MIKAILALSYS
Journal of Multidisciplinary Sciences

e-ISSN : 2987-2286
p-ISSN : 2987-3924

Index : Dimensions, Scilit, Crossref, Garuda, Semantic, Lens,Google Scholar,Base, etc

https://doi.org/10.58578/mikailalsys.v3i3.7311

The Analysis of Occupational Health and Safety at the Muhammadiyah Lamongan Hospital

Eko Ari Bowo, Laely Ufiz Tsani Sugiyana, Nadiya Istighfaara, Maharani Nusara Ardhi, Irsyad Yudisianto, Burhanuddin Hilmi Muhammad
Universitas Muhammadiyah Lamongan, Indonesia
ekoaribowo@umla.ac.id; laelyufiz@umla.ac.id

Article Info:

Submitted:	Revised:	Accepted:	Published:
Jul 22, 2025	Aug 16, 2025	Aug 28, 2025	Sep 2, 2025

Abstract

Hospitals, as complex healthcare institutions, present considerable occupational health and safety (OHS) risks due to the interplay of multiple stakeholders, technologies, and hazardous materials. Effective OHS management is essential to safeguard the well-being of workers, patients, and visitors. This study examines the implementation of OHS practices in the Inpatient Unit of Muhammadiyah Lamongan Hospital, utilizing a descriptive qualitative approach. Data were collected through in-depth interviews with three key informants: the Head of the Hospital's OHS Department (K3RS) and a maintenance staff member (IPSRS officer). The findings indicate that Muhammadiyah Lamongan Hospital has implemented OHS measures in alignment with national standards, specifically the Regulation of the Minister of Health of the Republic of Indonesia No. 66 of 2016. Key practices include the provision of safety signs and personal protective equipment (PPE), safe handling and management of hazardous and toxic materials (B3), maintenance of medical infrastructure, and implementation of fire prevention and control systems. Emergency and disaster preparedness is supported by a structured

Mikailalsys is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License

response plan encompassing hazard identification, team organization, protective systems, and life-saving equipment. Despite these strengths, the study recommends several improvements: increasing the frequency of emergency drills and simulations, conducting routine OHS audits and evaluations, enhancing documentation practices, integrating advanced technologies into OHS systems, and promoting active staff participation to foster a robust safety culture. These efforts are essential to further strengthen OHS effectiveness and ensure a safer, healthier hospital environment.

Keywords: Occupational Health and Safety; Hospital Risk Management; Inpatient Unit; Emergency Preparedness; K3RS Implementation

INTRODUCTION

Hospitals are complex healthcare institutions with various activities involving medical personnel, patients, visitors, and the use of medical equipment and chemicals. The working environment in hospitals has a high potential for occupational safety and health (OSH) risks, including exposure to infectious agents, hazardous chemicals, radiation, as well as ergonomic and psychosocial risks.

Globally, it is estimated that more than 2 million healthcare workers experience needlestick injuries (NSI) each year (Liyew et al., 2020). According to a systematic review and meta-analysis conducted by Bouya et al. (2020), which included 87 studies with a total of 50,916 healthcare workers in 31 countries, the global annual prevalence of NSI is 44.5%. The Southeast Asia region has the highest prevalence rate of 58.2%. In terms of profession, nurses are one of the groups most frequently affected by NSI. Therefore, the implementation of an effective OSH management system is crucial to protect all parties involved in hospital operations.

The implementation of OSH in hospitals is not only aimed at protecting workers, but also at ensuring the safety of patients and visitors, as well as maintaining the quality of health services. Indonesian Minister of Health Regulation No. 66 of 2016 concerning Occupational Safety and Health in Hospitals emphasizes the importance of implementing OSH as an integral part of hospital management.

However, the implementation of OSH in various hospitals in Indonesia still faces challenges, such as limited human resources, lack of training, and minimal supervision. A

study by Ahmadi et al. (2020) in Hasyim (2022) shows that at the East Kolaka Regional General Hospital, Hospital Occupational Safety and Health (K3RS) planning has been implemented, but not optimally. The implementation of the K3RS plan has not been fully realized due to limited human resources. Monitoring and evaluation of K3RS performance are carried out in collaboration with third parties due to inadequate human resources and the absence of testing equipment and methods in hospitals. Review and improvement of K3RS performance have been carried out, but there are still many aspects that have not been fulfilled.

