



CLINICAL WASTE MANAGEMENT UNDER COVID-19 SCENARIO IN MALAYSIA

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Introduction

- Clinical waste is the waste originating from healthcare facilities and other related facilities such as laboratories, autopsy or mortuaries etc.
- Clinical waste can be categorized into several categories such as infectious waste, pathological waste, sharp waste, chemical waste
- The generation of clinical waste in Malaysia is 90 tonnes/day or 33,000 tonnes/annually
- Schedule waste regulation (2005), Environmental Quality Act, 1974, and standard operating procedure provided by Ministry of Health, Malaysia regulates the management of clinical waste

Introduction (cont'd)

- COVID-19 outbreak was first identified in December 2019 and in March, it was declared as Pandemic
- Malaysia recorded 8616 Covid-19 cases and 121 deaths as of June 28th 2020
- Increase in the number of COVID-19 cases can be correlated to the increase in clinical waste generation
- Mainly disposable gloves, face masks and personal protective equipment (PPE) contribute to clinical waste generation during COVID-19 pandemic

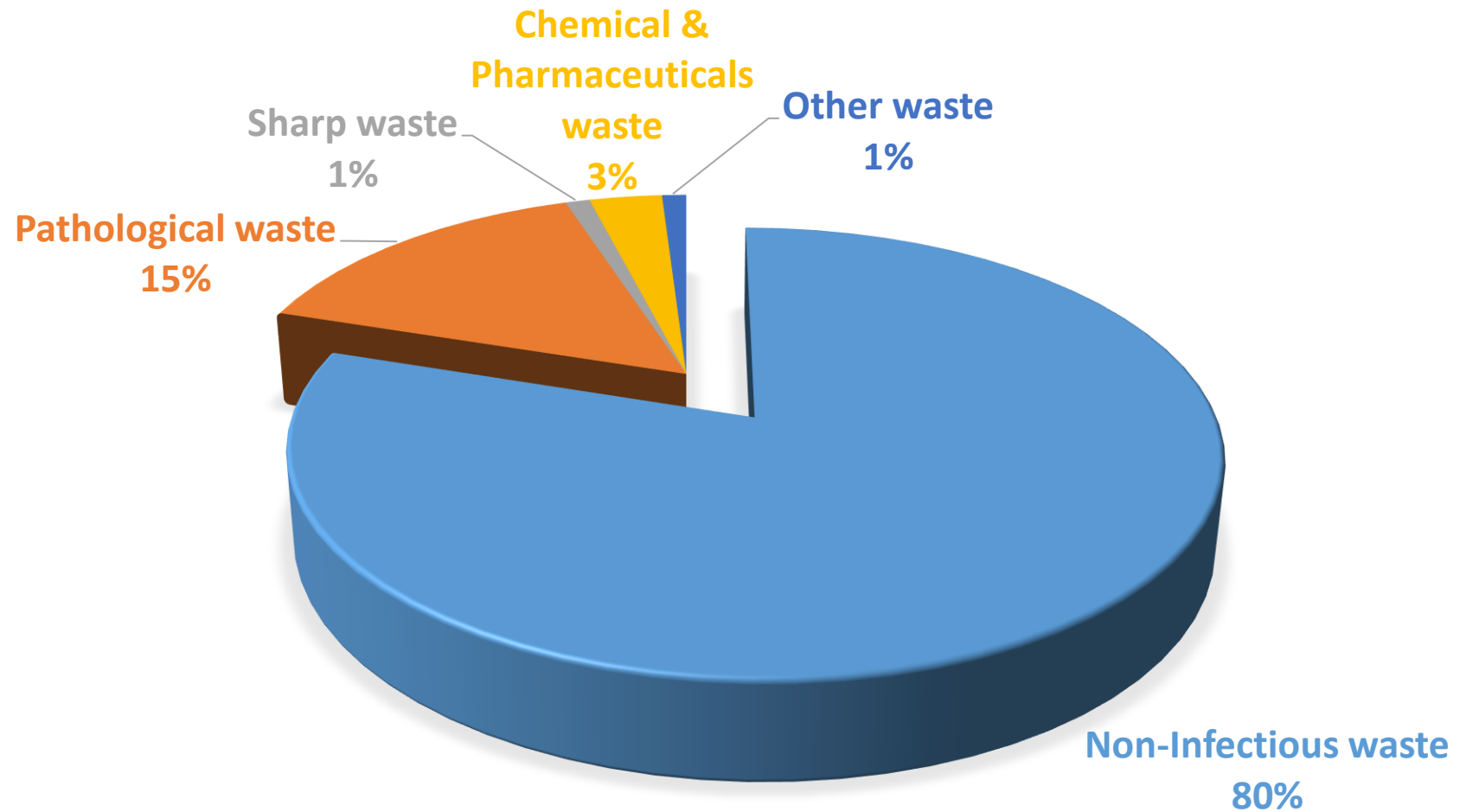


Littering of COVID-19 related waste

Clinical Waste Generation in Malaysia

Types of Waste	Years				
	2017	2016	2015	2014	2013
Pathogenic Clinical Waste - SW 404 (tonnes)	28,375.24	23,844.91	25,523.32	21,976.12	18,152.95
Expired Drug - SW 403 (tonnes)	458.97	14,250.60	282.31	447.97	1,470.14
Discarded Drug - SW 405 (tonnes)	298.53	337.77	112.01	110.59	120.36
TOTAL (tonnes)	29,132.74	38,433.28	25,917.64	22,534.68	19,743.45

Composition of Clinical Waste



Clinical Waste Management – Regulations

**Clinical waste is listed as
scheduled waste in
Malaysian environmental
regulations**

**Environmental Quality
(Scheduled Wastes)
Regulations 2005**

**The Environmental Quality
(Prescribed Premises) (Scheduled
Wastes Treatment and Disposal
Facilities) Order 1989**

**The Environmental Quality
(Prescribed Premises) (Scheduled
Wastes Treatment and Disposal
Facilities) Regulations 1989**

