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The Implementation of Life Saving Facilities at RSUD Surabaya East Java Province in 2023

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ABSTRACT The implementation of life-saving facilities is crucial to be considered in a hospital in order to minimize adverse events during emergency conditions. This study aims to describe the implementation of life-saving facilities at RSUD Suraabaya, East Java Province. The research utilizes a descriptive method with data collection through observation and measurement. The research subject is located at RSUD Surabaya, East Java Province, with the K3RS organization as the respondent. The variables examined include the identification of potential fire hazards and life-saving facilities such as emergency stairs, emergency doors, emergency lights, exit routes, exit signs, and assembly points. Data analysis is conducted descriptively. The research findings indicate that the identification of potential fire hazards in both the New and Old Buildings under normal conditions is in accordance with the applicable Standard Operating Procedures (SOP). Emergency stairs and emergency doors fall under the category of being sufficient, emergency lights fall under the category of being insufficient, while the exit routes, exit signs, and assembly points fall under the category of being good. Overall, the assessment of life-saving facilities falls under the category of being sufficient. Therefore, it is recommended that RSUD Surabaya, East Java Province, conducts monitoring regarding the compliance with SOP, carries out improvements, and procures life-saving facilities that do not meet the requirements. In future research, improvements need to be made by adding other variables. This is necessary in order to correct deficiencies in this research.

INDEX TERMS Hospital, Life-saving Facilities, Fire.

I. INTRODUCTION

A hospital is an institution that provides healthcare services to the community, including inpatient, outpatient, and emergency care, in order to achieve a high level of health for every individual. Hospitals must have a health and occupational safety program (K3RS) in place to ensure the ongoing, optimal, effective, and efficient implementation of healthcare services. The implementation of K3RS includes fire prevention and suppression measures to ensure the protection of all hospital resources and create a safe environment free from fire hazards and smoke. [1].

Fire is an incident that occurs as a result of the combination of three elements: oxygen, heat, and easily combustible material, which then ignites and causes damage or loss of property, as well as loss of life. [2]. Fire itself has a significant negative impact on human life. Therefore, the occurrence of a fire necessitates the presence of an emergency fire response system to quickly extinguish the flames, minimizing the losses incurred and preventing loss of life. [3].

Based on data cited from the National Fire Protection Association (NFPA), there were 1,319,500 fire incidents in 2017, resulting in 3,400 fatalities, 14,670 injuries, and property losses amounting to $10 billion. In Indonesia itself, there were 979 fire incidents reported from 2011 to 2015, occurring in schools, office buildings, and other structures. [4]. The main factors that contribute to fires are inadequate ventilation and the presence of easily combustible materials in basements and enclosed buildings. Other factors include multi-story buildings with low ceilings, which are prone to rapid fire spread. Conversely, buildings with high ceilings make fire suppression easier. [5].

RSUD Surabaya, East Java Province, is a Class B hospital that must meet several classifications. For example, it should have a minimum of 4 basic specialist medical facilities and capabilities, 4 specialist medical support facilities, 8 other specialists apart from the basic specialists, and 2 basic sub-specialists. The minimum number of beds in a Class B hospital is 200. Every life-saving facility must

also be fulfilled as a measure to save lives in the event of an emergency [6]. Based on observations at RSUD Surabaya, it has a minimum of 4 basic specialist medical facilities and capabilities, 4 specialist medical support facilities, 8 other specialists apart from the basic specialists, and 2 basic sub-specialists. However, there were several life-saving facilities that did not meet the requirements. The inadequate facilities identified include the absence of emergency stairs in the old building, the new building only having emergency stairs up to the second floor, locked emergency doors, the absence of a push bar system on emergency doors, and the lack of emergency lights throughout the building.

