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## **Study of Medical Waste Management Evaluation Based on Tri Hita Karana Concept in Sanglah General Hospital, Denpasar**

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**Received: 2018-08-24; Accepted 2018-09-11,**

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### **Abstract:**

The purpose of this study was to describe the quality of the implementation of the Program Management of Medical Waste-based concept of Tri Hita Karana in Sanglah Hospital in Denpasar in terms of context, input, process, product, and to describe the constraints any encountered in the implementation of the Program Management of Medical Waste-Based Concept of Tri Hita Karana at Sanglah General Hospital, Denpasar. The type of research used is evaluative. The number of samples used was 50 people. Data collection using a Likert scale questionnaire. Data were analyzed using CIPP. The results showed the conversion of the CIPP value to the Glickman prototype (+ + - +). If converted into quadrants prototype Glickman, then the quality of the implementation of the Medical Waste Management Program Based on the concept of Tri Hita Karana 2018 Sanglah Hospital located in quadrant II (second) or relatively effective. It is recommended to have a measurable measurement of training for employees of medical waste management and supervision.

**Keywords:** Context, Input, Process, Products, Management of Medical-Waste Based on Tri Hita Karana

### **Preliminary:**

Permenkes 1204 of 2004 states that every individual produces 60 grams of waste per day, so the amount of waste produced by Sanglah Hospital is 81,000 grams per day. The amount of medical waste produced by RSUP is very large, related to the amount of waste produced, one of which is solid medical waste consisting of sharp objects such as used syringes, preparation glass (Glass preparations), infusion sets, ampoules / medicinal vials, broken glass, bisturi (former operating knife), and others. infectious waste, namely the culture and stock of infectious agents from laboratory activities,

waste resulting from surgery or autopsy from patients suffering from infectious diseases from the isolation section, tools or other material touched by the sick person. Pathological waste, namely fetal organs, blood, vomit, urine and other bodily fluids, visible bodily fluids (limbs and placenta not through burial). Cytotoxic waste is a cototoxic drug that has the ability to kill or stop certain cell growth and is used in cancer chemotherapy, vomiting, urine or feces of patients treated with cytostatic drugs, chemicals, and radioactive, and formaldehyde. Pressurized packaging waste, namely Gas in cartridge tubes, aerosol cans, and others.

Pharmaceutical waste, namely pharmaceutical products, drugs, vaccines, serum that has expired, drug spills, and others. Expired drugs, drugs returned by patients and waste produced during compounding / drug production, including gloves, masks, bottles / boxes containing residues and others. Waste with heavy metal content which is metal mercury waste, which comes from leakage of medical equipment (thermometer, tensimeter and dental fillings) (Nainggolan and Supraptini, 2006). Chemical waste namely photographic chemicals regensia, solvents and others. Radioactive waste namely chemotherapy and radiotherapy. All of these wastes are B3 waste (hazardous and toxic materials) (Sari and Dalem, 2012; Sediharti, 2012; Razali and Ishak, 2010; Baaki et.al, 2017; Khosravipour and Nejati, 2016; Komilis et.al, 2012; Kumar et.al, 2015).

Then how is the relationship of medical waste solid with the concept of Tri Hita Karana, what is meant by Tri Hita Karana (THK) is THK derived from Sanskrit, which is tri which means three; hita which means happiness, kindness, joy, endurance, and karana means cause. The three elements contained in THK are pahrayangan, pawongan and palemahan. The elements of shadow are related to the Lord. The aspect of pawongan involves human relations with humans, wong means people as citizens. Palemahan is a balance of human relations with their environment. Weak means yard or residential area. (Wiana, 2007).

There is a technical mismatch between the existing B3 waste management in the storage system, collection, storage and destruction (Dhani, 2014; Siskawati and Susilawati, 2017; Astawa et.al, 2018). To note that the characteristics of medical waste have infectious or toxic properties, if not managed properly, will cause pollution (Madiasworo et.al, 2014). Medical solid waste is waste that originates from medical services, dental care, laboratories, pharmacy or the like, research, and which contain toxic substances, and treatment. Waste management is a strategic aspect of the Environmental Hygiene and Health Installation

(IKKL) program. However, this aspect has not been much explored, this study intends to study and harmonize medical waste management with the concept of Tri Hita Karana.

