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Non-structural Preparedness Analysis At RSUP Dr. Mohammad Hoesin In Disaster Based On The Hospital Safety Index

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ABSTRACT

Disasters are one of the most challenging cases for health institutions that can disrupt health services' functioning. However, as essential and primary care providers in society, health institutions and especially hospitals must be prepared for disasters and emergencies. This study analyzes the hospital's non-structural preparedness in facing disasters based on the Hospital Safety Index in RSUP (Central General Hospital) Dr. Mohammad Hoesin. This research is a mixed-methods study with a sequential explanatory design. The research subjects were four people. The key informants consisted of Occupational Health and Safety Staff and Non-Medical Facilities Maintenance Staff. The triangulation informant was the Occupational Safety and Health Committee. The non-structural preparedness of RSUP Dr. Mohammad Hoesin, based on the Hospital Safety Index is 0.84. The results of the in-depth interviews show that the obstacles for hospitals in implementing disaster preparedness are budgetary funds and the focus of the hospital in improving structural preparedness and health services. RSUP Dr. Mohammad Hoesin is at a high level of non-structural preparedness. Overall, the hospital can function in emergencies and disasters. However, it is recommended to continue with steps to improve crisis and disaster management's security and capacity.

Analisis kesiapsiagaan non-struktural rumah sakit dalam menghadapi bencana berdasarkan Hospital Safety Index

Kata kunci:

Kesiapsiagaan bencana
Rumah sakit
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ABSTRAK

Bencana adalah salah satu kasus paling sulit bagi institusi kesehatan yang dapat mengganggu fungsi layanan kesehatan. Namun, sebagai dasar dan penyedia perawatan primer dalam masyarakat, institusi kesehatan dan khususnya rumah sakit harus siap menghadapi bencana dan keadaan darurat. Penelitian ini bertujuan untuk menganalisis kesiapsiagaan nonstruktural rumah sakit dalam menghadapi bencana berdasarkan Hospital Safety Index di RSUP Dr. Mohammad Hoesin. Penelitian ini merupakan penelitian mix methods dengan jenis sequential explanatory design. Subjek penelitian berjumlah empat orang. Informan kunci terdiri dari Staf Keselamatan dan Kesehatan Kerja dan Staf Instalasi Pemeliharaan Sarana Non-Medik (IPSNM). Informan triangulasi yaitu Komite Keselamatan dan Kesehatan Kerja. Kesiapsiagaan nonstruktural RSUP Dr. Mohammad Hoesin berdasarkan Hospital Safety Index sebesar 0,84. Hasil wawancara mendalam menunjukkan bahwa kendala rumah sakit dalam menerapkan kesiapsiagaan bencana yaitu anggaran dana, serta fokus rumah sakit dalam tahap peningkatan kesiapsiagaan struktural dan pelayanan kesehatan. RSUP Dr. Mohammad Hoesin berada pada level kesiapsiagaan nonstruktural tinggi. Secara keseluruhan rumah sakit dapat berfungsi dalam keadaan

darurat dan bencana. Namun, direkomendasikan untuk melanjutkan langkah-langkah dalam memperbaiki tingkat keamanan dan kapasitas penanganan darurat dan bencana.

Introduction

Disasters are one of the most difficult cases for health institutions that can disrupt the functioning of health services. However, as the basis of care in the community and primary care providers in disasters and emergencies, health institutions, and especially hospitals must be prepared to face dangers and unusual events (Saif, 2018). Hospitals are expected to be ready to maintain a safe environment for patients and staff, as well as provide for the medical needs of victims in the face of a disaster. Disaster management plans are very important in ensuring the preparedness and response of the hospital. A disaster management plan is a set of procedures, policies, patterns of interaction, roles, and possibilities that must be implemented in an event according to predetermined criteria (Djalali et al, 2013).

Indonesia is an archipelagic country traversed by two mountainous routes, namely the Mediterranean in the west and the Pacific Circum in the east, causing Indonesia to have 130 active volcanoes, and more than 5,000 large and small rivers, 30% of which pass through densely populated areas. factors that put Indonesia as a disaster-prone country (Depkes RI, 2007). The South Sumatera region consists of swamps and brackish which are influenced by tides, lowlands, mountainous areas, and has several large rivers. Palembang City is in the medium risk class for being exposed to the threat of disaster. The average elevation of Palembang city is 8 meters above sea level with most of the area swampy, so the risk of natural disasters that often occurs is flooding. Other disasters that need to be anticipated are non-natural or social disasters such as fire, social conflict, and terror (National Disaster Management Agency, 2013).

