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Analysis of Risk Factors for Fire Protection

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Abstract: Active fire protection system in RSD. A. Dadi Tjokrodipo Bandar Lampung has not met the standards related to the Technical Requirements for Fire Protection Systems. Inside the building there is an alarm system and fire protection system that is not maintained and not functioning, there are no automatic sprinklers installed in the room, and there is no fire extinguishing system installed. permanent and uneven. The aim of this research is to determine the suitability analysis of RSD active fire protection system facilities. Dr. A Dadi Tjokrodipo, Bandar Lampung City, 2023. The aim of the research is to determine the risk factors for fire protection at RSD Dr. A. Dadi Tjokrodipo Bandar Lampung. This type of qualitative descriptive research uses an observation and documentation interview approach. The total sample was 4 respondents using purposive sampling technique. The research results show that active fire protection facilities are APAR, alarm, detector, sprinkler and hydrant with a total of 43 indicators, consisting of APAR (13 indicators), 12 indicators (90%) are met, 1 indicator (10%) is not met. . Of all these indicators. RSD dr. Dadi Tjokrodipo, Bandar Lampung City, 12 indicators were met (5.16%) and 34 (94.84%) other indicators were not met. It can be concluded that hospital fire response readiness in dealing with potential fires is still minimal and inadequate. It is hoped that the hospital will continue to improve the quality of facilities and infrastructure.

Keywords: Alarm; APAR; Detector; Hydrant; Sprinkler

Introduction

The development of infrastructure development in Indonesia continues to increase every year. This is confirmed by Indonesian Infrastructure Statistics data which shows that the number of basic service, economic and village-owned infrastructure facilities continues to increase (Central Statistics Agency, 2019). One important aspect in infrastructure development is safeguarding against fire hazards (Prihapsari et al., 2022)

Fire is a phenomenon that can occur when a material reaches a critical temperature and reacts chemically with oxygen, producing heat and other effects. Fires in hospitals are distinguished from other settings by the diversity of occupants, high levels of panic, variety of work, relatively large amounts of flammable materials, and 24-hour operating times (Kurniawan, 2014).

Fire cases require special attention and preventive measures to minimize or even eliminate the potential for fire hazards that pose a fatal risk to living creatures, such as burning or inhaling smoke containing dangerous substances (Suzanne, 2019). Fires can cause various detrimental impacts such as material loss, disrupting institutional performance, environmental damage, and even threatening life safety (Ismara, 2019). Based on data from the National Fire Protection Association 2020, fire services in the United States responded to approximately 1.3 million fires during 2019. These fires caused approximately 3,700 civilian deaths and 16,600 injuries. Property damage was estimated at $14.8 billion. The National Disaster Management Agency also stated that there had been 2,929 fire incidents in Indonesia from 1997 to 2018. The losses caused were damage to 12,206 houses, the death of 333 people, and damage to 28 health facility buildings (Meliza & Koesyanto, 2022).

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This shows that fires can occur anywhere and cannot be predicted, including in hospital buildings. Hospitals include health institutional buildings that provide complete services, healing and disease prevention for the community and are not free from the possibility of fire danger (Amalia, 2020). Based on the Decree of the Minister of Public Works, hospitals are categorized as places that are quite prone to fire hazards. Fires that occur in hospitals can cause very extensive losses and also have a high risk of causing casualties because hospitals have patients who are undergoing treatment and are in a condition of physical and mental incapacity so that the evacuation process carried out in hospitals is also different from the process Fire evacuations are usually carried out in other public places such as office buildings, supermarkets, residential areas and hotels (Redjeki, 2016). The case of a fire that occurred in the Bulgarian Psychiatric Hospital in March 2019 resulted in 3 patients dying and 60 patients being evacuated. The fire was caused by flammable materials originating from the patient's room (Azzam, 2019).

The fire that occurred at Sibu Hospital, Malaysia in 2017 resulted in the evacuation of around 1000 people. The fire was caused because the air conditioning system blower in the ward's toilet area was disturbed (Harian, 2017). A fire incident also occurred at PGI Cikini Hospital in September 2018 which was caused by an electrical short circuit in the transformer and resulted in losses reaching IDR 280 million (Ariefana, 2018). Based on research by (Musyafak, 2020), equipment and materials that can cause a fire in a hospital are chemicals, oxygen and LPG gas cylinders, electrical installations, cooling and heating machines, and generator sets. Areas that are at risk of fire are laundry rooms and generator sets, hospital laboratories or installation rooms in Comprehensive Buildings. Based on data from the National Fire Protection Association Research, fires that occurred in health care settings during 2011-2015 were caused by several things, namely kitchen equipment (66%) as the main cause of fires, followed by electrical distribution and lighting equipment (6%), intentional (6%), heating devices (5%), flammable materials (5%), cigarette butts (5%), and use of heat sources (2%) (Suprayitno, 2013).

