Journal of Advanced Multidisciplinary Studies
JAMS
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https://jurnal-jams.or.id
Vol. 1, No. 2, Juli 2025 | Page. 234 - 240

SYSTEMATIC REVIEW OF OCCUPATIONAL SAFETY AND HEALTH OF MEDICAL PERSONNEL: FOCUS ON BIOLOGICAL AND ERGONOMIC HAZARDS

Nur Azizah Situmorang[1], Ana Firdha A'qila[2], Hanum Prahasti[3], Abdurrozzaq Hasibuan[4]
Occupational Health and Safety Study Program, Faculty of Public Health, State Islamic University of North Sumatra, Indonesia [1-3]
Industrial Engineering Study Program, Faculty of Engineering, Islamic University of North Sumatra, Medan-Indonesia[4]
Email: nurazizahsitumorang02@gmail.com, anafirdhaaqilaaa@gmail.com, hanumprahasti.123@gmail.com, rozzaq@uisu.ac.id

Keywords:
Occupational Safety and Health, Medical Personnel, Hospitals, Biological Hazards, Ergonomic Hazards

Abstrak

Occupational safety and health (OHS) of medical personnel is a vital aspect in ensuring the quality of health services and protection against work risks. Biological and ergonomic hazards are two major risks faced by medical personnel in the hospital work environment. This study aims to systematically review the literature related to efforts to protect occupational safety and health against these two types of hazards. The method used is a literature study of national and international journals over the past 10 years. The results of the study indicate that the hospital OHS system still has many weaknesses, such as lack of specific training, suboptimal use of PPE, and the absence of a structured ergonomics program. This study recommends the need to strengthen OHS policies based on actual risks, as well as a comprehensive prevention approach to protect medical personnel sustainably.

INTRODUCTION

Medical personnel are a group of workers who have an important role in maintaining and improving public health. However, in carrying out their duties, they are also faced with various occupational safety and health (OHS) risks. Biological and ergonomic hazards are two dominant factors that can threaten the health and safety of medical personnel, especially in hospitals and other health care facilities. (Putri et al., 2017)

Biological hazards generally come from direct or indirect contact with patients, blood samples, body fluids, and medical waste. Meanwhile, ergonomic hazards arise from

improper working positions, excessive workloads, and non-ergonomic work tool designs. The accumulation of these risks has the potential to cause acute or chronic health problems, so it is important to systematically identify and prevent them. (Ramdan & Rahman, 2017)

This study aims to systematically review the literature related to efforts to protect medical personnel from biological and ergonomic hazards, in order to provide evidence-based recommendations for improving OHS programs in the health care sector. (Ivana et al., 2014)

METHOD STUDY

This study uses a qualitative approach with a literature study method (library research). Data sources were obtained from scientific articles published in accredited national journals and reputable international journals. The inclusion criteria in this study were articles in English or Indonesian published in the last 10 years (2014–2024), on the topic of biological hazards or ergonomics in medical personnel.

The analysis was carried out by reading, understanding, and synthesizing important information from each source, then compiling it in a systematic framework to find the relationship between safety and biological hazards and ergonomics in medical personnel.

RESULTS AND DISCUSSION

The research conducted by Utami, Susanto, and Setyaningsih (2020) in a journal entitled "Hospital Management in Preventing Ergonomic Hazards in Dentists" provides an important contribution to the development of occupational safety and health systems in the hospital environment. This study specifically evaluates the implementation of Hospital OHS (K3RS) management in preventing and controlling ergonomic hazards in medical personnel, especially dentists. The researchers emphasized that although K3RS management has carried out general occupational safety training and audits, there has been no specific approach to dealing with ergonomic disorders such as musculoskeletal disorders (MSDs). The results of the study showed that ergonomic disorders arising from static work positions and long working hours are still the dominant complaints, but there has been no prevention program specifically designed to overcome them. This weakness reflects the need for a more systematic evaluation of workload and application of ergonomic principles in each service unit, including posture analysis, work hour arrangements, and stretching training.

In the context of your research, this journal is a very relevant reference because it proves that Hospital OHS (K3RS) management has a central role in identifying and controlling ergonomic hazards experienced by medical personnel, especially dentists. This study reveals that ergonomic disorders such as musculoskeletal disorders (MSDs) arise due to static work postures, prolonged sitting positions, and lack of rest breaks when serving patients. This is in line with the focus of your research, which systematically highlights ergonomic hazards as one of the serious threats to the occupational safety and health of medical personnel. In addition, this journal also emphasizes the importance of periodic evaluations, OHS training, and the preparation of prevention policies based on real risks. Although OHS training has been carried out in general, the absence of specific programs or SOPs that address ergonomics indicates a managerial gap that needs to be fixed.

