medical Waste

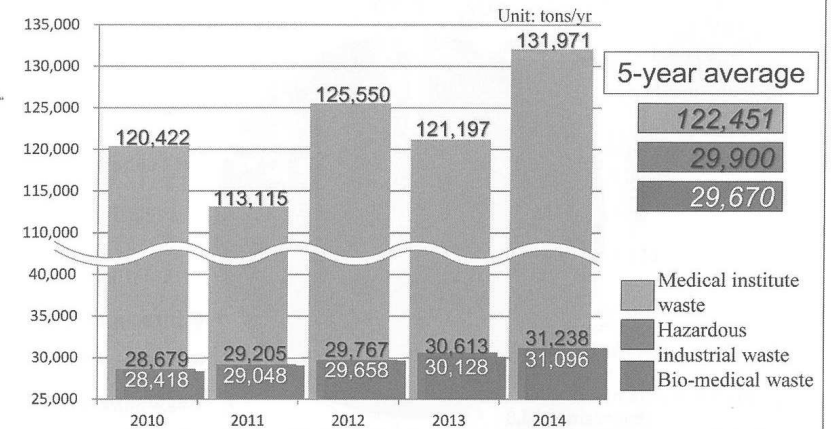
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Current State of Bio-medical Waste

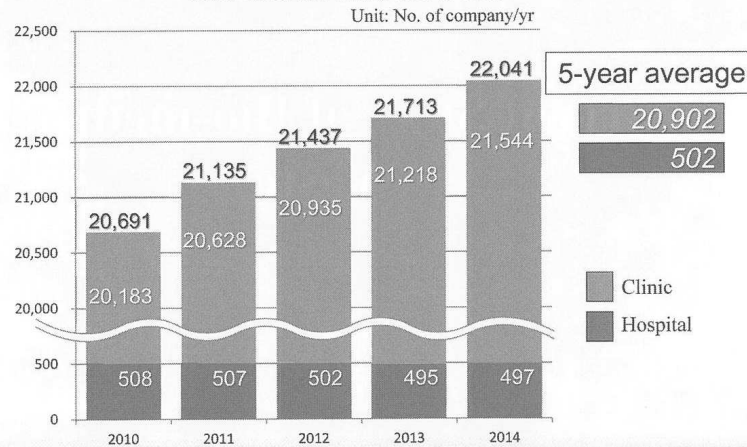
- Currently, there are 22 thousand Bio-medical institutes in Taiwan. They generate about 130 thousand tons of waste annually. Most of the waste is similar to household waste and only 24% particularly needs to control. It called "Bio-medical waste".
- There are 58 approved transport companies in Taiwan, which transport Bio-medical waste in vehicles (over 187) equipped with refrigerator and GPS. There are 85% waste would be delivered to 12 special treatment plants for incineration, and the rest (15%) were sterilized in 5 recycling plants for utilizing and recycling. The total permissible treatment amount is approx. 2.4 times the amount of the national one.



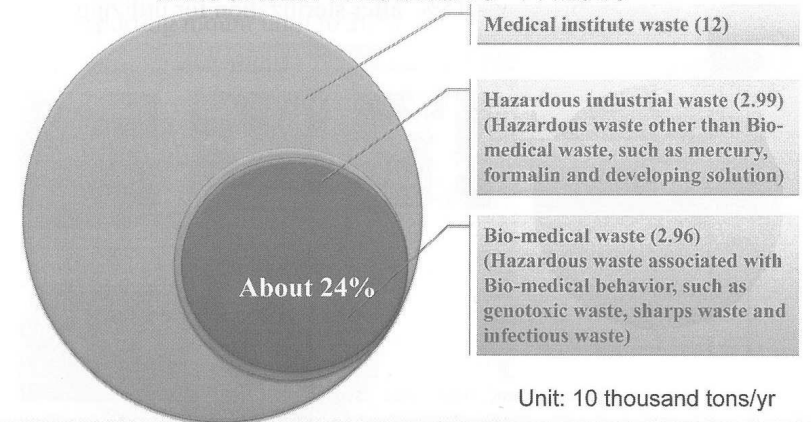
Historical Variation in the Yield of Bio-medical Institute Waste