In Perak Hospital, Malaysia, life-saving facilities in the form of emergency stairs are already available. In the event of a fire, the emergency stairs can be utilized as a means of life-saving. However, there are several components of life-saving facilities that are not yet available, namely emergency doors and exit signs. Therefore, each component of the life-saving facilities must be carefully considered to prevent any loss of life in the event of a fire in the hospital [7]. A life-saving facility must be implemented in hospitals because, fundamentally, hospitals have the potential for fire incidents, electrical short circuits, or explosions from chemical substances. Hospitals themselves have a high risk of fire due to the use of electricity, medical activities, and potentially explosive chemicals. Therefore, there is a need for life-saving facilities, education, and emergency training to support life-saving measures. Based on the previous description, a question arises regarding the implementation of life-saving facilities at RSUD Surabaya, East Java Province, in 2023. The objective of this study is to describe the implementation of life-saving facilities at RSUD Surabaya, East Java Province, in 2023. The benefits of this research are twofold: for the hospital, it serves as an evaluation tool regarding the unfulfilled requirements of life-saving facilities, and for the readers, it provides a reference or reading material to enhance their knowledge about life-saving facilities in hospitals.

II. METHOD

This research utilizes a descriptive research method, which aims to describe a specific condition through the process of observation and interviews. The data analysis technique employed in this study is descriptive analysis in order to obtain data on the condition of life-saving facilities as part of the emergency fire response at RSUD Surabaya, East Java Province, in 2023.

The observation process was conducted by observing the life-saving facilities, including emergency stairs, emergency doors, emergency lights, exit facilities, exit signs, and assembly points. After the observation, an assessment of the life-saving facilities was carried out, covering emergency stairs, emergency doors, emergency lights, exit facilities, exit signs, and assembly points. Subsequently, interviews were conducted with the K3RS organization regarding the implementation of life-saving facilities in the hospital.

The observation assessment criteria used the Guttman Scale, which consists of two consistent response options: "YES" and "NO". If the answer is "YES", it is assigned a value of 1, while if the answer is "NO", it is assigned a value of 0. The assessment of each variable is determined as follows.

1) Variable assessment Emergency Stairs
   a) Calculation
      Maximal score = ∑ question (weight) x maximal value = 4 x 1 = 4
      Minimal score = ∑ question (weight) x minimal value = 4 x 0 = 0
      Interval distance = $\frac{maximal\ score - minimal\ score}{value\ category} = \frac{4-0}{3} = 1{,}3$
   b) Value Category
      Good = 2,7 – 4 (68% – 100%)
      Enough = 1,3 – 2,6 (34% – 67%)
      Insufficient = 0 – 1,2 (≤ 33%)
2) Variable assessment Emergency Door
   a) Calculation
      Maximal score = ∑ question (weight) x maximal value = 7 x 1 = 7
      Minimal score = ∑ question (weight) x minimal value = 7 x 0 = 0
      Interval distance = $\frac{maximal\ score - minimal\ score}{value\ category} = \frac{7-0}{3} = 2{,}3$
   b) Value Category
      Good = 4,7 – 7 (68% – 100%)
      Enough = 2,3 – 4,6 (34% – 67%)
      Insufficient = 0 – 2,2 (≤ 33%)
3) Variable assessment Emergency Light
   a) Calculation
      Maximal score = ∑ question (weight) x maximal value = 6 x 1 = 6
      Minimal score = ∑ question (weight) x minimal value = 6 x 0 = 0
      Interval distance = $\frac{maximal\ score - minimal\ score}{value\ category} = \frac{6-0}{3} = 2$
   b) Value Category
      Good = 4 – 6 (68% – 100%)
      Enough = 1,9 – 3,9 (34% – 67%)
      Insufficient = 0 – 1,8 (≤ 33%)
4) Variable assessment Means of Exit
   a) Calculation
      Maximal score = ∑ question (weight) x maximal value = 7 x 1 = 7
      Minimal score = ∑ question (weight) x minimal value = 7 x 0 = 0

Interval distance = $\frac{maximal\ score - minimal\ score}{value\ category} = \frac{7-0}{3} = 2{,}3$

b) Value Category
Good = 4,7 – 7 (68% – 100%)
Enough = 2,3 – 4,6 (34% – 67%)
Insufficient = 0 – 2,2 (≤ 33%)

