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ORIGINAL ARTICLE

Evaluation of Fire Prevention and Control System in dr. R. Koesma Regional General Hospital of Tuban Regency in 2021

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ABSTRACT

Introduction: Fires in the workplace can have consequences that adversely affect many parties, both for companies of the workers and the wider community, including institutions such as hospitals. In this research, hospitals are considered to be at high risk of causing fatalities in the event of a fire. The purpose of this research is to evaluate the prevention and control of fire in dr. R. Koesma Hospital Tuban based on the regulation of Minister of Health No.66 of 2016 about Occupational Health and Safety of Hospital. **Method:** This research is observational research. Data collection was done by interview and observation. The assessment of the evaluation of fire prevention and control is done by using a scoring formula made independently. **Result:** The evaluation is done on the identification of fire and explosion risk areas as well as on the mapping of high-risk areas of fire and explosion in dr. R. Koesma Hospital based on regulation of Minister of Health No.66 of 2016. The evaluation results on both aspects are 4% out of 6%. The evaluation result of the risk reduction of fire and explosion hazards shows a score of 15% out of 18%. The evaluation result of fire control is 22%. The evaluation result of the fire simulation shows a score of 38% out of 48%. **Conclusion:** This research concludes that the evaluation results of the fire prevention and control system in dr. R. Koesma Hospital based on regulation of Minister of Health No.66 of 2016 show a score of 83%.

Keywords: fire control, fire prevention, hospital, occupational health and safety

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INTRODUCTION

A hospital is a building that is used 24 hours a day as the basis for medical treatment, mental illness, obstetrics, and/or surgical treatment. World Health Organization (WHO) stated that it is necessary to build safe hospitals that can save lives and can continue to provide health services to the community even during disasters and emergencies (Arrazy *et al*., 2014).

Hospitals are also very risky workplaces for their workers because various kinds of hazards can occur not only on the human resources of the hospitals (UshSholeh *et al*., 2021), but also on the patients, patient companions, visitors, and the community around the hospitals. Potential hazards in hospitals are caused by several factors such as hazards due to biological factors, chemical factors, ergonomic factors, physical factors, and psychosocial factors. Some of these factors can cause work-related accidents which generally occur due to lack of worker awareness and inadequate quality and skills of workers (Salmawati *et al*., 2019; Runtulalo *et al*., 2021) The hazard risks include infectious and non-infectious diseases such as fire hazards.

Fire disasters can occur anytime and anywhere. No workplace can be guaranteed to be risk-free and fire-free. Fires in the workplace can have consequences that adversely affect many parties (Suma'mur, 2018), both for companies of the workers and the wider community. The consequences of fire disasters in the workplace include material losses, loss of life, loss of employment and other

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indirect losses, especially when the disaster occurs in a vital project (Director of Supervision of Occupational Health and Safety Norms, 2013).

Hospitals are one of the workplaces that are at risk of fire and its impact can be widespread. Most of the residents of the hospitals are patients undergoing treatment who are physically incapacitated and require assistance during an evacuation process. Therefore, the evacuation carried out in hospitals will certainly be different from the evacuation carried out in markets, settlements, hotels, or tourist attractions (Kosha and Paskarini, 2020).

To minimize the occurrence of fires in the workplaces, especially in hospitals, it is necessary to have good and planned prevention and control efforts. Managing fires is not only about providing extinguishers or conducting regular extinguishing exercises once a year, but also about providing a planned program in a system known as a fire management system. The fire management system is carried out in three stages, namely prevention before a fire occurs (pre-fire), countermeasures during a fire, and rehabilitation after a fire (post-fire) (UshSholeh *et al*., 2021 ; Karuniawati *et al*., 2018).

The efforts to combat fires in the workplaces like hospital include early detection with adequate fire protection equipment, firefighting officers specially appointed to deal with fire disasters, and implementation of fire emergency management procedures. These efforts are done to create a safe and peaceful work atmosphere for workers in the company (Suma'mur, 2018).

Fire incidents that occurred in hospitals include the followings: (a) Calcutta Hospital Fire, East India (10 December 2010). The flight of medical staff leaving patients during the fire was suspected to be the cause of the death of more than 89 patients; (b) Fire in the data centre room of Pamekasan Hospital, Madura (11 January 2010) that caused all patient and employee data and other important data to burn; (c) The fire in the General Hospital of West Nusa Tenggara Province, Mataram (10 July 2011) that scorched the building at around 50 billion rupiahs, and two patients who were treated died (Arrazy *et al*., 2014).

The dr. R. Koesma Regional General Hospital is the largest hospital in Tuban Regency and is the highest referral centre for Tuban Regency. After conducting initial observations, the authors assess that several risks can cause fires in this hospital. Therefore, there is a need for continuous and well-planned management throughout the operating cycle of the hospital building as well as prevention and control of fire hazards in the dr. R. Koesma Regional General Hospital of Tuban Regency. In this report, the authors want to evaluate the fire prevention and control system of the dr. R. Koesma Regional General Hospital of Tuban, whether it is following the regulation of the Minister of Health Number 66 of 2016 concerning Hospital Occupational Health and Safety.