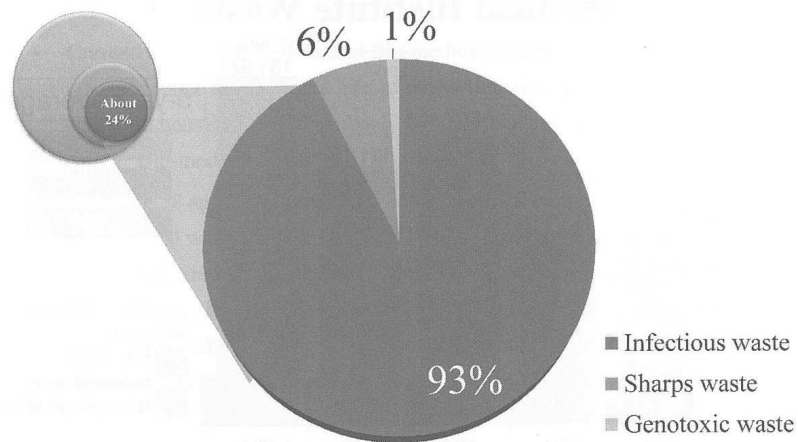
Historical Variation in the Number of Bio-medical Institutes



Proportion of Bio-medical Waste to Medical Institute Waste

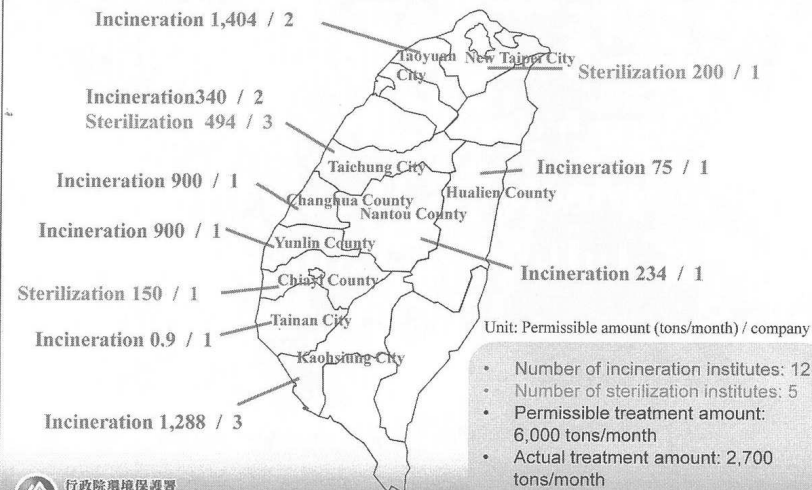


Proportions of Bio-medical Waste Types



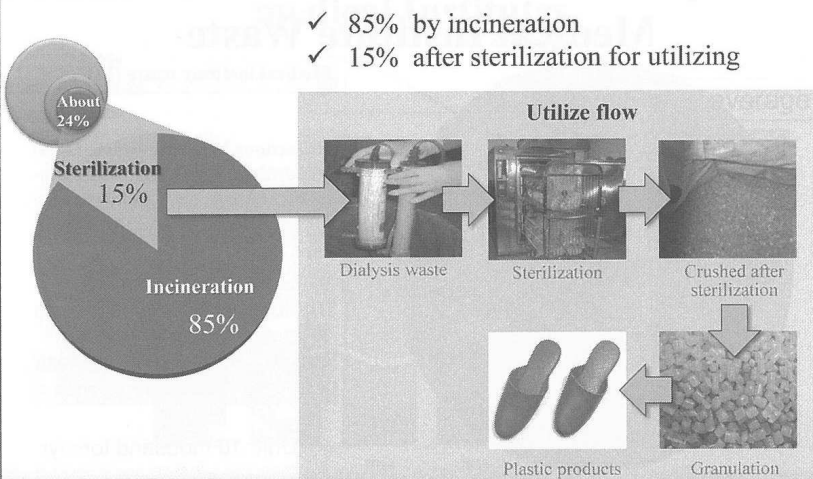
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Treatment Capacity of Bio-medical Waste