Hospital as a referral health service, especially for emergency cases, is demanded to be better prepared to face the impact of disasters. Disaster preparedness in hospitals can be assessed using the Hospital Safety Index guidelines issued by the World Health Organization (WHO). The Hospital Safety Index consists of three index groups, namely structural, non-structural, and functional preparedness. Non-structural preparedness was evaluated by assessing 93 elements. These elements are grouped into critical systems, air conditioning systems, fixtures, architectural elements, medical equipment, and supplies. Financially, these elements constitute the largest expenditure of the budget needed to build a hospital (Tabatabaei & Abbasi, 2016., Nisa, N., Mukhlis, H., Wahyudi, D., & Putri, R. 2019).

RSUP Dr. Mohammad Hoesin is the Central General Hospital for Government Agencies in Palembang City. This hospital was founded in 1953 and started operating on January 3, 1957. This hospital has several potential internal hazards, apart from infectious diseases there are also other potential hazards which are influenced by the situation and conditions in the hospital, namely explosions, fires, accidents related to electrical installations, radiation, hazardous chemicals, anesthetic gases, psychosocial and ergonomic disorders. . All of these potential hazards can cause disasters in the hospital that threaten the lives and lives of employees, patients and visitors in the hospital environment. External disasters can also disrupt and paralyze services in RSUP Dr. Mohammad Hoesin, such as floods, strong winds, and disasters due to technological failures. Based on the statement that has been stated, it is necessary to conduct research on "Analysis of Nonstructural Preparedness Dr. Mohammad Hoesin in Facing Disasters Based on the Hospital Safety Index ".

Method

This research uses a combination method (mixed-methods) with the type of Sequential Explanatory Design, where in the first stage data collection and analysis is carried out quantitatively, then in the second stage followed by qualitative data collection and analysis (Sugiyono, 2015). The quantitative method is used to determine the hospital's non-structural preparedness in the face of disasters where the measurement results are in the form of descriptive data, while the qualitative method is used to determine the obstacles experienced by the hospital in implementing disaster preparedness.

The research subjects consisted of four people consisting of Occupational Health and Safety Staff, Non-Medical Facilities Maintenance Staff, and the Occupational Safety and Health Committee. The tools used were the Hospital Safety Index (HSI) checklist, interview guide, stationery, voice recorder, and camera. Data analysis was carried out by calculating the non-structural preparedness index, collecting raw data, then a transcript of interviews, concluding in table form, interpreting and adjusting to existing theories from previous research.

Results and Discussion

Quantitative Analysis

The non-structural element is an element of disaster preparedness with a high level of preparedness, namely 0.84. The results of the assessment of the hospital's non-structural preparedness can be seen in the table 1.

The non-structural preparedness index group has several index groups of special concern, including (WHO, 2015):

1. Architectural Elements
   Architectural elements are not included in the main part of the hospital building structure but are very important for the performance of the hospital building. Based on observations there are still problems related to architectural elements, such as the narrow area in the front yard of the hospital which is used as a parking lot for four-wheeled vehicles so that it can hinder access to evacuation in the event of a disaster. The architectural element index in RSUP Dr. Mohammad Hoesin is in category A (high) with a value of 0.83.
2. Protection of infrastructure, access and physical preparedness of buildings.

The infrastructure protection index, access, and physical preparedness of buildings are in category A (high) with a value of 0.87. This index includes several elements such as hospital access routes, emergency exits, and evacuation routes, as well as the physical safety of buildings, equipment, staff, and patients. One of the accesses to RSUP Dr. Mohammad Hoesin was disturbed by the renovation and construction of a new building. Access is very important if the hospital is to function properly (Edmonds, 2017).

RSUP Dr. Mohammad Hoesin has emergency exits and evacuation routes that are found on walls and stairs in every building so that it can facilitate the evacuation process. Evacuation routes are very important to reduce damage and risk of casualties in the event of a disaster. People who are inside the hospital can follow the evacuation routes that have been provided to save themselves from the dangers that exist (Phyo & Sein, 2017). Then, there will be a gathering point at the end of the evacuation route which consists of 9 locations. This infrastructure shows that the place which is the last point is a place that is safe from disasters (Ramadhana, Ismail, & Husin, 2018).

RSUP Dr. Mohammad Hoesin has a securities system to protect his assets. There is CCTV (Closed Circuit Television) which can be monitored in the security room. CCTV installation is needed for remote or isolated places, parking areas, and other areas where losses often occur in hospitals (Berliana & Widowati, 2019). In a disaster situation, the delivery of information on the first incident in the hospital is carried out by security guards or officers assigned to disaster management without reducing their main function (Yennizar et al, 2015).