METHOD

Based on the data collection technique, this research is observational research. The purpose of this research is to evaluate the fire prevention and control system in the dr. R. Koesma Regional General Hospital of Tuban Regency whether it is following the regulation of Minister of Health No. 66 of 2016 concerning Hospital Occupational Health and Safety. This research was carried out at the dr. R. Koesma Regional General Hospital of Tuban Regency in August 2021 for one full month by following the working hours of the workers of the dr. R. Koesma Regional General Hospital, Tuban Regency.

In this research, the observation, deep interview, and checklist were carried out in accordance with the Regulation of Minister of Health No. 66 of 2016 concerning Hospital OHS (Indonesian Minister of Health, 2016). This research has obtained ethical feasibility with the number No: 53/EA/KEPK/2021.

Based on the data collection techniques, the data in this research are primary data and secondary data. The primary data used data collected by researchers by conducting interviews and observation. The secondary data used data obtained from the agency concerned with descriptions and general agency information, as well as the documents related to fire prevention and control in hospitals adapted to the regulation of Minister of Health No. 66 of 2016 concerning Hospital OHS.

In this research, the researchers will only focus on the application of the Regulation of Minister of Health No. 66 of 2016 concerning the evaluation of fire prevention and control variables in the dr. R. Koesma Regional General Hospital of Tuban Regency. In these variables, there are five elements as follows: (1) Identification of Fire and Explosion Risk Areas; (2) Mapping of High-Risk Areas of Fire and Explosion; (3) Reduction of Risk of Fire and Explosion Hazards; (4) Fire Control; and (5) Fire Simulation.

$$Element\ "x" = \frac{number\ of\ variable\ on\ the\ element\ "x"}{total\ of\ variable\ from\ the\ all\ element}\ x\ 100\%$$

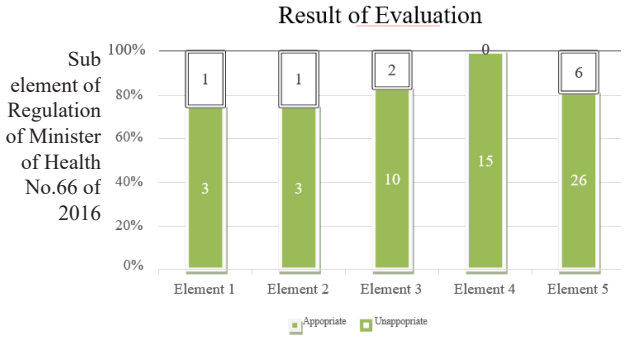
Note: In this study "X" are the Identification of Fire and Explosion Risk Areas, Mapping of High-Risk Areas of Fire and Explosion, Reducing the Risk of Fire and Explosion Hazards, Fire Control and Fire Simulation.

The evaluation of fire prevention and control in the dr. R. Koesma Regional General Hospital of Tuban Regency is done by using a scoring scheme where each element has a different maximum percentage value according to the number of elements in each variable (Purba, Girsang and Malay, 2018). The scoring tools are made independently by researchers so that the tools can be used in other workplaces or hospitals. The following is the scoring formula for each element being evaluated.

RESULT

Evaluation of the Implementation of Regulation of Minister of Health No. 66 of 2016 concerning Fire Prevention and Control in dr. R. Koesma Regional General Hospital of Tuban Regency

Based on the assessment conducted by researchers, the dr. R. Koesma Regional General Hospital of Tuban Regency has implemented the regulation of Minister of Health No. 66 of 2016 on its fire prevention and control. However, the hospital has not implemented some elements or variables.



Note:
Element 1: Identification of Fire and Explosion Risk Areas
Element 2: Mapping of High-Risk Areas of Fire and Explosion
Element 3: Reducing the Risk of Fire and Explosion Hazards
Element 4: Fire Control
Element 5: Fire Simulation.

Figure 1. Evaluation Result of Application of the Regulation of Minister of Health No. 66 of 2016 Concerning Fire Prevention and Control at the dr. R. Koesma Hospital of Tuban in 2021

The final score obtained from the evaluation results of the application of the Regulation of Minister of Health No. 66 of 2016 concerning fire prevention and control in the dr. R. Koesma Regional General Hospital is 83% with 10 discrepancies from a total of 67 evaluation variables. The result of the .evaluation of each element is described in figure 1

In this research the element of identification of areas at risk of fire and explosion hazards, 3 of the 4 sub-elements are fulfilled. In the element of mapping high-risk areas of fire and explosion, 3 of 4 sub-elements are fulfilled. In the element of reducing the risk of fire and explosion hazards, 10 of 12 sub-elements are fulfilled. In the element of fire control, 15 sub-elements are fulfilled, and in the element of fire simulation, 26 of the 32 sub-elements are fulfilled.

