

Analysis Of Occupational Safety And Health Risk Factors At Pertamedika Ummi Rosnati Hospital, Banda Aceh, 2026

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ABSTRACT

Occupational Safety and Health (OSH) in hospitals is essential to protect healthcare workers from occupational accidents and work-related diseases. This study aimed to analyze OSH risk factors among nurses in the inpatient wards of Pertamedika Ummi Rosnati Hospital in 2026. A descriptive-analytic design with the Job Hazard Analysis (JHA) approach was used, involving all 23 nurses through total sampling. Data were collected using observation, physical measurements (Sound Level Meter, Lux Meter, and Thermometer), and questionnaires, then analyzed using univariate and Spearman Rank tests. The noise level (68 dB(A)) was below the Threshold Limit Value, while the Asyifa Nurse Station lighting (166.6 lux) did not meet the minimum standard. The Azizah Nurse Station (303.1 lux) and Asyifa Inpatient Ward (340.7 lux) met the lighting standard, whereas the average room temperature (29°C) exceeded the recommended level. Chemical factors were significantly associated with OSH risk ($p = 0.048$; $r = -0.416$), while biological, ergonomic, and psychosocial factors were not. Hospitals are recommended to improve chemical exposure control, optimize lighting and room temperature, and strengthen OSH program implementation to reduce occupational risks among nurses.

INTRODUCTION

Occupational Safety and Health (OSH) is one of the essential aspects of protecting workers from occupational accidents and work-related diseases. The implementation of OSH not only contributes to workers' safety but also enhances the quality of services and organizational productivity (Nurdin et al., 2019).

In the healthcare sector, particularly in hospitals, the implementation of OSH is highly crucial due to the complexity of the working environment and its high level of occupational risk. As healthcare facilities, hospitals present various potential hazards that may threaten healthcare workers, patients, and visitors. Therefore, the implementation of Hospital Occupational Safety and Health (K3RS) is an obligation that must be fulfilled by every healthcare institution (Nurdin et al., 2019).

The Government of Indonesia has established regulations requiring every hospital to implement an effective Occupational Safety and Health program. Regulation of the Minister of Health of the Republic of Indonesia No. 66 of 2016 concerning Occupational Safety and Health in Hospitals stipulates that every hospital must implement a Hospital Occupational Safety and Health Management System, including hazard identification, risk assessment, risk control, as well as continuous monitoring and evaluation (Ministry of Health of the Republic of Indonesia, 2016).

Hospital activities involve occupational risks arising from physical, chemical, biological, ergonomic, and psychosocial factors. Potential hazards within hospitals need to be identified and assessed to determine the level of risk, which serves as an indicator of the likelihood of occupational accidents and work-related diseases (Indragiri & Yuttya, 2017).

Furthermore, each hospital unit has different potential hazards, making comprehensive risk analysis necessary to identify sources of hazards that may cause injuries and health problems. These risks include exposure to hazardous chemicals, infections caused by microorganisms, non-ergonomic working conditions, and work pressure that may affect the psychosocial well-being of healthcare workers. If not properly managed, these conditions may reduce healthcare workers' performance and compromise the quality of patient care (Khayla et al., 2026).

An occupational accident is an unexpected and unintended incident that occurs while performing work-related activities (Dwi Permana & Siregar, 2023). According to data published by the Indonesian Social Security Agency for Employment (BPJS Ketenagakerjaan), the number of occupational accidents reached 297,725 cases in 2022, increased to 370,747 cases in 2023, and further rose to 462,241 cases by the end of 2024 (Joko Priono, 2025).

Although regulations regarding Hospital Occupational Safety and Health have been established, their implementation in practice remains suboptimal. Occupational Safety and Health in hospitals is a fundamental aspect of protecting healthcare workers, improving the quality of patient care, and creating a safe and healthy working environment. As healthcare institutions, hospitals are exposed to a high risk of occupational accidents and diseases caused by hazardous substances; therefore, OSH implementation is mandatory under national regulations. However, several challenges remain, including limited financial resources, inadequate facilities, insufficient routine training, and lack of management commitment and leadership support (Nurdin et al., 2019). This is consistent with Law of the Republic of Indonesia No. 44 of 2009 concerning Hospitals, which mandates that hospitals provide a safe working environment for all human resources and establish effective systems for preventing occupational accidents and work-related diseases (Republic of Indonesia, 2009).