The danger of fire can be minimized by implementing hazard management. Good and planned fire hazard management must be carried out to guarantee safety in a building (Ismara, 2019). According to Ministerial Regulation No. 26 of 2008, the safety of people inside buildings and their surroundings must be a primary consideration, especially regarding the danger of fire (PUPR, 2008). Apart from that, Regulation of the Minister of Health of the Republic of Indonesia Number 66 of 2016 also requires every hospital to carry out Hospital Occupational Safety and Health (K3RS), one of which is related to fire prevention and control (Permenkes, 2016). One of the efforts to prevent and control fires is to have a fire protection system. A fire protection system is an important component that must be available in buildings, especially public facilities that serve many communities, which functions as a business and prevents damage to buildings, casualties and loss of assets or property (Bima, 2021). Hospital buildings are required to have an active fire protection system because hospital residents are patients who are being treated in a weak condition so they cannot save themselves from the danger of fire (Sholeh et al., 2021). Research conducted by Nurhaliza (2021) regarding the Active Fire Protection System at the Luwuk Regional Hospital Agency, Banggai Regency, stated that implementing a fire protection system in a hospital building is a necessity to create a sense of security and neutralize the danger of accidents. which can occur at any time and have a negative impact on the occupants of the hospital building. Research conducted by (Novrikasari et al., n.d.) regarding the Implementation of Fire Preparedness at Palembang Square Mall, stated that the fire protection system has an important role in showing the preparedness of a building or premises.

RSD. Dr A Dadi Tjokrodipo is a class C hospital which was founded in 2011 based on the Bandar Lampung City Health Service Letter Number 445.2.20.09.2011. Based on initial observations, the passive fire protection system in this hospital is in accordance with the standards according to Law no. 28 of 2002 concerning Buildings, such as the availability of compartmentation systems (separation of buildings that are at high risk of fire), evacuation facilities and evacuation aids (means of exit, emergency stairs, exit signs, emergency doors, emergency lighting and gathering places) (Eksikplopedia, 2018). Meanwhile, the active fire protection system in this hospital has been in place since 2011 but does not yet meet the standards of the 2012 Hospital Infrastructure Technical Guidelines on Active Protection Systems and the Regulation of the Minister of Public Works of the Republic of Indonesia No.29/PRT/M/ 2008 concerning Technical Requirements for Protection Systems Fires in Buildings. Researchers found alarm systems and fire protection systems that were not maintained and not functioning, rooms that did not have automatic sprinklers installed, and fire extinguishing systems that were not installed permanently and unevenly. The K3RS system management team at this hospital has also been inactive since 2017, and will only be updated in 2023.

RSD service facilities are available. Dadi Tjokrodipo includes health services such as outpatient clinics, inpatient care, intensive care units (ICU), emergency

clinics, rooms, surgery, maternity wards, medical rehabilitation services, medical services, and health support services such as pharmacies, laboratory facilities, radiology, and nutrition. Hospital supply room.

Based on observations, RSD. Dr A Dadi Tjokrodipo has various characteristics of activities that have the potential to cause fires, such as medical and administrative activities that use electrical installations as well as the use of intensive fire sources from laundry or generator set rooms. Besides that, RSD. Dr A Dadi Tjokrodipo also has relatively high flammable materials sourced from various medicines, chemicals, LPG gas cylinders and oxygen gas cylinders.

Based on the background description above, the researcher is interested in conducting research on "Evaluation of the Compliance Level of the Active Fire Protection System in RSD. Dr. A Dadi Tjokrodipo, Bandar Lampung City in 2023.

Method

This research method uses qualitative descriptive research. To obtain data, researchers used observation, interviews and documentation methods. Observations were carried out through direct observation at the research location, while interviews were carried out by direct question and answer with 4 research informants who were determined using a purposive sampling technique, consisting of: Head of General and Personnel Department, patients, PPK AND Head of Planning Department.

Result and Discussion

The results of the interview showed that there had never been a fire at RSD dr. Dadi Tjokrodipo City in Bandar Lampung. Regarding management regulations, fire safety and prevention, as well as fire emergency teams in this hospital have not been fully implemented. There is no special team that handles fires, there is only a disaster management team, and the active fire protection system in this hospital is still limited due to a lack of budget to equip these tools. There were 14 standard questions asked, 8 (57.14%) of which were not in accordance with the standards, 5 (35.71%) other indicators were present but not in accordance with the standards and 1 (7.14%) indicator was in accordance with the standards.