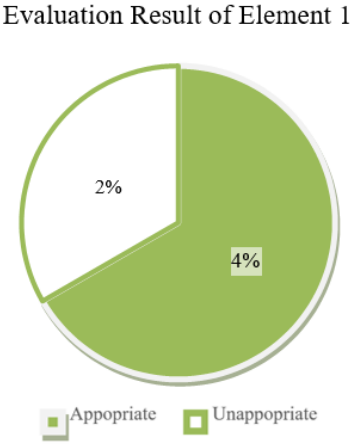


Figure 2. Evaluation result of Identification of Fire and Explosion Risk Areas in dr.R.Koesma Hospital of Tuban in 2021

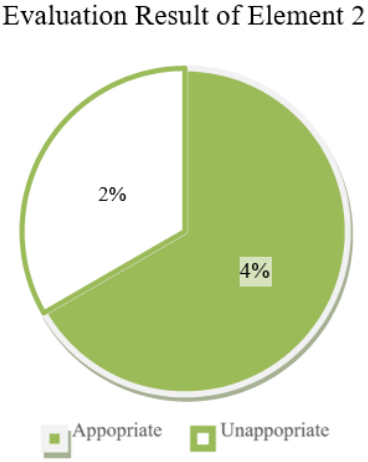


Figure 3. Evaluation result of High-Risk Areas of Fire and Explosion in dr.R.Koesma Hospital of Tuban in 2021

Identification of Fire and Explosion Risk Areas in dr. R. Koesma Regional General Hospital of Tuban Regency

The final score obtained from the evaluation results of the application of the regulation of Minister of Health No. 66 of 2016 concerning fire prevention and control in dr. R. Koesma Hospital Tuban, in element one, related to Identification of Fire and Explosion Risk Areas is 4% out of the maximum score of 6%. The appropriate number of variables is 3 out of 4 variables.

Evaluation of Mapping of High-Risk Areas of Fire and Explosion in dr. R. Koesma Regional General Hospital of Tuban Regency

The final score obtained from the evaluation result of the application of the Regulation of Minister of Health Number 66 of 2016 concerning fire prevention and control in dr. R. Koesma Regional General Hospital of Tuban, in element two, related to Mapping of High-Risk Areas of Fire and Explosion is 4% out of the maximum score of 6%. The appropriate number of variables is 3 out of 4 variables.

Evaluation of Fire and Explosion Hazard Reduction in dr. R. Koesma Regional General Hospital of Tuban Regency

The final score obtained from the evaluation result of the application of Regulation of Minister of Health No. 66 of 2016 concerning fire prevention and control in dr. R. Koesma Hospital of Tuban, in element three, related to Reducing the Risk of Fire and Explosion Hazards is 15% out of a maximum score of 18%. The number of appropriate variables is 10 out of 12 variables.

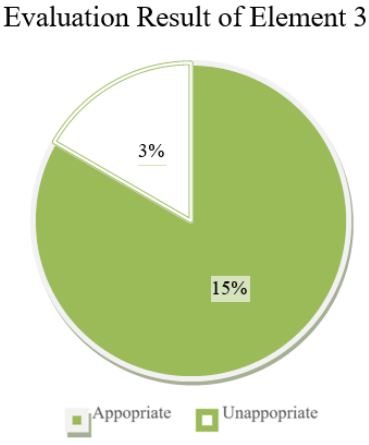


Figure 4. Evaluation results of Fire and Explosion Hazard Reduction in dr. R. Koesma Hospital of Tuban in 2021

Evaluation of Fire Control in dr. R. Koesma Regional General Hospital of Tuban Regency

The final score obtained from the evaluation result of the application of Regulation of Minister of Health No. 66 of 2016 concerning fire prevention and control in dr. R. Koesma Hospital of Tuban, in element four, related to Fire Control is at maximum score of 22%.

Evaluation of Fire Simulation in dr. R. Koesma Regional General Hospital of Tuban Regency

The final score obtained from the evaluation result of the application of Regulation of Minister of Health Number 66 of 2016 concerning fire prevention and control in dr. R. Koesma Regional General Hospital of Tuban Regency, in element five, related to Fire Simulation is 38% out of the

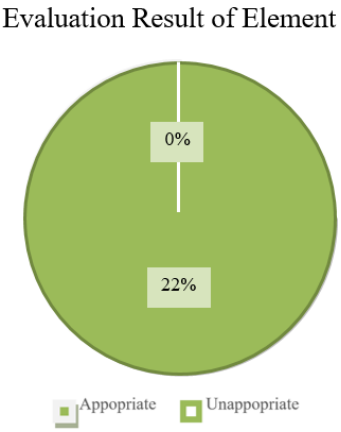


Figure 5. Evaluation result of Fire Control in dr. R. Koesma Hospital of Tuban in 2021

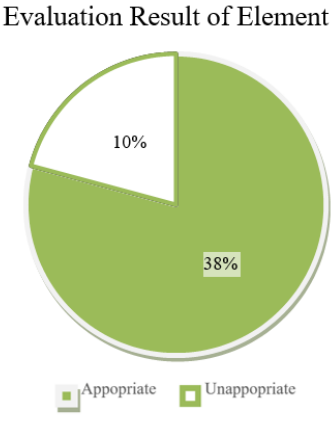


Figure 6. Evaluation result of Fire Control in dr. R. Koesma Hospital of Tuban in 2021

maximum score of 48%. The appropriate number of variables is 26 out of 32 variables.

DISCUSSION

Evaluation of the Implementation of Regulation of Minister of Health No. 66 of 2016 concerning Fire Prevention and Control in dr. R. Koesma Regional General Hospital of Tuban Regency

The application of the regulation of Minister of Health No. 66 of 2016 concerning Hospital Occupational Health and Safety aims to create safe and secure workplaces (hospitals) for Human Resource in hospitals including patients, patient companions, visitors, and the community around the hospitals (Sembiring, 2018). The final score obtained from the evaluation result of the application of Regulation of Minister of Health No. 66 of 2016 concerning fire prevention and control in dr. R. Koesma Hospital of Tuban is 83% with 10 variables having discrepancies out of 67 evaluation variables.