The purpose of this study was to describe the quality of the implementation of the concept of waste management based on Tri Hita Karana in terms of context, input, process, product. To describe what obstacles faced in implementing the medical waste management program based on the concept of Tri Hita Karana Denpasar Hospital.

## Literature:

### Basic Concept of Medical Waste

- a. Hospital Waste is all waste generated and hospital activities in the form of liquid and gas solids.
- b. Hospital solid waste is all solid hospital waste as a result of activities consisting of solid and non medical waste.
- c. Solid medical waste is solid waste consisting of infectious waste, pathological waste, sharps waste, pharmaceutical waste, cytotoxic waste, chemical waste, radioactive waste, pressurized container waste, and heavy metal waste.
- d. Infectious waste is waste contaminated with pathogenic organisms that are not routinely present in the environment and the organism is in sufficient numbers and virulency to transmit disease to vulnerable humans.
- e. Highly infectious waste is waste from breeding and stock of highly infectious material, autopsy, animal organs and other material that has been inoculated, infected or in contact with highly infectious material.
- f. Cytotoxic waste is waste from contaminated material from the preparation and administration of cytotoxic drugs for cancer chemotherapy which has the ability to kill or inhibit live cell growth.
- g. Minimization of waste is an effort made by the hospital to reduce material (reduce), reuse waste (reuse), and recycle waste.

### Approach Used:

Law Number 36 of 2009 concerning Health states that environmental health efforts are aimed at realizing a healthy quality of the environment, including among public places and facilities, such as health facilities. Law No. 32 of 2009 Article 59 paragraph (1) states that every person who produces B3 waste must carry out the management of B3 waste produced. Based on Government Regulation (PP) Number 18 of 1999 concerning Management of Hazardous and Toxic Waste Article 8 paragraph (1), medical waste is included in the category of hazardous and toxic waste material (B3) therefore health facilities as producers of medical waste must manage waste produced correctly and safely.

### Principle:

Basically, in implementing medical waste management, there is a need for basic principles based on international agreements, namely:

- a. The "polluter pays" principle or "polluter" principle that pays that all waste producers are legally and financially responsible for using safe and environmentally friendly methods in waste management
- b. The "precautionary" principle or the principle of "prevention" is a key principle that regulates health and safety protection through handling efforts as quickly as possible assuming significant risks can occur
- c. The "duty of care" principle or the principle of "obligation to be vigilant" for those who handle or manage hazardous waste because ethically is responsible for implementing high alertness
- d. The "proximity" principle or the principle of closeness in handling hazardous waste to minimize the risk of transfer.

### Medical Waste Management:

#### 1. Waste Minimization

- a. Every hospital must do waste reduction starting from the source.

- b. Each hospital must manage and supervise the use of hazardous and toxic chemicals.
- c. Every hospital must manage chemicals and pharmaceutical stocks.
- d. Every equipment used in the management of medical waste starting from collecting, transporting and destroying must go through certification from the authorities

#### 2. Sorting, Processing, Reuse and Recycling:

- a. Waste segregation must be carried out starting from sources that produce waste
- b. Waste that will be reused must be separated from waste that is not reused
- c. Sharps must be collected in one container without training in contamination or whether the container must be leak-proof, puncture-proof and not easy to open so that unauthorized people cannot open it.
- d. Needles and syringes must be separated so that they cannot be reused
- e. Solid medical waste that will be reused must go through a sterilization process.
- f. Hypodermic needle waste is not recommended for reuse.
- g. If the hospital does not have a disposable needle, the hypodermic needle waste can be reused after going through the sterilization process.
- h. Solid medical waste treatment must meet the requirements with the use of containers and labels.
- i. Recycling cannot be carried out by the hospital except for silver recovery resulting from the X-ray film process.
- j. Cytotoxic waste is collected in a strong container, antibocor, and labeled with cytotoxic waste.

#### 3. Collection, transportation and storage of solid medical waste in a hospital environment:

- a. Collection of solid medical waste from each waste-producing room using a special trolley that is closed.

- b. Storage of solid medical waste must be in accordance with the tropical climate, ie during the rainy season of a maximum of 48 hours and a long dry season of 24 hours.
- c. Containers for storing solid medical waste must always be available in all locations of waste-producing sources.
- d. Containers must be closed and filled with plastic bags with colors according to the type of waste.
- e. Waste in the bag must be collected at the designated storage location every day or if it has been filled 3/4 full.
- f. Before it is collected, make sure that it is recorded and that it has been labeled containing the date, weight and source of waste.
- g. Plastic bags that have been used should not be reused and replaced with new bags of the same type.