Physical hazards are hazards originating from workplace environmental factors that may cause injuries. Examples of physical hazards include thermal conditions, noise, vibration, microwave radiation, ultraviolet radiation, static magnetic field radiation, air pressure, and lighting. Chemical hazards, on the other hand, are factors that may affect work activities or

cause adverse health effects among workers due to exposure to hazardous chemicals or their derivatives in the workplace. Examples include laboratory reagents, formaldehyde, alcohol, chlorine used as disinfectants, and gas leakage (Pujiyanti, 2025).

Biological exposure is one of the major occupational risks that may lead to infectious diseases such as Hepatitis B, Hepatitis C, and Acquired Immunodeficiency Syndrome (AIDS) among healthcare workers in hospitals (Lestari et al., 2022).

Ergonomic factors, such as manual handling and awkward working postures, increase the risk of musculoskeletal disorders, including low back pain, myalgia, and shoulder syndrome among healthcare workers. In addition, night-shift work is associated with a higher risk of occupational stress, sleep disturbances, and work-related fatigue (Lestari et al., 2022).

Psychosocial hazards arise from mental pressure, workload, the distribution of roles and responsibilities, and social interactions in the workplace. In addition, poor ergonomic conditions may contribute to eye strain, migraine, stress, and burnout among healthcare workers (Pujiyanti, 2025).

Based on the foregoing discussion, it can be concluded that Occupational Safety and Health risks in hospitals are multidimensional, encompassing interconnected physical, chemical, biological, ergonomic, and psychosocial factors. The most common occupational accidents include needlestick injuries, skin contact with blood or body fluids, and exposure to disinfectant vapors and radiation. Other contributing risk factors include poorly organized work environments and excessive workloads (Muhammad Rifqi Nur W.A.P., 2023).

This study is expected to provide an overview of the existing Occupational Safety and Health risks in hospitals and serve as a basis for developing effective risk control measures to improve the safety and health of healthcare workers.

METHOD

This descriptive analytical study employed the Job Hazard Analysis (JHA) approach to identify and assess occupational safety and health (OSH) risks among nurses working in the inpatient unit of Pertamedika Umami Rosnati Hospital, Banda Aceh, Indonesia. The study was conducted in May 2026.

The study population consisted of all nurses working in the inpatient unit. A total sampling technique was applied, resulting in a sample of 23 nurses from the Class I inpatient ward.

Primary data were collected through direct workplace observation and structured questionnaires assessing chemical, biological, ergonomic, psychosocial, and occupational safety and health risk factors. Prior to data collection, the questionnaire was tested for validity and reliability. Items with Pearson's correlation coefficient exceeding the critical value ($r > 0.413$) were considered valid, while internal consistency was evaluated using Cronbach's alpha, with all variables demonstrating acceptable reliability ($\alpha > 0.70$). Secondary data were obtained from hospital records, including occupational accident reports.

Data were processed through editing, coding, tabulation, and verification before statistical analysis using SPSS. Univariate analysis was performed to describe the characteristics of each variable, whereas bivariate analysis was conducted using the Spearman rank correlation test to examine the relationships between chemical, biological, ergonomic, and psychosocial factors and occupational safety and health risks. Statistical significance was determined at a 95% confidence level ($p < 0.05$).

RESULT AND DISCUSSION

RESULT

Univariate Analysis

Table 1. Results of Physical Factor Measurements

Parameter	Measurement Results	Threshold Limit Value (TLV)
Noise	68 dBA	85 dBA
Temperature	28°C	24°C
Lighting at Azizah Nurse Station	303,1 lux	200 lux
Lighting at Asyifa Nurse Station	166,6 lux	200 lux
Lighting in Inpatient Room	340,7 lux.	250 lux

Based on Table 1, the results of physical factor measurements showed that the noise level obtained was 68 dB(A). Noise measurements were conducted at one point in the nurse station area for 10 minutes with readings taken every 5 seconds, resulting in 120 measurement data points. All data were subsequently processed using Microsoft Excel to obtain the average noise level. The room temperature measurement results showed a value of 28°C. Temperature measurements were conducted using a thermometer placed on the room wall until a stable reading was obtained. Lighting measurements were performed using a lux meter at nine measurement points in each location. The measurement results showed that the average lighting intensity at Azizah nurse station was 303.1 lux, at Asyifa nurse station was 166.6 lux, and in the inpatient room was 340.7 lux. The values presented in the table represent the average results from nine measurement points at each location.