5) Variable assessment Exit Instruction
a) Calculation
Maximal score = ∑ question (weight) x maximal value = 7 x 1 = 7
Minimal score = ∑ question (weight) x minimal value = 7 x 0 = 0
Interval distance = $\frac{maximal\ score - minimal\ score}{value\ category} = \frac{7-0}{3} = 2{,}3$
b) Value Category
Good = 4,7 – 7 (68% – 100%)
Enough = 2,3 – 4,6 (34% – 67%)
Insufficient = 0 – 2,2 (≤ 33%)

6) Variable assessment Assembly Area
a) Calculation
Maximal score = ∑ question (weight) x maximal value = 3 x 1 = 3
Minimal score = ∑ question (weight) x minimal value = 3 x 0 = 0
Interval distance = $\frac{maximal\ score - minimal\ score}{value\ category} = \frac{3-0}{3} = 1$
b) Value Category
Good = 2 – 3 (68% – 100%)
Enough = 0,9 – 1,9 (34% – 67%)
Insufficient = 0 – 0,8 (≤ 33%)

7) Assesment Life Saving Facilities
a) Calculation
Maximal score = ∑ question (weight) whole = 34
Minimal score = ∑ question (weight) whole = 0
Interval distance = $\frac{maximal\ score - minimal\ score}{value\ category} = \frac{34-0}{3} = 11{,}3$
b) Value Category
Good = 22,7 – 34 (68% – 100%)
Enough = 11,3 – 22,6 (34% – 67%)
Insufficient = 0 – 11,2 (≤ 33%)

After collecting the observation, interview, and measurement data, a descriptive analysis will be conducted by describing the collected data and categorizing it according to operational definitions. Subsequently, an analysis process will be performed using tables, narratives, and comparisons with Minister of Public Works Regulation No. 26/2008 on Technical Requirements for Fire Protection Systems in Buildings and Surroundings, SNI 03-1746-2000 on Procedures for Planning and Installation of Exit Facilities for Fire Safety in Buildings, SNI 03-6574-2001 on Emergency Lighting, Directional Signs, and Hazard Warning Systems in Buildings, and NFPA (National Fire Protection Association) 101 on the Life Safety Code.

III. RESULT

The results of the observation and assessment of the implementation of life-saving facilities at RSUD Surabaya, East Java Province in 2023 will be divided into two parts. The first part is the identification of potential hazards that may occur during various hospital activities in the new and old buildings of RSUD Surabaya, East Java Province. The second part is the identification of life-saving facilities in the New Building and Old Building of RSUD Surabaya, East Java Province. The aspects of life-saving facilities being investigated are emergency stairs, emergency doors, emergency lights, exit facilities, directional signs, and assembly points.

A. IDENTIFICATION OF HAZARD

Hazard identification is carried out as a primary step in risk management for workplace accidents and serves as a basis for determining actions to prevent hazards. There are three Value Categories in hazard identification: Normal (N) when activities are performed daily in accordance with applicable Standard Operating Procedures (SOPs). Next is Abnormal (A) category when daily activities are not in compliance with the applicable SOPs. Lastly, Emergency (E) category when all activities are in a difficult-to-control condition. [8]. The results of hazard identification will be further presented in the following table.

TABLE 1
Hazard Identification of New Building and Old Building

No	*Processes*	Hazard	(*Condition*) N/A/E
1.	**New Building** **a. 1st Floor :** 1) Panel Room 2) Janitor 3) R. IPSS 4) Calibration Room 5) Warehouse B3 6) Medicine Warehouse 7) Logistic Warehouse 8) Morgue 9) Park 10) Administration Room **b. 2nd-3th Floor :** 1) Panel Room 2) Park **c. 4th Floor ;** 1) B3 Warehouse 2) Park **d. 5th Floor :** 1) MCU 2) Panel Room 3) Park Room **e. Lantai 6 :** 1) Stroke Center 2) Panel Room **f. Lantai 7 :** 1) Irna 2) Panel Room **g. Lantai 8 :** 1) Panel Room 2) Training Room	a. electrical short b. Flammable and explosive material	N (Normal)

2.	**Old Building** **a. 1st Floor** 1) Action Lab 2) Poly Heart 3) Internal medicine Poly 4) Poli Anak 5) Medic Record 6) Casemix 7) Administration **b. Lantai 2-4** 1) Kitchen 2) VIP **3)** Nurse Room	Konsleting listrik	N (Normal)

Information:
N = Normal
A = Abnormal
E = Emergency

Based on the table, the identification of potential fire hazards in RSUD Surabaya, East Java Province, falls under the normal category, with the assessment based on room classification. Normal indicates that daily activities are conducted according to standard operating procedures (SOP) in the workplace, Abnormal indicates deviations from SOP in daily activities, and Emergency indicates difficulties in performing the tasks.

