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Occupational Health and Safety Risk Analysis Utilizing The HIRADC Method On Cleaning Service Workers In The Healthcare Segment

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Abstract

The healthcare industry is one of the industries that has a high risk of accidents and disease infection. Thus, the workers in this segment are vulnerable and require strict work rules to avoid the risks. The purpose of this study is to provide recommendations for preventive measures to reduce the risks faced by cleaning service workers in the health sector. Furthermore, the object of this study is an outsourcing company that provides cleaning service workers for several hospitals or healthcare institutions. The focus of this study includes i) identifying potential hazards, ii) risk assessments, and iii) risk control recommendations by using the HIRADC (Hazard Identification Risk Assessment and Determining Control) method. This study utilized primary information obtained through observation and interviews with the company's HSE (Health, Safety, and Environment) and samples from cleaning service workers in Indonesia. According to the results, the study found 15 medium risks and 19 low risks. Since several work accidents occurred to the cleaning services workers, it is still important to carry out appropriate risk control in the form of preventive measures to reduce the risks faced by workers, despite the medium and low-risk levels found in the company.

Keywords
Occupational Health Safety, Occupational Risk, Cleaning service, HIRADC

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INTRODUCTION

The healthcare industry is one of the industries that has a high risk of accidents and diseases. As healthcare service providers, several hospitals face workforce complexity with varying risks related to occupational diseases and accidents according to the type of work [1]. According to the data from Occupational Safety and Health Administration (OSHA) 2019, health and social services reported higher injury rates compared to other industries in the United States. Cleaning service workers in the healthcare sector are one of the groups who have the potential to experience these risks and face greater potential hazards compared to the workforce in general [2].

According to the Ministry of Health of the Republic of Indonesia [3], there were 42,500 work accidents in the health sector in Indonesia, with 273 fatalities. A study by the National Disaster Management Agency (BNPB) shows that the health sector has a higher risk of work accidents during the COVID-19 pandemic. Some risk factors include exposure to chemicals and infections, fatigue, and lack of self-protection. In addition to work accidents, another risk in the health sector is the risk of exposure to disease. Data from the Ministry of Health shows that in 2020, there were 1,216 health workers infected with COVID-19 in Indonesia.

A report from OSHA (Occupational Safety and Health Administration) in The United States shows that the risk of occupational accidents in the health sector can be reduced by implementing good safety, health, and work programs, such as providing training to employees on occupational hazards and risks, providing adequate personal protective equipment, and conducting regular inspections to identify and improve conditions that have the potential to cause workplace accidents.

Therefore, it is important to apply appropriate occupational safety and health standards in the work environment, especially for cleaning service workers in the healthcare sector, due to the responsibility for maintaining the cleanliness of the hospital environment [4] . One way to do this is to conduct a Occupational, Health, and Safety (OHS, or K3 in Indonesian Term) risk analysis. K3 risk analysis aims to identify, evaluate, and manage work-related risks cleaning service in the field of health. According to studies conducted by [5] , the application of good OHS can reduce the number of accidents and increase work productivity in the health sector. In addition, the HIRADC method in OHS risk analysis has also proven effective in increasing workers' awareness and understanding of the hazards and risks present in the work environment. Thus, the workers may take appropriate precautions based on the risk mapping. [6]. In this regard, the HIRADC method can help reduce work-related accidents and illnesses. HIRADC, which stands for Hazard Identification Risk Assessment and Determine Control, is an approach used in occupational risk management and safety. The HIRADC aims to identify, measure, evaluate, and control risks related to hazards that can occur in cleaning service activities [7]. From the explanation above, the health sector is one of the most accident reports. This information shows the potential risk of work accidents that are still high in the health sector, which affects the health and safety of workers, patients, and visitors. In the context of cleaning service workers, OHS risk analysis can help identify and evaluate work-related risks, such as the risk of contact with chemicals and the risk of accidents due to work procedure errors. By knowing the existing risks, appropriate preventive measures can be taken, such as OHS training, the use of personal protective equipment, and improvement of work procedures, through the implementation of a good OHS program and strict infection prevention measures, expected to reduce the risk of work accidents and improve safety and health in the health sector. [8]