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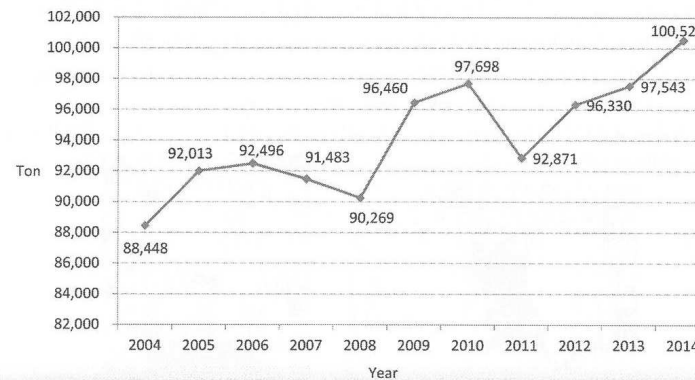
Treatment Methods of Bio-medical Waste




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The Amount of Medical Waste in Recent Years

- There are 10 thousands tons of medical waste manifest reporting amount until to 2014.





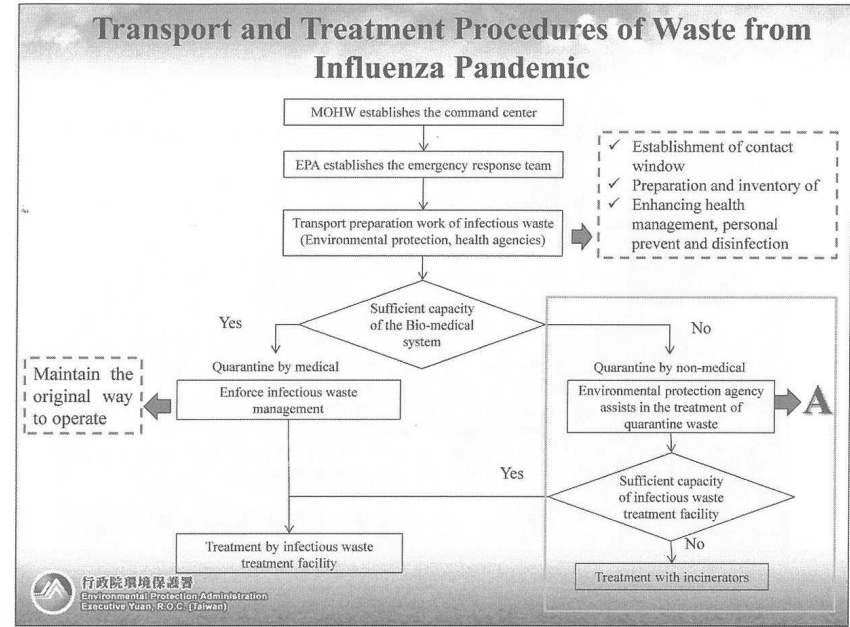
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Transport, Treatment and Emergency Response of Infectious Waste from Influenza Pandemic

Severe Acute Respiratory Syndrome (SARS)


- Total of 8,096 SARS cases which including 774 deaths were reported globally in 2003, mainly in China, Hong Kong, Taiwan and Singapore.
- The first case in Taiwan was found on March 14, 2003, and total of 664 cases which including 73 deaths had been reported by July 5th.
- Since the outbreak of SARS, Taiwan has been carefully reviewing the “Transport, Treatment and Emergency Response of Waste” when dealing with the outbreak of a new pandemic, and continues to modify the operation procedure.

Transport and Treatment Procedures of Waste from Influenza pandemic (Cont.)

➡ **A Health agency initiates quarantine**

- Location quarantine
Assist the quarantine location in handling the transport of infectious waste.
- Home quarantine (NOT home health self-management)
Environmental protection agencies are responsible for collecting home quarantine waste and entrusting facility to dispose of the waste. The waste shall be collected by infectious waste transport facility and the transport shall be supervised by the environmental protection agencies.
- In case of insufficient treatment capacity, the waste shall be delivered to **the city garbage incinerators** for handling through **coordination**, implementing disease prevention and disinfection.



