

## Aspek Kesehatan Lingkungan Pada Rumah Sakit Darurat Covid-19 di Provinsi DKI Jakarta

### *Aspects Of Environmental Health of The Covid-19 Emergency Hospital The Province of DKI Jakarta*

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#### ABSTRAK

**Pendahuluan:** *Coronavirus Disease 2019 (COVID-19) telah dinyatakan oleh WHO sebagai pandemi dan Indonesia telah menyatakan COVID-19 sebagai bentuk bencana non-alam dari wabah penyakit tersebut. Meningkatnya kasus COVID-19 di Indonesia, Pemprov DKI Jakarta membangun Rumah Sakit Darurat COVID-19. Rumah sakit darurat untuk mempertimbangkan aspek kesehatan lingkungan untuk meminimalkan risiko penularan penyakit. Tujuan penelitian ini adalah untuk mengetahui aspek kesehatan lingkungan di Rumah Sakit Darurat COVID-19 Provinsi DKI Jakarta.*

**Tujuan:** *Menganalisis aspek-aspek kesehatan lingkungan pada rumah sakit darurat COVID-19 di Provinsi DKI Jakarta*

**Metode:** *Kami menggunakan penelitian deskriptif dengan studi kualitatif dari data sekunder dari seminar HAKLI, buku panduan pencegahan dan pengendalian COVID-19 dan peraturan tentang Kesehatan Lingkungan Rumah Sakit Darurat COVID-19, yang dikeluarkan oleh Kementerian Kesehatan Republik Indonesia.*

**Hasil:** *Aspek kesehatan lingkungan di Rumah Sakit Darurat COVID-19 Provinsi DKI Jakarta, seperti : Ketersediaan air bersih dan air minum di rumah sakit dengan asumsi kapasitas 3000 pasien, rumah sakit membutuhkan 1.500 m<sup>3</sup> air/hari dan 15 m<sup>3</sup> air minum/hari. Tersedia berarti toilet dan wastafel sesuai dengan jumlah unit. Pengelolaan limbah padat domestik dengan penyimpanan sementara Kemayoran berkapasitas 280 m<sup>3</sup> serta pengolahan sampah organik dan anorganik. Pengelolaan limbah padat medis bekerja sama dengan pihak ketiga untuk dihancurkan oleh insinerator. Pengelolaan limbah cair dengan tempat pengolahan air limbah (WWTP). Kontrol vektor dan Hewan Pengerat di rumah sakit darurat dilakukan membuat pembunuh serangga, perangkap, penyemprotan, dan fogging. Penyediaan tanggap darurat dapur yang diketuai oleh ahli gizi dan bahan makanan selalu diperiksa sebelum diproses.*

**Kesimpulan:** *Seluruh aspek kesehatan lingkungan di Rumah Sakit Darurat COVID-19 Provinsi DKI Jakarta telah memenuhi persyaratan sesuai Peraturan Kementerian Kesehatan RI Nomor 7 Tahun 2019 tentang Kesehatan Lingkungan di Rumah Sakit.*

**Kata Kunci :** *Kesehatan lingkungan, rumah sakit, COVID-19*

#### ABSTRACT

**Background:** *Coronavirus Disease Of 2019 (COVID-19) has been declared by the WHO as a pandemic and Indonesia have expressed COVID-19 as a disaster non-natural form of the outbreak of the disease. The increasing cases COVID-19 in Indonesia, The Provincial government of DKI Jakarta building of Emergency Hospital COVID-19. The emergency hospital to consider the health aspects of the environment to minimize the risk of disease transmission. The purpose of this study is to determine the aspects of environment health in Emergency Hospital COVID-19 of Provinsi DKI Jakarta.*

**Objectives:** *Analyzing the environmental health aspects of the COVID-19 emergency hospital in DKI Jakarta Province*

**Methods:** *We used descriptive research with secondary data from online seminar by web, guidebook dan regulation about of Environmental Health of Emergency Hospitals COVID-19, issued by the Ministry of Health of the Republic of Indonesia.*

**Results:** Aspects of environmental health at the Emergency Hospital COVID-19 of Province DKI Jakarta such as : Availability of clean water and drinking water at the hospital with assuming a capacity of 3000 patients, the hospital requires 1,500 m<sup>3</sup> of water/ day and 15 m<sup>3</sup> of drinking water/ day. Available means the toilet and the sink in accordance with the number of units. Domestic solid waste management with temporary storage of Kemayoran with capacity of 280 m<sup>3</sup> and the processing of organic waste and inorganic. Medical solid waste management in collaboration with third parties to be destroyed by incinerators. Liquid waste management with wastewater treatment plant (WWTP). Vector control and Rodent at the emergency hospital is done make of insect killer, trapping, spraying, and fogging. The provision of a kitchen emergency response chaired by nutritionist and food ingredients always be checked before it is processed.

