Medical waste water management in Bhayangkara General Hospital at Medan city towards green hospital concept

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Abstract. Bhayangkara General Hospital is one of the hospitals in Medan City, which is located in the official residential area of the Mobile Brigade personnel of the Sumatera Utara Regional Police, therefore this Hospital is considered feasible to be used as a research location to see how the handling of medical waste water is managed properly. This type of research is a mixed method between qualitative and quantitative research. The purpose of this research was to determine the handling of medical waste water management at the Bhayangkara General Hospital Medan towards the Green Hospital development program. The green hospital concept is a PROFER criteria, one of the indicators is from the aspect of waste management (KLHK). Respondents in this research amounted to 40 people who were taken purposely (purposive sampling). Data were analyzed using CFA (Confirmatory Factor Analysis). Based on the processed data through CFA, an analysis of several related variables was obtained, namely; the variable of liquid waste (Y) Measurement indicators of physical and chemical parameters (1.00 coefficient); treatment of waste water management installation (0.2 coefficient); Monitoring of waste water management installation (0.2 coefficient); Utilization of final results of waste water management installation from the water waste (0.9 coefficient).

1. Introduction
Environmentally friendly Hospitals (Green Hospital) can be an answer to the efficiency and quality of good health and sustainability. Green Hospital is an environmentally sound hospital and the answer to the demands of the service needs of the hospital customers that shifted towards the plenary service as well as based comfort and safety of the hospital environment [1]. Green Hospital has a lot of terminology in the name of green hospitals, there are also those who interpret an environmentally friendly hospital. The concept of Green Hospital can be explained by Azmal, 2014. Joint Comission International Accreditation has formulated the
principle of Green in the hospital as follows: 1) hospital in the future should be a healthy place both inside and in the surrounding environment. 2) Reduce the level of toxicity on the ingredients used by hospitals. 3) Hospitals should be as little as possible using energy and water resources reduce the production of waste produced, 4) align the environmental health in consideration of health system priorities according to provisions 5) enter the concept Sustainable health Services [2].

The concept of Green Hospital in Indonesia will measure the performance of hospitals, referring to the concept of three Green hospital criteria. Three criteria include the criteria of PROFER (the company's performance rating assessment Program in Environment Management) from the Ministry of Environment as the criteria for waste management, building design criteria and criteria Energy management, food, pharmacy, transportation and purchasing [3, 4, 5, 6, 14].

The results of this research are expected to be used as information material and consideration for Bhayangkara General Hospital at Medan city in other cities in making integrated planning policy in managing hospitals waste to Green Hospital development see the figure 1.

Figure 1. Installation of water treatment for liquid waste of Bhayangkara Hospital in Medan

2. Material and Methods
2.1. Place and time of research
The study was conducted at Bhayangkara General Hospital, Medan City, located in North Sumatera Mobile Brigade Area at K. H. Wahid Hasyim Street, Medan City. The study took place in January 2019 until March 2019.

2.2. Methods
The research begins with the preparation of research, preliminary surveys, then the implementation of research and data collection through observation or interviews and questionnaires, data analysis and writing report. This research uses a qualitative and quantitative research approach.
2.3. Mathematical Formulation

This research variable, namely: Green Hospital (X), mitigation (Y1), Solid waste (Y2) and waste water/liquid (Y3). In the proposed hypothesis testing, data obtained from secondary data [9] will be processed according to the needs of the analysis [8, 10]. For the sake of discussion of data processed and displayed based on the principles of descriptive statistics, while for the sake of analysis and hypotheses testing used inferential statistics [12, 15].

The solution in the mathematical process, see figure 2, is to reduce the inability of the model developed to produce a unique estimate [7]. Identification issues may arise through the following symptoms: 1. Standard error for one to several coefficient is very large [1, 6]. 2. The Program is not able to produce matrix of information that should be presented. 3. The emergence of strange figures, such as variance errors are negative value. 4. The emergence of very high correlation numbers between the estimates coefficient obtained (example more than 0.9).

2.3.1. Parameters

1) X1.1 = Waste Management Training
2) X1.2 = Hazardous waste Legislation Regulation (AMDAL).
3) X1.3 = Waste knowledge.
4) X1.4 = Written policy to reduce the use of hazardous and toxic chemicals.
5) X2.1 = Sorting and collecting waste.
6) X2.2 = Waste deodorization
7) X2.3 = Hazardous Waste Destruction.
8) X2.4 = Hazardous Solid waste production and liquid waste.
9) X3.1 = Physical and chemical Parameter measurements.
10) X3.2 = IPAL Treatment.
11) X3.3 = IPAL surveillance.
12) X3.4 = Utilization of wastewater from IPAL for crops and compost.
13) X4.1 = Training officers in the handling of hospital medical solid waste.
14) X4.2 = Condition of society in the hospital environment.
15) X4.3 = Attitude of people in a hospital environment.
16) X4.4 = The level of awareness of the hospital against medical solid waste treatment

3. Result and Discussion

Based on the results of interviews with informants and the results of observations are in accordance with the Republic of Indonesia Decree No. 1204 of 2004 concerning Hospital Environmental Health Requirements. Global green and healthy hospital states that in the direction of green hospitals in the field of waste management, minimization and separation of waste is a real thing in waste management which is an indicator in green hospitals. Furthermore, in the waste management process, it is necessary to ban the use of materials which are harmful to the environment and disposable products that do not have to be used. Based on observations found that there is already the use of symbols prohibited from using hazardous substances that are harmful to the environment.

The result of medical waste water management in Bhayangkara General Hospital at Medan city towards green hospital concept, can be stated as follows the Figure 3.
Figure 2. Conceptual framework and image scheme

Figure 3. Statistical T Test SEM Models
Laboratory test results of liquid waste samples can be seen in the following Table [11, 13]:

**Table 1. Physical and chemical Parameter Measurements**

| Parameter               | Unit | Totally for quality raw | Result analysis laboratory | Methode |
|-------------------------|------|--------------------------|---------------------------|---------|
| Ph                      | -    | 6.0-9.0                  | 7.71                      | 4500-H-B |
| Amoniak                 | mg/l | 1.66                     | 1.22                      | 4500-NH3-F |
| TSS                     | mg/l | 30                       | 28                        | 2540 D   |
| Oil and Grease          | mg/l | 5                        | 1.0                       | 5520 B   |
| COD with                | mg/l | 100                      | 58.8                      | 5520 C   |
| K2Cr2O7                 |      |                          |                           |         |
| BOD 5 days until 20°C   | mg/l | 30                       | 29.20                     | 5210 B   |
| Total Coliform /100 ml  |      | 3000                     | 350                       | 9222 B   |

Source: Environmental Health Engineering Center and Disease Control Class I Medan, 2017.

4. Conclusion
The conclusions medical waste water management in Bhayangkara General Hospital at Medan city towards green hospital concept, can be stated as follows:

a. Data were analyzed using CFA (Confirmatory Factor Analysis). Based on the processed data through CFA, an analysis of several related variables was obtained, namely; the variable of liquid waste (Y).

b. Based on processed Y24 CFA data of 0.98 which means it is good enough in the implementation.

c. Measurement indicators of physical and chemical parameters (1.00 coefficient).

d. Treatment of waste water management installation (0.2 coefficient).

e. Monitoring of waste water management installation (0.2 coefficient).

f. Utilization of final Results of waste water management installation from the water waste (0.9 coefficient).

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