#### 4. Transportation:

The things that must be considered in transporting solid medical waste are as follows:

##### a. Internal transport (*Onsite*):

1. Using special transportation equipment that is closed, waterproof, easy to clean and equipped with special marks for transporting waste
2. The transportation route is attempted through the most appropriate route and must be planned before the trip begins, the path is different from the transportation of food
3. Transport agents must use personal protective equipment (PPE)
4. The transport officer must bring the manifest or recording document and sign it

##### b. External transport (*Offsite*):

- 1) Using transportation equipment / special vehicles to transport medical waste and must have permission from the Ministry of Transportation.

- 2) The transportation route is attempted through the most appropriate route and must be planned before the trip begins, in accordance with applicable regulations.
- 3) The transport officer must use PPE
- 4) The transport officer must bring the manifest and sign it

Both internal and external transport equipment used must be cleaned and disinfected every day while for the PPE used must be cleaned and disinfected after use. After departure from the waste generating point every effort must be made to prevent additional handling.

#### 5. Temporary Storage:

Penyimpanan sementara harus memenuhi persyaratan sebagai berikut:

- a. Have permission from the Regent / Waticota, with conditions in accordance with applicable regulations.
- b. The shelter must have a sturdy, impermeable, well-drained floor, wall and roof, the floor must be easily cleaned, and disinfected.
- c. There must be a cleaning station with sufficient water supply equipped with a closed sewer to the WWTP.
- d. The shelter area must be easily accessible by staff in charge of handling waste.
- e. The room or area must be locked to prevent unauthorized entry of people.
- f. Waste is placed in a container that is closed, strong, waterproof and neatly arranged in sequence according to entry.
- g. Ease of access by waste collection vehicles is very important.
- h. There must be protection from the sun.
- i. Shelter areas should not be easily accessible to insects, birds and other animals.
- j. There must be good lighting and ventilation.
- k. Shelter locations should not be near the location of food storage or food preparation.
- l. Supplies of cleaning equipment, protective clothing, and waste bags or containers must be

located in a location close enough to the waste disposal location.

- m. The maximum storage time for medical waste is 2 x 24 hours

### 1. Processing / Destruction:

Some processing methods that can be used in the management of solid medical waste include:

- a. Incinerator
- b. Chemical disinfection
- c. Autoclave
- d. Open Microwave

### Basic Concept of Tri Hita Karana:

In the life of Balinese people there is a philosophy known as Tri Hita Karana (THK). THK comes from the Sanskrit language, which is Tri which means three, hita which means happiness, kindness, joy, endurance, and karana means cause. Thus, THK means three elements that cause happiness. The three elements contained in THK are pahrayangan, pawongan and palemahan. The element of parahyangan relates to the deity, which means Sang Hyang Widi (God Almighty). Humans must establish a harmonious relationship with God. How far humans maintain harmony in their relationship with God, how far humans maintain harmony in their relationship with God as seen from their daily behavior in carrying out their religious teachings. Wong means people as citizens. Palemahan is a balance between human relations and the environment. Weak means yard or residential area. If these three aspects develop in balance, it will be the guidance of human life that will guarantee the happiness of his life in the world (Wiana, 2007).

### CIPP Program Evaluation

Evaluation is an effort to measure and source this objectively from the achievement of previously planned results, where the results of the evaluation are intended to be feedback for planning to be carried out in the future (Yusuf, 2000). Anderson views evaluation as a process of determining the results achieved by several activities planned to

support the achievement of goals. While Stufflebeam, revealed that evaluation is a process of drawing, searching and providing information that is useful for decision makers in determining alternative decisions (Arikunto, 2002).

Evaluation is a process of providing information that can be used as a consideration to determine prices and services (the worth and merit) of the objectives achieved, design, implementation, and impact to help make decisions, help accountability and increase understanding of phenomena. According to the formula, the core of the evaluation is the provision of information that can be used as a material consideration in making decisions. (Widoyoko, 2012: 4)

Programs are activities or activities designed to implement policies and implement for an unlimited time. Certain policies are general and to realize policies various types of programs are arranged. (Wirawan, 2012: 16).