However, the research of Utami, Susanto, and Setyaningsih (2020) still has limitations because it has not explicitly evaluated the effectiveness of general K3 training on reducing ergonomic complaints, and there is no quantitative measurement of workload and ergonomic risk levels. This is where the potential contribution of your research lies in filling this gap, for example by developing work posture analysis instruments, ergonomic risk evaluations, and the relationship between workload and levels of muscle complaints or fatigue. Your research can also add a more systematic evaluative approach, such as the use of ergonomic risk questionnaires, direct observation in the workplace, and statistical mapping of medical personnel complaints. (Intan Wahyu Utami et al., 2020)

The research conducted by Pradana and Iqbal (2024) in a journal entitled "Occupational Safety and Health Program in Hospitals: Systematic Evaluation of Implementation and Improvement Strategy" provides an important contribution in mapping the real conditions of the implementation of the K3 program in hospitals. This study focuses on a systematic evaluation of the implementation of the K3 program through a literature review approach, and identifies various obstacles faced by hospitals, such as lack of understanding of health workers regarding standard precautions, minimal ongoing training, and limited facilities and human resources. This study confirms that routine training, ongoing evaluation, and the use of information technology such as web-based reporting systems are key factors in strengthening K3 management in hospitals.

In the context of your research, this journal is a very relevant reference because it reinforces the main focus on the importance of an OHS management system that is not only formal, but also functional and has a direct impact on the safety of medical personnel. In particular, this journal also touches on biological hazards that are part of the focus of your journal, such as the risk of infection from contaminated needle sticks and infectious diseases such as Hepatitis B, C, and HIV, which are explicitly mentioned as real threats to medical personnel. In addition, this study also raises ergonomic hazards, such as inappropriate workload and posture, as part of the work risks that have not been optimally addressed in several hospitals.

However, the limitations found in the Pradana and Iqbal (2024) journal are the absence of detailed mapping of the level of ergonomic and biological exposure based on work units or types of medical professions, as well as the absence of quantitative instruments in measuring the readiness or risk level of each medical personnel. This is where your research position becomes very strategic, namely to complement the results of the study through a systematic approach that groups risks based on the type of hazard and highlights the need for strengthening specific training, such as ergonomics training in dental clinics or infection prevention training in the ER and isolation rooms. (Iqbal, 2024)

Research conducted by Christin Butar Butar in the journal “Implementation of Occupational Safety to Prevent Diseases in Nurses in Hospitals” provides a comprehensive picture of the high risk of biological and ergonomic hazards faced by medical personnel, especially nurses, in the hospital environment. This study confirms that hospitals have complex potential hazards-ranging from infectious diseases such as HIV/AIDS and hepatitis from exposure to blood or injection needles, to the risk of muscle injury and fatigue due to poor work posture, excessive workload, and shift work schedules. This condition directly supports the main focus of your research, which systematically examines the occupational safety and health of medical personnel with an emphasis on biological and ergonomic hazards.

This journal also mentions that many work accidents occur due to lack of compliance with safety procedures, such as the practice of recapping syringes, mixing sharp waste with regular medical waste, and suboptimal use of personal protective equipment (PPE). This shows a gap in the implementation of OHS management in hospitals, which is also an important part of the focus of your systematic review. The author emphasizes the importance of continuous training, routine supervision, and administrative and technical approaches in preventing occupational diseases. This strengthens the argument in your research that officers' awareness and understanding of OHS is still uneven, and that protection against biological and ergonomic hazards requires more structured and comprehensive interventions.

Thus, this journal can be used as very strong supporting literature evidence in exploring the real problems faced by medical personnel in the field, while also emphasizing the importance of a systematic and holistic approach in improving K3 programs in hospitals. (Butar Butar, 2020)

Research conducted by Rafi'ah, Maliga, and Lestari (2022) in the journal "Identification of Occupational Health and Safety Risks for Nurses in Hospitals" directly strengthens the main focus of your systematic review, namely the importance of controlling biological and ergonomic hazards for medical personnel. This study shows that nurses are highly susceptible to various occupational risks, especially from blood exposure, needle sticks, back pain due to incorrect working positions, and fatigue due to night shifts. These hazards have been shown to occur in various nursing activities such as IV insertion, patient mobilization, blood sampling, and drug administration. Biological hazards in the form of needle sticks and splashes of patient body fluids were recorded as experienced by 38.4% of respondents, while back pain due to physical workload and ergonomic errors were found in more than 69% of respondents. In addition, fatigue and sleep disturbances as psychosocial hazards are also one of the highest risks, at 76.9%.

This finding is in line with the focus in your journal which highlights that hospitals as workplaces have high potential risks for medical personnel, both in terms of biology and ergonomics. The lack of awareness of some nurses towards the threat of K3 and the weak implementation of risk control indicate that the hospital K3 system has not been running optimally and needs to be strengthened through training, specific SOPs, provision of ergonomic work aids, and monitoring of work compliance. In addition to supporting the content of your study, this journal also opens up space to complement the systematic approach you use, by providing field data as a real picture of the risks faced by medical personnel. Therefore, this journal is not only topically relevant, but can also be used as an important foothold in compiling a sharper analytical framework and policy recommendations in an effort to improve the occupational safety and health of medical personnel.