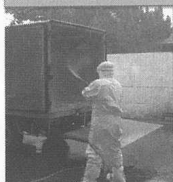
Management Points of Infectious Waste from Influenza Pandemic

Storage



- ✓ Waste collecting staff shall **wear personal protective equipment.**
- ✓ The waste shall be **disinfected** and **packaged**.
- ✓ The waste shall be **stored** and arranged for transport according to the storage **temperature.**
- ✓ **The waste storage sites are disinfected** with bleach every day.

Transport



- ✓ Transport vehicles shall have **refrigeration equipment**, and the containers **shall not be compressed or opened** during the transport.
- ✓ Before vehicles leaving the hospital, **tires and car bodies shall be disinfected** with bleach.
- ✓ The **cargo compartment, door handles, steering wheel and seats of the accompanying staff** of vehicles shall be cleaned with bleach every day.
- ✓ Vehicles shall carry bleach and **emergency equipment** all the time.

Treatment



- ✓ Disinfection before treatment
 - Before entering the plant and after unloading, **tires and car bodies shall be disinfected** with bleach.
 - The crew shall wear surgical **masks and gloves.**
- ✓ Incineration
 - The waste shall be **incinerated immediately** after being delivered to the plant, and not stored unless necessary.
 - Incineration shall be operated according to the specified **temperature and combustion gas retention time.**

Inspection

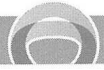


- ✓ Regular inspections of the environmental protection agencies
 - The **storage condition** of infectious waste in the hospital.
 - Random inspection or escort of the infectious waste **transport vehicles.**
 - Inspect infectious waste **treatment facility** and perform resident supervision if necessary.
- ✓ Inspectors shall wear surgical **masks and gloves.**

Conclusions

Conclusions

- Not all hospital wastes are considered hazardous. Only 24% of the waste is “Bio-medical waste” that requires particularly attention, appropriate classification, packaging, labeling, management, and treatment.
- After sterilization, some material can be re-used as secondary plastic sources to help sustainable usage of natural resources. Promoting reduction and recycling will benefit our future.



Session 2

Sharing Information and
Cases of Effective Use of
Medical and Industrial
Waste Mgt System

Session 2-1

Management of Medical Waste in Korea

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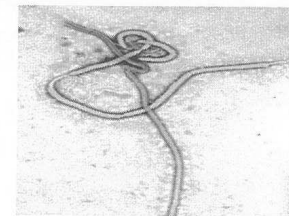
Management of Medical Waste in Korea

2015. 10. 20.

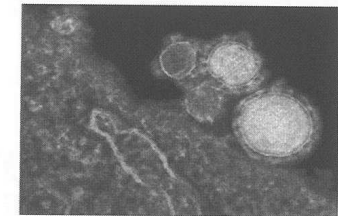
Kyoung-Mu Lee, Assistant Prof.
Department of Environmental Health,
Korea National Open University



Concern about the Wastes from Hospitals



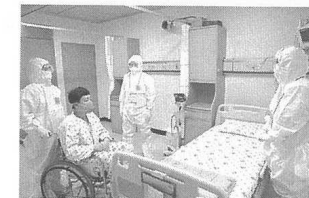
Evola virus



Mers virus



Evola epidemic, 2014



Mers epidemic in Korea, 2015

Contents

- **Management system of medical wastes in Korea**
 - Definition, classification, processes from generation to incineration
 - RFID system etc.
 - International comparison
- **Issues raised for medical waste management in Korea**
 - Issues related with RFID system
 - Increasing trend of medical waste in Korea
 - Spatial imbalance between generation and treatment