Program evaluation is a series of activities carried out intentionally to see the level of success of the program. There are several understandings about the program itself. According to Tyler (1950) in Arikunto (2009: 5), program evaluation is a process to find out whether educational goals have been realized. Furthermore, according to Cronbach (1963) and Stufflebeam 14 (1971) in Arikunto (2009), program evaluation is an effort to provide information to be conveyed to decision makers..

### Research Methods:

#### Research design

In the theoretical study it has been explained that of the many program evaluation models, none of the best models. The implementation of the evaluation model needs to be adjusted to the evaluation design and the dimensions of the program to be evaluated. In connection with the evaluation study on the implementation of the medical waste treatment program based on the Tri Hita Karana concept, the CIPP model was chosen, with consideration:

1. Program yang akan dievaluasi tersusun berdasarkan komponen *context, input, process*, dan *product*.
2. Informasi yang diperlukan menyangkut keempat komponen tersebut.
3. Kebijakan-kebijakan yang akan diambil sebagai implementasi dari studi evaluasi ini terkait dengan keempat komponen tersebut.

**Population and sample:**

The population in this study were 50 people who manage or implement medical waste management programs and the community. Using a purposive sampling method.

**Evaluation of the Medical Waste Management Program Based on the Tri Hita Karana Concept:**

Evaluation of the medical waste management program based on the concept of Tri Hita Karana with the CIPP method The characteristics of the data found will be different, so before all the data is searched for mean (mean) and standard deviation (SD) which is then analyzed by transforming all the calculated data using the formula:

$$Z = \frac{X - M}{SD}, Z = \text{book value.}$$

T-score is a number scale that uses the mean = 50 and standard deviation = 10. The T-score scale can be searched by multiplying the Z-score by 10, then adding 50 (Arikunto, 2006). Thus, the formula used to calculate the T-score is:

**T = 10 (Z) + 50 or T = 50 + 10 Z (Arikunto, 2006).**

To find the T-score for each Z number multiplied by SD, then add the mean. Changing T-scores to + and - used rules:

T-score > 50 = + (plus)

T-score ≤ 50 = - (minus)

Then the conversion (change) from the CIPP T-score to the Glickman quadrant is described in the following prototype.

<p><b>CIPP</b> <b>Quadrant II</b> (+++ -) (++ - +) (+ - ++) (- +++ ) <b>(Effective)</b></p>	<p><b>CIPP</b> <b>Quadrant I</b>  (++++) <b>(Very Effective)</b></p>
<p><b>CIPP</b> <b>Quadrant IV</b>  (----) <b>(Less effective)</b></p>	<p><b>CIPP</b> <b>Quadrant III</b> (+---) (-+--) (--+-) (---+) (+--+) (+-+-) (-+-+) (-++-) (- - ++) (+ - - +) <b>(Effective enough)</b></p>

**Figure 1 Effectiveness Prototype of the Implementation of the Medical Waste Treatment Program Based on the Tri Hita Karana Concept (Adaptation of Glickman's theory, 1981)**

**Research Results and Discussion:**

The results of the analysis of context variables transformed into T-Scores can be described in Table 4.4, as follows:

**Table 1 Recapitulation of Context Variable Calculation Results**

Variable	Frequency			Description
	f (+)	f (-)	Result	
Context	16	14	+	Positive
Result	+			Positive

Based on Table 1 above it appears that in the context variable, S (+) = 16 < S (-) = 14, so as to produce positive (+) (effective). Thus, it can be

stated that the quality of the implementation of the medical waste management program based on the concept of Tri Hita Karana in Denpasar Sanglah Hospital in 2018 is viewed in terms of context as effective. This means that the implementation of the medical waste management program based on the concept of Tri Hita Karana in Denpasar Sanglah Hospital in 2018 is in accordance with the vision, mission, because these components are used as a benchmark in measuring the context variables.

The results of the analysis of input variables transformed into T-Scores can be described in Table 4.5, as follows:

**Table 2 Recapitulation of Input Variable Calculation Results**

Variable	Frequency			Description
	f (+)	f (-)	Result	
Input	17	13	+	Positive
Result				Positive

Based on Table 2 above it appears that in the input variable,  $S (+) = 17 > S (-) = 13$  so as to produce (+) (effective), thus, it can be stated that the quality of the implementation of the medical waste management program is based on the Tri Hita Karana concept in Denpasar Sanglah Hospital in 2018, in terms of input, it is classified as effective. This means that the implementation of the medical waste management program based on the concept of Tri Hita Karana in Denpasar Sanglah Hospital in 2018 in terms of human resources, operational costs, facilities and infrastructure has been effective, because these components are used as benchmarks for measuring input variables.