Tabel 1. Respondent Characteristics

Name	Position	Gender	Age	Last education
Tn. I	Head of General Subdivision and Staffing	Male	47 Years	Magister
Ny. T	Patient	Female	44 Years	Senior High School
Tn. J	Patient	Male	55 Years	Bachelor
Tn. W	PPK	Male	34 Years	Magister
Ny. H	Head of Subdivision Planning	Female	55 Years	Magister

Table 2. Implementation of active fire protection system parameters in the Dr A. Dadi Tjokrodipo Hospital Environment

Point	Total Indicator	Application	
		In accordance	It is not in accordance with
APAR	13	12 (28%)	1 (2.3%)
Alarm	6		6 (14%)
Detector	8		8 (18.6%)
Sprinkler	7		7 (16.2%)
Hydrant	9		9 (20.9%)
Amount of Indicator	43	12 (28%)	31 (72 %)

The active fire protection system consists of 5 parameter points with 43 indicators, consisting of APAR (13 indicators); fire alarm (6 indicators); detector (8 indicators); hydrant (9 indicators); and sprinkler (7 indicators). From all these indicators that. RSD dr. Dadi Tjokrodipo, Bandar Lampung City, 12 indicators (28%) were met and 31 (72%) other indicators were not met. This shows that this hospital is still very far from being able to meet the standard guidelines for class C hospitals.

Light Fire Extinguisher (APAR)

From the parameters of light fire extinguishers (APAR) which consist of 13 standard indicators, RSD dr. A. Dadi Tjokrodipo Bandar Lampung City has implemented 12 (28%) appropriate indicators and 1

(2.3%) indicator that is not appropriate. Indicators that are met are indicators for placing APARs, using APARs, maintenance processes and

APAR marking. RSD dr. A. Dadi Tjokrodipo Bandar Lampung City already has APAR placement data; APAR placement has been placed in a place that is easy to reach and see; APAR has a distance of placing a light fire extinguisher from any place or point in the hospital building which must be no more than 25 meters; The fire extinguisher has been hung with the top end of the fire extinguisher no more than 1.2 m above the floor; availability of instructions for using APAR; APAR inspections are carried out twice in one year; APAR must always be maintained in full condition and ready to operate and must be maintained at all times in a designated place when not in use; APARs are checked at least once a month, the date and name of the officer carrying out the inspection must be recorded.

Meanwhile, the indicators that have not been met are the APAR Specifications, namely regarding APAR qualifications. APAR qualifications do not consist of letters indicating the fire class. The placement of APARs in this hospital is still not evenly distributed, APARs are only in general poly rooms while other rooms and buildings do not have APARs. The APAR indicators that correspond to the assessment indicators can be seen in Figure 1. and Table 3

According to Minister of Public Works Regulation No. 26 of 2008 and Technical Guidelines for Hospital Infrastructure, Active Fire Protection Systems have the following requirements:

The fire extinguisher must be clearly visible and not obstructed by anything, including operating instructions and identification markings, Fire extinguishers other than wheeled fire extinguishers must be installed firmly on a hanger or tie, APARs with a gross weight not exceeding 18 kg must be installed so that the top end of the APAR is no more than 1.5 m above the floor, The distance from each APAR placement or point in the hospital building must be no more than 25 meters

Figure 1. APAR that corresponds to the assessment indicators

This research considers how to implement a hospital fire management system in dealing with the possibility of a fire using applicable regulatory indicators as a benchmark. Dr. Hospital A. Dadi Tjokrodipo Bandar Lampung City is one of the hospitals under the government that should implement a fire control system to control fires. A hospital is a place that is used 24 hours as a base for medical, health, obstetric or surgical care. Hospitals have a high risk of causing death if a fire occurs, especially since most of the people in the hospital are patients undergoing treatment whose physical condition is unable to carry out rescue operations. Therefore, it is necessary to implement a fire control system.

Based on the Ministry Decree Classification number. 186/MEN/1999 concerning fire fighting units in the workplace, RSUD Dr. A. Dadi Tjokrodipo Bandar Lampung City is classified as low fire prone. It is classified as Class A by the NFPA where it will ignite on solid materials other than metal. Combustible material elements usually contain carbon. Even though RSD Dr. A. Dadi Tjokrodipo Bandar Lampung is in the low fire potential category, however this hospital must still complete the installation of active fire protection systems such as hydrants, sprinklers, alarms and fire detectors. In hospitals, there is a high risk of death from fire.