Table 2. Frequency and Percentage of Responses Regarding Chemical Factors

Response Category	Frequency	Percentage (%)
Very Rarely	61	29.47
Rarely	55	26.57
Neutral	29	14.01
Frequently	43	20.77
Very Frequently	19	9.18
Total	207	100.00

Based on Table 2, it was found that out of a total of 207 responses regarding chemical factors, the *very rarely* category had the highest frequency, with 61 responses (29.47%), followed by the *rarely* category with 55 responses (26.57%). Furthermore, the *frequently* category accounted for 43 responses (20.77%), the *neutral* category accounted for 29 responses (14.01%), and the *very frequently* category had the lowest frequency with 19 responses (9.18%). These results indicate that most respondents rarely experienced symptoms caused by exposure to chemical hazards in the form of dust in the workplace environment. Based on the research instrument, the assessed symptoms included dry cough, wheezing, dry throat, red eyes, sneezing, chest discomfort, nasal congestion, runny nose, itchy eyes, and skin irritation after working in dusty environments. The dominance of "rarely" and "very rarely" responses indicates that dust exposure at Pertamedika Umami Rosnati Hospital is relatively controlled. Nevertheless, 29.95% of responses were still categorized as "frequently" and "very frequently", indicating that air quality control, mask usage, and workplace environmental monitoring must continue to be maintained to prevent health problems due to dust exposure.

Tabel 3. Frequency and Percentage of Responses Regarding Biological Factors

Response Categories	Frequency	Percentage (%)
Very Rare	54	26.09
Rare	58	28.02
Neutral	40	19.32
Frequently	36	17.39
Very Frequently	19	9.18
Total	207.00	100.00

Based on Table 3, it was found that the *rarely* category had the highest frequency, with 58 responses (28.02%), followed by the *very rarely* category with 54 responses (26.09%). Subsequently, the *neutral* category accounted for 40 responses (19.32%), the *frequently* category accounted for 36 responses (17.39%), and the *very frequently* category accounted for 19 responses (9.18%). These results indicate that most respondents rarely experienced symptoms associated

with biological hazard exposure in the workplace environment. Based on the questionnaire, the assessed symptoms included prolonged coughing, recurrent colds, unexplained fever, sore throat, itchy skin, peeling skin, red or watery eyes, diarrhea, boils, and skin rashes. The dominance of "rarely" and "very rarely" responses indicates that infection control implementation in the hospital has been carried out relatively well. However, some respondents still reported experiencing these symptoms frequently; therefore, the implementation of standard precautions, the use of personal protective equipment, hand hygiene practices, and nosocomial infection control measures need to be continuously improved.

Table 4. Frequency and Percentage of Responses Regarding Ergonomic Factors

Response Categories	Frequency	Percentage (%)
No Pain	514	79.81
Moderate Pain	101	15.68
Pain	28	4.35
Severe	1	0.16
Total	644	100

Based on Table 4, it was found that out of a total of 644 responses regarding ergonomic factors, the *no pain* category had the highest frequency, with 514 responses (79.81%). This was followed by the *moderate pain* category with 101 responses (15.68%), the *pain* category with 28 responses (4.35%), and the *severe pain* category with only 1 response (0.16%). Based on the Nordic Body Map (NBM) instrument, the assessment was conducted on 28 body regions, including the neck, shoulders, back, waist, arms, elbows, wrists, thighs, knees, calves, and feet. The results showed that most respondents did not experience musculoskeletal complaints in these body regions. These findings indicate that the overall ergonomic working conditions were relatively good. Nevertheless, approximately 20% of responses indicated the presence of fatigue, pain, or musculoskeletal complaints in several body parts. Therefore, evaluation of working posture, lifting activities, and the provision of ergonomic workplace facilities are still necessary to prevent work-related musculoskeletal disorders.

Table 5. Frequency and Percentage of Pain Categories

Response Categories	Frequency	Percentage (%)
No Pain	0	0
Moderate	23	100
Severe	0	0
Very Severe	0	0
Total	23	100

Based on Table 5, it was found that all respondents who experienced ergonomic complaints, namely 23 respondents (100%), were categorized as having moderate complaints. No respondents were classified into the no pain, severe, or very severe categories. According to the Nordic Body Map classification, the moderate category indicates that respondents experienced mild to moderate musculoskeletal complaints that require attention to prevent progression into more severe disorders. These results indicate that although the level of complaints was not categorized as severe, the hospital still needs to implement preventive measures through improvements in work ergonomics, regular muscle stretching exercises, job rotation, and education regarding proper working postures.