Based on initial observations and internal reports, Muhammadiyah Lamongan Hospital demonstrates good implementation of Occupational Safety and Health (OSH). This is indicated by the availability of personal protective equipment (PPE) for all workers, the implementation of routine training on occupational safety, and a structured incident reporting system. In addition, the hospital also has an active OSH team that conducts periodic monitoring and internal audits to ensure that all safety procedures are complied with by both medical and non-medical staff. However, a problem was found in one of the inpatient rooms that has the potential to cause an Unwanted Event (KTD). The problem is the lack of handrails in the toilet, which can cause a risk of slipping. In addition, the use of squat toilets also risks putting excessive pressure on the knees and ankles of the elderly, and can even increase the risk of falling. This condition is also risky for pregnant women, especially in the final trimester of pregnancy. To overcome these problems, an evaluation of the implementation of K3 at the Muhammadiyah Lamongan Hospital is needed.

METHODS

This study uses a qualitative approach with a descriptive method, which aims to describe in depth the phenomenon related to the implementation of Hospital Occupational Safety and Health (K3RS) in the Inpatient Unit of Muhammadiyah Lamongan Hospital. The selection of this method is based on the consideration that descriptive qualitative research is able to provide a comprehensive understanding of the actual conditions, experiences, and perspectives of informants regarding the implementation of K3RS. This method was chosen based on the consideration that descriptive qualitative research can provide a comprehensive understanding of the actual conditions, experiences, and perspectives of informants regarding the implementation of K3RS. Data collection

techniques were carried out through in-depth interviews with three informants, namely the Head of K3RS, the Hospital Facility Maintenance Officer (IPSRS), and an Inpatient Nurse.

These informants were selected using purposive sampling because they were considered to have knowledge and experience relevant to the research topic. In addition to interviews, this study also used document checks as secondary data to verify the implementation of the K3RS program. To ensure data validity, the researcher applied source triangulation, which is comparing interview results from various informants with related documents, thereby obtaining a more objective and valid picture of the implementation of K3RS in hospitals.

RESULTS

1. This Study Focuses on Occupational Health and Safety Standards at Muhammadiyah Lamongan Hospital
   a. K3RS Risk Management

      According to the Head of K3RS, *"K3RS risk management at Muhammadiyah Lamongan Hospital is carried out through good cooperation between K3RS managers and all elements of the hospital."* This effort is manifested in the provision of clear hazard warning signs in areas with potential risks, such as electrical hazards, explosive hazards, and infectious hazards. In addition, Personal Protective Equipment (PPE) is available according to the needs and risks of the work in each installation.

      IPSRS staff stated, *"We always ensure that PPE is available in every unit and that its types match the potential hazards present."* Disposable equipment is also provided to minimize infection risks. According to the Head of K3RS, "To deal with emergencies, the hospital has equipped itself with structured evacuation instructions, including evacuation routes, emergency stairs, and easily accessible assembly points. Muhammadiyah Lamongan Hospital also always conducts risk mitigation."

   b. Safety and Security in Hospitals

      Muhammadiyah Lamongan Hospital strives to create a safe and secure environment for its employees, patients, visitors, and the surrounding community. This is supported by the compliance of all parties with established regulations and Standard Operating Procedures (SOPs).

According to the Inpatient Nurse, *"All new employees receive orientation on hospital safety and security regulations."* According to the Inpatient Nurse, *"When an accident occurs, a report form is filled out, and then an investigation is conducted."* The availability of adequate facilities and infrastructure is also an important factor in ensuring safety and security in the hospital environment.

c. Occupational Health Services

Occupational health services at Muhammadiyah Lamongan Hospital are carried out in accordance with Indonesian Minister of Health Regulation No. 66 of 2016. The services provided are comprehensive, covering promotional, preventive, curative, and rehabilitative efforts for all hospital human resources. The implementation includes strict pre-employment health examinations for prospective employees and workers who are transferring between departments, periodic health examinations tailored to job risks and age, and a Medical Check-Up for Retirement Preparation (MCU MPP) program to prepare for a healthy and productive retirement. According to the Head of the K3RS Department, every employee who will work and also transfer to another installation must undergo a Pre-employment Medical Check-up with physical examinations, MCU and Vision clinics, Radiology support (PA position THORAX), LAB (DL, UL, Liver Check, Kidney Function Check, AIDS-HIV), if there are deficiencies and inaccuracies in the employee's examination, then they cannot continue to work at the agency. *"Every prospective employee must undergo a pre-employment MCU. If there are findings that do not meet health standards, we cannot continue the recruitment process."*

d. Management of Hazardous and Toxic Materials (B3) from an Occupational Health and Safety Perspective