B. IDENTIFICATION OF LIFE SAVING FACILITIES

Life safety equipment, according to the KBBI (Indonesian Dictionary), refers to everything that can be used as tools to achieve specific purposes and objectives. The identification of life safety equipment aims to analyze the feasibility of life-saving measures, including emergency stairs, emergency doors, emergency lighting, exit facilities, exit signs, and assembly points. The results of the identification will be presented in the following table.

TABEL 2
Life Saving Facilities New Building

VARIABEL		SKORMAKS=1		New Building	TOTAL	%	INF
	Emergency Stairs		Clean, and not used for smoking/warehouse/rest	1	4	100 %	B
			Not used as a place for equipment, such as panels, and AC units	1			
			There is a block or something holding the door to the stairs so it doesn't open all the time	1			
			The lighting is on	1			
	Emergency Door		Emergency door height 210 cm	1	7	100 %	B
			Lebar pintu darurat minimal 90	1			
			Emergency exit width of at least 90	1			
			Equipped with a push bar system	1			
			The emergency door is not locked	1			
			Equipped with instructions written "EXIT" and the door opens to the outside	1			
			There must be 2 emergency exits for each floor that has occupants > 60 people	1			
	Emergency		The source of electricity comes from generators and batteries	0	0	0%	K
	Light		Minimum switching time of 10 seconds	0			
			Minimum endurance of 60 minutes	0			
			Minimum battery capacity of 60 minutes	0			
			Warna lampu kuning	0			
			Yellow light color	0			
	Means Way Out		There is a corridor that is used as an exit access	1	7	100 %	B
			Tidak ada cermin di dalam or dekat akses keluar	1			
			Means of egress >2	1			
			Exit ends in release	1			
			Exit width ≥ 71cm	1			
			Regular maintenance is carried out and is free from obstacles	1			
			There are no furniture, decorations, or other things that could interfere with the means of egress	1			
	Exit Directions		Each location has a direction sign with direction indicators	1	7	100 %	B
			Directional signs can be read in normal or emergency lighting conditions	1			
			Direction signs are located at each exit	1			
			Directional signs must be in contrasting colors such as green and white	1			
			Directional signs must be continuously illuminated	1			
			Directional signs must be legible and the length of the "EXIT" sign ≥ 10 cm	1			
			Lebar tanda tulisan "EXIT" ≥ 5 cm, dan spasi minimal ≥ 1 cm	1			
	Assembly Point		Must be safe, easy to reach, and able to accommodate all occupants with a minimum width of 0.3 meters/person	1	3	100 %	B
			There is a sign indicating the assembly point	1			
			There is a gathering place after the evacuation process	1			
∑					28		
%					82,35%		
INFORMATION					B		

Information:

= K / Insufficient (≤33% or 0 – 11,2)
= C / Enough (34% – 67% or 11,3 – 22,6)
= B / Good (68% – 100% or 22,7 – 34)
= Not Used

Based on the observation and assessment results, the life safety equipment in the New Building of RSUD Surabaya, East Java Province in 2023 has a total value category of Good, with a score of 82.35%.

