



Description Of The Quality Of Hospital Liquid Waste Processing In Controlling Chemical Parameters : Literature Review

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Abstract

Introduction: Apart from being a health service facility, hospitals are also a medium for disease transmission for patients, employees, visitors and the community around the hospital. Many activities in hospitals have the potential to increase environmental pollution because every activity produces waste. The aim of this research is to obtain an overview of liquid waste management in preventing environmental pollution in hospitals. **Material and Methods:** This research uses the literature study method (literature review). The population is 4 journals and journals published are limited to the last 5 (five) years. Analysis used with PICO. **Results:** The results of this research are that liquid waste produced by hospitals includes waste water originating from the canteen and nutrition kitchen, waste water originating from inpatient rooms, waste water originating from central operating/surgery rooms, waste water originating from isolation rooms, waste water originating from outpatient rooms/polyclinics, waste water originating from pharmacy rooms, waste water originating from obstetrics rooms, and waste water originating from laboratories. All waste water is channeled to the IPAL, except for waste water that comes from nutritional kitchens, laundry and laboratories, because it must be treated especially before heading to IPA. **Conclusion:** concluded that liquid waste processing in hospitals still does not meet hospital liquid waste quality standards, so supervision and monitoring by the government needs to be improved.

Keywords: Hospitals, Waste Water, IPAL (Waste Water Treatment Plant)

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1. Introduction

Hospitals are institutions health services providing health services individuals in a complete manner providing inpatient, nursing care services roads, and emergencies (Law No. 40 of 2022 concerning Hospitals) Apart from being a service facility health, hospitals are also media transmission of disease to patients, employees, visitors, and the community around the house Sick.(Permenkes, 2022) The disease is caused by agent or source of disease in hospital. One source of disease these are from hospital activities. Lots of activity in the hospital has the potential to increase pollution environment due to every activity produce waste.

Hospital waste is waste generated by hospitals, which can cause infectious diseases and pollution, can be solid, liquid, or gas. Hospital activities affect the condition of the waste generated, in this case liquid waste, which can cause pollution environment and cause disruption health. According to Ministerial Decree Environmental Country No. 58 Years 2023 concerning Liquid Waste Quality Standards For Hospital Activities, liquid waste are all waste materials possible liquid form contains pathogenic microorganisms, toxic chemicals, and radioactivity.(Ali et al., 2023) Liquid waste can come from: nutritional kitchen and canteen waste, laundry, laboratory, x-ray and radiotherapy. (Peraturan Menteri Kesehatan Republik Indonesia Nomor 7 Tahun 2019, 2019)

Liquid waste has standards waste that can be thrown into the environment, which is called liquid waste quality standards. Raw the quality of hospital liquid waste is the limit maximum allowable liquid waste discharged into the environment from an activity hospital. (Ali et al., 2023). Health Hospital environment, waste water from all sources from buildings/activities hospitals must be processed in the installation waste water treatment. Mandatory hospital providing IPAL (Processing Installation Wastewater). Pollution in hospitals can occur due to waste water management which is not good. Therefore, the need for home wastewater management good and true pain, so that the environment the hospital becomes healthy, comfortable, and sustainable. Waste water management good and true can also support effluent quality so that it does not exceed liquid waste quality standards and not cause pollution in the environment hospital. (Ramon et al., 2019)





Waste management is carried out by condition that it does not contaminate air, water, soil, does not cause odor, and no cause a fire. Waste management solid medical can be done in a variety of ways method, one of the implementation of management solid medical waste, namely with using an incinerator machine. Incinerator used as a tool for burning and managing medical waste generated from hospital activities. (Veronica Prila Arlinda et al., 2022)

2. Research Method

Research on management liquid waste in pollution prevention environment in this hospital using literature study methods (literature review). Population of 4 journals and journals published in the last 5 years. Say the key used is hospital, waste water, WWTP, analyze with using PICO.