Department of Environment (DOE) is responsible for all aspects of clinical waste management from collection, transportation, treatment and disposal and uses online system named electronic scheduled waste management system (eSWIS) to monitor compliance

Classification of Clinical Waste

Clinical waste classification under the Environmental Quality (Scheduled Wastes) Regulations, 2005

Scheduled waste codes	Types of clinical waste
SW403	Expired drugs containing psychotropic substances or containing substances that are toxic, harmful, carcinogenic, mutagenic or teratogenic;
SW404	Pathogenic and clinical wastes and quarantined materials;
SW 405	Discarded drugs
SW421	A mixture of scheduled wastes;
SW422	A mixture of scheduled and non-scheduled wastes.

Clinical Waste Management – Regulations (Cont'd)

- Clinical waste management guidelines requires scheduled wastes to be managed properly before disposal as it could be harmful
- Generators of scheduled waste need to notify the DOE of any scheduled wastes generated and keep up-to-date inventory of scheduled waste generated, treated and disposed as per regulation
- Scheduled wastes may be stored, recovered and treated within the premises of a waste generator
- Waste generators shall conform to the requirements of the consignment note system when transporting wastes to ensure it reaches the approved destination and are carried out by licensed transporter and the treatment shall only be carried out at prescribed premises licensed by the DOE

Clinical Waste Management – Disposal

- Disposal of clinical waste is performed as followed;
 - Separation of clinical waste from generated waste
 - Labelling of clinical waste
 - Disposal into proper containers and bags
 - Collection by licensed contractors for disposal and treatment at 12 incineration facilities nationwide
- The waste is disposed of according to color coded containers or plastic bags (Zaimastura, 2005)

Clinical Waste Bag

Blue plastic bag / container is used for wastes to be autoclaved, yellow is for wastes that are to be incinerated and black is for general household wastes (DOE, 2009)