Safety, Health, Work

Occupational health and safety (OHS) must be applied in all work environments, including the formal and informal sectors. This issue becomes even more essential in workplaces with a high level of risk or potential hazard, which can result in accidents or disease infection to the workers. [9]

One of the common OHS standards is OHSAS 18001. This standard provides a structured framework for identifying, managing, and reducing OHS risks in the workplace [10]. This standard also emphasises on preventing occupational accidents and diseases through risk management, worker engagement, training, and continuous monitoring. Every country has national laws and regulations related to OHS. This law was enacted to protect workers and the public from accidents, diseases, and ensure safe working conditions. In Indonesia, the national OHS Law covers various aspects, including labour protection, risk identification and assessment, preventive measures, training, supervision, and sanctions against OHS violations. For instance, Law No. 1, the year 1970, determines basic requirements for employers and workers to maintain safety and health in the workplace.

Risk Management

In his book Dewa Gede [11] Risk can be interpreted as uncertainty that arises due to change. This includes deviations from expected results and the possibility of occurrence of an

event that could negatively impact income and capital, especially in a business context. The uncertainty factor is the main trigger for the emergence of risk in an activity. Risk management, according to Fahmi [12] as a field of science, relates to the way an organization applies a comprehensive and systematic approach in managing risk.

From a business perspective, risk can be described as the potential or expectation of an event that can result in adverse impacts. The probability and impact matrix is one of the tools and techniques in the process Qualitative Risk Analysis [13]. Probability and impact matrices are tools and techniques used in the Qualitative Risk Analysis process. Its purpose is to help prioritize the risks faced by a project or organization. This matrix consists of two dimensions: probability and impact.

Probability refers to the probability of a risk occurring. Typically, probabilities are measured on a numerical scale, such as low, medium, or high. The probability of risk can be influenced by factors such as the history of similar events, the potential severity, and environmental factors. Impact describes the degree of consequence or consequence that can be caused if the risk occurs. Impact is also measured on a numerical scale, such as low, medium, or high. Risk impacts can include financial, schedule, reputation, safety, and so on.

HIRADC

Basically, HIRADC has the goal to protect the health and safety of workers, prevent work accidents, and minimize the risks that may occur, HIRADC helps workers to do their jobs correctly and safely [14]. In this process HIRADC is divided into 3 stages namely,

1. Hazard Identification

Hazard identification is the first step in occupational hazard and safety management. This process is carried out to know the potential hazards faced by workers while working. These hazards can be physical factors such as damaged equipment, unsafe environmental conditions, or hazardous chemicals. In addition, hazards can also be in the form of ergonomic factors such as non-ergonomic work posture, biological factors such as exposure to viruses or bacteria, and psychosocial factors such as work stress or interpersonal conflicts.

2. Risk Assessment

Once a hazard is identified, the next stage is an assessment of the risks associated with that hazard. Risk assessment is a process used to determine the urgency or priority of implementing controls, focusing on the level of risk related to accidents or diseases that can arise as a result of work activities [15]. This is an important component in ensuring the safety and effectiveness of an operation. In this context, safety is planned early in the process, so risk assessment becomes even more important.

3. Risk Control (Determine Control)

The results of this risk assessment are important for creating a hazard control program. Hazard control programs are designed to reduce or eliminate identified hazards to minimize the risks. The program involves the implementation of appropriate risk prevention and control measures, such as equipment repair, worker training, use of personal protective equipment (PPE), or changes in work procedures. The main goal of a hazard control program is to create a safe and healthy work environment for workers.

This research contributes to the context of risk management in the cleaning service sector, especially in the health sector in Indonesia. The novelty of this study lies in its focus on risk analysis specific to cleaning service workers, an aspect that is rarely thoroughly explored in the Indonesian risk literature. In the healthcare sector, especially at the level of cleaning service workers, risk assessment practices are rarely carried out properly. Hence, this study contributes to strengthening awareness of the importance of risk management in the work environment. Thus, this study is expected to provide recommendations for risk control as a best practice in mitigating health and safety risks for cleaning service workers in Indonesia.