TABEL 3
Life Saving Facilities Old Building

VARIABE		SKORMAK		Old Building	TOTAL	%	INF
	Emergency Stairs		Clean, and not used for smoking/warehouse/rest	0	0	0%	K
			Not used as a place for equipment, such as panels, and AC units	0			

L		**S = 1**	There is a block or something holding the door to the stairs so it doesn't open all the time	0			
			The lighting is on	0			
	Emergency Door		Emergency door height 210 cm	0	0	0%	K
			Lebar pintu darurat minimal 90	0			
			Emergency exit width of at least 90	0			
			Equipped with a push bar system	0			
			The emergency door is not locked	0			
			Equipped with instructions written "EXIT" and the door opens to the outside	0			
			There must be 2 emergency exits for each floor that has occupants > 60 people	0			
	Emergency Light		The source of electricity comes from generators and batteries	0	0	0%	K
			Minimum switching time of 10 seconds	0			
			Minimum endurance of 60 minutes	0			
			Minimum battery capacity of 60 minutes	0			
			Warna lampu kuning	0			
			Yellow light color	0			
	Means Way Out		There is a corridor that is used as an exit access	1	6	85,71 %	B
			Tidak ada cermin di dalam or dekat akses keluar	1			
			Means of egress >2	0			
			Exit ends in release	1			
			Exit width ≥ 71cm	1			
			Regular maintenance is carried out and is free from obstacles	1			
			There are no furniture, decorations, or other things that could interfere with the means of egress	1			
	Exit Directions		Each location has a direction sign with direction indicators	1	6	85,71 %	B
			Directional signs can be read in normal or emergency lighting conditions	1			
			Direction signs are located at each exit	1			
			Directional signs must be in contrasting colors such as green and white	1			
			Directional signs must be continuously illuminated	0			
			Directional signs must be legible and the length of the "EXIT" sign ≥ 10 cm	1			
			Lebar tanda tulisan "EXIT" ≥ 5 cm, dan spasi minimal ≥ 1 cm	1			
	Assembly Point		Must be safe, easy to reach, and able to accommodate all occupants with a minimum width of 0.3 meters/person	1	3	100 %	B
			There is a sign indicating the assembly point	1			
			There is a gathering place after the evacuation process	1			
∑					15		
%					44,11%		
INFORMATION					C		

Information:

= K / Insufficient (≤33% or 0 – 11,2)

= C / Enough (34% – 67% or 11,3 – 22,6)

= B / Good (68% – 100% or 22,7 – 34)

= Not Used

Based on the observation and assessment results, the life safety equipment in the New Building of RSUD Surabaya, East Java Province in 2023 has a total value category of Enough, with a score of 44.11%.

TABEL 3

Recapitulation of Total Whole for New Building and Old Building of RSUD Surabaya, East Java Province.

				∑	%	INF
VARIABEL	**Emergency Stairs**	**SKORMAKS = 1**	Clean, and not used for smoking/warehouse/rest	4	50 %	C
			Not used as a place for equipment, such as panels, and AC units			
			There is a block or something holding the door to the stairs so it doesn't open all the time			
			The lighting is on			
	Emergency Door		Emergency door height 210 cm	7	50 %	C
			Lebar pintu darurat minimal 90			
			Emergency exit width of at least 90			
			Equipped with a push bar system			
			The emergency door is not locked			
			Equipped with instructions written "EXIT" and the door opens to the outside			
			There must be 2 emergency exits for each floor that has occupants > 60 people			
	Emergency Light		The source of electricity comes from generators and batteries	0	0%	K
			Minimum switching time of 10 seconds			
			Minimum endurance of 60 minutes			
			Minimum battery capacity of 60 minutes			
			Warna lampu kuning			
			Yellow light color			
	Means Way Out		There is a corridor that is used as an exit access	13	92,85 %	B
			Tidak ada cermin di dalam or dekat akses keluar			
			Means of egress >2			
			Exit ends in release			
			Exit width ≥ 71cm			
			Regular maintenance is carried out and is free from obstacles			
			There are no furniture, decorations, or other things that could interfere with the means of egress			
	Exit Directions		Each location has a direction sign with direction indicators	13	92,85 %	B
			Directional signs can be read in normal or emergency lighting conditions			
			Direction signs are located at each exit			
			Directional signs must be in contrasting colors such as green and white			
			Directional signs must be continuously illuminated			
			Directional signs must be legible and the length of the "EXIT" sign ≥ 10 cm			
			Lebar tanda tulisan "EXIT" ≥ 5 cm, dan spasi minimal ≥ 1 cm			
	Assembly Point		Must be safe, easy to reach, and able to accommodate all occupants with a minimum width of 0.3 meters/person	6	100 %	B