Apart from that, losses can also occur in property, buildings, service processes and the social impact of hospitals. The fire control system indicator ranking is Minister of Manpower Regulation No. 04/MEN/1980, Minister of Manpower Decree No.KEP.186/MEN/1999, Minister of Public Works Regulation no. 26/PRT/M/2008, Minister of Public Works no. 20/PRT/M/2009, Technical Instructions for Hospital Infrastructure Active Fire Protection Systems 2012, SNI No. 03-3989- 2000, SNI 03-3985-2000, SNI 03 -17452000,

SNI 03-1746-2001, NFPA 13, NFPA 101. The parameters used in this research are: Management policy in this research, evaluation indicators from two parameters totaling 54 indicators consisting of 14 management indicators; and 43 active fire protection system detectors. Commenting on the results of the RSD indicator assessment, Dr. Dadi Tjokrodipo, Bandar Lampung City reached 5.16% (12 indicators) and 94.84% (33 indicators) were not met. These indicators that are not achieved cannot be ruled out considering that if a fire actually occurs and the components do not meet the standards, it will result in high damage and even death.

Similar research was conducted by Ali (2020) at RSJD dr. Amino Gundotomo, Central Java Province. This research shows that the active fire protection system in RSJD dr. Amino Gundotomo, Central Java Province has been 85% fulfilled, which means the hospital has a good score in fulfilling active fire protection system equipment. There are 8 indicators that are not appropriate at this hospital. These indicators are about management, obligations to manage fire, rescue procedures, insurance programs, identifying fire risks and fire risk identification methods.

Based on Minister of Public Works Regulation No. 20/PRT/M/2009, hospitals must at least have a team that can manage fire management, have a fire management plan book, and have a team that is competent in fire safety and emergency rescue (P3K) experts. Another important standard that must be met is the existence of procedures for saving occupants, finances, stopping machines or installations; register assets in fire insurance coverage to minimize losses that occur; Identifying fire hazards and risks is the first step in developing a fire management system.

There are 5 indicators that exist but do not comply with the standards. These indicators are about fire management, namely the existence of a disaster emergency team but no special fire emergency team; planning and installation of an active fire protection system, only fire extinguishers are available and installation is not evenly distributed throughout buildings and rooms; fire management training which should be carried out at least 1 year and 1 training but at Dr. Hospital. A Dadi Tjookrodipo was carried out twice in the last 5 years; implementation of SOPs regarding fire prevention and handling procedures that patients and staff should know; and improvements to the SOP which must be revised every year but are still in the progress of improvement and development.

This hospital only has 1 indicator that meets the standards, namely the existence of procedures for preventing and handling fires such as fire evacuation routes in the form of gathering points. According to Ministerial Regulation No. 26 of 2008, a fire evacuation route must be in every building so that people can save themselves. This route must not be blocked by items, be easily visible and be clearly marked. The evacuation route must lead to a designated gathering point or safe point.

Fire Alarm

In accordance with PU Ministerial Decree No. 26/PRT/M/2008 that every hospital building must have a fire alarm system. The fire alarm evaluation in this research consists of 6 standard points. Of these six points, none of them meets research standards. This hospital does not yet have an active protection system in the form of a fire alarm, so assessment points such as the alarm location plan, how to use the alarm and manual call points also do not exist.

Based on the results of an interview with one of the informants, the budget funds at this hospital are still insufficient to equip active fire protection systems such as alarms. One informant thought that there were still many more important things that had to be fulfilled first than completing an active fire protection system. Of course this is very unfortunate, considering that hospitals are places that are used 24 hours as a base for medical care. Hospitals have a high risk of causing death if a fire occurs, especially since most of the people in the hospital are patients undergoing treatment whose physical condition is unable to carry out rescue operations. Therefore, an active protection system in this hospital must be equipped.

Table 3. APAR assessment indicators at RSD dr. A. Dadi Tjokrodipo Bandar Lampung

Point	Standard	References	Instrument	
			Observation	Documentation Study
	The manager has data on APAR placement	KepmenPU No. 20/PRT/ M/2 009	In accordance	available
	APAR must be placed in a place that is easy to reach and see, must be clearly visible and unhindered	KepmenPU No. 20/PRT/M/2 009	In accordance	available
	Fire extinguishers, other than the wheeled type, must be mounted firmly	PER.04/ ME N/1980 NFPA 10	In accordance	available