RESEARCH METHODS

The study began with observations and interviews with the one who handles the cleaning service workers. The method used is descriptive research, which aims to provide an objective picture of the situation without comparisons or looking for relationships between variables. The population that is the focus is cleaning service workers in the health sector is ten workers. The samples taken are eight out of 10 people, according to the Slovin method, with a significance level of 0.05%. The aspects analyzed in this study include hazard identification, risk assessment, risk level determination, and risk control. The data used was sourced from primary information obtained through observation and interviews with the company's OHS, namely HSE officer, hospitals HSE, and eight cleaning service workers, which work processes in the area, work procedures in the healthcare segment, and accident control efforts.

In the HIRADC process is divided into 3 stages, namely,

1. Hazard Identification
2. Risk Assessment
3. Risk Control

Data processing and analysis are carried out by referring to the results of interviews and observations obtained from the company's OHS. From these results, potential hazards likelihood and severity in the work process of the healthcare can be identified. Furthermore, the likelihood and severity values of each potential hazard are recorded and analyzed using a risk assessment matrix table. The results of the analysis help determine the level of risk in each potential hazard and determine whether the hazard is included in the Medium, Low, or High category.

One of the tools used in risk analysis is the probability and impact matrix. This matrix helps in determining which risks require a more detailed risk response plan. In this matrix, numerical values are obtained by multiplying the probability value and impact value of a risk.

$$Risk = Severity\ X\ Likelihood \quad (1)$$

Where:
Severity: Acuity Level
Likelihood: Level of Possibility

Table 1. Risk Score

		RISK				
Likelihood	5 Almost certain	Medium 5	High 10	High 15	High 20	High 25
	4 Likely	Medium 4	Medium 8	High 12	High 16	High 20
	3 Moderete	Low 3	Medium 6	Medium 9	High 12	High 15
	2 Unlikely	Low 2	Medium 4	Medium 6	Medium 8	High 10
	1 Rare	Low 1	Low 2	Low 3	Medium 4	Medium 5
		Near miss incident	Minor Injury / Long Time Injury	Major Trauma	Major Injury	Fatality
		Severity				

After a risk assessment, the next step is to determine control. Control can be done gradually starting from the highest risk rating to the lowest. Negative risk control is carried

out based on a control hierarchy consisting of five stages, such as Elimination, Substitution, Engineering control Type, Administrative control, and Personal perspective equipment (PPE).

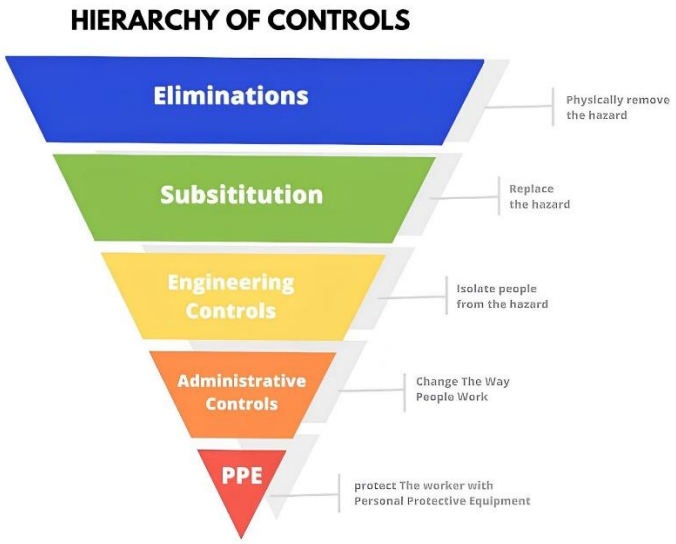

Figure 1. Hierarchy Of Controls, Source: [7]

RESULTS AND DISCUSSION

The preparation of HIRADC in this study begins by identifying potential hazards and opportunities contained in all work process activities as a cleaning service. Every potential hazard and opportunity detected will undergo risk analysis and assessment. The results of this risk assessment then become the basis for determining the most suitable risk control strategy. It is hoped that the implementation of appropriate risk control can reduce or even eliminate existing risks, provide benefits, and improve the performance of the company's occupational safety and health.