Muhammadiyah Lamongan Hospital has established standard operating procedures (SOPs) for the management of hazardous and toxic materials (B3) in accordance with occupational health and safety (K3) aspects. According to the Head of K3RS, *"This incinerator room is equipped with a strict security system and only trained personnel are allowed to enter."* Additionally, according to the IPSRS Officer, *"Appropriate Personal Protective Equipment (PPE) must also be used by workers assigned to the B3 management facility."* Based on Minister of Health Regulation No. 18 of 2020 concerning Medical Waste Management, health facilities are required to sort, manage, and safely dispose of B3 waste. A study by Silvaninda et al (2020)

emphasizes that medical waste management must be carried out by trained personnel in order to prevent exposure to hazardous substances.

e. Fire Prevention and Control

Muhammadiyah Lamongan Hospital has comprehensive measures in place for fire prevention and control. These include identifying areas with a high risk of fire and providing strategically placed and well-maintained fire extinguishers. According to an IPSRS officer, *"We routinely check the fire extinguishers every month to ensure they are in working order."* Then, according to the Head of the K3RS Department, *"The installation of a hydrant system that covers the entire hospital area, the use of automatic water sprayers (sprinklers) in every room, the installation of an automatic fire alarm system connected to early detection, and the provision of smoke and heat detectors are also an important part of this effort."*

This is in line with NFPA standards and Ministry of Health Regulation No. 66 of 2016, which stipulates that active and passive fire protection systems must be available in hospitals to protect patients and staff. Research (Nasution et al, 2025) shows that integrated fire systems reduce response time and losses when incidents occur. Muhammadiyah Lamongan Hospital has met optimal fire system standards.

f. Hospital Infrastructure Management from an Occupational Health and Safety Perspective

Hospital infrastructure management at Muhammadiyah Lamongan Hospital pays attention to occupational health and safety aspects. This can be seen from the fulfillment of occupational health and safety standards in utility systems, such as the availability of elevators (lifts) that are separated for patients and visitors in each building.

According to IPSRS officers, "*The separation of elevators is important for the comfort and safety of patients."* In addition, IPSRS officers also said that *"There are records of infrastructure usage approval that demonstrate compliance with occupational safety and health standards."*

g. Medical Equipment Management from an OHS Perspective

Muhammadiyah Lamongan Hospital manages medical equipment in accordance with the standards of the Health Equipment and Facility Safety Agency (BPAFK). The hospital has internal testing/calibration equipment for

some medical equipment and routinely conducts functional testing/calibration of all medical equipment. According to the Inpatient Nurse, *"All of our medical equipment must be calibrated at least once a year."* According to the Head of the OSH Department, *"For equipment in the Radiology room, there is special supervision from the Radiation Protection Officer (PPR) and the Nuclear Energy Regulatory Agency (BAPTEN)."*

h. Preparedness for Emergencies or Disasters

Muhammadiyah Lamongan Hospital has preparedness measures in place to deal with emergencies or disasters, especially those that frequently occur in the area, such as flooding. These measures include the provision of rubber boats and equipment, a ban on the use of elevators during emergencies, the provision of easily accessible emergency stairs, and clear evacuation routes with signs. According to the Head of the K3RS Department, *"We have a special disaster response team that is always on standby."* According to the Inpatient Nurse, "*We always have patient evacuation aids such as Emergency Evacuation Chairs and Vertical Rescue equipment ready."*

2. Fire Emergency Response System

a. Sources of Fire Hazards

Muhammadiyah Lamongan Hospital has identified various potential sources of fire hazards in the hospital environment. These sources include areas with electrical installations that are at risk of short circuits, such as the generator room and radiology room, the incineration of hazardous waste in the incinerator room, the storage of flammable gases such as liquid oxygen cylinders, and the use of equipment that has the potential to cause fires in infrastructure installations and the use of LPG in nutrition installations. According to the Head of the K3RS Department, "We pay special attention to areas with a high potential for fire through routine inspections."