Yellow bag for disposal of clinic waste



Blue bag for autoclaving clinical waste

Clinical Waste Bins



Two wheel clinical waste bin



Pedal operated clinical waste bins



Mobile pedal operated clinical waste bin



Sharp waste bins

Management of Expired or Discarded Drugs

Guidelines for Clinical Waste Management by DOE Malaysia


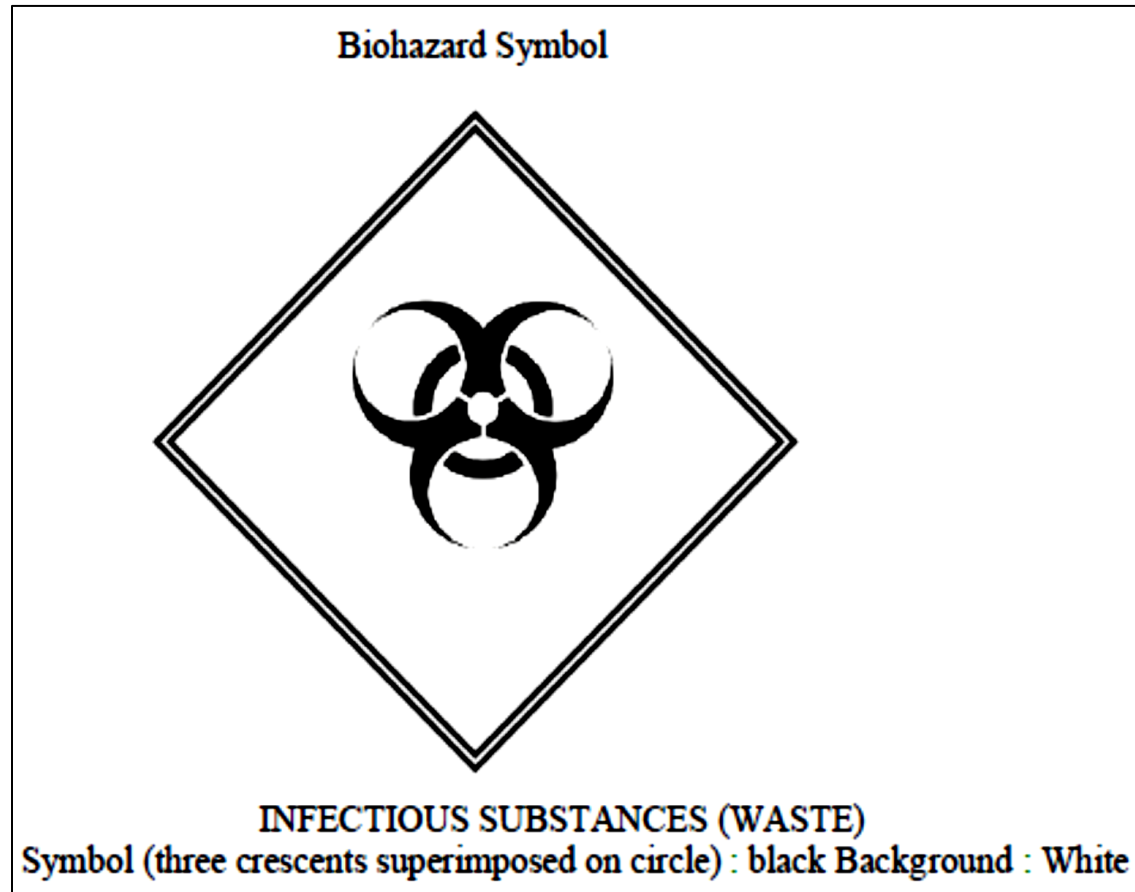
Description of Clinical Waste	Waste Management Guidance
<p>Pharmaceuticals which have become unusable for the following reasons:-</p> <ul style="list-style-type: none">• expiry date exceeded• expiry date exceeded after the packaging has been opened or the ready-to-use preparation prepared by the user; or• use is not possible for other reasons (e.g. call-back campaign)	<p>Class I - pharmaceuticals such as camomile tea, cough syrup, and the like which pose no hazard during collection, intermediate storage and waste management: managed jointly with municipal wastes</p> <p>Class II - pharmaceuticals which pose a potential hazard when used improperly by unauthorized persons: managed in an appropriate waste disposal facility</p> <p>Class III - Heavy metal – containing unidentifiable pharmaceuticals: managed in an appropriate waste disposal facility</p>
<p>Wastes arising in the use, manufacture and preparation of, and in the oncological treatment of patients with, pharmaceuticals with a cytotoxic effect (mutagenic, carcinogenic and teratogenic properties)</p>	<p>Intermediate storage of these wastes takes place under controlled and locked conditions. For reasons of occupational safety, cytotoxic pharmaceutical wastes must be collected separately from pharmaceutical waste and disposed of in a hazardous waste incineration plant</p>