Table 6. Frequency and Percentage of Responses Regarding Psychosocial Factors

Response Categories	Frequency	Percentage (%)
Never	370	53.62
Sometimes	226	32.75
Frequently	88	12.75
Very Frequently	6	0.87
Total	690	100

Based on Table 6, it was found that the *never* category had the highest frequency, with 370 responses (53.62%), followed by the *sometimes* category with 226 responses (32.75%). Furthermore, the *frequently* category accounted for 88 responses (12.75%), while the *very frequently* category had the lowest frequency with 6 responses (0.87%). Based on the IFRC instrument, the assessment was conducted on fatigue symptoms, including reduced activity, decreased motivation, and physical fatigue symptoms such as feeling heavy-headed, drowsiness, difficulty concentrating, forgetfulness, stiff shoulders, headaches, and shortness of breath. The dominance of "never" responses indicates that most workers did not frequently experience fatigue symptoms or psychosocial disturbances during work. However, some respondents reported frequently experiencing these symptoms; therefore, workload management, adequate rest periods, and psychosocial support should continue to be considered to maintain worker productivity and health.

Table 7. Frequency and Percentage of Fatigue Levels

Fatigue Dimension	Total Score	Description
Reduced Activity	41	Low Fatigue
Reduced Motivation	34	Low Fatigue
Physical Fatigue	35	Low Fatigue

Table 7 presents the total score results for the three IFRC fatigue dimensions, namely reduced activity, reduced motivation, and physical fatigue. Based on the total scores obtained, the respondents' fatigue levels were classified as Low Fatigue.

Table 8. Frequency and Percentage of Responses Regarding Occupational Health and Safety (OHS) Risks

Response Categories	Frequency	Percentage (%)
Never	159	49.38
Rarely	100	31.06
Sometimes	60	18.63
Frequently	3	0.93
Very Frequently	0	0.00
Total	322	100

Based on Table 8, it was found that the *never* category had the highest frequency, with 159 responses (49.38%), followed by the *rarely* category with 100 responses (31.06%). Furthermore, the *sometimes* category accounted for 60 responses (18.63%), the *frequently* category accounted for 3 responses (0.93%), and no respondents reported experiencing OHS risks very frequently. These results indicate that most respondents had never or rarely experienced events related to occupational health and safety (OHS) risks during work. This finding suggests that the implementation of the OHS system at Pertamedika Umami Rosnati Hospital has been carried out relatively well, thereby reducing the occurrence of occupational accidents and work-related health problems. Nevertheless, a small proportion of respondents reported experiencing OHS risks sometimes to frequently. Therefore, the hospital needs to continuously improve OHS programs through occupational safety training, monitoring compliance with standard operating procedures, providing adequate personal protective equipment, and conducting periodic risk assessments to create a safer working environment.

Bivariate Analysis

Table 9. Relationship Between Chemical Factors and Occupational Health and Safety (OHS) Risks

Correlation Coefficient	N	Sig.
-0,416	23	0,048

Based on Table 9, the results of the Spearman Rank correlation test showed that the correlation coefficient between chemical factors and occupational health and safety (OHS) risks was -0.416, with a total of 23 respondents (N) and a significance value (Sig.) of 0.048. A significance

value lower than the 5% significance level ($0.048 < 0.05$) indicates that there was a significant relationship between chemical factors and occupational health and safety risks. The correlation coefficient of -0.416 indicates that the relationship had moderate strength and a negative direction. This means that an increase in the chemical factor score tended to be followed by a decrease in OHS risk scores, and vice versa.

Table 10. Relationship Between Biological Factors and Occupational Health and Safety (OHS) Risks

Correlation Coefficient	N	Sig.
-0,291	23	0,178

Based on Table 10, the Spearman Rank correlation test showed that the correlation coefficient between biological factors and occupational health and safety (OHS) risks was -0.291, with 23 respondents (N) and a significance value (Sig.) of 0.178. The significance value of 0.178 was greater than the 5% significance level (0.05), indicating that there was no significant relationship between biological factors and occupational health and safety risks. The correlation coefficient of -0.291 indicates a weak negative relationship, meaning that statistically there was a tendency for increased biological factor scores to be followed by decreased OHS risks. However, because the relationship was not statistically significant, this tendency cannot be generalized as a meaningful relationship in the population.

Table 11. Relationship Between Ergonomic Factors and Occupational Health and Safety (OHS) Risks

Correlation Coefficient	N	Sig.
0,060	23	0,787

Based on Table 11, the Spearman Rank correlation test showed that the correlation coefficient between ergonomic factors and occupational health and safety (OHS) risks was 0.060, with 23 respondents (N) and a significance value (Sig.) of 0.787. The significance value of 0.787 was greater than the 5% significance level (0.05), indicating that there was no significant relationship between ergonomic factors and occupational health and safety risks. The correlation coefficient of 0.060 indicates that the relationship between the two variables was positive with a very weak strength (negligible). This suggests that changes in ergonomic factors were only followed by very small changes in OHS risks, and the relationship was not statistically meaningful.