According to Indonesian Minister of Health Regulation No. 66 of 2016 concerning K3RS, hospitals are required to identify fire risks and develop fire hazard control plans. In a study by Ruwanto et al (2025), fire risk control must be carried out systematically through periodic inspections and evaluation of potential hazards in all hospital installations. From this, it can be seen that efforts to detect sources of fire hazards at Muhammadiyah Lamongan Hospital are in accordance with applicable regulations.

b. Fire Emergency Response Organization

Muhammadiyah Lamongan Hospital has a clear fire emergency response organizational structure. According to the IPSRS officer, *"There is a special team responsible for firefighting, whose schedule is stated in writing."* The officers on duty are hospital staff who are on duty, with tasks differentiated by helmet color. According to the Head of the K3RS, *"Each team member has a specific role in the event of a fire, according to the color of the helmet they wear."* The hospital also has a control team with specific job descriptions for each role in firefighting.

According to Indonesian Minister of Health Regulation No. 66 of 2016 concerning K3RS, hospitals are required to identify fire risks and develop fire hazard control plans. In a study by Ruwanto et al (2025), fire risk control must be carried out systematically through periodic inspections and evaluations of potential hazards in all hospital installations. From the above description, it can be explained that Muhammadiyah Lamongan Hospital is in compliance with applicable regulations.

c. Fire Protection System

Muhammadiyah Lamongan Hospital is equipped with an adequate fire protection system. This system includes Light Fire Extinguishers (APAR) distributed throughout the hospital area according to the type and potential hazard. According to the IPSRS Officer, *"The placement of APAR is in accordance with standards and is easily accessible."* According to the Head of the K3RS Department, *"This system can include a hydrant system with optimal coverage, automatic sprinklers installed in every room, automatic fire alarms with control panels in every building connected to an early detection system, as well as smoke and heat detectors integrated with other protection systems."*

d. Life-Saving Equipment

Muhammadiyah Lamongan Hospital has complete life-saving equipment to ensure safe evacuation in emergency conditions. This equipment includes ramps/corridors as alternative stairways. According to the Inpatient Nurse, "These ramps are very helpful for evacuating patients in wheelchairs or stretchers." According to the IPSRS Officer, *"Emergency stairs located at several strategic points in each building, clearly marked evacuation routes that meet standards, easily accessible evacuation doors, and safe assembly points are also available. Additionally, evacuation*

aids such as the Emergency Evacuation Chair and Vertical Rescue equipment are available to assist in the evacuation of patients requiring special assistance."

DISCUSSION

1. This Study Focuses on Occupational Health and Safety Standards at Muhammadiyah Lamongan Hospital
   a. K3RS Risk Management

      The results of the study show that risk management at Muhammadiyah Lamongan Hospital has been implemented systematically through risk mapping, installation of hazard signs, and provision of personal protective equipment (PPE) as needed. This implementation is in line with Minister of Health Regulation No. 66 of 2016, which emphasizes the obligation of hospitals to identify risks and establish mitigation measures as part of K3RS management. These findings are reinforced by Diannita (2022)., who explain that risk mapping and the availability of PPE are crucial indicators in creating a safe working environment for health workers.

      The global perspective also confirms this, with the WHO (2017) stating that safety-based risk management is a key pillar of patient safety systems, while OSHA (2020) emphasizes the importance of incident reporting and risk analysis as strategies for preventing workplace accidents in healthcare facilities. Thus, the effectiveness of risk management depends not only on the provision of physical facilities, but also on the sustainability of evaluation and reporting systems. Therefore, the development of a digital incident reporting system is recommended as a strategic step to accelerate response, improve data accuracy, and support the real-time risk evaluation process. This effort will strengthen the readiness of Muhammadiyah Lamongan Hospital in meeting national standards while approaching international best practices in hospital risk management.

   b. Safety and Security in Hospitals

      A culture of occupational safety is a key element in creating a safe and high-quality hospital environment. The efforts made by Muhammadiyah Lamongan Hospital through the dissemination of Standard Operating Procedures (SOPs) and training for health workers demonstrate a commitment to building a culture of safety. These findings are consistent with the research by Alaraidh et al

(2023), which proves that regular training plays a significant role in increasing staff compliance with safety procedures. In addition, Alabdaly et al (2024) emphasizes that a strong safety culture not only serves to prevent workplace accidents but also contributes to improving overall workforce performance.