Point	Standard	References	Instrument	
			Observation	Documentation Study
Placement	on hangers or fasteners made by fire extinguisher manufacturers, or fasteners approved for that purpose, or placed in cupboards or walls of such construction enter into			
	The distance between placing a light fire extinguisher from any place or point in the hospital building must be no more than 25 meters	PerMenPU No:26/PRT/M /2008 Active Fire Protection System 2012	In accordance	available
	The fire extinguisher is hung with the top end of the fire extinguisher no more than 1.2 m above the floor	Hospital Infrastructure Technical Guidelines Active Fire Protection System 2012	In accordance	available
Use of APAR	There are instructions use of APAR	Permena kertr ansNo. PER.04/ME N/1980	In accordance	available available
Specification	APAR qualifications must consist of letters indicating the fire class	Hospital Infrastructure Technical Guidelines Active Fire Protection System 2012	Not In accordance	-
	APAR inspections are carried out twice a year	Permenakertr ansNo. PER.04/ME N/1980	In accordance	Not available
Maintenance	APAR must always be maintained in full condition and ready to operate and must be maintained at all times in the designated place not in use	Hospital Infrastructure Technical Guidelines Active Fire Protection System 2012	In accordance	Not available
	APARs are checked at least once a month, the date and name of the officer carrying out the inspection must be recorded	Permenakertr ansNo: PER.04/ME N/1980 and Technical Guidelines for Hospital Infrastructure Active Fire Protection System 2012	In accordance	Not available
	APAR is a must have a card or label shows the month and year it was carried out maintenance	Permena kertr ansNo: PER.04/ME N/1980	In accordance	available
Tagging	There is an operating instructions label on the front of the APAR	Permenakertr ansNo: PER.04/ME N/1980	In accordance	available
	APAR has a label or identification mark with a side width of 30 cm	Permenakertr ansNo: PER.04/ME N/1980 and Technical Guidelines for Hospital Infrastructure Active Fire Protection System 2012 NFPA 10	In accordance	available

Tabel 4. Fire alarm assessment indicators at RSD Dr. A. Dadi Tjokrodipo Bandar Lampung

Point	Standard	Reference	Observation
Alarm location plan	Each fire alarm system has a complete installation description that includes location detectors and alarms	Permen PU No. 26/PRT/M/2008	There isn't any
Use	Fire alarms are not used for other activities		

Point	Standard	Reference	Observation
Manual Call Point	Has a distinctive sound and rhythm so it is easily recognized as fire alarm Manual Call Point (TPM) should be red The TPM placement location must not be easily exposed to interference, not hidden, easy to see, easy to reach, and on the route direction to exit the building All TPMs must be installed on the track towards the outside and installed on height 1.4 m from floor	SNI 03-3985-2000	There isn't any

Detector

Fire detector at RSD dr. A. Dadi Tjokrodipo Bandar Lampung consists of 8 assessment indicators. Based on SNI 03-3985-2000, the standard that must be met is that every building must have at least 1 detector. The reality in the field shows that there is not a single indicator that meets the standards, because there is no fire detector system available in this hospital. Active fire protection facilities at RSD dr. A. Dadi Tjokrodipo Bandar Lampung is still in the development stage, so it still doesn't have complete active protection equipment. Special funds for fire management in this hospital are very limited, thus hampering the completeness of active protection facilities. The fire detector indicator table can be seen in Table 5.

Table 5. Fire Detector assessment indicators at RSD dr. A. Dadi Tjokrodipo Bandar Lampung

Point	Standard	Reference	Results
Placement	The building has detectors Fire Smoke detectors are a no-no placed in the direction of air flow Detectors must be installed throughout the area In the storage area high shelf items, detectors mounted on the ceiling above each street or aisle Smoke detectors are a no-no placed closer than distance 9.1 meters The detector is protected against possible damage due to mechanical interference Smoke detectors are a no-no placed in the direction of air flow	SNI 03- 3985- 2000	There isn't any

Hydrant

The evaluation of hydrants in this study amounted to 7 points which were assessed based on the reference SNI 03-1745-2000, Minister of Public Works Regulation No. 26 of 2008 and the 2012 Technical Guidelines for Hospital Infrastructure Fire Protection Systems. In the Technical Guidelines for Hospital Infrastructure, Active Fire Protection Systems for hospitals with a height of more than 10 meters must provide a hydrant system for fire fighting needs. For public meeting places, entertainment venues, hotels, maintenance areas, shops and offices with an area of more than 800 m2, a minimum of 1 building hydrant must be installed.

According to Minister of Public Works Regulation No. 26 of 2008, the water supply for yard hydrants must be at least 38 liters/second at a pressure of 3.5 bar and capable of flowing water for a minimum of 30 minutes. 20 Siamese connections are also required so that fire trucks can connect fire hoses to the standpipe system.

The evaluation results of the 7 indicators, none of them met the standards. Hydrant at RSD dr. A. Dadi Tjokrodipo Bandar Lampung is still not available. This is because there is still a lack of budget to be able to complete the complete active fire protection system. Apart from that, there are still very few medical personnel who understand the importance of K3RS.