**Conclusions:** All aspects of environmental health at Emergency Hospital COVID-19 of Province DKI Jakarta have met the requirements according to the Regulation of Ministry of Health of The Republic Indonesia Number 7 at 2019 about Environmental Health in Hospital.

**Keyword:** environmental health, hospital, COVID-19

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## INTRODUCTION

Coronavirus Disease 2019 or COVID-19 is a new disease that can cause respiratory disorders and pulmonary inflammation. The disease is caused by infection of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Clinical symptoms which appear diverse, ranging from the like symptoms of the common cold (cough, runny nose, sore throat, muscle pain, pain of the head) until the complication severer (pneumonia or sepsis). COVID-19 has been declared by the WHO as a pandemic and Indonesia have expressed COVID-19 as a disaster non-natural form of the outbreak of the disease (Kementerian Kesehatan, 2020).

Case of COVID-19 in Indonesia until Thursday, 9 April 2020 according to the data PHEOC, Ministry Of Health Of the Republic Of Indonesia with a number of specimen received is 16.511 specimens and as much as 13.555 specimen was declared negative. The number of cases confirmed as much 2.956 case with the number who died is 240, to the number of cases declared cured as much as 222 and still in care as much as 2.494 (Kementerian Kesehatan, 2020b).. All region in the Province Of DKI Jakarta is red zone of case of corona virus disease. The case until April 9, 2020 recorded the number of positive cases confirm achieve a 1706 case, 82 cured and 142 died (Pemprov DKI Jakarta, 2020). Based On The Decree Of The Minister Of Health Of The Republic Of Indonesia Number Hk.01.07/Menkes/169/2020 regarding the Determination Of Hospital Referral the Prevention of Infectious Diseases Emerging Specific. Indonesia has set a total of 132 Referral Hospital in each province in Indonesia, one of them is in the Province of DKI Jakarta.

In the provision of hospital emergency COVID-19 of course aspects of the environment health need to be considered. As a health services facility, hospital provide comprehensive, curative ad preventive health services to the public and they are expected to be able to treated COVID19 patient. Operating hospital activities can bring about both positive and negative effect. Environmental health aspect of hospital that must be met for handling COVID-19 case are water supply, medical waste management, sanitation facilities and controlling of vectors and pest (Kemenkes, 2020). Environmental health aspects need to be reviewed during the pandemic, especially in COVID emergency hospitals, because COVID-19 is an infectious disease transmitted through the environment, if environmental health can be managed properly it can stop the transmission of COVID-19 (Deni, 2020). The purpose of this article is to determine the aspects of environmental health in emergency response COVID-19 on emergency hospital COVID-19 in the Province of DKI Jakarta.

## METHODE

We used studi descriptive research with quantitative study. The researcher only provided the obtained description of the phenomenon. This research was conducted in one of the hospitals that had been assigned by the Ministry of Health of the Republic of Indonesia as a COVID19 referral hospital tasked in handling the COVID-19 virus. The hospital was located in Province DKI Jakarta. The research was conducted from April to July 2020. The reference used in this research is the secondary data from online seminar by the Association of Indonesian Environmental Health (HAKLI), guidebook titled Prevention and Control of COVID-19, Waste

Manajemen in Emergency Hospital COVID-19 and regulation about Environmental Health in Hospitals, issued by the Ministry of Health of the Republic of Indonesia.

## RESULTS AND DISCUSSION

In the handling of emergency response to the environmental health aspects need to be considered such as water supply, solid and liquid waste management, control of vector and rodent.