The global perspective reinforces this finding, with the WHO (2017) affirming that a safety culture is the foundation of an effective patient safety program, while the Joint Commission International (JCI, 2021) accreditation standards require hospitals to establish a transparent incident reporting system as part of their safety culture. Thus, the consistent implementation of a safety culture at Muhammadiyah Lamongan Hospital has strategic implications, both in minimizing the risk of accidents and in supporting the improvement of health service quality in accordance with national and international standards.

c. Occupational Health Services

Occupational health services at Muhammadiyah Lamongan Hospital have covered promotive, preventive, curative, and rehabilitative aspects as mandated in Minister of Health Regulation No. 66 of 2016 concerning K3RS. This implementation demonstrates a comprehensive effort to protect health workers from the risk of occupational diseases. The findings of this study are consistent with Oshio, T. et al, (2021), which prove that periodic health checks contribute significantly to reducing the incidence of occupational diseases in health care facilities.

The WHO (2020) emphasizes that occupational health services in hospitals must include periodic examinations, immunizations, and mental health support as part of a patient safety strategy. Meanwhile, the ILO (2019) emphasizes that a holistic approach to occupational health not only improves the well-being of health workers but also has implications for increasing productivity and the quality of health services. Thus, although occupational health services at Muhammadiyah Lamongan Hospital are in accordance with national regulations, the integration of stress counseling and psychosocial support programs is still necessary to build a more sustainable occupational health system that is oriented towards the safety and well-being of health workers.

d. Management of Toxic and Hazardous Materials from an OHS Perspective

The management of hazardous waste at Muhammadiyah Lamongan Hospital has been carried out in accordance with national regulations through the implementation of SOPs and the use of special incinerators. This demonstrates compliance with K3RS standards, which aim to protect health workers while minimizing the impact of environmental pollution. Fildzah (2022) emphasizes that proper management of hazardous waste plays an important role in preventing exposure to hazardous substances for health workers. In line with this, Pratiwi (2020) also affirms that compliance with national standards is a crucial indicator in ensuring occupational safety and health in healthcare facilities.

The WHO (2014) highlights that improper medical waste management has the potential to increase the risk of infectious disease transmission, while UNEP (2016) emphasizes the need for an environmentally friendly approach to healthcare waste management to support environmental sustainability. Therefore, in addition to compliance with national regulations, regular audits and alignment with international standards, such as the International Maritime Dangerous Goods (IMDG) Code (Zhao, M et al, 2023), are necessary to ensure that medical waste management in hospitals is in line with global best practices. Thus, Muhammadiyah Lamongan Hospital not only meets national standards but also strengthens a safe and sustainable hazardous waste management system that is oriented towards environmental protection and worker safety.

e. Fire Prevention and Control

Muhammadiyah Lamongan Hospital has implemented active and passive fire protection systems in accordance with the National Fire Protection Association (NFPA) standards and Minister of Health Regulation No. 66 of 2016 concerning K3RS. This implementation includes the provision of fire extinguishers (APAR), hydrant systems, automatic sprinklers, and fire alarms integrated with early detection. The results of this study are consistent with the findings of Nasutioin et al (2025), which show that integrated fire systems can speed up response times while reducing the risk of casualties and material losses in health facilities.

The global perspective also emphasizes the importance of this aspect, with the WHO (2017) stressing that fire protection systems are one of the indicators of

hospital disaster preparedness, while the Joint Commission International (JCI, 2021) accreditation standards require fire evacuation procedures that have been tested through routine simulations as part of patient safety. Thus, the effectiveness of a fire protection system is not only determined by the existence of physical facilities, but also by the quality of maintenance and the readiness of human resources. Therefore, regular maintenance of protection equipment, functional audits of the system, and improving staff competence through continuous training and fire simulations are important steps to ensure optimal preparedness. These efforts show that Muhammadiyah Lamongan Hospital not only complies with national regulations but also moves towards international safety standards oriented towards the protection of patients, health workers, and hospital assets.

f. Hospital Facility Management from an Occupational Health and Safety Perspective

Infrastructure management at Muhammadiyah Lamongan Hospital has taken into account occupational health and safety aspects, one of which is through a policy of separating the use of elevators between patients and visitors. This policy is in accordance with Permenkes No. 66 of 2016, which emphasizes the importance of hospital facility safety standards to support comfort while reducing the potential for incidents. The recording of facility approvals also shows that there is a structured quality control mechanism as part of the K3RS management system.