Every company that has a minimum of 100 workers or whose production processes and materials contain hazards that can cause work accidents in the form of explosions, fires, pollution and occupational diseases is required to implementation an OHS management system. One thing that can be applied is identification of areas at risk of fire and explosion hazards (Utami and Sugiharto, 2020).

Based on the scores above, the dr. R. Koesma Regional General Hospital of Tuban Regency has fulfilled almost all the requirements. In addition to the results of supervision, the dr. R. Koesma Regional General Hospital of Tuban has implemented the Regulation of Minister of Health No. 66 of 2016 (Indonesian Minister of Health, 2016). However, the hospital has not implemented some items, such as the provision of evacuation equipment for high-rise buildings and the determination of the volume or number of combustible materials in certain areas where the storage warehouse is quite small and not fireproof (Hamurwani and Denny, 2021).

Besides that, one document is not verified, namely the preparation of SOP (Standard Operating Procedure) for safe work implementation or those related to the impact of fire. The SOP is the steps or stages in carrying out activities, especially those related to open fire work. A job requires instructions as a guide for officers to reduce the risk of accidents (Hariyono, 2016). The document is not verified because there is no open fire work in the dr. R. Koesma Hospital of Tuban.

Identification of Fire and Explosion Risk Areas in dr. R. Koesma Regional General Hospital of Tuban Regency

Based on the results of the assessment of the implementation of Regulation of Minister of Health No. 66 of 2016 concerning fire prevention and control, the dr. R. Koesma Regional General Hospital of Tuban Regency has implemented Element One by providing a general list of potential hazard document under the Regulation of Director of dr. R. Koesma Regional General Hospital of Tuban No. 153 of 2019 concerning the Stipulation of the List of Hazardous and Toxic Materials (Indonesian: B3) and Their Wastes (Director of Koesma Regional General Hospital of Tuban, 2019). This list already contains materials that are included as potential fire hazards in the hospital area. From the document, several items or aspects that can increase the risk of fire (potential hazards) in hospitals are as follows: (1) dangerous areas (dirty linen rooms, garbage collection points, and oxygen storage rooms); (2) the presence of damaged signs of evacuation routes; (3) cooking activities in the kitchen; (4) medical gas leak; (5) electrical short; (6) inappropriate fire extinguishers such as expired or damaged fire extinguishers; (7) LPG, diesel, alcohol, and others.

The fire protection system consists of physical, equipment, installation and efforts related to prevention, control and rescue of buildings and people in hospital (Arrazy, Sunarsih and Rahmiwati, 2014 ; UshSholeh, Suroto and Wahyuni, 2021). Active fire protection system is a fire protection system that is implemented using equipment that can work automatically or manually (Kowara and Martiana, 2017). dr. R. Koesma Regional General Hospital of Tuban has active fire protection such as fire extinguishers at every 15 meters distance, hydrants, fire alarms, smoke and fire detectors, sprinklers, and others that are spread in various areas in each building. In addition, passive protection system is defined as a fire protection system that is implemented by regulating building components from architectural and structural aspects, so as to protect occupants and objects from physical damage during a fire (Kowara and Martiana, 2017). Passive fire protections in dr. R. Koesma Regional General Hospital of Tuban are also available such as evacuation routes, emergency exits marked with

red paint, emergency stairs, safe gathering points, evacuation route signs, compartments, and others.

There is only one sub-element that is not available at the dr. R. Koesma Regional General Hospital of Tuban, namely documents related to specific locations and areas of potential fires. However, researchers have conducted interviews and observations. Disasters cannot be handled effectively and quickly without being supported by adequate facilities and infrastructure, one of them is the availability of documents that describe potential fire areas (Annilawati and Fitri, 2019) According to the Occupational Health and Safety (OHS) officers at the hospital, areas of potential fires include oxygen installations, logistics warehouses, laboratories, pharmacy warehouses, and nutrition installations. Those locations are used to store flammable materials.

Evaluation of Mapping of High-Risk Areas of Fire and Explosion in dr. R. Koesma Regional General Hospital of Tuban Regency

From the evaluation, it is known that the dr. R. Koesma Regional General Hospital of Tuban Regency has fulfilled 3 of the 4 documents that must be fulfilled under the Regulation of Minister of Health No. 66 of 2016. So, the application of Regulation Minister of Health on Element Two is fulfilled by 4%. However, one sub-element is not appropriate, namely the unavailability of a map of the high-risk areas for explosions and fires. Based on the results of previous studies, it was stated that the high risk of fire in hospitals apart from being triggered by an electric short circuit can also be triggered by the use of pressurized gas cylinders and the use of various chemicals that are flammable, corrosive, harmful (UshSholeh *et al*., 2021). Besides of that, based on the interviews carried out by the researchers, almost all areas are at risk of fire, while high-risk areas for explosions and fires include logistics warehouses, pharmaceutical installations, nutrition installations, storage, and Hazardous and Toxic Materials (Indonesian: B3).