Table 6. Fire Hydrant assessment indicators at RSD dr. A. Dadi Tjokrodipo Bandar Lampung

Poin	Standar	Referensi	Result
Placement	The distance to the yard hydrant is 50 meters from the fire engine access route	SNI 03- 1745-2000 Technical Guidelines for Hospital Infrastructure Protection Systems Fire 2012	There isn't any
Specification	For buildings with a height of 10-40 meters, use a dry standpipe system, and height >40 meters using a wet standpipe Technical Guidelines for Hospital Infrastructure Protection Systems Fire 2012	Technical Guidelines for Hospital Infrastructure Protection Systems Fire 2012	
Water supply	There is an approved and capable water supply supplies water flow for fire protection	SNI 03-1745-2000	
Reach	Yard hydrants and their connections to other water supplies must be accessible by the fire department	SNI 03- 1745-2000	
Hose box requirements	The hose reel is not in a tight position.	Technical Guidelines for Hospital Infrastructure Protection Systems Fire 2012	

Sprinkler

According to SNI 03-3989-2000, a sprinkler is a fire extinguisher that is permanently installed in a building which can extinguish a fire automatically by spraying water at the point where the fire starts (Hanan & Talarosha, 2020; Rini, 2023). Every hospital building is required to have a sprinkler to prevent the spread of fire if a fire occurs (Hostikka et al., 2021; Mirakbari et al., 2021). The assessment evaluation used on sprinklers consists of 9 indicators which are assessed based on NFPA 13 references. These indicators include sprinkler placement, specifications and water components. NFPA 13 states that hospitals must have sprinklers in all areas of the building, the sprinkler distance to the wall is at least 4 inches or 102 mm, the hose reel is regular or not messy, the sprinkler head hole size is 15 mm and the water in the reservoir must not contain fibers and materials that may interfere.

Of the nine indicators, not a single indicator meets the standards. Sprinklers at this hospital are still not available. Lack of budget is the main factor in the unavailability of active fire protection systems such as sprinklers. The active fire protection system in this hospital is still in the development stage and will be updated when there is sufficient budget. Policies related to the fire management team are very necessary in managing the threat of fire in hospitals, especially rooms or installations in hospitals. There is no special fire team or fire management team at RSUD Dr. A. Dadi Tjokrodipo made several high-ranking officials at RSUD Dr. A. Dadi Tjokrodipo began planning the formation of a special fire team and fire management team.

Fire emergency management must be structured so that it becomes an integrated fire emergency response pattern, so that it becomes a guide for officers so that the implementation of fire emergency response can run smoothly, effectively and efficiently and avoid panic in order to prevent wrong actions being taken which could fatal consequences or cause greater losses (Munawar et al., 2022; Skar et al., 2016). It comes from the authority holder, in this case the hospital director, because the principal has the right and authority to make all decisions.

Table 7. Sprinkle assessment indicators at RSD dr. A. Dadi Tjokrodipo Bandar Lampung

Point	Standard	Reference	Result
Placement	There are sprinklers in all areas of the building Technical Guidelines for Hospital Infrastructure 2012 Fire Protection System	NFPA 13	There isn't any
	J The sprinkler distance to the wall is at least 4 inches (102 mm)		
	The distance between sprinklers measured from the sprinkler center must not be less than 6 ft (1,8 m)		
	If there is an obstacle, sprinklers must be placed so that the distance is three times greater than the maximum dimensions of the obstacle		

Point	Standard	Reference	Result
	to the maximum 24 inchi (609 mm)		
	Hose reel is not in position complicated		
Specification	Sprinkler heads are made from corrosion-resistant materials		
	The size of the sprinkler head hole is 15 mm		
Water	The water in the reservoir must not contain fibers and materials that can interfere with the work of the sprinkler system		

Fire management policies can be used as a basis for hospital residents or officers to manage potential fire risks in hospitals. In this case (Agus Salim et al., 2023; Jaafar et al., 2023), the management policy has 2 indicators, most of these indicators have not been implemented in hospitals. These indicators include management policies and active fire protection system planning.

Based on the Hospital Technical Guidelines, it is stated that all employees/officers are required to carry out fire prevention. If officers are found to be ignoring fire prevention provisions, they will be given disciplinary sanctions. The hospital said it wanted to provide early fire detection. Meanwhile, fire prevention in hospitals is carried out by: Keep flammable items away from sources of fire, provide fire extinguishers in potential places, provide communication equipment in areas with the potential for fire and appoint officers who are competent in extinguishing fires (Amasi, 2021; Irwanto et al., 2023). The document states that all employees must at least be able to handle fires using light fire extinguishing equipment (APAR). The aim is to prevent the spread of fire and minimize the risk of burning places. Preventive action is the responsibility of management which needs to organize a fire prevention program as a form of preparedness in facing the threat of fire. In this way, it is hoped that fires that have a wide impact can be avoided. To plan a fire protection system to prevent and minimize the impact of fire, the hospital formed a K3RS team which included the MFK Working Group whose task was to identify and plan the need for fire protection equipment together with the IPSRS team.

In fire management, an emergency response organization is a grouping of people and determining their respective tasks with the aim of creating activities related to emergencies (Khorram-Manesh et al., 2021; Rezaeifam et al., 2023). There are three indicator points for organizational and procedural parameters, namely fire prevention and control, implementation of procedures, and evaluation of procedures. Of these three indicators, the hospital has not met the standard guidelines for managing the potential and risk of fire.

