Treatment Of Medical Solid Waste Before And During The Covid-19 Pandemic

***Serlly Frida Drastyana[1], Puryanti[2], Sendy Ayu Mitra Uktutias[3]**

[1 2 3] Prodi S1 Administrasi Rumah Sakit STIKES Yayasan Rumah Sakit Dr. Soetomo, Surabaya, East Java, Indonesia

Correspondence*:

serlly_frida@stikes-yrsds.ac.id, puryanti@stikes-yrsds.ac.id, sendy@stikes-yrsds.ac.id

Abstract

Background: *The condition of the Covid-19 pandemic also has an impact on increasing the generation of medical solid waste produced by health service facilities which have the potential to cause environmental pollution and interfere with health if not managed properly.*

Objective: *Analyzing the differences in covid 19 solid waste treatment in Hospitals in 2019, 2020, and 2021*

Methods: *A quantitative research with observational study. The survey was conducted online to identify covid 19 waste treatment in the hospitals. The study was carried out from May to September 2022.*

Results: *The hospitals have licensed incinerators and the volume of waste increased from 2019 to 2021. Storage of solid medical waste is in accordance with Minister of Health No.7 of 2019. The most problem is the increasing solid medical waste volume. Based on the analysis, there is no difference between the treatment of medical solid waste in 2019, 2020, and 2021. This is because the processing method is carried out in the same way in 2019, 2020, and 2021.*

Conclusion: *The treatment of solid medical waste before and during covid-19 is in accordance with the guidelines for processing covid-19 waste and the regulation of the Minister of Health No. 7 of 2019. The treatment of solid medical waste is no different before and during the COVID-19 pandemic.*

Keywords: *treatment, solid medical waste, hospitals, covid-19*

INTRODUCTION

The epidemic that attacks the respiratory tract, was first identified in Wuhan, Hubei province, China, the cause is coronavirus (new virus). The virus was named "SARS-CoV-2" and the disease caused by it is "*Coronavirus disease* 2019" or called Covid-19. (Topcuoglu, 2020). There are 65 countries infected with coronavirus. Around 93% of the total world populations are silent because of the many efforts to implement movement restrictions and quarantine at home. This restriction policy is designed to break the chain Covid-19 transmission. The increase in Covid-19 positive cases and hospitalized is proportional to the increase in the amount of waste, especially medical waste (Wardani and Azizah, 2020).

When Covid-19 is stated as a pandemic, cities all around the world reported an increase for almost fivefold in medical waste production (Capoor and Parida, 2021). As a health facility, hospital has to carry out a comprehensive, curative, and preventive health services to the society and is expected to be able to treat Covid-19 patients (RI, 2020b). The hospital operations can produce good and bad impacts. The good impact is public health restoration, especially for Covid-19 patients, whereas the bad impact is unhealthy environment such as the occurrence of general waste, medical waste, liquid waste, and a decrease in air quality in the hospital environment. (Yu *et al.*, 2020).

Indonesia is a country that is also exposed to the coronavirus disease. The addition of Covid-19 cases happened continuously. Coronavirus disease is quickly spread to everyone including health workers who are moving as the front line. Covid-19 weekly cases keep increasing since October 2020 until January 2021 and reached its peaked at 61.260 cases on 8 until 14 January 2021 (Republika, 2022).

Medical waste can be in the form of used masks, used gloves, used sanitary napkins, used syringes, used infusion sets, used personal protective equipment, and from the emergency unit (ER), special isolation rooms, intensive care unit (ICU), treatment rooms and other service rooms (Wardani and Azizah, 2020). As the producer of medical solid waste, hospital has to manage the medical solid waste starting from the waste minimization and segregation, waste storage, waste transportation, waste treatment, waste burial, to waste landfill (RI, 2015).

Based on the data of Indonesian Health Profile, it is estimated that the number of hospitals in Indonesia will continue to grow. In Indonesia, the amount of hospitals are 2.813 in 2018 and 2.877 in 2019. The increasing amount of hospitals in Indonesia has an impact to the total medical waste produced (Purwanti, 2018). The increase in medical hazardous and toxic waste continues to increase and even almost doubled during the Covid-19 pandemic. The amount of waste increased the most in June 2020 by 41.670 kg (Yolarita and Kusuma, 2020). Other research showed that the increase in medical solid waste also increase at the referral hospital in Surabaya, it is known from the medical solid waste chart in April as many as 45.533 kg, in May as many as 49.876, in June as many as 50.056 kg (Wardani and Azizah, 2020). Covid-19 pandemic also cause the increase in the medical waste volume from the health services facility, especially medical solid waste which can cause pollution and adverse health effects if not disposed of properly. Based on those data and problems, a research is conducted to identify medical waste disposal before and during the Covid-19 pandemic. This research aims to give a description of covid 19 solid waste management and policy determination in handling covid 19 solid waste. The research results can also be used as program planning in reducing the

impact of covid 19 solid waste.