Based on the results of the assessment or evaluation, the dr. R. Koesma Regional General Hospital of Tuban has not provided a map of the high-risk areas for explosions and fires. However, based on the results of interviews with OHS officers and workers in several installation areas as well as the results of supervision, all areas have a risk of fire. However, several areas have a high-risk category for fires, such as the storage areas for flammable goods or materials, namely the kitchens, nutrition installations, logistics warehouses, pharmaceutical installations, Hazardous and Toxic Materials (B3) waste treatment sites, medical, and others. Some of these areas are at risk of fire because of the possibility of an electric short circuit, an operating kitchen, a medical gas leak, and so on. Therefore, it is necessary to control the risks by utilizing periodic checks on cooking utensils in the kitchen such as LPG cylinders and stoves, periodic maintenance on medical devices, generators, and laundry equipment, periodic checks on the centre and the network of medical gas, and periodic checks on tools that use electricity (Fitriani, Setyaningsih and Denny, 2021 ; Kowara and Martiana, 2017).

In addition, there is a map showing active fire protection equipment such as fire extinguishers at every 15 meters distance. Hydrants, sprinklers, smoke and fire detectors, and fire alarms are spread throughout the area of each building. This map is available together with the evacuation route map. The dr. R. Koesma Regional General Hospital of Tuban has also provided a map of the evacuation route marked by a green arrow on the map, and safe gathering points that are divided into 4 evacuation zones. Each map describes the evacuation zones 1, 2, 3, and 4. The assembly point is important to be a concern for the hospital management, so that in the event of a fire, the parking lot or other land can be used as a rescue place (Astrianti and Elwindra, 2019). In addition, exit signs are placed at intersections of corridors, exit to the emergency stairwell, balcony or terrace and doors leading to the emergency stairwell (Indonesian National Standard, 2000 ; Seftyarizki *et al*., 2019). Each map also describes where the reader of the map is located to facilitate evacuation directions. This assessment also shows that the dr. R. Koesma Regional General Hospital of Tuban has provided 28 location plans in each building.

Evaluation of Fire and Explosion Hazard Reduction in dr. R. Koesma Regional General Hospital of Tuban Regency

In this research, Element Three is related to how the dr. R. Koesma Regional General Hospital of Tuban reduces the risk of fire and explosion hazards in the hospital. According to the Minister of Public Works Decree No. 10 of 2000 explains that every building is obligated to implement and fulfil the provisions on fire hazard safety including planning for fire protection, rescue facilities, active protection

systems, and passive protection systems (Minister of Public Works of the Republic of Indonesia, 2000). The results of the assessment show that the dr. R. Koesma Regional General Hospital of Tuban, regarding the application of Regulation of Minister of Health No. 66 of 2016 concerning this third variable, has fulfilled it by 15%.

Several assessments that are unregulated the Regulation of Minister of Health No. 66 of 2016 are the provision of evacuation equipment for high-rise buildings (supervision) and determination of the volume or number of flammable materials in certain areas where the storage warehouse is quite small and not fire-resistant (supervision). In addition, one variable is still not verified, namely the document for the preparation of Standard Operating Procedure (SOP) for safe work implementation or related to the impact of fire. The SOP includes steps or stages in carrying out activities, especially those related to open fire work. This is because there is no open fire work at the dr. R. Koesma Regional General Hospital of Tuban. Based on the Regulation of Minister of Health Number 66 of 2016 states that SOP related to occupational health and safety policies in hospital are stipulated in writing by a decision of the hospital director. In addition, the policy must also be clear and easy to understand, and be known by all workers in the hospital (Indonesian Minister of Health, 2016 ; UshSholeh, Suroto and Wahyuni, 2021).

Based on the evaluation and assessment on the documents and direct supervision, the dr. R. Koesma Regional General Hospital of Tuban has provided an audio and visual early warning system such as a red fire alarm, lights up, and sounds when there is a fire. This fire alarm is installed at various locations in the hospital. Besides that, smoke and fire detectors are also installed adjacent to the sprinkler (Salindeho *et al*., 2020). In addition, according to Law Number 24 of 2007 concerning Disaster Management, everyone has the right to obtain written or verbal information about disaster management policies (Samosir, Suroto and Kurniawan, 2021).

The next variable is the availability of signs and/or evacuation route signs that are placed along the evacuation route to the safe assembly point. This situation is important to be a concern for the hospital management so that patients can see and understand the way out according to the directions made by the hospital (Astrianti and Elwindra, 2019). Evacuation route signs are located throughout the hospital area which are placed on the floor surface not less than 15 cm and not more than 20 cm, using the right words, colours, and directions. At the safe meeting points, "assembly point" signs are placed. The next variable is the availability of exit access, evacuation access, and the safe area for the assembly point. The dr. R. Koesma Regional General Hospital of Tuban has provided exit access in every building at its ground level, easily visible, and has direct access to a safe open space outside the building. Furthermore, there is evacuation access such as emergency doors and emergency stairs on each floor in the building which is marked with red doors and evacuation route signs. The stairs of the evacuation route are equipped with handrails and lighting. There are also ramps that will make it easier for patients who are unable to walk independently to accommodate the shortage of evacuation beds. The ramps enable patient bed to slide down.