			There is a sign indicating the assembly point			
			There is a gathering place after the evacuation process			
∑				43		
%				63,23%		
INFORMATION				C		

Information:

= K / Insufficient (≤33% or 0 – 11,2)
= C / Enough (34% – 67% or 11,3 – 22,6)
= B / Good (68% – 100% or 22,7 – 34)
= Not Used

Based on the table of identification, the total whole assessment for the New Building and Old Building of RSUD Surabaya, East Java Province, falls under the "Enough" category with a percentage of 63.23%. The emergency stairs are categorized as C, emergency doors are categorized as C, emergency lights are categorized as K, exit routes are categorized as B, exit signs are categorized as B, and assembly points are categorized as B.

IV. DISCUSSION

A. THE POTENTIAL FIRE HAZARDS AT RSUD SURABAYA

Based on the research, the results of hazard identification in the New Building and Old Building in February 2023 revealed that the activities within them have the potential for fire incidents due to the presence of low to high voltage electrical currents in all rooms, making them susceptible to ignition and explosion. The sparks can originate from short circuits or occur due to the inability to withstand the temperature rise of the electrical current in low voltage cables or conductors that have been damaged due to aging, heating, or rodent bites. [9].

The entire process of activities that can cause a fire in the New Building and Old Building falls under the normal category. The spread of fire originating from cigarette butts begins with the ignition and inhalation of the cigarette's lit end, causing the flame used to light the cigarette to transform into smoldering embers. When the cigarette is further smoked, glowing or smoldering occurs. Once the cigarette diminishes and becomes a butt, it is discarded. [10]. Often, this becomes a cause of fire due to the presence of surrounding wind. There are two factors that contribute to the occurrence of fire: natural factors and human factors, and the hazard from cigarette butts falls under the human category. Fires can be extinguished using water, soil, sand, HCFC, foam fire extinguishers, and dry chemical fire extinguishers, as they are effective for combating Class A fires commonly found in solid materials, excluding metals. [11] [12].

A hospital must be prepared to face various potential fire hazards if the implementation of fire management is carried out effectively, categorized as Good, which includes fire prevention and control standard operating procedures (SOPs) being in place and followed by all hospital staff. [13]. Therefore, the recommendation for RSUD Surabaya in East Java Province is to maintain the use of standard operating procedures (SOPs) in all work activities to ensure that conditions remain normal and prevent fire incidents. Training and prevention efforts in fire handling can provide knowledge on fire risk prevention and factors contributing to fire incidents. [14]. Therefore, through training, it is expected to promote awareness of the surrounding environment in the process of fire prevention and management.

B. LIFE SAVING FACILITIES RSUD SURABAYA

1. EMERGENCY STAIRS

Based on the observation and assessment results, the overall condition of the emergency staircases in RSUD Surabaya, East Java Province, in 2023 falls under the category of Enough. This conclusion is derived from the combination of assessment results for the emergency staircases in the New Building (100%) and the Old Building (0%). The quality of the safety routes or emergency staircases should comply with standards to ensure the safety of human lives effectively. [15]. All components of the emergency staircases assessment have been fulfilled by the New Building. However, none of the components in the Old Building meet the assessment criteria for emergency staircases. Emergency staircases serve as the primary safety feature and must be present and fulfilled in a building. [16]. Staircases themselves serve as a crucial factor in ensuring ease of evacuation and minimizing casualties in a building during emergency situations, such as fires. Therefore, the Old Building needs to be improved to provide emergency staircases that comply with safety standards, facilitating the evaluation process in case of unforeseen events. Furthermore, the implementation of security, safety, and comfort in a building should also prioritize safety aspects, including emergency staircases. [17].

2. EMERGENCY DOOR

The observation and assessment of the emergency doors in RSUD Surabaya, East Java Province, in 2023 indicate that they fall under the category of "Enough." This is evidenced by the combination of assessment components for emergency doors in the New Building (100%) and the Old Building (0%). All the components have been met by the New Building, but not by the Old Building. During the observation, it was found that there is insufficient land available for construction, resulting in only a regular door without the specifications of an emergency door.