METHODE

This research is a quantitative research with observational research design. Survey is conducted online with google form to identify the treatment of waste before and during the covid 19 pandemic in each hospital. The research implementation is conducted from May to September 2022.

RESULTS AND DISCUSSIONS

According to the Regulation of Minister of Health of Republic of Indonesia No. 3 of 2020 concerning Classification and License of Hospital, the classification of general hospital consists of class A, B, C and D. (RI, 2020c). The conducted research obtained 13 samples of hospitals who are willing to become respondents through the ATKLRS association. Based on the research conducted through questionnaire, obtained the hospital data in table 1.

Table 1. Identity of Hospital

		n	%
Hospital Location Province	East Java	12	92
	DKI Jakarta	1	8
	Total	13	100
Hospital Type	Class A	3	23
	Class B	6	46
	Class C	3	23
	Class D	1	8
	Total	13	100

Table 1 explained that most of the respondents are hospitals in East Java Province. And most of the hospital's type is class B.

Hazardous and toxic waste (infection waste) is from the health services facility which handled Covid-19. Process procedures of hazardous and toxic waste are in the form of storing the infectious waste in closed packaging up to 2 days from generation, transportation and/or destruction at the waste disposal site (facility), incineration temperature of at least 800 °C or shredder/incinerator shredder with autoclave), residue from combustion or destruction from the autoclave are contained and labeled with the symbols "Toxic" and hazardous and toxic waste. The waste will be stored in a temporary shelter for hazardous and toxic waste and given to the manager. (RI, 2020a). The research (Buana, 2021; Wijaya, Alwi and Baharuddin, 2021; Sukmawati and Dahlan, 2022) showed that Covid-19 medical solid waste treatment also carried out combustion using a temperature of more than 800 °C using an incinerator.

The disposal of COVID-19 medical solid waste must refer to the guidelines for waste management of referral hospitals, acute care hospitals, and health centers that treat Covid-19 patients by the Indonesian Ministry of Health 2020. The hospital medical solid waste tratement in 2019, 2020, 2021 can be seen in table 2.

Table 2. The treatment of medical solid waste

		2019		2020		2021	
		n	%	n	%	n	%
Ways of treatment	Third party	5	38	5	38	5	38
	Incinerator	8	62	8	62	8	62
	Total	13	100	13	100	13	100
Incinerator status	Licensed	8	100	8	100	8	100
	Unlicensed	0	0	0	0	0	0
	Total	8	100	8	100	8	100
Waste volume	Increase from the previous year	12	92	11	85	11	85
	Decrease from the previous year	1	8	2	15	2	15
	Total	13	100	13	100	13	100
Storage Time of Medical Solid Waste	≤ 2 x 24 hours	11	85	11	85	11	85
	> 2 x 24 hours	2	15	2	15	2	15
	Total	13	100	13	100	13	100
Obstacles of Medical Solid Waste Treat-ment	No obstacle	4	31	3	22	4	30
	Increase in volume	4	31	6	46	6	46
	Lack of human resources	0	0	1	8	0	0
	Maintenance of incinerator	1	8	0	0	0	0
	Damage of incinerator	1	8	1	8	1	8
	Use of PPE by officers	1	8	0	0	0	0
	Supplies of yellow plastic barrel/ trolley	0	0	1	8	1	8
	Obstacle from third party	2	14	1	8	1	8
	Total	13	100	13	100	13	100

Table 2 explained that most of the hospitals have licensed incinerator and increasing waste volume from 2019 to 2021. The storing of medical solid waste is mostly according to the Regulation of Minister of Health No. 7 of 2019. The storage > 2 x 24 hours is caused by third party. The research (Agung and Endan, 2021) also showed that the disposal of medical hazardous and toxic solid waste is of high value for all first referral hospitals (100%), the second referral hospital is 70% good, 30% is adequate. This is not in line with the research by (Salman, Taqwa and Aryanti, 2019; Tri Nurwahyuni *et al.*, 2020; Alfarel, Kholil and Mulyawati, 2021; Arisma, 2021; Mar, Sjaaf and Djunawan, 2021) that the storing of medical solid waste during the Covid-19 pandemic can still be carried out < 2 x 24 hours.