3. Results

Name, years	Research Design	Sample	Result
(Wahyuningsih et al., 2020)	This research is descriptive in nature, namely to find out a description of the system liquid waste processing at Syarifah Ambami Rato Ebu Bangkalan Regional Hospital.	Research object This is an inspection of the quality of liquid waste at the Syarifah Ambami Rato Regional Hospital IPAL Ebu Bangkalan with sampling once a month.	From the results of measuring liquid waste parameters which were tested at the DLH laboratory. It is known that the East Java Province laboratory test results for NH ₃ and E-coli exceed quality standards or not according to East Java Gubernatorial Regulation No. 72. 2017. NH ₃ = 1.05Mg/l, Quality Standard (0.1 Mg/l). E-coli = 35,000/100ml Quality Standard (10,000/100ml). The cause of NH ₃ exceeding quality standards is due to because during the processing process in the tank 3 aerobic room unit the blower machine died. Where as the cause of high e-Coli is an inappropriate chlorination process.
(Zeswita & Indriati, 2022)	Deskriptive with analize is kuantitative	The sample for this research is liquid waste at the hospital.	1. waste water source at RSUD in South Solok liquid from the hospital laboratory tests stated





		method of collecting data through primary data by observation.	that it was waste pharmacy, obstetrics and laboratories. Results surgery, isolation room, polyclinic, room kitchen, bathroom, nurse's room, room come from various rooms, namely the canteen, in South Solok has meet the liquid waste quality standard values. 2. Hospital liquid waste that has been processed through waste water management stages (IPAL) is discharged to the final sedimentation tank (fish pond) before discharged into public channels connected to rivers and channeled into rice fields. Results laboratory tests of liquid waste from hospitals have met waste quality standards liquid (COD, BOD, pH, E-Coli, free NH ₃ , PO ₄).
(Yuwati, 2021)	The research methodology used field surveys, literature studies, interviews and test analysis of the characteristics of liquid waste in the laboratory.	The sample in the research was water waste taken before being processed at the IPAL (inlet) and waste water samples that have been collected processed from IPAL (outlet). Samples are taken periodically every 1 month.	The results of the water analysis showed that the parameters of temperature, PH, BOD, COD, TSS, and NH ₃ , have met the Quality Standards of Hospital Liquid Waste that have been stipulated by the government. The process of managing liquid waste at the X Hospital in South of Sumatera has been carried out properly and in accordance with the Decree of the Minister of Health of the Republic of Indonesia Number: 1204/MENKES/SK/X/2004, namely the hospital has carried out its own wastewater treatment using a Wastewater Treatment Plant.
(Fitria et al., 2020)	The type of this research was a	Data collection obtained through	1. the research that has been done, it can be seen in the





	<p>descriptive study using qualitative methods,</p>	<p>observations and observations of the condition of the drainage of wastewater treatment, and interviews with related sections, namely the sanitation department and WWTP officers of Lampung Province Mental Hospital about the wastewater treatment process.</p>	<p>treatment of wastewater in the Lampung Provincial Mental Hospital that has not gone well. In the treatment of wastewater treatment plants WWTP off, the wastewater from laundry is not flowed to WWTP, the inspection of wastewater quality is not in accordance with established regulations.</p> <p>2. Parameters : Gol Germ. Coli Inlet : 9200/100 ml Interpretation : M Outlet : 1800/100 ml Interpretation : M Maximum Level : 10000/100 ml</p>
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4. Discussions

Based on the table above, you can It is known that of the 4 journals, 2 (two) of them (50%) did not comply quality standards for hospital liquid waste and 2 of them (50%) met the standards quality of hospital liquid waste. For determine the quality of liquid waste, parameters are used, namely parameters physical, chemical and biological. Physical parameters in the form of temperature and pH, chemical parameters in the form of BOD (Biological Oxygen Demand), COD (Chemical Oxygen Demand), TSS (Total Suspended Solid), free NH₃, phosphate. It is said that it does not meet standards the quality of liquid waste because it only does quality standard inspection on one parameters only. If not done overall quality standard inspection it will damage the environment. Water waste contains germs, substances dangerous and poisonous that can be cause disease. Besides that, causes of non-fulfillment of quality standards liquid waste due to several parameters the results exceed liquid waste quality standards.