Both human resources and natural resources regarding K3RS in this hospital are still very far from being adequate. So, the author provides several solutions/suggestions to improve the quality of K3RS human resources in this hospital, such as forming the smallest unit team responsible for dealing with fires in each room unit. The term for the team is red officers (red code). When a fire occurs, red code officers take the first action to extinguish the fire with APAR, evacuate patients, secure valuable documents and communicate the fire incident to the main guard post officers. To continue follow-up on fire management, hospitals must form a central team consisting of the K3RS team, security officers, emergency room officers. The procedure is that after the substation team assigned to the security officer receives a report of a fire incident, the security officer forwards the report to the K3RS chairman regarding the fire incident and informs all hospital residents that there has been a fire in the building. After that, the security officer reported and asked for assistance regarding this incident to the Bandar Lampung City Fire Department. The active fire protection system in this hospital has been in place since 2011 but has not met the standards of the 2012 Hospital Infrastructure Technical Guidelines on Active Protection Systems and Regulations. Republic of Indonesia Minister of Public Works No. 29/PRT/M/2008 Concerning Technical Requirements for Fire Protection Systems in Buildings. The K3RS system management team at this hospital has not been active since 2017, and will only be updated again in 2023.

Based on the results of the analysis regarding SOPs and fire system planning at RSD dr. A. Dadi Tjokrodipo, found that there is only APAR at RSD dr. A. Dadi Tjokrodipo as a fire protection system. Based on observations made at RSD dr. A. Dadi Tjokrodipo, why fire system planning only has APARs because of limited costs and knowledge so that only APARs are available as the existing fire protection system. Therefore, planning for the procurement of hydrants will be carried out if the hospital really needs them.

Based on the Minister of Manpower and Transmigration regulation no. 4 of 1980 concerning the installation and maintenance of APAR article 4 which states that every light fire extinguisher must be placed in a position that is easy to see, easy to pick up and equipped with installation signs.

Dr. Hospital A. Dadi Tjokrodipo conducts fire training once a year. This is done to provide knowledge

to every new employee so they understand the procedures when a fire occurs and also to remind old employees. Dr. Hospital A. Dadi Tjokrodipo also does not have a competent emergency response team, there are no procedures for rescuing residents, finances and stopping machines. And identification of fire hazards and risks has never been carried out because there is no special team. Dr. Hospital A. Dadi Tjokrodipo also did not register any hospital assets in the fire insurance coverage.

Meeting point at RSD dr. A Dadi Tjokrodipo has been provided in case of fire. Fire evacuation routes must be prepared in each building so that hospital residents can save themselves when a fire occurs. Evacuation routes must also lead to a designated gathering point (Musyafak, 2020). The lack of understanding and awareness regarding the dangers of fire in hospitals means that the fire prevention system does not work well, even though without realizing it, solid fires cause a lot of losses and even claim lives. Hospital K3 policies can run well if the work environment is supportive and can form a new culture in the hospital. So Dr. RSUD should. A. Dadi Tjokrodipo immediately established a fire protection system in accordance with existing procedures. The lack of understanding and information received by patients regarding APAR prevention and control procedures means that training should not only be carried out by health workers or hospital staff.

Inconsistency in the parameters of the active fire protection system, including the uneven installation of sprinklers in each room and building, then the failure to carry out regular maintenance on fire-resistant construction, as well as the discovery of building openings that were not made of fire-resistant materials. A good active protection system will play an important role when a fire occurs.

Emergency response procedures are created so that when an emergency (fire) occurs, each worker can take the appropriate actions that must be taken (Kodur et al., 2020). This procedure is carried out not only when a fire occurs, but also when simulating a fire emergency response. After that, the activity will be evaluated to correct deficiencies or inappropriate actions in accordance with existing procedures. The company also needs to create other more technical or detailed procedures, for example the use of protective equipment, fire extinguishing, evacuation, and so on.

Fire Protection System Management

Dr A. Dadi Tjokrodipo Hospital does not yet have a fire management team. As stated by the Head of General Affairs and Civil Service in the following interview session:

"….it has been around since 2021, but not a special team for fires, but rather a disaster management team. However, in the future a special fire management team will soon be formed."

Not only does there not yet exist a fire management team, but there is also no emergency response team at Dr A. Dadi Tjokrodipo Hospital. This was conveyed directly during the interview session.

"… there are no experts yet, there is only early prevention. Maybe if a fire breaks out, a fire brigade will be called.

So that first aid when a fire occurs, everyone in the RSD dr. A. Dadi Tjorkodipo can provide first aid..." (Mr. Irwan Sukojo-Head of General Affairs and Civil Service)

There is also no team to manage fires and planning at RSD dr. A. Dadi Tjokrodipo, this was conveyed by the Head of Planning Subdivision in the following interview session:

".....not yet, but still in the process of planning to form a team for the future."