The research results explained that the biggest obstacle for the hospitals is the increase of the amount of medical solid waste. The amount of medical solid waste in Indonesia keeps on increasing, however, the health facilities are not adequate to carry out the waste treatment process thereby is limited in the treatment. Indonesia only has 20 Covid-19 referral hospitals with licensed incinerators from a total of 132 hospitals. From 2.889 regular hospitals, only 112 hospitals who have licensed incinerators (Wardani and Azizah, 2020).

The research by (Tri Nurwahyuni *et al.*, 2020) showed that North Sulawesi has 11 hospitals that can treat medical waste during the Covid-19 pandemic from 18 existing hospitals. The

incinerator used was late to get permission from the Ministry of Environment and Forestry. As well as research of (Nofrianty, Anwari and O, 2020) which explained that the medical solid waste treatment during the Covid-19 pandemic carried out combustion with incinerator every day. The research by (Firdaus, 2021) in Bhayangkara Hospital Palangka Raya City also used incinerator but there are problems with operating permits.

The Regulation of the Ministry of Environment and Forestry No. 56 of 2015 stated that the medical solid waste treatment can cooperate with waste treatment party (third party) and the treatment must be carried out at least twice a day.

The difference test result of the hospital medical solid waste treatment in 2019, 2020, 2021 can be seen in table 3.

Table 3. The difference in the treatment of medical solid waste in 2019, 2020, 2021

Difference test	Ways of medical solid waste treatment
P value	1.0

Table 3 explained that there is no difference between the medical solid waste treatment in 2019, 2020, 2021. This is because the ways of treatment is conducted with the same way in 2019, 2020, 2021.

The research by (Alfarel, Kholil and Mulyawati, 2021; Mar, Sjaaf and Djunawan, 2021) also saw that the difference in medical waste management before and during the Covid-19 pandemic was evident from the classification of medical waste and the amount of medical waste transportation. The disposal of medical waste by third party also has permission. Hospitals also dispose medical waste according to the regulation.

CLOSING

The disposal of medical solid waste before and during the Covid-19 pandemic is in line with the Guidance of Covid-19 Waste Disposal and the Regulation of Minister of Health No. 7 of 2019. There is no difference between the medical solid waste disposal before and during the Covid-19 pandemic.

ACKNOWLEDGMENTS

The author expressed gratitude to hospital staff that made it possible to retrieve data. Furthermore, the authors thanked to the residents, that kindly participate in the research

REFERENCES

1. Agung, T. and Endan, S. (2021) ‘Evaluasi Pengelolaan Limbah Padat Rumah Sakit Rujukan Covid-19 di Provinsi Nusa Tenggara Barat’, *Jurnal Sulolipu: Media Komunikasi Sivitas Akademika dan Masyarakat*, 21(1), pp. 14–23.
2. Alfarel, M.A., Kholil and Mulyawati, I. (2021) ‘Tinjauan Pengelolaan Sampah Medis Dan Non Medis Di Ruang Khusus Perawatan Covid 19 Gedung Anggrek Rumah Sakit Umum Pusat Fatmawati Jakarta Selatan’, *Jurnal SEOI*, 3(1), pp. 50–61.