The dimensions of emergency doors must meet the standard requirements as there may be collisions between the door height and a person's head in highly panicked situations. [18]. Furthermore, the implementation of an automatic door

can provide convenience for individuals to be more efficient, as automatic doors can open automatically. [19]. It was found that there is no "Exit" signage on the emergency door, which has the potential to mislead people. The "Exit" signage serves as a guide to facilitate individuals in exiting the building to prevent confusion and getting lost. Additionally, an emergency door should be made of steel, as it is a non-combustible material. [20] [21].

Based on the above, regular monitoring should be conducted on the emergency doors in the New Building to maintain their condition according to the standard. Additionally, the emergency doors in the Old Building should undergo renovation to meet the standard requirements. Adhering to the Good standards ensures smooth operational activities without any hindrances. [22].

3. EMERGENCY LIGHT

Based on the observation and assessment results, the condition of all emergency lights in RSUD Surabaya, East Java Province, in 2023 falls under the category of Insufficient. This is evidenced by the data obtained from the combination of components in the New Building (0%) and Old Building (0%). None of the components are fulfilled by both buildings, and they do not comply with SNI 03-674-2000.

The New Building and Old Building do not have emergency lights as they are still in the procurement process. Emergency lights are lights that only turn on in emergency situations. [21]. Emergency lights must be powered by two sources, namely a generator set and batteries, so that they can still illuminate even in the absence of electricity supply. [23]. An emergency light should be yellow in color, as the color yellow can minimize panic in emergency situations. [18]. Furthermore, the use of yellow color in emergency lights is intended to penetrate through smoke and prevent glare that could impair vision. [24].

Several actions can be taken at RSUD Surabaya, East Java, including following up on the procurement of emergency lights to be promptly implemented and placed in areas frequently accessed by all hospital staff. Emergency lights can be installed in corridors, staircases, elevators, hallways, and along pathways leading to safe areas or assembly points. [25]. Therefore, the presence of emergency lights will facilitate the evacuation process of victims in the event of unforeseen circumstances such as power outages and others.

4. MEANS OF EXIT

Based on the observation and assessment results, the overall condition of the exit routes in RSUD Surabaya, East Java Province, in 2023 falls under the "Good" category. This is evidenced by the examination results of the exit route components in both the New Building (100%) and the Old Building (85.71%). These components were evaluated according to the standards set by SNI 03-1746-2000.

All the components have been fulfilled by both buildings. The New Building is able to meet 100% of the requirements as it is a new building, whereas the Old Building does not fulfill all the components due to the lack of adequate land for construction. The number of exit routes within a building can exceed two, as they serve different purposes, such as pedestrian exits and entrances for heavy machinery like forklifts [21]. The component that is not fulfilled by the Old Building is the exit routes, which are limited to only one and not more than two. RSUD Surabaya, East Java Province, needs to conduct regular monitoring and maintenance processes to ensure smooth evacuation procedures. The maintenance of the exit routes should be prioritized to eliminate any obstacles that may hinder their functionality [26]. RSUD Surabaya, East Java Province, can reconsider and add additional access to exit routes in the Old Building to provide more than one exit route.

5. EXIT DIRECTION

The observation and assessment of the exit signage in RSUD Surabaya, East Java Province, in 2023 indicate that it falls under the category of Good. This is evidenced by combining the examination results of the exit signage components in the New Building (100%) and Old Building (85.71%). These components are based on the SNI 03-1746-2000 standard. There are no issues with the exit signage in the New Building. However, in the Old Building, there are still some components that have not been fulfilled. These components include one directional sign that does not receive continuous illumination. The sign is made of sticker material, and when the lights are turned off, the sign becomes invisible and unreadable. Directional signs can be made using acrylic material because it is weather-resistant, recyclable, resistant to sunlight, chemically stable, and durable. [27]. In addition, the use of sticker material is not recommended as it is not waterproof, making it prone to damage and tearing. The adhesive properties of the sticker can also degrade when exposed to heat and water. [28]. RSUD Surabaya in East Java Province should continue to perform regular maintenance and cleaning of the exit signs. Additionally, in the Old Building, it is recommended to replace the exit signs with acrylic material. Acrylic material is expected to have a longer lifespan compared to the previous sticker material.