### Provision Clean Water and Drinking Water

The planning of the provision and distribution of clean water for building space insulation covers the water needs for the function-function space, the needs of clean water to the appliance, the water needs to clean / remove contaminants and water needs for fire-fighting systems. A source of clean water for the needs of for hospital emergency COVID-19 can be sourced from PDAM, deep wells, rain water and other sources that have been through the treatment process. Emergency Hospital COVID-19 of Province DKI Jakarta provides clean water from Kemayoran regional clean water processing industry and for provides drinking water from bottled water. The calculation of the minimum clean water capacities for building isolation space is 500 liters per bed per day. Capacity patients in Emergency Hospital COVID-19 is for 3000 bed. Assuming the amount of clean water requirement for Emergency Hospital COVID-19 is 1500 meter cubic per day. For calculation of the minimum drinking water for patients is 5 liters per day, The assuming the amount of drink water requirement is 15 meter cubic drink water per day.

To meet the needs and maintain water quality of the hospital also carries out some processing are monitoring daily discharge water, perform water treatment using disinfection, cheking daily parameter for turbidity levels, pH levels, chlorine residual every day and cheking microbiologi parameters for total coliform and *E.coli* and chemical parameters every month. This is in accordance with research by (Syadir, 2015) at the Ibnu Sina Hospital Makassar, that the source of clean water comes from the regional clean water industry and ground water while the source of drinking water comes from bottled water. The amount of clean water needed to maintain care activities at the hospital, the more hospital activities will increase the amount of clean water used (Krismayasari *et.al.*, 2014).

### Provision of Sanitation Facilities

The Emergency Hospital COVID-19 of Province DKI Jakarta has provided sanitation facilities such as toilets and hand washing stations in each room. Toilets are equipped with water seal, hot and cold water. Toilets for patients and employees were separated and toilets for men and women were also separated. Water drains from toilets and hand washing stations all go to wastewater treatment. In addition to provision in the building, sanitation facilities portables are also provided in outdoor areas such as in the park, yard and parking area. This is in accordance with research by (Syadir, 2015) at the Ibnu Sina Hospital Makassar, that the there are toilets in each room with ratio of toilet with bed ratio of 1:10, this is in accordance too with Regulation of Ministry of Health of The Republic Indonesia Number 7 at 2019 about Environmental Health in Hospital (Kemenkes, 2020). Hand washing facilities are very important to preventing the transmission of COVID 19 so that it is maximized to provide a place to wash hands that can be reached by all patients, employees or people entering to hospitals (Kementerian Kesehatan , 2020).

### Liquid Waste Management

The Emergency Hospital COVID-19 of Provinsi DKI Jakarta provides unit of waste water treatment plant (WWTP) for treat a liquid waste. All wastewater from hospital activities enters the WWTP except rain water. The flow of liquid waste disposal, namely waste originating from the toilet will enter in the septic tank, waste originating from the nutrition unit is pre-treated with a grease trap, waste originating from the laboratory and laundry is equipped with pre-treatment before being channeled into the waste water treatment plant (WWTP) (Kemenkes RI, 2020).

Image 1. Flow of Processing Unit of Waste Water Treatmet Plant (WWTP)

Based on the picture above, it's known that there are six stages of th liquid waste treatment process at the Emergency Hospital COVID-19 of Province DKI Jakarta. Before being treated, waste water from variouse activities in collected in the pre-treatment a container with closed drain, in the pre-treatment, a temporary sedimentation process occurs and it sprays large solids. After from pre-treatment, waste water collected to equalisasi tank, The equalization tank functions to mix together and uniform the quality of the liquid waste including the temperature and pH of the liquid waste. In addition, the equalization tank is the first processing unit which functions to reduce organic substances, the remains of organic substances which have a larger size will settle to the bottom of the equalization basin and experience decomposition by microorganisms so that the content of organic substances in wastewater will be reduced (Ibnuloah, Deppy Lucky, 2015). After from

equalisasi tank, liquid water collected in Anaerob tank. Anaerobic processes take place in the absence of oxygen supply, the process of changing organic compounds into methane (CH<sub>4</sub>) and carbon dioxide (CO<sub>2</sub>). In anaerobic tank, there is a process of contact between the wastewater and activated sludge containing anaerobic microorganisms that function in the decomposition of organic substances. According to (Nurdijanto, Purwanto, and Sasongko, 2011) that anaerobic treatment system needs to be paid attention to the flow of water that flows smoothly, because wastewater contains organic substances which are food for the development and growth of microorganisms or anaerobic microorganisms that are formed in activated sludge or sludge. After from Anaerob tank, liquid waste water collected in Aerob / aeration tank. Aeration tank filled with activated sludge (Sarto, 2018). Activated sludge is a sludge of aerobic microorganisms that functions to break down waste. In the aeration basin, the process of decomposing organic compounds by aerobic microorganisms will occur. Aeration is the process of adding oxygen using an aerator blower (Majid et al, 2017). The blower dipped into the aeration bath serves to provide additional air. The aeration process continues for 24 hours which is carried out by 2 aerator blowers in turn. Wastewater will contact with microorganisms suspended in water so that it can increase the decomposition of organic matter and accelerate the nitrification process (Sarto, 2018).

