



IDENTIFICATION OF K3 HAZARD RISK IN FIREFIGHTERS AT MEDAN CITY FIRE AND RESCUE SERVICE

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Abstract

Firefighters are particularly vulnerable to several work-related illnesses and injuries, including toxic gas poisoning, burns, respiratory distress, and bodily injury. Therefore, an important first step in implementing successful prevention tactics is to identify possible K3 hazards precisely and accurately. To prevent industrial accidents that endanger workers due to hazards arising in the Medan City Fire and Rescue Department, the purpose of this study is to identify hazards and evaluate risks using the HIRA method analysis. The research was conducted using qualitative methodology. Three data collection methods were used: documentation, in-depth interviews, and observation. The informants in this study amounted to 4 people consisting of 2 key informants and 2 main informants. Based on the results of hazard identification and risk assessment, there are 19 accident risks spread across 5 activities in the Medan City Fire and Rescue Service. Based on the results of the study, it was concluded that 10 potential hazards fall into the meaningful category, 4 potential hazards fall into the medium-risk category, 4 potential hazards fall into the low-risk category, and high-risk categories as many as 1 potential hazard. Based on these conclusions, suggestions were submitted to the Medan City Fire and Rescue Service to increase the provision of personal protective equipment (PPE) such as gloves, helmets, heat-resistant shirts, and pants, and SCBA was an anticipation of the proposal submitted to the Medan City Fire and Rescue Service. Medan City Fire and Rescue Officers are also required to always comply with established work rules to reduce risks and avoid work accidents.

Keywords: Firefighters, Hazard Identification, Risk Assessment

Introduction

Fires are unplanned events and cannot be foreseen when or where they occur, so firefighters are instructed to maintain vigilance at all times. Because fire is something that cannot be controlled and causes losses, it is impossible to prevent it if it has spread. Typically, fires occur in dense metropolitan areas. The three constituent elements of fire commonly called the fire triangle, namely fuel and oxygen, combine chemically with the presence of a heat source to start a fire. Therefore, objects that will burn violently and quickly if exposed to sparks include cloth, paper, wood, chemicals, and gasoline. When all property is destroyed and many people die from fire, it is considered a disaster. Firefighters in Indonesia still face several challenges, including those related to operational procedures, institutional capabilities, regulatory requirements, and equipment adequacy. In other words, because fire safety has not been seen as a fundamental need, it often has deadly and repeated impacts (Jayati et.al., 2020).

According to Law Number 1 of 1970 which regulates work safety, the purpose of work safety regulations is to avoid accidents by reducing the risk of explosions, fire suppression, and making self-rescue routes in the event of fire or other hazards. situation. By Article 3(1), further legislative

recommendations are issued regarding the maintenance and installation of automatic fire extinguishing systems, special inspections for fire prevention and control in work areas, and requirements for the use of Light Fire Extinguishers (APAR) (Sianturi, 2017).

The main goal of firefighting is to save lives and minimize property damage in various emergency scenarios and locations, so in this case, there is a great risk of accidents. Because it facilitates reaction and prevention planning in unstable and changing conditions, special personal protective equipment (PPE) is essential equipment for firefighters (ILO, 2018). If needed, PPE will be worn at the scene of the fire. Firefighters are obliged to trace the origin of the fire (Sianturi, 2017).

The majority of firefighting accident risks according to the results of research by the Medan City Fire and Prevention Service (A. Aini, 2016), arise due to travel to the location of the fire and due to working at height, electric shock, high temperatures, fire, smoke, sharp objects, falls, and verbal or physical altercations with others. Inhaling strong smoke is the main cause of health problems, so symptoms such as coughing, shortness of breath, nausea, vomiting, dizziness, eye pain, and even fainting cannot be avoided.

According to the findings of previous research conducted by Batubara et al., (2021) on employees of the Tangerang City Fire Department, there have been several incidents of objects falling from the top of buildings, burning, falling while descending stairs from very high places to being crushed. They were not wearing fireproof clothing so they were exposed to asbestos and burned. Officers have to take turns using PPE due to several factors, including workers' misunderstanding of K3, workers' inability to implement K3, and PPE that is no longer suitable for use. According to Batubara et al., (2021), there are rules in Article 10 of the Minister of Manpower Regulation No. 03/MEN/1985 which states that work clothes or personal protective equipment worn by a worker may not be reused by other workers except in sterile and clean conditions.

Emergency responders, such as firefighters, work in high-risk environments because they often face stressful situations. Firefighters face several hazards when traveling and responding to fires, including electrical short circuits, high temperatures, fires, working at heights, explosions, backflows, lightning, burning buildings, sharp objects, and personal contact with residents (Nuramida et al., 2020). An expert in recognizing various hazards in an emergency is essential for firefighters and emergency medical services to do their job. According to ILO (2000), various risks may arise, including mechanical, electrical, biological, chemical, and physical risks. Exposure to possible hazards and their impacts that lead to work disruption can be used to determine the risk of accidents (Jayati et al., 2020).