According to the head of the general and civil service sub-division, identification of fire hazards has already been carried out "... yes, it already exists and there is a separate HDP TEAM".

The fire management planning book is already available at RSD dr. A Dadi Tjokrodipo As stated by the Head of Planning and Personnel Subdivision in the following interview session:

"…it already exists and is available at RSD dr. A. Dadi Tjorkodipo".

The limited fire protection system at RSD dr. A. Dadi Tjokrodipo so that only APAR is owned by the hospital. This was conveyed in the interview session by the Head of General Affairs and Civil Service as follows:

"...there are, but only APARs for other active fire protection systems such as sprinklers and hydrants do not yet exist, but this will be planned as the hospital develops and will implement a fire protection system according to standards."

According to the Head of Planning Subdivision, this happened because of limited knowledge, he was of the opinion that:

... from the planning problem, there is no proposal, because so far we don't know if there should be a hydrant in the hospital, if that is a requirement.

"Hospitals must have hydrants, so it will be proposed in the 2023/2024 budget for budgeting for hydrants in hospitals."

APAR training is carried out once a year at RSD dr. A Dadi Tjokrodipo said this by Mr. Irwan *"...APAR training has been carried out at RSD dr. A Dadi Tjokrodipo once a year. "If there are additional employees who don't know and those who already know and have, they can learn more so they can understand and comprehend better."*

Fire protection system procedures

Education regarding the use of APAR has begun to be carried out by the officers in charge. This was conveyed in an interview session by the Head of General Affairs and Civil Service as follows:

"…education has begun to be carried out by the team for patients at RSD dr. A. Dadi Tjokrodipo so that when a fire occurs, patients are able to use APAR properly."

According to the Head of General and Personnel Subdivision, the procedure for adding APARs has been carried out in accordance with changes in existing conditions at RSD dr. A. Dadi Tjokrodipo:

"... every time there is additional space, the number of APARs will be adjusted according to the existing space requirements, but limited funds mean that the protection system at RSD dr. A. Dadi Tjorkodipo only has fire extinguishers, no sprinklers or hydrants."

Procedures for rescuing occupants, finances and stopping machines are also in place at RSD dr. A. Dadi Tjokrodipo, but there are no assets yet register in the fire insurance guarantee. This was conveyed by the Head of the General Affairs and Civil Service Subdivision, he said that:

"… K3RS has been formed and will be developed. However, RSD dr. A. Dadi Tjokrodipo has not yet registered his assets for fire insurance. This was revealed by the Head of Planning Subdivision that no assets have been registered for fire insurance because he has to coordinate first with PEMKOT regarding existing assets. The reason is that the fire protection system only has APAR at RSD dr. A. Dadi Tjorkodipo, because we were founded in 2010, according to developments, we only have fire extinguishers. If they are needed in the future, they will be budgeted for by the City Government, including if there is a new building, we will install auto-detectors, then we will make roofs with hindrances installed, if there is smoke. it will automatically release water from the attics. Progress on the procurement of hydrants will be carried out soon because it is very necessary for the fire protection system to comply with existing procedures. This is due to costs and also knowledge."

Preventive procedures already exist at RSD dr. A Dadi Tjokrodipo conveyed this in an interview session by the Head of General Affairs and Civil Service as follows:

"…. Yes, there is a gathering point available when a fire occurs. "SOPs and APAR training have been prepared, as well as human resources so that they are able to handle a fire in the hospital, training is carried out for all employees."

Conclusion

Based on the research results that have been presented, it can be concluded that the active fire protection system consists of 5 parameter points with 43 indicators, consisting of APAR (13 indicators), 12 indicators (28%) are met and 31 (72%) other indicators are not met. From these results, there were 14 standard questions asked, 8 (57.14%) of which did not meet the standard, 5 (35.71%) other indicators existed but did not meet the standard and 1 (7.14%) indicator did not meet the standard. according to the standard. standard. So it can be concluded that the fire management readiness of Dr. RSUD. A. Dadi Tjokrodipo, Bandar Lampung City, in dealing with potential fires is still very minimal and inadequate in terms of human resources and natural resources. Factors that cause the lack of completeness and suitability of active fire protection systems are the budget used specifically for K3RS is still very minimal and the lack of K3RS personnel who understand active fire protection systems. Not only the budget, knowledge regarding SOPs for hospital fire protection systems is still minimal.

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Author Contributions

Febri role in this research is to compile the background and find problems that occur, design research methods, analyze, process and present data, discuss research results and findings. While the role of nurhalina, dina, and samino is to provide input, direction and improvement in this research.

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