In addition, there are four zones for safe assembly points. The assembly point zones must be safe and easy for users and visitors to access at the hospital, have a safe distance from danger in the event of a fire or the risk of the hospital building collapsing, and large enough to accommodate many people in the hospital (Anastasia, Kahar and Agung, 2021). In this dr. R. Koesma Regional General Hospital, Zone 1 is in front of the ER, Zone 2 is in front of the South Polyclinic Building, Zone 3 is in front of the West Polyclinic Building, and Zone 4 is in front of the corpse building.

The dr. R. Koesma Regional General Hospital of Tuban has not provided evacuation equipment for high-rise buildings. So, for the evacuation of high-rise buildings, it relies on assistance from the local Fire Department (Indonesian: PMK) or the Regional Disaster Management Agency (Indonesian: BPBD). However, overall evacuation tools such as emergency routes, emergency stairs, evacuation signs, and others are already available in all areas of the hospital. From the results of supervision and existing documents, it is also known that the dr. R. Koesma Regional General Hospital of Tuban has placed flammable materials safely or separately from sources of fire and heat. Separation and grouping are aimed to avoid reactivity. In addition, the storage of combustible materials is equipped with proper and accurate containers and markings according to the type and level of hazard. The irregularity of the work area in the flammable material storage warehouse will have an impact on the threat to security and safety for workers and companies (Fathurochman and Sarvia, 2020).

In SNI 03-7011 in 2004 explain building materials used in building construction must take into account fireproof properties (SNI, 2014 ; Astrianti and Elwindra, 2019). The hospital has not implemented the determination of volume or number of combustible materials in certain areas where the storage warehouse is quite small and not fireproof enough. However, from the results of interviews and supervision, it is known that the flammable materials are stored in a system divided into several storage places, such as logistics warehouses, pharmaceutical installations, nutrition installations, laundry, and others. In addition, the building in the dr. R. Koesma Regional General Hospital of Tuban already uses concrete on the floors and walls, so it is considered strong enough to withstand fire.

The next variable is fire protection. Prevention of the spread of fire and smoke through vertical openings can be done by equipping vertical openings with fire stop, fire retardant, fire damper (Ardianyah, 2017). The dr. R. Koesma Regional General Hospital of Tuban has prepared some fire protections by including standards such as fire resistant building structures and also compartmentalization (fire stop, fire retardant, fire damper), so that smoke and fire do not spread to other areas. From the results of interviews and observations, it is known that the construction of the hospital building consists of concrete, brick, and gypsum that make the structure fire-resistant.

The next variable is the storage of flammable, hazardous and toxic materials (Indonesian: B3) and medical gases. It is known that the dr. R. Koesma Regional General Hospital of Tuban has storage of flammable, hazardous and toxic materials (B3) and medical gases. From the result of the supervision, the hospital has a storage and processing area for flammable, hazardous and toxic materials (B3) and medical gases. In addition, the waste of the flammable, hazardous and toxic materials (B3), medical, and plastics are placed separately.

Another variable assessed in the evaluation of fire and explosion risk reduction is the availability of a smoking ban in the hospital area. The dr. R.Koesma Regional General Hospital of Tuban has provided anti-smoking signs and posters installed at several points. If there is a violation, a maximum fine of IDR 50,000,000 will be imposed and the legal basis for the prohibition of smoking in this hospital is following the Tuban Regency Regulation No. 1 of 2016 Article 31 Paragraph 1 (Local Regulation of Tuban Regency Number 1, 2016). In addition, there are special officers assigned to give warnings to workers, patients, patient companions, or visitors who smoke at the hospital.

The dr. R. Koesma Regional General Hospital of Tuban has also fulfilled a checklist related to documents stating that periodic inspections of fire risk facilities/areas are carried out. It is proven that there is a fire prevention form such as inspection of the fire extinguisher and other active protection. From the results of the interview, it is also known that OHS officers carry out inspections every day. However, large-scale inspections are carried out every 6 months.

Next is the availability of policies, guidelines, and SOP related to fire safety. The dr. R. Koesma Regional General Hospital of Tuban has provided policies, guidelines, Term of Reference (TOR), and also Standard Operating Procedure (SOP) related to fire safety. The document is entitled "Guidelines for Fire Management, Disaster Precautions and Evacuation". This document is following the Decree of the Director of the Koesma Regional General Hospital of Tuban No.188.4/167/KPTS/414.109/2014 concerning Stipulation of Guidelines for Fire Management, Disaster Awareness and Evacuation at the dr. R.Koesma Regional General Hospital of Tuban (Decree of the Director of the Koesma Regional General Hospital of Tuban No.188, 2014).

The last variable in the Element Three is not verified with the application of Regulation of Minister of Health No. 66 of 2016. This is because there is no work implementation related to the impact of fires, especially in open fire work at the dr. R.Koesma Regional General Hospital of Tuban.

Evaluation of Fire Control in dr. R. Koesma Regional General Hospital of Tuban Regency

In Element Four, the assessment is mostly done by conducting direct supervision or observation around the hospital. From the assessment, the dr. R. Koesma Regional General Hospital of Tuban has fulfilled all the assessment variables under the Regulation of Minister of Health No. 66 of 2016 with a score of 22%.