Table 12. Relationship Between Psychosocial Factors and Occupational Health and Safety (OHS) Risks

Correlation Coefficient	N	Sig.
0,080	23	0,716

Based on Table 12, the Spearman Rank correlation test showed that the correlation coefficient between psychosocial factors and occupational health and safety (OHS) risks was 0.080, with 23 respondents (N) and a significance value (Sig.) of 0.716. The significance value of 0.716 was greater than the 5% significance level (0.05), indicating that there was no significant relationship between psychosocial factors and occupational health and safety risks. The correlation coefficient of 0.080 indicates that the relationship between the two variables was positive with a very weak strength. This means that changes in psychosocial factors were only followed by minimal changes in OHS risks, and the relationship was not statistically significant.

DISCUSSION

Physical Factors Occurring at Pertamedika Umni Rosnati Hospital

Noise

The results of noise level measurements in the nurse station area using a sound level meter showed an average value of 68 dB(A). Based on the comparison with the Regulation of the Minister of Manpower and Transmigration of the Republic of Indonesia concerning the Threshold Limit Value for Physical and Chemical Factors in the Workplace, which was used in this study, the noise level met the applicable requirement of 85 dB. The measurement results were still below the threshold limit value, indicating that the working environment in the nurse station area was relatively safe from noise exposure that could potentially interfere with the health of nursing personnel. Nevertheless, noise exposure still needs to be controlled because healthcare service activities, conversations among staff, sounds from medical equipment, patient monitor alarms, and visitor traffic may cause an increase in noise levels at certain times.

Lighting

The measurement results showed that the average lighting intensity at Azizah Nurse Station was 303.1 lux, which met the quality standards according to the Regulation of the Minister of Health of the Republic of Indonesia No. 7 of 2019, with a minimum lighting requirement of 200 lux. Adequate lighting can support nursing activities, such as nursing care documentation, medical record reading, medication administration, and other administrative activities. Lighting conditions that comply with standards can also help reduce eye fatigue, improve work accuracy, and decrease the risk of work errors caused by limited visibility.

The measurement results showed that the average lighting intensity at Asyifa Nurse Station was 166.6 lux, which was lower than the minimum standard of 200 lux. This condition indicates that the lighting in the nurses' work area was inadequate. Low lighting intensity can reduce visual

comfort, increase eye fatigue, and potentially decrease nurses' accuracy in performing activities such as reading medical records, documenting nursing procedures, and preparing medication. Therefore, improvement efforts are needed, such as increasing the number of lamps, using lamps with appropriate lumen levels, or rearranging the lighting layout to ensure more even light distribution in the nurse station area.

The measurement results showed that the average lighting intensity in the Asyifa Inpatient Room was 340.7 lux. According to Minister of Health Regulation No. 40 of 2022, the quality standard for lighting in patient rooms is 250 lux; therefore, it has met the minimum lighting standard used in this study. Adequate lighting intensity plays an important role in improving visual comfort for healthcare workers and patients, as well as supporting nursing procedures, patient condition observation, medication administration, and other healthcare activities. Nevertheless, variations were found among measurement points, ranging from 228–513 lux, indicating that light distribution within the room was not completely uniform. These differences may be influenced by the position of lighting fixtures, natural light entering through windows, or the arrangement of furniture inside the room. Therefore, equal distribution of lighting should continue to be considered to ensure that all work areas have adequate lighting levels.

Adequate lighting is very important because nurses perform various activities requiring accuracy, such as reading medical records, documenting nursing procedures, preparing medication, and patient identification. Insufficient lighting intensity may cause eye fatigue, reduce accuracy, increase the risk of work errors, and decrease comfort during work. Conversely, appropriate lighting can help improve accuracy, work efficiency, and safety in providing healthcare services to patients.

Room Temperature

The results of temperature measurements in the nurse station area showed an average temperature of 29°C. Based on the comparison with the applicable standard of the Indonesian Ministry of Health Regulation No. 40 of 2022, which specifies a recommended temperature of 24°C for the nurse station area, the measured room temperature did not meet the thermal comfort requirements in the hospital environment.