The Command Headquarters (MAKO) and Technical Implementation Unit (UPT) are responsible for carrying out fire safety measures in Medan City on behalf of the Medan City Fire and Rescue Service. The head of UPT is in charge of UPT and is responsible to the head of service in carrying out his duties, while the head of MAKO is in charge of MAKO. (Medan City Government, 2022).

On January 25, 2024, located at the main unit, the MAKO Fire Department, researchers conducted an initial survey and interviews with firefighters from the Medan City Fire and Rescue Service. Four firefighters were interviewed and they revealed that there was a possibility of accidents and health problems at work. Common accidents include tripping and falling after hitting objects, slipping on water hoses and slippery puddles, and building collapses while extinguishing a fire in buildings due to strong water pressure from hoses when the top is wet, which causes corrugated boards and roofs to collapse and hit officers, crushed by hoses that slip out of hands, kicked by the glass, zinc, embers, etc. and electrocuted due to electricity that was not turned off or cut off, caught in a fire or explosion while at the scene, and had an accident while traveling to the scene. Also often when local firefighters take longer than expected to arrive at the scene, residents are angry with them.

When fighting fires, workers can experience health problems such as chemical poisoning, smoke inhalation, and shortness of breath due to lack of oxygen. Firefighters also showed signs of fatigue due

to their heavy-duty, which included lifting and holding large hoses. The fact that many officers were not wearing personal protective equipment contributed to the incident. This is based on claims made during interviews that people do not comply because they feel uncomfortable wearing personal protective equipment (PPE) or are too lazy to do so when PPE is indispensable and lowers the chances of accidents.

Research Methods

The study was conducted using qualitative methodology using observation methods, in-depth interviews, and documentation to explore information about the occupational risks of firefighters in the Medan City Fire and Rescue Service. The informants in this study amounted to 4 people consisting of 2 key informants and 2 main informants. The HIRA approach was used in this study to assess the risk of workplace accidents. This is the process of determining the risks that may arise from each work activity and then evaluating those risks (Rehuel, 2020). There are two perspectives available to analyze occupational risk: likelihood and severity (ILO, 2018). How often and for how long a worker is exposed to possible risks should be considered when estimating the likelihood of an occupational accident or disease. Decisions regarding the frequency of accidents for each potential hazard can be made in this way. Table 1 lists risk probability groups.

Table 1. Probability Level Assessment

Likelihood	Score
Very rare	1
Infrequently	2
Maybe	3
Often	4
Very often	5

The next one is the severity. The number of people affected by the event and body parts that may be in danger should be taken into account when assessing the severity of an accident. Table 2 displays the severity categories.

Table 2. Determination of Consequences/Severity

Impact	Score
No injuries	1
Minor Injury/ Requires P3K	2
Moderate Injury/ Requires Medical Treatment	3
Severe Injury/ Causing Permanent Disability	4
Causing Death	5

Table 3. Determination of Risk Level

P x S	Risk Level	Color Description
1 - 3	Low	
4 - 6	Keep	
8 - 12	Means	
15 - 25	Tall	

Result

Based on the identification carried out on the aspects of danger that can be experienced by firefighters starting from preparation for departure, leaving for the location, preparation of equipment, the extinguishing process, until returning to headquarters, several sources of danger and risks can occur to the extinguishers. Based on the results of observations and interviews, *hazard identification* was obtained at the Medan City Fire and Rescue Service which can be seen in Table 4. The results of the *risk assessment* at the Medan City Fire and Rescue Service can be seen in Table 5.

Table 4. Hazard Identification

No	Activities	Source Danger	Risk/ Impact
1	Preparation for Departure	Falling from a ladder or pole when notified of an emergency Collided with another officer Driving too fast and falling out of the car	Falling from a height, bruises/bruises Collided Bruises, sprains
2	Depart to Location	Falling out of the car due to high-speed Accidents involving vehicles The officer sitting on top of the car was in danger because of trees and power lines across the road	Falling from a height Die Minor injuries
3	Tool Preparation at the Fire Site	Wrapped around a water hose when attaching a hose from the pump to the fire site The large number of people who surrounded the scene of the fire made it difficult for officers to move	Fall Bruises, minor injuries
4	Outage Process	At the scene of a fire, the temperature of the hot air can exceed 100°C Electric shock Inhaling fire smoke containing hazardous materials Smoke and dust make eyes hurt Exposed to building debris Slipping and falling due to standing water or slippery surfaces Burn Exposed to sharp objects such as glass, iron, and other objects Chemical explosion	Dehydrates Electrocuted Poisoning and respiratory distress Skin or eye irritation Bruises, falls from heights, dies Abandoned, Burns Moderate injuries, bruises/bruises Respiratory distress, burns, and death
5	Back to Headquarters	Falling out of the car due to fatigue and low concentration levels Fatigue due to long blackout processes	Bruises/sprains Dehydrates