These findings are in line with the research by Silvalinda et al (2020), which emphasizes that compliance with infrastructure standards and documentation of facility approvals are important factors in ensuring safety in the hospital environment. However, the effectiveness of infrastructure management does not only depend on initial policies, but also on periodic evaluations of the function, suitability, and safety of existing facilities. Therefore, routine inspections and internal audits are necessary to ensure that hospital infrastructure remains compliant with safety standards, oriented toward the protection of patients, healthcare workers, and visitors.

g. Management of Medical Equipment from an OSH Perspective

The results of the study show that medical equipment management at Muhammadiyah Lamongan Hospital has been carried out through a routine calibration process in accordance with the ISO 13485 standard. This implementation reflects the hospital's commitment to maintaining the reliability of medical devices as part of its efforts to ensure patient safety. This finding is consistent with the WHO (2017) recommendation, which emphasizes that regular calibration and maintenance of medical equipment are important indicators in hospital safety systems. JCI (2021) requires documentation of equipment calibration and maintenance as part of hospital accreditation standards, while the Food and Drug Administration (FDA, 2020) emphasizes the importance of validating and reporting on the quality of medical devices to prevent the risk of malfunction. Thus, the success of medical equipment management is not only determined by the implementation of calibration, but also by the existence of internal audit mechanisms, transparency of calibration reports, and compliance with international accreditation standards. Strengthening the aspects of monitoring, auditing, and documentation will ensure that service quality is maintained, while increasing patient confidence in the quality of health services.

h. Preparedness for Emergencies or Disasters

The preparedness of Muhammadiyah Lamongan Hospital in facing emergencies is reflected in the provision of evacuation routes, the availability of patient evacuation equipment, and the formation of a disaster response team. This implementation demonstrates the hospital's commitment to developing a structured emergency response system. The findings of this study are consistent with Yenni et al (2021), who emphasizes that the readiness of disaster response teams plays a significant role in determining the effectiveness of evacuation in healthcare facilities.

The WHO (2017) recommends that hospitals have an emergency response plan integrated with routine simulation exercises, while the United Nations Office for Disaster Risk Reduction (UNDRR, 2019) emphasizes the importance of cross-sector coordination as a key element in building the resilience of health facilities. Therefore, preparedness cannot only be measured by the availability of facilities and the formation of teams, but must also be supported by

the implementation of continuous joint exercises and post-simulation evaluations. With this step, Muhammadiyah Lamongan Hospital not only meets national regulatory standards but also moves towards implementing international best practices in hospital emergency response management that prioritizes the safety of patients, healthcare workers, and visitors.

2. Fire Emergency Response System

a. Sources of Fire Hazards

The hospital has identified potential fire hazards, formed an emergency response organization, and provided an adequate fire protection system. This is in line with Ruwanto et al (2025), who emphasize the importance of regular inspections to minimize fire risks. The availability of evacuation facilities, such as emergency stairs and evacuation chairs, also supports hospital preparedness. However, periodic evaluation of evacuation routes and emergency lighting remains important to ensure functionality when incidents occur.

b. Fire Emergency Response Organization

The implementation of fire risk identification and the preparation of hazard control plans at Muhammadiyah Lamongan Hospital are in accordance with Indonesian Minister of Health Regulation No. 66 of 2016 concerning K3RS, which emphasizes the obligation of hospitals to implement comprehensive fire risk management. The findings of this study are consistent with the study by Ruwanto et al (2025), which shows that fire risk control must be carried out systematically through periodic inspections and evaluations of potential hazards in every hospital facility. This is also in line with international standards from the National Fire Protection Association (NFPA, 2018), which recommends the implementation of active and passive protection systems, including early detection, automatic alarms, and adequate evacuation facilities in health facilities.