After passing through the aeration process, the wastewater is then processed at the advanced processing stage using an aerobic-anaerobic biofilter system. Aerobic-anaerobic biofilter is shaped like a tube. Before discharging liquid waste into city water bodies / canals, it goes through further processing to remove certain contaminants. Biofilter functions to decompose pollutants in waste (Yenyi, 2011). The biofilter also contains media made of pyramid-shaped plastic which functions as a medium for breeding of microorganisms to decompose liquid waste. Anaerobic microorganisms that grow on bioball media will break down the organic substances present in the liquid waste. Wastewater will come into contact with microorganisms suspended in water or attached to the surface of the media, which can increase the efficiency of decomposing organic substances, detergents and speed up the nitrification process, so that the efficiency of removing organic substances is greater. In this biofilter system there is also a sedimentation process, resulting in a lot of sludge or sludge in this process (Sugito, 2015). After passing through biofilter system, the final stage of processing uses a chemical process, namely the chlorination system. Chlorination is the final stage before waste water is discharged into city bodies. The chlorination process uses a tablet type of chlorine disinfectant. The chlorination process aims to remove pathogenic microorganisms, especially the *Coli* Group bacteria, which may remain in wastewater so that wastewater is safe when discharged into water bodies (Ningrum, 2014). The combination of the wastewater treatment process with an aerobic-anaerobic system is efficient in reducing organic substances such as BOD, COD, ammonia, phosphate and suspended solids (TSS) (Said, 2016).

All processing of liquid water treatment in Emergency Hospital COVID-19 of Province DKI Jakarta in accordance with research conducted by (Sarto, 2018) in Hospital Putri Surabaya that processing liquid waste using a biofilter system can reduce the organic content in liquid waste and is also in accordance with Regulation of Ministry of Health of The Republic Indonesia Number 7 at 2019 about Environmental Health in Hospital (Kemenkes, 2020) that in the processing unit of waste water (WWTP) at least consists of the process of the initial sedimentation or pre-treatment, biological treatment processes ( aerobic and/or anaerobic), the sediment end, and disinfection.

### **Domestic Solid Waste Management**

The domestic waste disposal processes using a plastic bag with black colour. This crrying process conducted 2 times a day, especially at 05.00 Am and 04.00 PM. If already filled  $\frac{3}{4}$  part, of solid waste dumped into the temporary storage station in time 1x24 hours. Trash on the temporary storage will be sorted, organic waste is processed into compost and inorganic waste in place on a waste bank at the temporary storage station of Kemayoran.

Domestic solid waste derived from all activities in the building is not contaminated with blood and body fluids of the patient such as: scrap paper, cardboard, beverage bottles, food scraps, non-patients and other. The provincial government of DKI Jakarta has been equipped with a garbage disposal which is named temporary storage of Kemayoran, temporary storage Kemayoran is located in front of the building of Emergency Hospital COVID-19 Province DKI Jakarta. Temporary storage of kemayoran can accommodate 280 cubic meters of domestic waste and equipped with facilities garbage bank, and composting. Emergency Hospital COVID-19 are provided organic and inorganic trash. The steps for domestic solid waste management in emergency Hospital COVID-19 of Province DKI Jakarta such us Provided organic and inorganic trash bag in each room, Trash bag with water-resistant, strong and given a cover (Kemenkes RI, 2020).

### **Medical Solid Waste Management**

Medical Solid Waste are all goods or materials remaining from activities that are likely to be contaminated by substances the infectious. Waste can be derived from the rest of the activities in contact with the patient (ODP, PDP and Positive) cases COVID-19 such as: used syringe, mask, handscoon, used tissues,

bandages, infusion sets used and the rest of the food as well as items contaminated with body fluids of the patient.