The results of the analysis of process variables transformed into T-Scores can be described in Table 3, as follows:

**Table 3 Recapitulation of Calculation Results of Process Variables**

Variable	Frequency			Description
	f (+)	f (-)	Result	
Process	12	18	-	Negative
Result				Negative

Based on Table 4.6 above shows that the process variable,  $S (+) = 12 < S (-) = 18$  so as to produce (-) (Not effective), thus, it can be stated that the quality of the implementation of a medical waste management program based on the Tri Hita concept Karana in Denpasar Sanglah Hospital in 2018 in terms of the process is classified as ineffective. This means that the implementation of the medical waste management program based on the concept of Tri Hita Karana in Denpasar Sanglah Hospital in 2018 in terms of planning, implementation, supervision and evaluation has not gone well in supporting the quality of the implementation of the medical waste management program based on the Tri Hita Karana concept in Sanglah Hospital Denpasar Year 2018.

The results of the analysis of product variables transformed into T-Scores can be described in Table 4, as follows:

**Table 4 Recapitulation of Product Variable Calculation Results**

Variable	Frequency			Description
	f (+)	f (-)	Result	
Product	28	22	+	Positive
Result				Positive

Based on Table 4 above it appears that the product variables,  $S (+) = 28$  and  $S (-) = 22$  so as to produce (+) (effective), thus it can be stated that the quality of the implementation of the medical waste management program is based on the Tri Hita Karana concept in Sanglah Denpasar General Hospital in 2018 in terms of product is classified as effective. This means that the implementation of the medical waste management program based on the Tri Hita Karana concept in Sanglah Hospital in Denpasar in 2018 is in line with the expectations of the hospital.

When analyzed as a whole of the context, input, process and product variables, the implementation of the medical waste management program based on the Tri Hita Karana concept in Denpasar Sanglah Hospital in 2018, after the data is transformed into the T-score, the results of the analysis are shown in Table 5, as following:

**Table 5 : Recapitulation of Calculation Results of Context, Input, Process and Product Variables Simultaneously**

No.	Variable	Frequency			Description
		f (+)	f (-)	Result	
1.	Context	16	14	+	Effective
2.	Input	17	13	+	Effective
3.	Process	12	18	-	Ineffective
4.	Product	28	22	+	Effective
<b>Result</b>				+ + - +	<b>Effective</b>

Based on Table 5 above it appears that in the context variable,  $S (+) > S (-)$  so as to produce + (Effective), for input variables  $S (+) > S (-)$  so as to produce + (effective), for process variables  $S (+) < S (-)$  so as to produce - (ineffective), and for product variables  $S (+) > S (-)$  so as to produce + (effective). If converted into the Glickman prototype quadrant, the quality of the implementation of the medical waste management program based on the Tri Hita Karana concept in Denpasar Sanglah Hospital in 2018 is located in quadrant II (second) or classified as effective. This means that in effective context variables, the effective input variables, the process variables have not been effective, and the product variables are effective. Based on this analysis it can be concluded that the implementation of the medical waste management program based on the concept of Tri Hita Karana in Denpasar Sanglah Hospital in 2018 is considered effective.

To answer the second problem, from the results of the analysis it can be seen that the constraints faced by the hospital in the implementation of the medical waste management program based on the Tri Hita Karana concept in Sanglah Denpasar Hospital in 2018 are as follows:

- 1) Still weak supervision on waste products.
- 2) The lack of understanding of the dangers of waste by the less painter collector in pouring liquid waste into containers, which has an impact on scattered waste.

- 3) Lack of training for waste management officers.

**Conclusions and Recommendations:**

Based on data analysis and research findings, it can be concluded as follows.

- 1) The quality of the implementation of the medical waste management program based on the Tri Hita Karana concept in Denpasar Sanglah Hospital in 2018 is reviewed in terms of the context of providing effective results (+), but the quality of the implementation of the medical waste management program based on the Tri Hita Karana concept in Sanglah Denpasar General Hospital in 2018 is reviewed from in terms of input, process and product provide effective results (+).
- 2) The constraints faced by Sanglah General Hospital in implementing the medical waste management program in 2018 are as follows: The weak understanding of the waste management concept based on Tri Hita Karana, less intensive supervision.

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