Table 1
Recapitulation of Nonstructural Preparedness of RSUP Dr. Mohammad Hoesin, Palembang

No	Index Group	Total score	Maximum Number of Item Values	Index Group Score
1.	Architectural Elements	25	30	0,83
2.	Protection of Infrastructure, Access and Physical Preparedness of Buildings	7	8	0,87
3.	Critical System	87	106	0,82
4.	Equipment and Supplies in the Hospital	34	43	0,90
Structural Preparedness Index		**157**	**186**	**Index : 157/186 = 0,84**

3. Critical System

The critical system has an index of 0.82. Each assessment of critical system elements can be seen in the table 2.

a. Electricity System

The electrical system index in RSUP Dr. Mohammad Hoesin, namely 0.9 which is included in category A (high). The electrical system in Dr. Mohammad Hoesin consists of four generators with a total power of 5,465 kVA. The generator currently used by the hospital with a power of 3,000 kVA can meet the needs of the hospital in the event of an electric extinguisher. 100% of the electricity needed by the hospital is provided by the public network and the hospital's electricity generator if there is a power cut (Jahangiri, Izadkhah, & Lari, 2014). In addition, the location and placement of the generator are also well maintained and are regularly maintained.

Table 2
The Critical System of Dr. Mohammad Hoesin, Palembang

No	Critical System Elements	Number of Detailed Rating Points			Maximum Number of Item Values	Index
		Rendah	Sedang	Tinggi		
1.	Electricity system	-	2	8	20	0,9
2.	Telecommunication System	-	2	6	16	0,87
3.	Water Supply System	-	1	5	12	0,92
4.	Fire Protection System	-	1	4	10	0,9
5.	Waste Management System	-	-	5	10	1
6.	Fuel Storage System	-	1	1	10	0,3
7.	Medical Gas System	-	2	4	12	0,83
8.	Heating, Ventilation and Air Conditioning (HVAC) System	-	4	4	16	0,75
Index Group Score		**-**	**13**	**37**	**106**	**87/106 = 0,82**

b. Telecommunication System

Telecommunication system index in RSUP Dr. Mohammad Hoesin, namely 0.87 which is included in category A (high). The telecommunication system in RSUP Dr. Mohammad Hoesin is a telephone that is owned by every employee and medical officer in the hospital. A special telecommunication system in the form of a telephone that connects each room and HT (Handy Talky) is also used in hospitals. Communication is essential for the successful management of medical services and other essential services during disasters (Samsuddin et al, 2018). When all telephone lines, cellphones, and radio connections are lost, hospitals must have other alternatives to be able to communicate in the event of a disaster (Lapcevic et al, 2018).

c. Water Supply System

The water supply system index in RSUP Dr. Mohammad Hoesin, namely 0.92 which is included in category A (high). Hospital water supply is a critical system component that is most threatened during disasters (Janius, Abdan, & Zulkaf, 2017). The total capacity of the Water Tank at Dr. Mohammad Hoesin, namely 5,400 m3 which is able to meet water needs for ± 72 hours. In addition, the hospital's water source also comes from the PDAM, as well as periodic inspections and maintenance of the water supply system.

Internal water supply systems in hospitals are usually divided into two types of use; namely the use of facilities such as air conditioning systems, boilers, autoclaves, medical equipment, fire fighting, and sprinkler systems; and staff or patient use such as diet, dialysis services, laboratories, patient decontamination, pharmacy, surgery, and toilets (Centers for Disease Control and Prevention and American Water Works Association, 2012).

d. Fire Protection System

Fire protection system index at RSUP Dr. Mohammad Hoesin, namely 0.9 which is included in category A (high). The hospital is a difficult building to evacuate. An important aspect of fire safety is having the best means of prevention and protection (Simsek & Akinciturk, 2015). The fire protection system at RSUP Dr. Mohammad Hoesin has met the criteria by having a fire protection system either manually or automatically. The manual fire protection system uses fire extinguishers and hydrants that are scattered in each building, and automatically uses the Fire Alarm System. Then, there is a documented maintenance record, such as checking APAR and Hydrant every month.

e. Waste Management System

Index of waste management system in RSUP Dr. Mohammad Hoesin is 1 in category A (high). The waste management system in question is to review the waste management system and ensure that the waste does not pollute the environment and does not pose a risk to the health of the waste management system in RSUP Dr. Mohammad Hoesin is good overall. The hospital has a Wastewater Treatment Plant (IPAL) and an incinerator which is used to burn medical waste. Important factors in the storage of medical waste are storage areas with covers, keeping the storage area from being mixed with other waste, limiting site access, and choosing a safe place.

f. Fuel Storage System

Index of the fuel storage system in RSUP Dr. Mohammad Hoesin, namely 0.3 which is included in category C (low). This is because the hospital does not have above ground fuel tanks or cylinders. The fuel reserves owned by the hospital are diesel to fill generators, gas, and diesel. This reserve fuel is stored in the container and the supply is adjusted to the needs of the hospital. A safe and suitable place must be designed to store fuel (Moghadam, Moradi, & Amiresmaili, 2017).