Appropriate room temperature plays an important role in creating a comfortable working environment, allowing nurses to perform their duties optimally. Conversely, excessively high temperatures may cause discomfort, fatigue, sweating, and reduced concentration. Meanwhile, temperatures that are too low may also lead to discomfort and negatively affect work productivity. Therefore, temperature control through ventilation systems and air conditioning should be regularly maintained to ensure that workplace environmental conditions remain in accordance with established standards.

Relationship Between Chemical Factors and Occupational Safety and Health (OSH) Risks

Based on the Spearman Rank correlation test, the correlation coefficient was -0.416 with a significance value of 0.048 ($p < 0.05$). These results indicate a significant relationship between chemical factors and Occupational Safety and Health (OSH) risks, with a moderate correlation strength and a negative direction of association.

In this study, chemical factors were measured based on complaints experienced by workers after exposure to dust in the workplace environment, including dry cough, wheezing, dry throat, red eyes, itchy eyes, sneezing, nasal congestion, runny nose, and chest discomfort. These complaints are common symptoms resulting from exposure to particulate matter or dust in the workplace, particularly when workers are exposed to areas with poor air quality.

According to the Ministry of Health of the Republic of Indonesia, chemical hazards originate from gases, vapors, liquids, and particulates such as dust that can enter the body through inhalation, skin contact, or eye exposure. Such exposure may cause respiratory irritation, eye disorders, sensitization, and occupational diseases if exposure occurs over a prolonged period¹¹. Therefore, the occurrence of these complaints among respondents indicates the possibility of chemical exposure in the form of dust during work activities.

Although a significant relationship was identified, the direction of correlation in this study was negative. This direction of association is strongly influenced by the scoring system applied in the study. If the OSH risk score is structured so that a higher score represents a lower level of risk, then a negative relationship indicates that the greater the number of complaints caused by chemical factors, the lower the occupational safety score obtained, meaning that the OSH risk increases. Conversely, if the risk score is arranged in the same direction as the risk level, the negative correlation should be interpreted according to the scoring system used so that it remains consistent with the theoretical concept.

Theoretically, these findings support the concept that chemical exposure is an important determinant of occupational safety and health risks. Xu et al. (2022) explained that workplace chemical exposure may increase the risk of health problems when hazard identification, risk assessment, and exposure control are not optimally implemented¹⁴. This study indicates that monitoring workplace air quality, controlling dust exposure, using respiratory protective equipment, and conducting periodic health examinations should be continuously improved as efforts to minimize the impact of chemical exposure among healthcare workers.

Relationship Between Biological Factors and Occupational Safety and Health Risks

The results of this study showed that biological factors had a correlation coefficient of -0.291 with a significance value of 0.178 ($p > 0.05$). Therefore, there was no statistically significant relationship between biological factors and Occupational Safety and Health (OSH) risks among the study respondents.

In this study, biological factors were assessed based on various complaints associated with potential biological infections, including prolonged cough, runny nose, fever, sore throat, red eyes, digestive disorders, skin rashes, boils, and other skin abnormalities. These complaints represent early indicators commonly used to identify possible exposure to microorganisms in the workplace environment.

According to the Ministry of Health of the Republic of Indonesia, biological hazards originate from bacteria, viruses, fungi, parasites, and other microorganisms that can infect healthcare workers through contact with patients, body fluids, medical waste, or airborne transmission in the workplace environment¹¹. Therefore, healthcare workers are considered a group of workers with a higher risk of experiencing occupational diseases due to biological exposure compared with other occupational groups.

However, the findings of this study indicated that biological complaints experienced by respondents were not significantly associated with OSH risks. This condition may be attributed to the effective implementation of Infection Prevention and Control (IPC) programs in hospitals, including the use of personal protective equipment (PPE), hand hygiene practices, immunization of healthcare workers, equipment sterilization, and medical waste management according to established procedures. In addition, the relatively small number of respondents (23 individuals) may have influenced the statistical power to detect associations between variables.

Although no significant relationship was identified, efforts to control biological hazards must be continuously maintained because exposure to pathogenic microorganisms remains one of the major causes of occupational diseases among healthcare workers.

Relationship Between Ergonomic Factors and Occupational Safety and Health Risks

The ergonomic variable in this study was measured using the Nordic Body Map instrument, which identifies musculoskeletal complaints in 28 body regions, including the neck, shoulders, back, waist, arms, hands, thighs, knees, and feet. Complaints in these body regions reflect musculoskeletal disorders that may arise due to inappropriate working postures, repetitive tasks, or manual lifting activities.

The results showed a correlation coefficient of 0.060 with a significance value of 0.787, indicating that there was no significant relationship between ergonomic factors and OSH risks.