Table 5. Risk Assessment

No	Activities	Source Danger	Risk/ Impact	Risk Level
1	Preparation for Departure	Falling from a ladder or pole when notified of an emergency	Falling from a height, bruises/bruises	High
		Collided with another officer	Collided	
		Driving too fast and falling out of the car	Bruises, sprains	Medium
2	Depart to Location	Falling out of the car due to high-speed Accidents involving vehicles	Falling from a height	Medium
		The officer sitting on top of the car was in danger because of trees and power lines across the road	Die Minor injuries	
3	Tool Preparation at the Fire Site	Wrapped around a water hose when attaching a hose from the pump to the fire site	Fall	Medium
		The large number of people who surrounded the scene of the fire made it difficult for officers to move	Bruises, minor injuries	
4	Outage Process	At the scene of a fire, the temperature of the hot air can exceed 600°C	Dehydrates	High
		Electric shock	Electrocuted	
		Inhaling fire smoke containing hazardous materials	Poisoning and respiratory distress	
		Smoke and dust make eyes hurt	Skin or eye irritation	
		Exposed to building debris	Bruises, falls from heights, dies	
		Slipping and falling due to standing water or slippery surfaces	Abandoned,	
		Burn	Burns	
5	Back to Headquarters	Falling out of the car due to fatigue and low concentration levels	Bruises/sprains	Medium
		Fatigue due to long blackout processes	Dehydrates	

Discussion

Hazards in the workplace can come from a variety of sources, such as physical, ergonomic, chemical, biological, or psychological risks. According to Halim and Panjaitan (2016), hazards can also be divided into three categories, namely environmental, health, and accident hazards. The physical, chemical, electrical, and mechanical hazards arising from any firefighting operation are sources of danger discussed in this study. The actions of the Medan City Fire and Rescue Service are at a fairly good level, based on the findings of the average risk assessment. Table 5 shows that there are four low-hazard risks, four medium-hazard risks, ten meaningful hazard risks, and one high-hazard risk out of a total of 19 accident risks. Low hazard potentials include colliding with other officers, falling while driving too fast, being wrapped around hoses, and slipping due to slippery surfaces. In moderate potential dangers, there are several dangers, namely falling from stairs or poles, traffic accidents, being hit by phones and cables while sitting on top of the car, and falling from the car due to fatigue. At the potential hazard level, there are ten hazard risks, including falling from cars, crowds, hot temperatures, electric shock, smoke, building ruins, burning, sharp objects, explosions, and fatigue.

The findings of this study also support previous research (Shafwani, 2012), which found that the occupational risks of firefighters such as collisions, are greater when traveling to the scene of a fire. When responding to a fire, firefighters may encounter hazards related to electricity, heat, flames, heights, firefighting equipment, explosions, backflows, electrical currents, burning buildings, sharp objects, and physical confrontation with residents.

The main task of firefighters is at a considerable level of risk based on the findings of a risk assessment conducted using the HIRA matrix. A hazard control hierarchy, which includes substitution, elimination, engineering control, administration, and use of PPE, can be used to reduce this risk. The following actions can be taken to make improvements in this area: 1) Prepare yourself physically and emotionally to handle phone calls and responsibilities in an emergency. 2) Cooperate with local authorities and authorities in mobilizing communities who see fires. 3) Provide frequent training to firefighters and ensure their fitness. 4) Increase vigilance on site. 5) Understand SOPs thoroughly. 6) Arrange for PLN to carry out power cuts around the fire site. 7) Provide necessary first aid training to firefighters. 8) Continuous maintenance and maintenance on equipment and PPE. 9) Use complete PPE.

Conclusion

Ten possible hazards are meaningful categories with the greatest level of risk, four potential hazards fall into the low-risk category and four potential hazards fall into the medium-risk category. For one potential hazard in a high group, there may be a risk for a while. There are high and meaningful risks that must be addressed. Firefighters face some type of risk as they prepare to depart, arrive at the scene of the fire, set up equipment there, perform extinguishing operations, and then return to the control center after the extinguishing operations are completed.

The Medan City Fire and Rescue Department handles mechanical, electrical, chemical, and physical threats. Physical hazards such as burns, falls, and collisions with sharp objects are the most common hazards. The K3 control hierarchy which includes replacement, elimination, technical control, management, and use of PPE is the basis for suggestions that can be taken.

Suggestion

The increase in the provision of personal protective equipment (PPE) such as gloves, helmets, heat-resistant shirts, and pants, as well as SCBA, is an anticipation of the proposal submitted to the Medan City Fire and Rescue Service. Medan City Fire and Rescue Officers are also required to always comply with established work rules to reduce risks and avoid work accidents. In addition, in the future, researchers may use other risk assessment techniques to investigate K3 hazards associated with firefighters. This will allow decision-makers to evaluate study findings and use them to guide policy.

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