3. Arisma, N. (2021) ‘Gambaran Pengelolaan Limbah Medis Padat Di Rumah Sakit Hi Muhammad Yusuf Kalibalangan Kotabumi Tahun 2019’, 15(2), pp. 85–91.
4. Buana, R.S. (2021) ‘Aspek Hukum Penglolaan Limbah Bahan Berbahaya dan Beracun (B3) Di Rumah Sakit Umum Daerah Balangan’, *Dinamika*, 27(10), pp. 1387–1405.
5. Capoor, M.R. and Parida, A. (2021) ‘Biomedical Waste and Solid Waste Management in the Time of COVID-19: A Comprehensive Review of the National and International Scenario and Guidelines.’, *Journal of laboratory physicians*, 13(2), pp. 175–182. doi:10.1055/s-0041-1729132.
6. Firdaus, N. (2021) ‘Analisis Pengolahan Limbah Padat Rumah Sakit Bhayangkara Kota Palangka Raya Kalimantan Tengah’, *Sultan Agung Fundamental Research Journal*, 2(1), pp. 41–64.
7. Mar, E., Sjaaf, A.C. and Djunawan, A. (2021) ‘Evaluasi Pengelolaan Limbah Medis Di Rumah Sakit Sentra Medika Cikarang’, *Jurnal Manajemen Kesehatan Yayasan RS.Dr.Soetomo*, 7(1), pp. 105–114.
8. Nofrianty, D., Anwari, A.Z. and O, E.S.L. (2020) ‘Evaluasi Sistem Pengelolaan Limbah Padat Medis di Rumah Sakit Umum Daerah Ulin Kota Banjarmasin Tahun 2020’, 30, pp. 1–17.
9. Purwanti, A.A. (2018) ‘Pengelolaan Limbah Padat Bahan Berbahaya Dan Beracun (B3) Rumah Sakit Di RSUD Dr.Soetomo Surabaya’, *Jurnal Kesehatan Lingkungan*, 10(3).
10. Republika (2022) ‘Gejala Covid-19 tidak Biasa yang Perlu Diwaspadai’, *Republika.co.id*. Available at: https://iqra.republika.co.id/berita/r7t8i0425/gejala-covid-19-tidak-biasa-yang-perlu-diwaspadai.
11. RI, M.K. (2020a) ‘Pedoman Pengelolaan Limbah Rumah Sakit Rujukan, Rumah Sakit Darurat dan Puskesmas yang Menangani Pasien Covid-19’, *Kementerian Kesehatan RI*, pp. 1–14.
12. RI, M.K. (2020b) ‘Peraturan Menteri Kesehatan Nomor 18 Tahun 2020 Tentang Pengelolaan Limbah Medis Fasilitas Pelayanan Kesehatan Berbasis Wilayah’.
13. RI, M.K. (2020c) *Permenkes No 3 Tahun 2020 Tentang Klasifikasi dan Perizinan Rumah Sakit, Permenkes RI*. Available at: https://peraturan.bpk.go.id/Home/Details/152506/permenkes-no-3-tahun-2020.
14. RI, M.L.H. dan K. (2015) *Peraturan Menteri Lingkungan Hidup dan Kehutanan RI Nomor 56 Tahun 2015 Tentang Tata Cara dan Persyaratan Teknis Pengelolaan Limbah Bahan Berbahaya dan Beracun dari Fasilitas Pelayanan Kesehatan*.
15. Salman, N., Taqwa, F.M.L. and Aryanti, D. (2019) ‘Evaluasi Pengelolaan Limbah Rumah Sakit (Studi Kasus : Rumah Sakit X di Kab . Tasikmalaya)’, *Jurnal Komposit*, 5(1), pp. 7–16.
16. Sukmawati, S. and Dahlan, M. (2022) ‘Manajemen Pengelolaan Limbah Rumah Sakit Umum Daerah Polewali di Masa Pandemi Covid-19’, *JI-KES (Jurnal Ilmu Kesehatan)*, 5(2), pp. 180–189. doi:10.33006/ji-kes.v5i2.326.
17. Topcuoglu, N. (2020) ‘Public Health Emergency of International Concern: Coronavirus Disease 2019 (COVID-19)’, *The Open Dentistry Journal*, 14(1), pp. 71–72. doi:10.2174/1874210602014010071.
18. Tri Nurwahyuni, N. *et al*. (2020) ‘Pengolahan Limbah Medis COVID-19 Pada Rumah Sakit’, *Jurnal Kesehatan Lingkungan*, 10(2), pp. 52–59. doi:10.47718/jkl.v10i2.1162.
19. Wardani, R.A. and Azizah, R. (2020) ‘Management of Solid Medical Waste on One of the Covid19 Referral Hospitals in Surabaya, East Java’, *Jurnal Kesehatan Lingkungan*, 12(1), pp. 38–44. doi:10.20473/jkl.v12i1si.2020.38-44.

20. Wijaya, H., Alwi, M.K. and Baharuddin, A. (2021) ‘Analisis Risiko Keselamatan dan Kesehatan Kerja (K3) Dalam Pengelolaan Limbah Medis Rumah Sakit Islam Hasanah Muhammadiyah Mojokerto Di Masa Pandemi COVID-19’, *Journal of Muslim Community Health (JMCH)*, 2(1), pp. 36–51.
21. Yolarita, E. and Kusuma, D.W. (2020) ‘Pengelolaan Limbah B3 Medis Rumah Sakit Di Sumatera Barat Pada Masa Pandemi Covid-19’, *Jurnal Ekologi Kesehatan*, 19(3), pp. 148–160.
22. Yu, H. *et al.* (2020) ‘Reverse Logistics Network Design for Effective Management of Medical Waste in Epidemic Outbreaks: Insights from the Coronavirus Disease 2019 (COVID-19) Outbreak in Wuhan (China)’, *International Journal of Environmental Research and Public Health*, 17(5), p. 1770. doi:http://dx.doi.org/10.3390/ijerph17051770.