In addition, the WHO (2017) emphasizes that preparedness for fires and disasters is an important indicator in assessing hospital safety, which must include aspects of equipment, procedures, and training for health workers. Thus, Muhammadiyah Lamongan Hospital can be considered to have met national regulatory standards and global best practices in fire management. However, continuous evaluation of the effectiveness of implementation, particularly routine training of personnel and maintenance of fire protection equipment, is still

necessary so that hospital preparedness is not only administrative but also operational and oriented towards the safety of patients and health workers

c. Fire Protection System

Fire protection is a crucial aspect of hospital safety as it is directly related to the protection of patients, healthcare personnel, and facility assets. The implementation of the protection system at Muhammadiyah Lamongan Hospital is in accordance with the provisions of Permenkes No. 24 of 2016 and the international standards of the National Fire Protection Association (NFPA, 2018), which require the presence of early detection, fire extinguishing equipment, and an integrated monitoring system. This finding is in line with the research by Rahmani (2025), which shows that a comprehensive fire protection system can reduce the risk of fatalities in fire incidents in healthcare facilities.

The existence of a comprehensive protection system at Muhammadiyah Lamongan Hospital reflects an important achievement, not only in complying with national regulations but also with global best practices. However, fire protection is not sufficient with the provision of facilities alone; it also requires continuous management, including regular training programs for personnel, periodic audits of protection equipment, and strengthening a fire safety culture throughout the organization. Thus, the hospital is not only prepared in terms of infrastructure, but also has the human resources and organizational culture to support effective fire preparedness.

d. Life-Saving Facilities

In accordance with Minister of Health Regulation No. 24 of 2016, hospitals are required to provide safe, accessible, and inclusive evacuation facilities for all patients, including those with special needs. The findings of this study indicate that Muhammadiyah Lamongan Hospital is equipped with adequate life-saving facilities, such as evacuation routes, emergency stairs, and evacuation aids. These results are consistent with the study by Mandal et al (2022), which confirms that the accessibility of evacuation routes for patients with limited mobility is a determining factor in the success of disaster preparedness.

The WHO Hospital Safety Index guidelines (2017) also emphasize that evacuation routes must be designed to accommodate patients with varying levels of mobility, while NFPA standards (2018) recommend the use of automatic

emergency lighting to ensure visibility during evacuation. Thus, even though the life-saving facilities at Muhammadiyah Lamongan Hospital are in accordance with national regulations, periodic evaluations of the function of evacuation routes and the installation of automatic emergency lighting systems are still necessary. These efforts will strengthen the culture of safety and ensure the hospital's preparedness in protecting patients and health workers during emergencies.

CONCLUSION

Based on the results of the study, the implementation of Occupational Safety and Health (OSH) at Muhammadiyah Lamongan Hospital has generally been running well and in accordance with established standards, particularly with reference to Indonesian Minister of Health Regulation No. 66 of 2016 concerning OSH in Hospitals. Aspects that have been implemented well include infrastructure management that prioritizes user safety, a comprehensive and integrated fire protection system, thorough identification of fire hazards, and the availability of adequate life-saving equipment to deal with emergency situations. Additionally, an emergency response organization has been established with a clear and coordinated structure of duties. However, there are several shortcomings that need to be improved, such as the need for periodic evaluations and routine training for all officers, as well as improving the quality of documentation and maintenance of safety equipment to keep it in optimal condition. With continuous improvement, Muhammadiyah Lamongan Hospital can increase the effectiveness of K3 implementation to create a safer and healthier work environment for all hospital employees.

REFERENCES

Alaraidh, S., Alnaim, L. S., & Almazrou, S. H. (2023). Impact of Educational Intervention on Compliance of Health Care Workers Towards Chemotherapy Handling Guidelines. *Journal of multidisciplinary healthcare*, *16*, 3035–3042. https://doi.org/10.2147/JMDH.S426931

Bouya, S., Balouchi, A., Rafiemanesh, H., Amirshahi, M., Behnammoghadam, M., Moghadam, M. P., ... & Dalvand, S. (2020). Global prevalence of needlestick injuries among healthcare workers: A systematic review and meta-analysis. *BMC Public Health, 20*(1), 1–12. https://doi.org/10.1186/s12889-020-08446-7

Diannita, R. (2022). Mapping analysis of Personal Protective Equipment usage as an effort to reach zero accident at Ponorogo Hospital. *The Indonesian Journal of Occupational Safety and Health*, 11(SI), 48–57. https://doi.org/10.20473/ijosh.v11iSI.2022.48-57

Food and Drug Administration. (2020). *Medical device quality systems manual: A small entity compliance guide*. FDA.