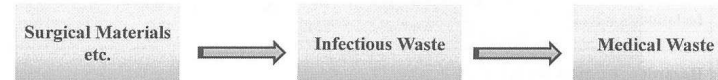


Management system of medical wastes in Korea

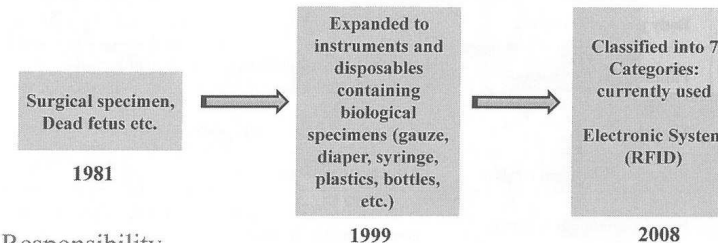


Brief History of Medical Waste Management in Korea

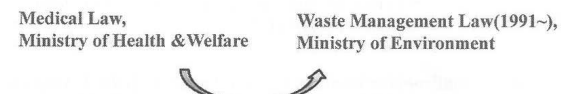
Terminology



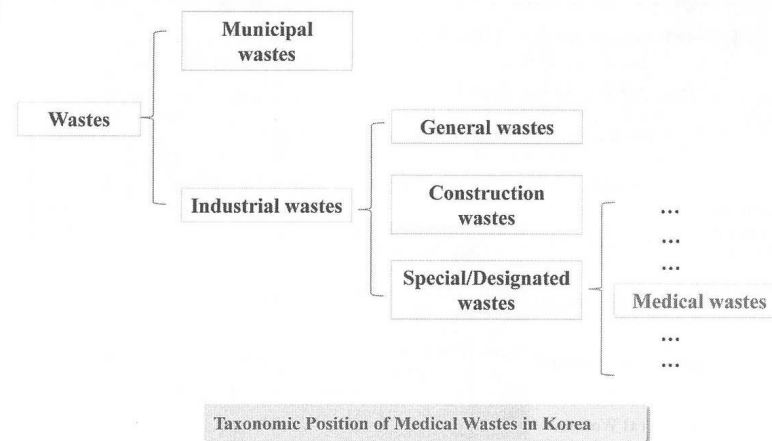
Scope



Law & Responsibility



Position in the Classification of Wastes in Korea



Classification of Medical Wastes in Korea

구분	예
Isolation Medical Wastes	* Medical wastes from medical treatments from those isolated with designated infectious diseases
Hazardous Medical Wastes	
Body parts or fluids etc.	* Parts of body from human or animals including serum, plasma etc.
Pathological test wastes	* Materials used in clinical tests including media, containers, micro-organisms, test tubes, slide glass, cover glass, vinyl gloves etc.
Sharps	* Various kinds of needles, knives, and broken glasses etc.
Biological/Chemical wastes	* Vaccines, anti-cancer drugs etc.
Blood-contaminated wastes	* Blood bags and others used for transfusion or dialysis which were contaminated with blood
General medical waste	* Cotton, bandage, gauze, diaper, sanitary pad, disposal syringe etc. which are contaminated with various kinds of biological specimens

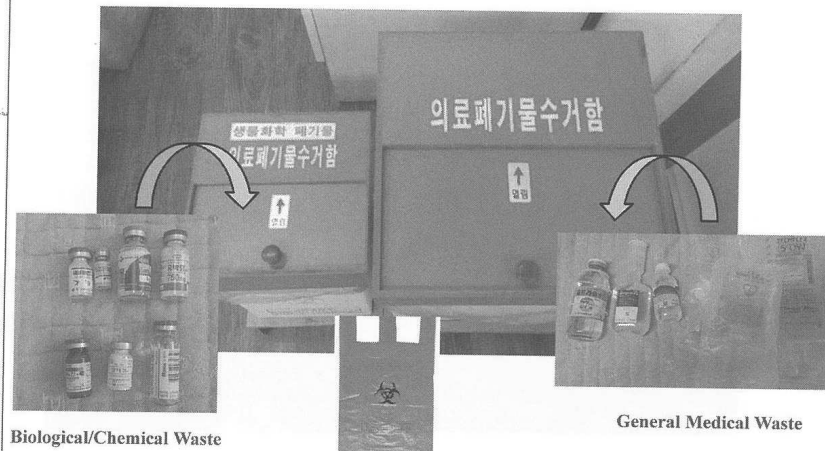
From the Enforcement Ordinance of Medical Wastes Law (2008)

Regulations for Collection and Storage

Classification	Container (color of mark)	Temperature for Storage	Duration of storage (days)	
Infectious Medical Wastes	Plastic Box (Red)	≤4 °C	7	
Hazardous Medical Wastes	Body parts or fluids	≤4 °C (Teeth: RT ^a)	15 (Teeth: 60)	
	(Placenta)	≤4 °C	15	
	Sharps	RT ^a	30	
	Pathological test	Plastic, Cardboard Box or Bag (Yellow)	RT ^a	15
	Biological/Chemical	Plastic, Cardboard Box or Bag (Yellow)	RT ^a	15
Blood-contaminated	Plastic, Cardboard Box or Bag (Yellow)	RT ^a	15	
General Medical Wastes	Plastic, Cardboard Box or Bag (Yellow)	RT ^a	15	