6. ASSEMBLY POINT

The observation and assessment results regarding the assembly points at RSUD Surabaya in East Java Province in 2023 are categorized as Good. This is evidenced by the fulfillment of all components in both the New Building (100%) and the Old Building (100%). These components are based on NFPA 101 (2012) standards.

All components have been fulfilled by both the New Building and the Old Building. However, the assembly point in the Old Building has been converted into a parking

area, which can be dangerous in case of an emergency situation. The determination of evacuation routes, assembly points, and signage for assembly points should be considered according to the needs of the building users. This determination should be carefully calculated to minimize losses and the number of casualties resulting from emergency situations. [29]. The determination of evacuation routes and assembly points should be accompanied by complete signage indicating the assembly points. The designated gathering place after evacuation is one of the disaster mitigation measures, and it is expected that all individuals can respond promptly to self-evacuate and proceed to the designated assembly points. [30]. Several recommendations can be implemented at RSUD Surabaya, East Java Province, regarding assembly points. It is important to maintain the condition and functionality of the assembly points through regular monitoring processes to ensure that the land is used as intended. A recommendation for the assembly point in the Old Building is to regulate vehicles using the assembly point as a parking area. Based on the hazard identification assessment regarding the potential fire hazards at RSUD Surabaya, East Java Province, it is evident that both the New Building and Old Building are in normal condition. This is reinforced by the implementation of Standard Operating Procedures (SOP) that minimize work accidents. There is a significant correlation between the implementation of SOP and work accidents among employees of PT PLN (Persero) UPPP Kendari. Factors that can contribute to work accidents include failure to use standard Personal Protective Equipment (PPE), fatigue, negligence, and failure to follow established SOPs [31]. The life-saving facilities at RSUD Surabaya, East Java Province, are generally categorized as "Enough." These facilities are utilized as emergency response measures in the event of a fire or natural disaster. Upon closer examination, the life-saving facilities in the New Building are classified as "Good," with a total score of 82.35%. However, in the Old Building, they are categorized as "Enough," with a total score of 44.11%. It is necessary to improve and procure life-saving facilities in the Graha Nur Arfiah Building to address the insufficiencies in the life-saving facilities.

V. CONCLUSION

Based on the research objectives at RSUD Surabaya, East Java Province, it was found that the identification of potential fire hazards in the New Building and Old Building is in accordance with the applicable Standard Operating Procedure. The emergency staircases in the New Building and Old Building are categorized as "Enough," but a reassessment is needed to construct emergency staircases that comply with the standards in the Old Building. The emergency exits in both buildings are also categorized as "Enough," but renovation is required to adjust the height of the emergency exits, install a push bar system, and add the "EXIT" signage on the emergency exits in the Old Building. The emergency lighting in both buildings is categorized as "Insufficient," necessitating the procurement of emergency lighting that complies with the standards and should be placed at points frequently used by hospital staff and visitors.

Furthermore, the means of egress in both buildings are categorized as "Good," but there is a need to increase the number of means of egress in the Old Building to comply with the applicable standards. The exit signage in both buildings is categorized as "Good," but a replacement of the acrylic material for the exit signs in the Old Building is required to ensure legibility in dark conditions. The assembly points in both buildings are categorized as "Good," but there is a need to regulate parking in designated areas, add additional signage for assembly points, and provide a designated gathering area after evacuation in the Old Building. The life-saving equipment in both buildings is categorized as "Enough," but improvements should be made to address any deficiencies.

To achieve comprehensive and precise findings, it is highly recommended that future researchers engage in an extensive exploration of additional critical factors related to natural disasters. Moreover, it is imperative to conduct a thorough investigation that scrutinizes the interplay between life-saving facilities and the potential threats arising from emergency situations caused by natural calamities. This comprehensive and in-depth examination will significantly contribute to the advancement and improvement of the current study.

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