Fildzah, C. N. N. (2022). *Hazardous and toxic (B3) waste management system at Cut Meutia Regional General Hospital, Langsa City* [Doctoral dissertation, Universitas Sumatera Utara]. http://repository.ar-raniry.ac.id/id/eprint/24587

Alabdaly, A., Hinchcliff, R., Debono, D., & Hor, S.-Y. (2024). Relationship between patient safety culture and patient experience in hospital settings: A scoping review. *BMC Health Services Research, 24*, Article 906. https://doi.org/10.1186/s12913-024-11329-w

International Labour Organization. (2019). *Safety and health at the heart of the future of work: Building on 100 years of experience*. ILO.

Joint Commission International. (2021). *Joint Commission International accreditation standards for hospitals* (7th ed.). JCI.

Liyew, E. B., Tsegaye, A. T., & Abebe, M. A. (2020). Occupational exposure to blood and body fluids among healthcare workers in low- and middle-income countries: A systematic review and meta-analysis. *Environmental Health and Preventive Medicine, 25*(1), 1–13. https://doi.org/10.1186/s12199-020-00869-0

Mandal, T., Rao, K. R., & Tiwari, G. (2022). Simulation of emergency evacuation of passengers with and without disability at different types of metro stations. https://doi.org/10.48550/arXiv.2209.06187

Nasution, N. C. R., Faradillah, & Hasibuan, A. H. (2025). Hospital readiness for fire emergency response in Indonesia: A literature study. *Radinka Journal of Health Science, 2*(1), 1–12. https://doi.org/10.56778/rjhs.v2i1.292

National Fire Protection Association. (2018). *NFPA 99: Health care facilities code*. NFPA.

Occupational Safety and Health Administration. (2020). *Recommended practices for safety and health programs in healthcare*. OSHA.

Oshio, T., Tsutsumi, A., & Inoue, A. (2021). Determining whether periodic health checkups have any preventive effect on deterioration in health among middle-aged adults: A hazards model analysis in Japan. *Journal of Occupational Health, 63*(1), e12291. https://doi.org/10.1002/1348-9585.12291

Pratiwi, D. D. (2020). Evaluation of management aspects of temporary hazardous and toxic (B3) waste storage at Perdana Medica Maternity and Child Hospital, Surabaya. *Journal of Environmental Health, 17*(2), 95–104. https://repository.stikes-yrsds.ac.id/id/eprint/73/

Rahmani, N., Fathi, M., & Hosseini, S. (2025). Hybrid method analysis of fire accidents in medical centers: A focus on a disastrous fire during the pandemic. *BMC Health Services Research, 25*(1), 1316. https://doi.org/10.1186/s12913-025-13016-w

Ruwanto, R., Hariyono, W., & Hidayat, M. S. (2025). Prevention and mitigation of hospital high-rise fires: A literature review. *Journal of Promotive Preventive, 8*(1), 94–102. https://doi.org/10.47650/jpp.v8i1.1702

Silvalinda, N., Sriatmi, A., & Nandini, N. (2020). Hazardous and toxic waste management operations in educational hospitals Semarang city. *Media Ilmu Kesehatan, 11*(3), 87–92. https://doi.org/10.30989/mik.v11i3.842

United Nations Environment Programme. (2016). *Safe management of wastes from health-care activities* (2nd ed.). UNEP.

World Health Organization. (2014). *Safe management of wastes from health-care activities* (2nd ed.). WHO.

World Health Organization. (2017). *Patient safety in hospitals: A guide for national implementation*. WHO.

Yenni, R. A., Novrikasari, & Windusari, Y. (2021). Analisis kesiapsiagaan struktural dalam menghadapi bencana berdasarkan hospital safety index. *ARKESMAS,* 6(1), 1–8. https://journal.uhamka.ac.id/index.php/arkesmas/article/download/4801/2392/20147

Zhao, M., Zhang, D., & Wu, X. (2023). A safety assessment model for handling dangerous goods in port operations: The key role of detection capability. *Journal of Marine Science and Engineering, 11*(9), 1704. https://doi.org/10.3390/jmse11091704