The dr. R. Koesma Regional General Hospital of Tuban has provided a light fire extinguisher. This is shown by the existence of one fire extinguisher every 15 meters. In addition, the state of the fire extinguishers are checked every day, and a major inspection is carried out every 6 months. Another assessment is on the availability of smoke and fire

detection (Local Regulation of Tuban Regency Number 1, 2016). In the dr. R. Koesma Regional General Hospital of Tuban, smoke and fire detectors are installed on the top of the building or roof. Supervision is also carried out to check the fire alarm system in the hospital area. The color of fire alarms at the dr. R. Koesma Regional General Hospital of Tuban is red and installed at various points at various buildings (Hidayat, Suroto dan Kurniawan, 2017).

In addition, the Regulation of Minister of Health No. 66 of 2016 also requires hospitals to provide automatic water sprayers or sprinklers. Sprinkler is one of the systems used to extinguish and prevent the spread of fire that must exist in the building (Karimah *et al*., 2016). The researchers found that the dr. R. Koesma Regional General Hospital of Tuban has automatic water sprayers to automatically extinguish a fire or explosion source. The sprinklers are placed adjacent to the smoke and fire detection on the top of the building or roof. This can facilitate firefighting if a fire is detected in the area. In addition, there are mechanical smoke exhaust systems designed technically (engineered smoke system) in the buildings or parts of buildings. In addition to the fire smoke control system, this hospital has also installed a smoke exhaust system in the kitchen and at the waste treatment area in the hospital area.

The dr. R. Koesma Regional General Hospital of Tuban has also provided emergency exits on every floor of the buildings. The color of emergency doors at this hospital is red and always open to making it easier in case of an emergency. The emergency exit on the top floor leads directly to the emergency stairs. This makes fire evacuation easier. Evacuation routes to the four safe assembly point zones are provided and evacuation route plans for each building at the dr. R. Koesma Regional General Hospital of Tuban are also provided. The evacuation route plans are made based on the area in each building, showing 28 evacuation route plans and the position of the reader (Hidayat, Suroto dan Kurniawan, 2017).

In addition, the dr. R. Koesma Regional General Hospital of Tuban has provided emergency stairs, because in the event of a fire, the workers must immediately assist patients who need immediate assistance. Emergency stairs are made to prevent accidents or injuries when evacuating during a fire (Lasmida, 2018). Emergency stairs are located on various floors. The use of the stairs are limited and not for public access. From the results of supervision, it is also known that there are no obstacles in the emergency stairwell area and there are handrails to make the evacuation easier and safer.

From the results of the assessment, the dr. R.Koesma Regional General Hospital of Tuban has yards or safe gathering point locations equipped with signs stating that the yards are gathering point zones. The signs at the four meeting point zones in the hospital are clear, bright green in colour, and easy to find. This makes it easier for the evacuation process. In addition, every safe gathering point is equipped with emergency lighting. White emergency lighting lamps are located on the yard. There are also lighting along the evacuation route (Barael, Kawatu and Nelwan, 2021).

The Regulation of Minister of Health No. 66 of 2016 also requires the hospitals to provide manual water sprayers or hydrants. Based on the placement location, the building must have 2 types of hydrants, namely building hydrants and yard hydrants (Lasmida, 2018). From the evaluation of the dr. R.Koesma Regional General Hospital of Tuban, it is known that the hospital has provided hydrants that are spread out in every building. Hydrants can be found near emergency exits, at parks, and at several points in the building.

In the formation of a fire fighting team, the dr. R.Koesma Regional General Hospital of Tuban has provided arranged a team to deal with disasters called the Disaster Management Alert Command Unit. This team handles not only fire incidents but also other disasters, both internal and external disasters. The document owned by the dr. R. Koesma Regional General Hospital of Tuban also explains the job descriptions of each part of the disaster management alert command unit. However, there is no special fire suppression team at the hospital unit level. Instead, the hospital has provided all staff in each unit with training related to fire prevention (Satrio, Lestantyo and Wahyuni, 2021).

Training and socialization related to fire prevention and control in hospitals have been carried out by the dr. R. Koesma Regional General Hospital of Tuban. This is shown by the availability of a schedule of socialization and training for all workers every 6 months to adjust the schedule of annual activities in the hospital. The socialization and training provided are related to holding fire prevention training, conducting fire prevention and fire evacuation simulations, providing facilities and infrastructure to support activities, socialization

related to adequate communication systems, evacuation direction signs, evacuation route plans, and fire extinguisher maintenance (Decree of the Director of the Koesma Regional General Hospital of Tuban No.188, 2014).

Evaluation of Fire Simulation in dr. R. Koesma Regional General Hospital of Tuban Regency

The last element in the Regulation of Minister of Health No. 66 of 2016 which discusses fire prevention and control is the fire simulation in a hospital. Fire simulation needs to be given to hospital workers with the aim that workers have the knowledge and ability to fight with fires (Karimah, Kurniawan and Suroto, 2016). From the results of the assessment, it is known that the implementation of the fire simulation at the dr. R. Koesma Regional General Hospital of Tuban has been fulfilled by 38%, where 26 out of 32 variables are fulfilled.

The Koesma Regional General Hospital of Tuban has carried out a fire simulation for all its human resources in the hospital environment. After conducting education in the room (indoor class), then the workers are immediately invited to practice the material by implementing fire prevention simulation and fire evacuation in the hospital environment.