According to the Ministry of Health of the Republic of Indonesia, ergonomic disorders result from incompatibility between workers, work equipment, and the work environment, which may lead to Work-Related Musculoskeletal Disorders (WMSDs). Complaints of pain in the neck, shoulders, back, and lower back generally increase in occupations involving prolonged static postures or manual handling of heavy loads.

The absence of a significant relationship in this study indicates that the musculoskeletal complaints experienced by respondents were not sufficiently severe to influence overall OSH risk levels. Another possible explanation is the variation in respondents' job types, resulting in differences in ergonomic workload exposure among workers. Nevertheless, the application of

ergonomic principles remains essential through proper work posture management, provision of lifting aids, adjustment of workplace design, and adequate rest periods to prevent musculoskeletal complaints from developing into occupational diseases.

Relationship Between Psychosocial Factors and Occupational Safety and Health Risks

In this study, psychosocial factors were assessed using the Industrial Fatigue Research Committee (IFRC) questionnaire, which consists of three dimensions: decreased activity, reduced motivation, and physical fatigue. The evaluated symptoms included heavy-headedness, drowsiness, difficulty concentrating, forgetfulness, nervousness, headaches, back pain, shortness of breath, and feeling physically unwell.

The analysis showed a correlation coefficient of 0.080 with a significance value of 0.716, indicating that there was no significant relationship between psychosocial factors and OSH risks. According to the International Labour Organization (ILO) and the Ministry of Health of the Republic of Indonesia, psychosocial factors are influenced by work organization, workload, interpersonal relationships, communication, and workplace conditions. Long-term exposure to psychosocial risk factors may lead to work-related stress and fatigue, which can ultimately increase the likelihood of work errors and occupational accidents.

The absence of a significant relationship in this study suggests that the psychological and physical fatigue levels among respondents were likely still within tolerable limits and had not substantially affected OSH risks. This condition may have been influenced by effective workload distribution, support among employees, and individual adaptability to job demands. Nevertheless, hospitals should continue monitoring healthcare workers' psychosocial conditions through workload evaluations, provision of adequate rest periods, and mental health promotion programs. These efforts are important to prevent prolonged fatigue that may negatively affect both worker safety and patient safety.

Job Hazard Analysis (JHA)

Likelihood	Severity					
		Negligible (1)	Minor (2)	Moderate (3)	Major (4)	Extreme (5)
Rare (1)		Low (1x1)	Low (1x2)	Low (1x3)	Low (1x4)	Medium (1x5)
Unlikely (2)		Low (2x1)	Low (2x2)	Medium (2x3)	Medium (2x4)	High (2x5)
Possible (3)		Low (3x1)	Medium (3x2)	Medium (3x3)	High (3x4)	High (3x5)
Likely (4)		Low (4x1)	Medium (4x2)	High (4x3)	High (4x4)	Very High (4x5)
Almost Certain (5)		Medium (5x1)	High (5x2)	High (5x3)	Very High (5x4)	Very High (5x5)
Adapted from the AS/NZ 4360 Standard Risk Matrix and NHS QIS Risk Matrix						

Figure 1. Risk Matrix

Table 13. Likelihood Scale

	Description	Explanation
5	<i>Almost Certain</i>	May occur at any time
4	<i>Likely</i>	Frequently occurs
3	<i>Posibble</i>	May occur occasionally
2	<i>Unlikely</i>	Rarely occurs
1	<i>Rare</i>	Almost never occurs or extremely unlikely to happen

Table 14. Consequence Scale

	Description	Explanation
1	<i>Insignificant</i>	No injury occurs, minimal financial loss
2	<i>Minor</i>	Minor injury, minimal financial loss
3	<i>Moderate</i>	Moderate injury requiring medical treatment, significant financial loss
4	<i>Major</i>	Severe injury involving more than one person, major losses, disruption of production activities
5	<i>Catastrophic</i>	Fatalities involving more than one person, extremely large losses, widespread impacts, and complete cessation of activities

Source: <https://biz-sheq-advisor.blogspot.com/p/h-i-r-a.html>

Table 15. Potential Hazards in Class I Inpatient Ward

Work Activity	Potential Hazard	Impact	L	C	Score	Risk Level	Control Recommendations
Installing intravenous infusion	Physical: needle-stick injury; Biological: contact with blood; Ergonomic: bending posture	Needle-stick injury, Hepatitis B, Hepatitis C, AIDS, HIV infection, and back pain	3	4	12	High	1. Substitution: Use safety IV catheters when available. 2. Engineering control: Provide safety boxes near the treatment area. 3. Administrative control: Implement infusion installation SOPs and prohibit needle recapping.