Image 2. Graph of Generation of Medical Waste In Emergency Hospital COVID-19 Province DKI Jakarta

From the results of the Webinar conducted by the Association of Indonesian Environmental Health (HAKLI), described that the generation of medical waste in emergency hospital COVID-19 of Province DKI Jakarta up to 5 April 2020 the average amount 9401.4 kg per day. Medical waste includes medical infectious or medical consumables and trash the rest of the food patients the PDP and the patient's Positive COVID-19. And According to the Secretary-General Association Expert of Environment of Indonesia (Indonesian Environmental Scientists Association/IESA), the average patient COVID-19 accounted for 14,3 kilograms of medical waste per day. Assuming a generation of medical waste in emergency hospital COVID-19 for 3.000 patients is 42.9 ton per day. The management of medical Emergency Hospital COVID-19 of Provinces DKI Jakarta is done working with a third party for processing medical waste and some of it is processed at the Friendship Hospital Jakarta to be destroyed by incinerators.

The steps for medical solid waste management are provided trash medical specialty waterproof, strong and there is a cover in every room, trash was given a plastic bag yellow color and label biohazard, Once the ¾ part of the trash filled medical waste or within 2x24 hours medical waste must be packed and tied tightly and kept in the temporary storage area of medical waste. Personal medical waste management using a protective equipment (PPE) such as, head covering, mask, work clothes, special gloves and boots. Medical waste in temporary storage area to be processed at the time of no more than 2x24 hours. Spraying of disinfectans also conducted when the container has been used. Management of medical waste is carried out by burning in incenerator.

All process medical waste management in Emergency Hospital COVID-19 of Province DKI Jakarta is accordance with research conducted by (Purwanti, 2018). at the dr. Soetomo Hospital stated that the medical waste management process consists of sorting, storing, transporting and treating medical waste using incinerators and is also in accordance with Regulation of Ministry of Health of The Republic Indonesia Number 7 at 2019 about Environmental Health in Hospital (Kemenkes, 2020).

### **Controlling of Vector and Rodent**

Each hospital is obliged to perform an action peggendalian vectors and pests in order to prevent the occurrence of disease transmission through vectors and animals. Vector and animal annoying that must be controlled such as mosquitoes, flies, cockroaches, rats and cats. Vector control in Hospital emergency COVID-19 of Province DKI Jakarta is carried out in collaboration with third parties. Several methods of vector control and rodent which is done in Emergency Hospital COVID-19 of Province DKI Jakarta is: Perform monitoring and eradication of the mosquito. Nest Installation of the trapping of rats and cats. Installation of feed the feed for the control rats and the cockroaches. Installation Of Insect Killer. The planting of plant-based repellents against mosquitoes in the courtyard area of the hospital. Doing spraying chemicals to control the flies in the area of the temporary station waste. Conduct cold fogging. Perform fumigation or fogging in the area outside the hospital building. This is in accordance with the research conducted by (Atikasari dan Sulistyorini, 2019) at the Surabaya Hospital that the mosquito control method is carried out by cold fog for indoor areas and fogging for outdoor area. eradication of mosquitoes in places. eradication of mosquitoes in places difficult to reach such as a ward stays and congested places visitors because of these places also prone to breeding places mosquitoes and disease transmission (Atikasari dan Sulistyorini, 2019) . It's also in accordance with Regulation of Ministry of Health of The Republic Indonesia Number 7 at 2019 about Environmental Health in Hospital that's every hospital is obliged to carry out vector and rodent control so as not to become a vector transmission of disease (Kemenkes, 2020).

### **Provision of Food and Kitchen Disaster**

Emergency Hospital COVID-19 of Province DKI Jakarta provided a public kitchen is located near the building hospital. A Common kitchen is chaired by a Nutritionist from the military health center. Members of the common kitchen of Emergency Hospital COVID-19 consists of some nutritionists and the ranks of the military. Material needs food Emergency Hospital COVID-19 is supplied directly by the farmers and merchants of traditional markets in Province DKI Jakarta. Raw materials each day comes with a fresh state. In the daily food requirement can reach to 1 ton of rice, vegetables, meat, fish and other foodstuffs. The steps that are performed in the fulfillment of food needs in Emergency Hospital COVID-19 are: Supply of fresh food, do the inspection before it is processed. All its handlers food, personal must to be using PPE at least in the form of masks and gloves. Food raw separated with food ingredients ripe. The stove using gas by National gas Company (PGN). Feeding against the officer and the patient COVID-19 as much as three time for morning at 0600, lunch at 12.00 and in the afternoon at 18.00. Food safety is always maintained with the inspection of food. After the processing is done cleaning the kitchen and disinfection using chlorine 0.5 %.