Fire and smoke management plans (testing of tools related to early detection and extermination of the fire and smoke) are included in the fire simulation, such as being carried out using socialization methods in class and evacuation practices (Musyafak, 2020). One of the materials is how to use active fire protection to put out a fire using a fire extinguisher. The training is done by explaining beforehand about the types of fire extinguishers and how to use fire extinguishers, and then direct practice on using fire extinguishers, and others. Apart from fire extinguishers, workers also learn how to use other tools such as communication tools in an emergency, sprinklers, hydrants, and others.

Furthermore, it is known that the dr. R.Koesma Regional General Hospital of Tuban has not provided documents stating that it is monitoring, especially those related to the use of combustible materials and the use of heat/fire sources. The researchers only found the document entitled "Evaluation Report on the Management of Toxic and Hazardous Materials in dr. R. Koesma Regional General Hospital of Tuban". The dr. R. Koesma Regional General Hospital of Tuban has carried out fire prevention as an implementation of third parties/ contractors. This is shown by the availability of a checklist of contractor compliance audits, in which fire prevention is discussed (Risanova, Rahayu and Asril, 2020).

The results of the next assessment or evaluation are related to early warning system, early detection system, smoke, heat, ion, or flame detector, fire alarm, and fire patrol. Every worker in the location or area of the hospital has understood a set of tools of firefighting. This is because all human resources at the dr. R. Koesma Regional General Hospital of Tuban have been given socialization to direct practice on fire prevention and control. This training, which is given to workers every 6 months, discusses how to handle an emergency, including in the event of a fire. In addition, there are also documents showing that pre-test and post-test have been carried out for workers related to fire handling.

Fire patrols at the dr. R. Koesma Regional General Hospital of Tuban are also routinely carried out. This is shown by the availability of the form of an infection control permit or Infection Control Risk Assessment (ICRA) and Fire Prevention. One of the contents of the form is related to active and passive fire protection devices. This is carried out every day by officers, and large patrols are also carried out to replace the expired active protection every 6 months. As for the results of the assessment on the sub-element of socialization, socialization has been carried out to all hospital staff in each unit and building regularly, namely once a year. It is proven by the documents in 2019 which state that socialization on disaster prevention and control including fires will be carried out in September and October.

The last sub-element in this element is related to suppression mechanisms such as water hoses, chemical suppressants, and sprinkler systems. From the results of the supervision, the dr. R. Koesma Regional General Hospital of Tuban has provided access for firefighters to move their vehicles. This is because the yard of the dr. R.Koesma Regional General Hospital of Tuban is quite wide and the entrance to the hospital is also wide and can be entered by a fire engine. The hospital yard and firefighting access are clear and unobstructed.

Water sources - pumps - generators / emergency resources have been adjusted to the applicable rules and regulations, in which there are guidelines for the management of the utility system at the dr. R. Koesma Regional General Hospital of Tuban, under the Regulation of Director of Koesma Hospital

No. 207 of 2018 (Regulation of the Director of the Koesma Hospital No. 207 of 2018). The result of supervision shows that supporting facilities such as water sources are always available with clean and ready-to-use water. The clean water installations consist of ground tanks, tower tanks, and pumps that are always maintained.

Furthermore, from the assessment, the dr. R. Koesma Regional General Hospital of Tuban has carried out periodic inspections and maintenance of fire protection equipment in accordance with the provisions. Routine checks are carried out every day by occupational safety and health officers. Meanwhile, inspection and maintenance are usually carried out in routine major inspections, namely once every 6 months. The inspection and maintenance are carried out at the same time to replace the damaged or expired fire extinguisher and other fire protection equipments.

The Fire Emergency Plan (FEP) for fire prevention and control is available at the dr. R. Koesma Regional General Hospital of Tuban as stated in the Decree of the Director of the Koesma Regional General Hospital of Tuban No.188.4/167/ Kpts/ 414.109/2014 (Decree of the Director of the Koesma Regional General Hospital of Tuban No.188, 2014). The implementation of a fire safety audit is similar to a self-assessment related to fire safety management carried out at the dr. R. Koesma Regional General Hospital of Tuban. This is shown by the availability of pre-test and post-test question and answer documents that had been implemented by the workers of the dr. R. Koesma Regional General Hospital of Tuban.

The last thing to be assessed is the establishment of an emergency control centre for communication (Saputra, Kridawati and Wulandari, 2019). The dr. R. Koesma Regional General Hospital of Tuban has carried it out in a controlled and centered manner in one area. If there is an emergency such as a disaster or fire, then all workers, patients, patient companions, and visitors will be directed to a safe gathering point. Each building has an evacuation route plan following the road or corridor in each building. At the dr. R. Koesma Regional General Hospital of Tuban, the emergency control centre is called the "Disaster Management Post". Disaster Management Post is needed to manage and accommodate several activities to support the handling of disaster victims so that the handling and management can be more coordinated and directed.

CONCLUSION

Based on the research carried out in dr. R. Koesma Regional General Hospital of Tuban Regency regarding the evaluation of fire prevention and control based on the Regulation of Minister of Health No. 66 of 2016 concerning Occupational Health and Safety in Hospitals in 2021, it can be concluded that the dr. R. Koesma Hospital obtained a score of 83%, with the appropriate number of variables is 57 out of 67 variables.

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