							4. PPE: Use gloves.
Changing intravenous infusion	Ergonomic: awkward posture	Shoulder or back pain	3	2	6	Medium	1. Engineering control: Provide height-adjustable beds. 2. Administrative control: Apply ergonomic work techniques
Changing wound dressing	Biological: blood-borne diseases	Needle-stick injury, Hepatitis B, Hepatitis C, AIDS, HIV infection	3	3	9	Medium	1. Administrative control: Apply standard precautions and aseptic techniques. 2. PPE: Use masks and gloves.
Transferring patients	Ergonomic: lifting heavy loads and non-ergonomic postures	Musculoskeletal injuries and low back pain	2	3	6	Medium	1. Engineering control: Use transfer boards/hoists or adjustable beds. 2. Administrative control: Provide manual handling training and involve at least two healthcare workers when transferring heavy patients.
Administering injectable medication	Physical: needle-stick injury; Biological: blood-borne diseases	Needle-stick injury, Hepatitis B, Hepatitis C, AIDS, HIV infection	3	4	12	High	1. Administrative control: Do not perform needle recapping. 2. PPE: Use gloves.
Bathing patients	Ergonomic: patient lifting, repetitive tasks, slipping hazards	Muscle pain and back pain	2	3	6	Medium	1. Engineering control: Use adjustable beds. 2. Administrative control: Apply proper manual handling techniques. 3. PPE: Use anti-slip footwear.
Disposing of medical waste	Physical: sharp object injuries; Biological: exposure to infectious waste	Needle-stick injury and HIV/AIDS infection risk	3	4	12	High	1. Engineering control: Provide safety boxes and waste disposal containers according to standards. 2. Administrative control: Implement medical

							waste segregation SOPs. 3. PPE: Use gloves.
Patient handover	Psychosocial: fatigue due to shift changes and workload	Reduced concentration	3	3	9	Medium	1. Administrative control: Use standardized handover formats (e.g., SBAR), conduct briefings before shift changes, arrange shift schedules to ensure adequate rest periods, and minimize interruptions during handover to maintain concentration.
Cleaning blood spills using disinfectants	Chemical: disinfectant vapors or splashes	Respiratory disorders and skin irritation	2	3	6	Medium	1. Substitution: Use effective disinfectants with lower toxicity when available. 2. Engineering control: Provide adequate ventilation during disinfectant use and prepare spill kits. 3. Administrative control: Implement blood spill management SOPs, chemical handling training, and spill management procedures. 4. PPE: Use gloves, masks, eye protection (goggles/face shields) when splash exposure is possible, and aprons when necessary.

Based on Table 15, hazard identification using the Job Hazard Analysis (JHA) method on nine nursing activities in the Class I inpatient ward revealed that three activities (33.3%) were categorized as having a high-risk level, namely intravenous infusion installation, injectable medication administration, and medical waste disposal. Meanwhile, six activities (66.7%) were classified as having a medium-risk level, including changing intravenous infusion, wound dressing changes, patient transfer, patient bathing, patient handover, and cleaning blood spills using disinfectants.

The most frequently identified hazards were ergonomic and biological hazards, each occurring in four activities, followed by physical hazards identified in three activities. Meanwhile, chemical and psychosocial hazards were each found in one activity. These findings indicate that nurses in inpatient wards continue to face various occupational hazards; therefore, appropriate risk control measures based on the hierarchy of controls are required to reduce Occupational Safety and Health (OSH) risks.

CONCLUSION AND SUGGESTIONS

Based on the findings of the study on Occupational Safety and Health (OSH) risk factors at Pertamedika Umami Rosnati Hospital, Banda Aceh, in 2026, it can be concluded that the physical conditions in the inpatient ward have not fully met the required standards, particularly regarding room temperature and lighting intensity in certain areas. Chemical factors were significantly associated with OSH risks, indicating that complaints related to dust exposure contributed to increased occupational risk among respondents. Meanwhile, biological, ergonomic, and psychosocial factors were not significantly associated with OSH risks.

The hospital is recommended to strengthen OSH risk control measures, particularly by improving environmental conditions through regular monitoring and controlling of room temperature, optimizing ventilation and air conditioning systems, ensuring adequate lighting, and maintaining preventive measures against chemical, biological, ergonomic, and psychosocial hazards. Continuous implementation of the hierarchy of controls, including engineering controls, administrative measures, and the use of appropriate personal protective equipment (PPE), is essential to create a safer and more comfortable working environment for healthcare workers.

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