All of Step For provision food also in accordance with Regulation of Ministry of Health of The Republic Indonesia Number 7 at 2019 about Environmental Health in Hospital. The process of viral infection and inflammatory drugs can increase the risk of malnutrition. To prevent the necessary administration of the nutritional intake of energy, macronutrient (carbohydrate, protein and fat) and micronutrients (vegetables and fruit). In patients COVID-19 there is an imbalance of nutritional needs. The energy requirements for COVID-19 is 30-35 kcal/kg bw / day, the protein requirement is 20% of the energy needs, the need for carbohydrates is 50% of the energy needs and fat needs are 30% of the energy needs as well as the needs of vegetable and fruit 200 gr/day (PDSGKI, 2020).

## CONCLUSION

Aspects of environmental health in the Emergency Hospital COVID-19 of Province DKI Jakarta in accordance with the Regulation of Ministry of Health of The Republic Indonesia Number 7 at 2019 about Environmental Health in Hospital which includes the provision of water facilities and drinking water, the provision of the sanitation facilities, solid and liquid waste management, vector control and rodent and the provision of emergency kitchens. Need to do further research in Emergency Hospital COVID-19 of Province DKI Jakarta.

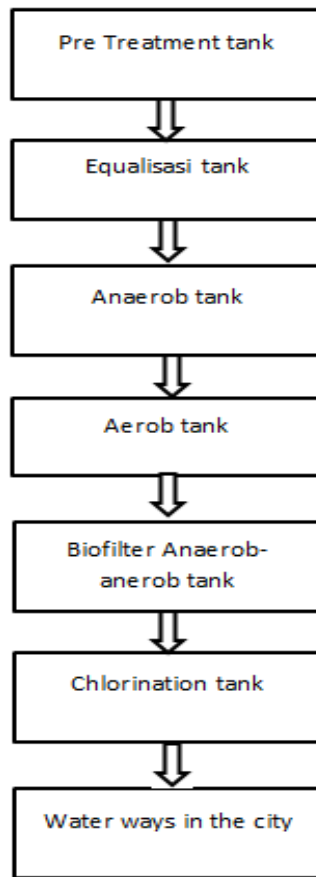
## ACKNOWLEDGEMENT

Thank you to the Indonesian Environmental Health Association (HAKLI), because thanks to your seminar I was able to obtain secondary data for me to write about in this research. Thanks also to everyone who has supported me while I was writing this article

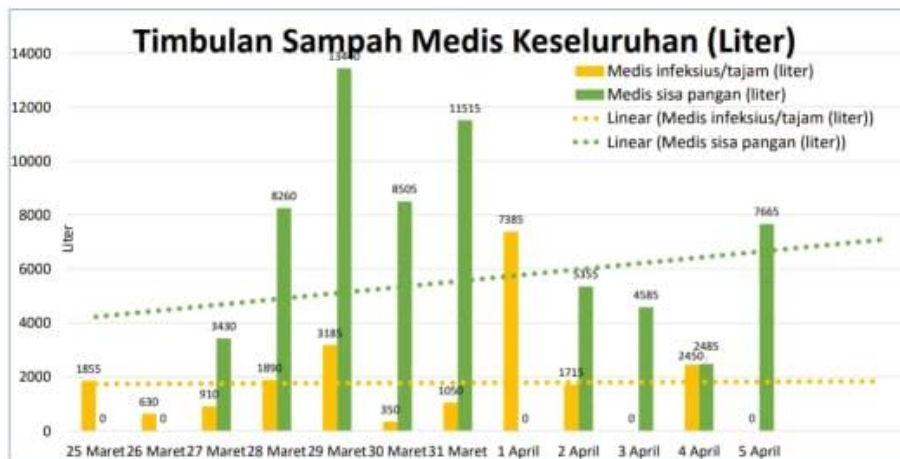
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**Image 1.** Flow of Processing Unit of Waste Water Treatmet Plant (WWTP)



**Image 2.** Graph of Generation Medical Solid Waste of Emergency Hospital COVID-19 of Province DKI Jakarta in March 25 - April 5 2020 (Sourch : Seminar Online With Association of Indonesian Environmental Health (HAKLI))