^aRT: room temperature

Containers (example of one hospital)

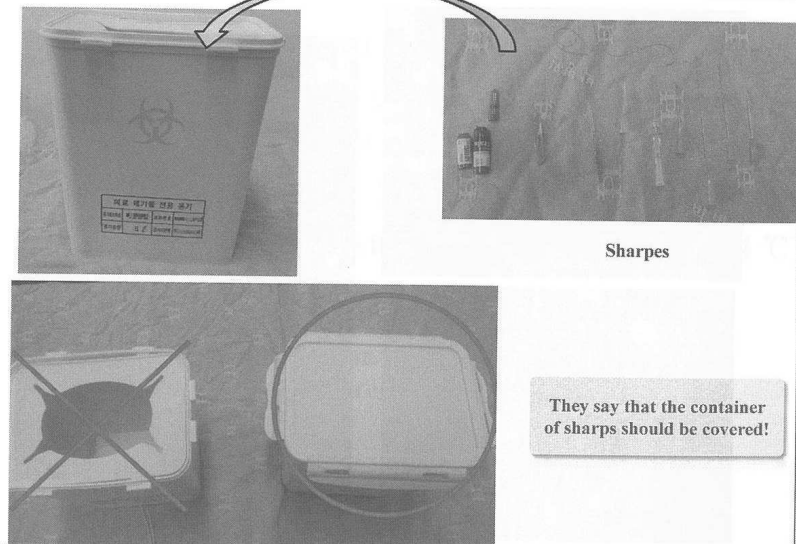


Biological/Chemical Waste

General Medical Waste

They say that it's confusing due to same shape of box!

Containers (example of one hospital)



Sharps

They say that the container of sharps should be covered!

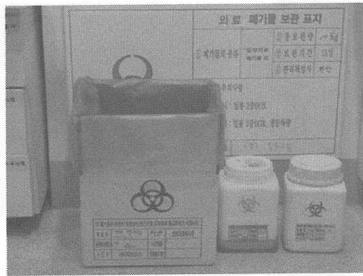


Containers (example of one hospital)



Details including the dates it was started to use should be written down on the box!

Containers in storage room



Containers in storage room



Regulations for Generator of Medical Wastes

➤ Should use designated kinds of bags and containers

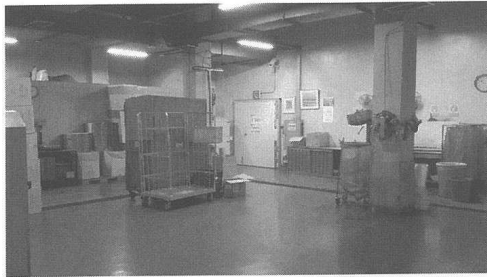
- Bags/Cardboard: solid phase
- Plastic container: liquid phase, sharps, surgical
- Not allowed to reuse bags/containers

➤ Should be equipped with refrigerating system ($\leq 4^{\circ}\text{C}$) for storage

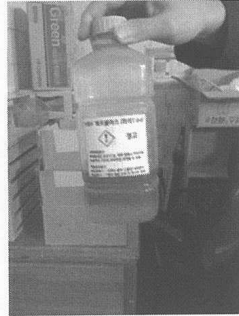
- Chemical disinfection should be conducted at least once per week for storage facility.