Clinical Waste Management – Concession Companies

List of concession companies that manage clinical waste in Malaysia

Company	Service for Government /Private
Radicare Sdn Bhd	Government hospital, clinic, medical institute
Edgenta Medisure Sdn Bhd	Government hospital, clinic, medical institute
Medivest Sdn Bhd	Government hospital, clinic, medical institute
Sedafiat Sdn Bhd	Government hospital, clinic, medical institute
One Medicare Sdn Bhd	Government hospital, clinic, medical institute
Future Nrg Sdn Bhd	Private hospital and clinics
Kualiti Alam Sdn Bhd	Private hospital and clinics

Biohazard symbol and labelling of clinical waste



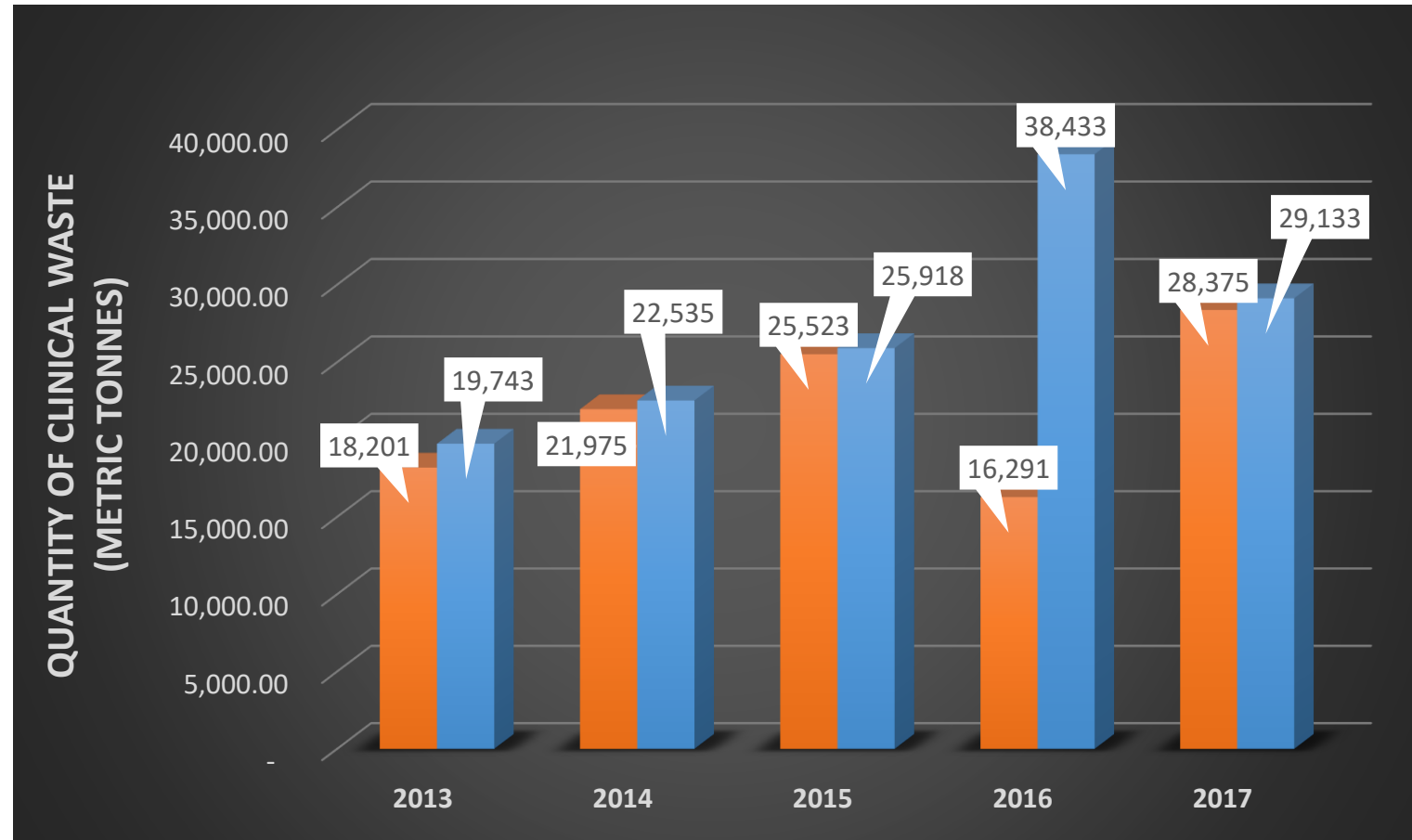
Waste code	:	
Waste name	:	
Date generated	:	
Waste generator	:	
Address and telephone number	:	