Based on the literature review that has been conducted, the occupational safety and health of medical personnel still faces serious challenges, especially related to biological and ergonomic hazards in the hospital environment. Biological hazards such as exposure to blood, patient body fluids, and the risk of being pricked by infectious needles are real conditions that are often experienced by medical personnel in their daily activities. On the other hand, high physical workloads, non-ergonomic work positions, and prolonged shift work systems are the main triggers for muscle disorders and work fatigue. These two types of hazards not only have an impact on physical health, but also reduce the performance and quality of medical services. (Rafi'ah Rafi'ah et al., 2022)

Research conducted by Utami, Susanto, and Setyaningsih (2020) highlights the weak implementation of ergonomic hazard control in the hospital OHS system, especially in the dental profession. This study shows that although OHS training and audits have been carried out in general, there is no specific approach to dealing with ergonomic complaints such as musculoskeletal disorders (MSDs). These disorders are caused by static and prolonged work postures, as well as lack of rest breaks during service. This reinforces the importance of focusing on your study that places ergonomic hazards as one of the critical factors that must be controlled systematically, through workload evaluation, posture analysis, and development of SOPs that are appropriate to the characteristics of each medical unit.

Meanwhile, findings from Pradana and Iqbal (2024) revealed that the implementation of the K3 program in hospitals is still faced with various obstacles such as lack of ongoing training, poor understanding of health workers regarding standard prevention procedures, and limited K3 supporting facilities and infrastructure. This study explicitly states that biological risks such as needle sticks and exposure to infectious diseases (Hepatitis B, C, HIV) still occur due to the absence of an effective control and reporting system. In addition, ergonomic hazards such as physical workload and inappropriate posture are also mentioned as issues that have not been optimally addressed. This is very much in line with the urgency in your journal which emphasizes the importance of an K3 management system that is not only administrative, but also responsive to field conditions and based on actual risks.

Research by Christin Butar Butar (2020) clearly shows how negligence in implementing safety procedures can exacerbate biological and ergonomic risks in hospitals. It was found that the practice of recapping syringes, mixing sharp waste with regular medical waste, and suboptimal use of PPE were the main factors in workplace accidents among nurses. On the other hand, fatigue due to work shifts and incorrect work postures were the main triggers for ergonomic complaints. These findings provide direct support for the focus of your journal, as they prove that protecting medical personnel from biological and ergonomic hazards has not been a top priority in daily hospital work practices.

Furthermore, Rafi'ah, Maliga, and Lestari (2022) quantitatively identified the types of hazards most frequently experienced by nurses in hospitals. The results showed that 38.4% of nurses had experienced exposure to patient body fluids and needle sticks (biological hazards), while 69.2% experienced back pain due to patient mobilization (ergonomic hazards). In addition, 76.9% of respondents also reported fatigue and severe sleepiness due to night shift work, which are included in the category of psychosocial hazards but are interrelated with ergonomic risks. These findings strongly support the argument in your systematic review that these hazards have occurred massively, and have not received maximum protection from the current K3RS system.

Overall, from the research findings above, it can be concluded that biological and ergonomic hazards are two main types of threats that consistently appear in various health care facilities, and greatly affect the safety of medical personnel. Weak internal policies, inconsistent use of PPE, the absence of specific SOP targeting ergonomics, and minimal quantitative evaluation of workloads are factors causing the high number of accidents and occupational health complaints. Therefore, your research is in a strategic position to formulate evidence-based recommendations that can fill this systemic gap, through a systematic, thematic, and profession-based approach in encouraging improvements in the

quality of the K3RS program in Indonesia. (Pratiwi et al., 2024)

SUGGESTION

Based on the results of a review of several previous studies, it can be concluded that biological and ergonomic hazards are still serious problems that threaten the safety and health of medical personnel in the hospital environment. Biological risks such as needle sticks, exposure to blood or patient body fluids, and the threat of infection from infectious diseases such as HIV, Hepatitis B and C, have been proven to occur frequently in daily medical service practices. On the other hand, ergonomic disorders arise due to poor work posture, lifting patients without assistive devices, long work durations, and lack of adequate rotation or rest time. These two types of hazards are interrelated and contribute to high rates of fatigue, injury, and even decreased productivity of medical personnel.

These findings indicate that the implementation of K3 in hospitals is still administrative and has not fully touched on practical and functional aspects in the field. Lack of specific training, the absence of SOPs that are in accordance with the real workload, and low awareness and internal supervision are factors causing the high exposure to biological and ergonomic hazards. Therefore, this systematic review has a high urgency to fill this gap by formulating a more targeted prevention and control strategy, based on field data, and adjusted to the characteristics of each medical personnel work unit. That way, the K3 management system in hospitals is not just a formality, but is truly able to protect health workers from real and evolving work risks.

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