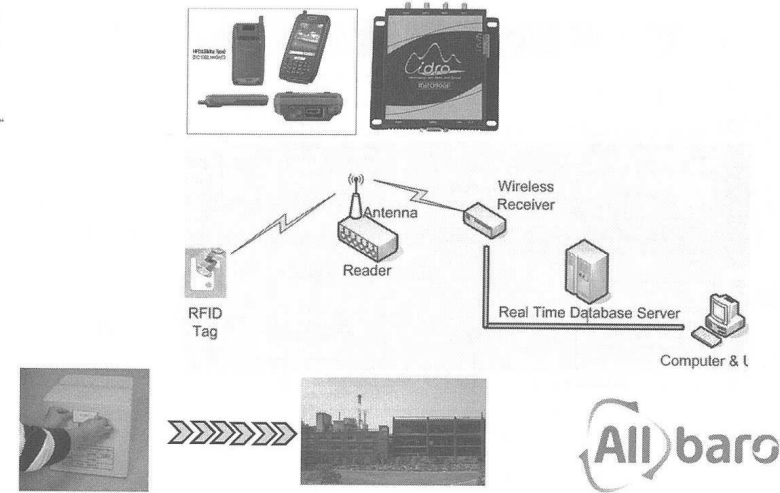
Storage room in a general hospital



Storage room in a general hospital



RFID system (Radio-frequency identification)

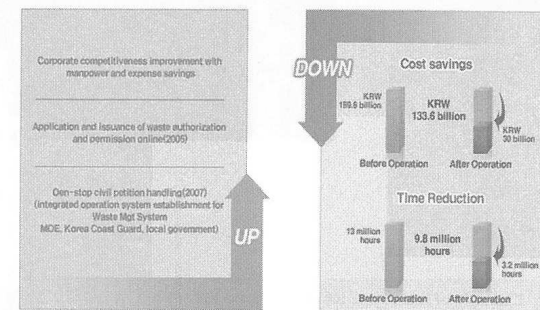


Allbaro System



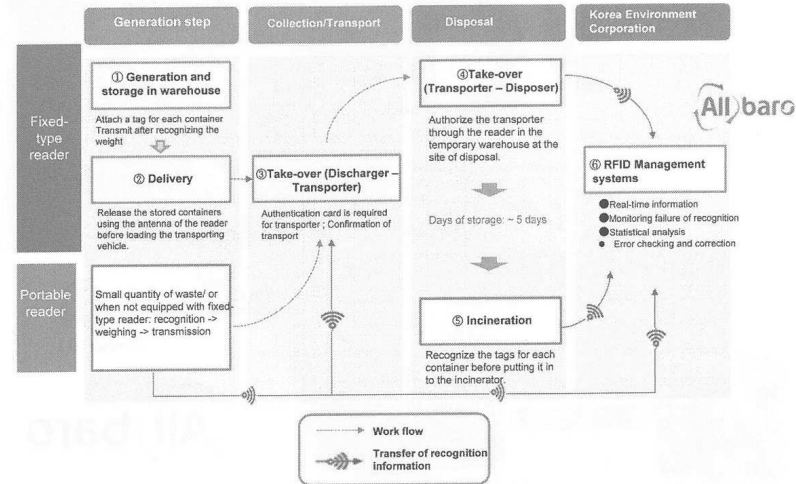
IT-based e-information system managing all processes from discharge, transport, and ultimate treatment of industrial waste using the internet or cutting-edge radio frequency identification (RFID) technology instead of paper transfer document (manual document)

The system cuts down expenses by KRW 133.6 billion, saves 9.8 million working hours, and prevents the illegal treatment of waste and indiscriminate waste disposal



<https://exim.allbaro.or.kr/eng/service.do?id=52040000>

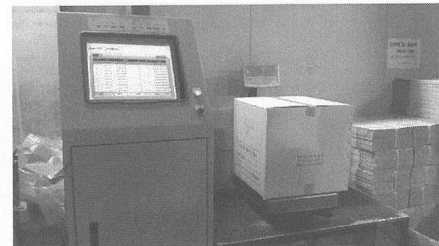
Flow-chart of RFID-based medical waste management



Regulations for Transportation

- **The vehicles should be equipped with cargo box and refrigerating system ($\leq 4\text{ }^{\circ}\text{C}$).**
 - Should transport medical wastes with refrigerating system on
 - The inner side of cargo box should be water-proof, proper for chemical disinfection. And a thermometer needs to be attached on it.
- **Temporary storage**
 - < 5 days when kept ($\leq 4\text{ }^{\circ}\text{C}$) or ≤ 2 days otherwise

RFID (radio-frequency identification) System



Example of fixed-type RFID reader in the storage room of hospital

Transportation for Off-site Incineration