Clinical Waste Management - Temporary Storage

- Some hospitals store the clinical waste generated at cold rooms as a temporary storage until dedicated lorry arrives
- Collection can be daily or 3 times a week depending on the quantity
- Transportation is done only by the special lorry licensed to transport hazardous waste which belongs to the concession companies

Clinical Waste Management - Treatment

- Almost all pathological or infectious clinical waste is incinerated in Malaysia
- Only Class III or cytotoxic pharmaceutical waste is required to be incinerated
- Class I pharmaceuticals may be disposed in municipal disposal site



Source: Environmental Quality Reports (2013 – 2017)

Clinical Waste Management – Treatment (Cont'd)



Healthcare Waste Treatment by Kualiti Alam

Kualiti Alam Incineration Plant



Incinerator ash of clinic waste is transported to Integrated Hazardous Waste Treatment Center, is Solidified with cement, and disposed of in secure landfill

Clinical Waste Management (Cont'd)

- According to environmental regulations related to clinical or schedule waste;
 - Public is not allowed to handle and dispose any type of scheduled waste including clinical waste without proper license
 - Those found guilty can be sentenced to a mandatory prison and maximum fine of RM500,000 (115,000 USD)

Clinical Waste and COVID-19

- **27% increase** in clinical waste following Covid-19 outbreak in Malaysia (**25 tonnes** of COVID-19 clinical waste per day)
- Increased generation of swab, syringes, needles, sharps, blood or body fluid, excretions, mixed waste, laboratory waste, material or equipment contaminated with the virus, mask or disposable gloves, personal protective equipment (PPE)
- Asian development bank estimated additional generation of clinical waste due to COVID-19 in just 60 days to be:

16,800 tonnes in Manila

12,750 tonnes in Jakarta

9,600 tonnes in Hanoi

12,600 tonnes in Bangkok

9,240 tonnes in Kuala Lumpur



China struggled to cope with plethora of medical waste generated by COVID-19 outbreak in the country

(Source: Reuters, 2020)

Generation of Covid-19 clinical waste by country

Country	Amount of waste generated during covid-19 (kg/bed/day)	Percentage of increase in clinical waste generation during covid-19 pandemic	References
Taiwan	0.9 – 2.7	No data	Chiang et al. (2006)
Jordan	3.95	1000%	Abu-Qdais et al.(2020)
Wuhan, China	0.6 – 2.5	213%	Yu et al., 2020
Bandung, Indonesia	2.2	17.1%	Damanhuri (2020)
Penang, Malaysia	0.4 – 1.0	27%	Astro Awani (2020)
Thailand	2.9	No data	IGES (2020)
Mexico	2.0 -2.2	No data	IGES (2020)

Clinical Waste Management and COVID-19

- COVID-19 related clinical waste is being managed through the same regulations as for clinical waste or schedule waste
- COVID-19 related clinical waste is collected by assigned workers, stored in designated areas, transported, incinerated and disposed of by licensed companies

Household clinical waste management and COVID-19

- Abundance of masks are not properly disposed by the public
- Penang city council observed an sharp increase in the amount of clinical waste generated daily and warned that it could be an environmental disaster if no action is taken to manage the waste
- Some of the clinical waste has ended up in the solid waste landfills which is mostly PPE and face masks
- It also reported that about 9,000 face masks is disposed daily in Penang. This also poses risk to the municipal workers who collected the waste from households, shop lot and industrial area (The Sunday daily, 23rd June 2020).



Littering of Facemasks used as personal protective gear by public

Improper Disposal of face masks



CONCLUSION

- In Malaysia, clinical waste management is under the Federal Government and Department of Environment
- Environmental Quality Act 1974 with recent amendments is currently being implemented in Malaysia
- The generation of clinical waste is 90 tonnes/day or 33,000 tonnes/annually whereby about 75 to 80% is non-pathogenic waste whereas 15% of composition is pathogenic waste and chemical and pharmaceuticals waste, sharp waste and other waste accounts for 3%, 1% and 1%, respectively
- The guideline on the management of clinical waste provides comprehensive information on appropriate handling and disposal of clinical wastes generated from hospitals and other health care facilities



THANK YOU