g. Medical Gas System

Medical gas system index in RSUP Dr. Mohammad Hoesin, namely 0.83 which is included in category A (high). The medical gas system is a life support system because failure in the system can cause the death of the patient (International Standards Organization, 2002). Several medical gases are used in patient care, namely oxygen, medical water, nitrogen oxides, nitrogen, and vacuum (Karim et al, 2018). The medical gas system in RSUP Dr. Mohammad Hoesin is centrally using a portable system. Requests for medical gas stocks to third parties can be made if the use in the hospital is in maximum condition. Medical gas cylinders are placed in a special room for medical gas central in the presence of safety precautions. If there is an emergency or disaster so that access to filling medical gas cannot be passed, the medical gas will experience a vacuum, resulting in failure of the hospital's service function.

h. (HVAC) Heating, Ventilation, and Air Conditioning (HVAC) System

HVAC system index in RSUP Dr. Mohammad Hoesin, namely 0.75 which is included in category A (high). The location of the HVAC system in RSUP Dr. Mohammad Hoesin is in a safe place. HVAC system, AC pipes are protected by conduit. Water heaters and air conditioners are anchored to the walls of the building structure to prevent damage in the event of a disaster. The hospital also has a boiler room for laundry purposes and a hospital kitchen. The boiler gets heat supply from burning liquid fuel (diesel or internal diesel oil) (Syahputra, Wardhana, & Hermawan, 2016).

4. The Equipments and Supplies in the Hospital

The equipment and supplies element index in the hospital is included in category A (high) with a value of 0.90. Medical equipment supplies at RSUP Dr. Mohammad Hoesin is adequate and is carried out periodic maintenance. Medical and laboratory equipment used for diagnosis and treatment of patients, namely medical equipment in the operating room, radiology, laboratory, emergency room, intensive care room, pharmacy, sterilization, neonatal, other medical equipment, medical supplies, sterilized goods supplies, supplies medical gases, ventilator supplies, electromedical equipment, life-support equipment, and cardiopulmonary attack equipment. The hospital also provides special equipment when a disaster occurs.

Lakbala (2016) states that assessing non-structural preparedness of critical service facilities such as hospitals is very important and is expected to function as a safe environment during a disaster. Disaster events can cause hospitals to lose critical service facilities, vulnerable systems, and equipment so that they cannot function as service facilities. Therefore, to protect critical services, systems and equipment must be placed in locations away from hazards.

Fard & Sadeghian (2019) also stated that the non-structural aspects of preparedness in hospitals are very important for the continuity of services in the short and long term after a disaster. The low level of non-structural preparedness in hospitals, especially in the critical system index group, causes obstruction and cessation of services at the hospital, which can lead to new disasters that can cause casualties in the hospital.

Qualitative Analysis

The results of the analysis from the in-depth interviews show that the obstacles in implementing non-structural preparedness experienced by RSUP Dr. Mohammad Hoesin in the form of budget funds, construction of new buildings, and renovation of several old buildings, as stated by the following informant:

"It depends on the availability of the budget. If there is a budget, we can fulfill everything. Because the budget already has a share, there is a problem for hospital infrastructure, buildings, services, and many other needs "(Informant 1).

The condition of the hospital, which is under construction in terms of infrastructure, also causes the hospital budget to focus on increasing structural preparedness. The following is the informant's statement:

"As far as I know, more structural improvements have been made. People are still focused on the construction and renovation of old buildings. Because now there is also an accreditation assessment, so there are more improvements. Yes, only in general terms, for non-structural use in this hospital, we can say that it is good "(Informant 2).

In addition, the current construction conditions have disrupted several elements of non-structural preparedness, such as access to one of the main doors in the hospital which was closed due to construction. Then, the limited parking space is also an obstacle for RSUP Dr. Mohammad Hoesin. It is not uncommon for vehicles to park outside the hospital environment, which often causes traffic jams.

Conclusions and Recommendations

Based on the results of research on the analysis of hospital non-structural preparedness in the face of disasters using the WHO version of the Hospital Safety Index (2015) IN RSUP Dr. Mohammad Hoesin, it can be concluded that non-structural preparedness is at a high level of preparedness with an index score of 0.84. Hospitals can function in emergencies and disasters, however, there is still an increase in preparedness capacity to improve hospital safety in the event of a disaster.

Suggestions from researchers are that hospitals are advised to increase preparedness by modernizing the building system, through the construction of corridors outside the hospital building, making connecting access between buildings, and making multi-story parking to reduce congestion and provide comfort to hospital visitors.

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