Liquid waste produced by hospitals include: waste water comes from the canteen and nutritional kitchen in the form of food waste (contains oil and fat); wastewater originating from space hospitalization in the form of eating and drinking patient, patient waiter, water from the room bathe. The wastewater contains chemicals that can cause infection and contains germs; water waste originating from space central surgery/surgery





in the form of chemicals, remaining medicines, water used to wash surgical equipment, or from the patient's body; water waste originating from the isolation room in the form of blood. (Zia Napoleon Bayusunuputro & Arum Sari, 2022) The patient's blood can contains HIV, Hepatitis B, and viruses germs of other diseases; waste water comes from the outpatient room/polyclinic in the form of water from the sink, alcohol, and drugs; wastewater originating from space pharmacy in the form of medicines; wastewater those from the obstetrics room; and water waste originating from laboratories in the form of water containing heavy metals or other chemicals. (Syifa Qurratu'ain et al., 2023)

All that waste water channeled to the IPAL, but for water waste originating from the nutritional kitchen accommodated in a special tank (catching tank fat/greasetrap), the goal is to make fat does not mix with water.(Baeti et al., 2022) Plus, water waste originating from laboratories neutralize first by giving anion and cation powder, due to waste water which comes from many laboratories contains toxic chemicals comes from the remaining examination samples and reagents for examination. Stage waste water treatment, as follows: Pretreatment (pre-processing) This stage is the initial stage carried out before liquid waste enter the main processing process. At this stage, the burden of content liquid waste will be reduced. (Perwira et al., 2022b)

- a. Kitchen pretreatment. This stage aims to separate fat or carried solids/garbage liquid waste.
- b. Laundry pretreatment. This stage aims to separate solid (suspended solid/SS), fat, and dirt other.
- c. Metal Precipitator. This stage aims to neutralize and reduce chemical content is present in the liquid waste that originates from the laboratory. Cleaning activities, such as removal of settled objects (sand), needs to be done to speed up and expedite the processing process subsequent liquid waste. Inner unit this stage includes a catch basin sand (grit chamber), catch basin fats and oils (skimmer and grease trap), and equalization tank (basin equalization). Equalization tank This function is to handle speed flow by stirring up waste water so that you can enter the IPAL directly constant.





First Stage Processing (Primary Treatment), this stage is a stage physical processing, where collection of waste water into the tank main precipitator. (Perwira et al., 2022a) Second Stage Processing (Secondary Treatment), this stage is a stage biological processing. Liquid waste flowed to the Bio-reactor unit for processed biologically using aerobic degrading microbial services pollutant. The aim of this stage is so that liquid waste is released into environment meets standard standards quality of liquid waste. Microbes pollutant degradation developed in packing special media to optimize activity in liquid waste. Third Stage Processing (Tertiary Treatment), this stage is a stage continuation if there are still a lot of substances which is dangerous for society. (Tosepu et al., 2023)

Environmental pollution at home Pain cannot be removed, but it can be minimized by treating water waste effectively and efficiently so pollution load entering environment can be reduced. Liquid waste that has met standard quality standards for hospital liquid waste must be completely fulfilled by the house sick, so that liquid waste is excreted into the safe and non-disruptive environment public health around the hospital.

5. Conclusion

Liquid waste generated by the house illness includes wastewater originating from canteen and nutritional kitchen, waste water comes from inpatient rooms, waste water originating from the operating room/surgery central, wastewater originating from space isolation, waste water originating from space outpatient/polyclinic, waste water comes from the pharmacy room, waste water comes from the obstetrics room, and water waste originating from laboratories. All waste water is drained towards the WWTP, except for waste water comes from the nutrition kitchen, laundry, and laboratory, because it has to be done special treatment before going to the IPAL. In the IPAL, processing is carried out until the waste water fills liquid waste quality standards and appropriate released into the environment. Liquid waste which has met quality standards hospital liquid waste must be completely filled by hospitals, so that waste liquid released into a safe environment and does not harm health community around the hospital.

6. Compliance with ethical standards





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There is no potential for any stakeholder to have a conflict of interest in this research.

Statement of informed consent

In our capacity as writers, every action we perform constitutes a joint agreement or consent.

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