Hazard Identification

In the process of identifying potential hazards and opportunities using the HIRADC method by ISO 45001:2018 standards, several potential hazards and opportunities have been identified. Here are several potential hazards detected at this stage.

Table 2. Hazard Identification

No	Activity	Hazard	OHS Risk
1	Dusting	Tripping, falling, slipping	minor to serious injuries
		Dust and particles	Respiratory tract infections (ARI), and irritation
		Ergonomic	Musculoskeletal disorder (MSDS)

No	Activity	Hazard	OHS Risk
		Fatigue	Pain, Not focused on work
		Needle Pricked	Infected with infectious diseases
		Exposure to germs, bacteria,	Contracting the disease
2	Dry & Damp Mooping	Stumble	Broken bones, bruises, minor cuts
		Dust and particles	Respiratory tract infection (ARI), irritation
		Ergonomic	Musculoskeletal disorder (MSDS)
		Fatigue	Pain, Not focused on work
3	Dry/Wet vacumming	Stumble	Broken bones, bruises, minor cuts
		Dust and particles	Respiratory tract infection (ARI), irritation
		Ergonomic	Musculoskeletal disorder (MSDS)
		Fatigue	Pain, Not focused on work
		Electric Shock	Burns
		Use of Tools	Risk of injury due to improper use of machinery
4	Glass Cleaning	Chemical Vapors	Dermatitis
		Ergonomic	Musculoskeletal disorder (MSDS)
		Fatigue	Pain, Not focused on work
		Stumble	Broken bones, bruises, serious injuries
		Slipping	Broken bones, bruises, minor cuts
5	Toilet Cleaning	Chemical Vapors	Dermatitis
		Stumble	Broken bones, bruises, minor cuts
		Ergonomic	Musculoskeletal disorder (MSDS)
		Fatigue	Pain, Not focused on work
		Exposure to human body fluids, Exposure to germs, bacteria, or	Contracting the disease

No	Activity	Hazard	OHS Risk
		viruses attached to equipment	
6	Bed cleaning	Snapped/bumped Hazardous (infectious) materials	Bruises, cuts Exposure to disease/contamination
7	Vomit Cleaning	Exposure to germs, bacteria, or viruses	Contracting the disease
8	Medical and Non Medical waste disposal	Contaminated with garbage, punctured by syringes, exposed to diseases, Back pain	Dermatitis, infection, Musculoskeletal disorder (MSDS).
9	Loading/Unloading goods	Stricken by goods Ergonomics / Manual Handling Fatigue	Minor to moderate injuries Back pain Pain, Not focused on work

Risk Assessment

The results of the HIRADC risk assessment table from the calculation are as follows;

Table 3. Risk Assessment

Risk Assessment					
Activity	Impact (Risk K3)	Severity	Likelihood	Risk	Risk Level
Dusting	Broken bones, bruises, minor to serious injuries	3	2	6	Medium
	Respiratory tract infections (ARI), irritation	2	2	4	Medium
	Musculoskeletal disorder (MSDS)	2	1	2	Low
	Pain, Not focused on work	2	1	2	Low
	Infected with infectious diseases	3	3	9	Medium
	Contracting the disease	2	3	6	Medium
Dry Mooping	Broken bones, bruises, minor cuts	3	3	9	Medium
	Respiratory tract infections (ARI), skin irritation	2	1	2	Low

Risk Assessment					
Activity	Impact (Risk K3)	Severity	Likelihood	Risk	Risk Level
Damp Mooping	Musculoskeletal disorder (MSDS)	2	1	2	Low
	Pain, Not focused on work	1	1	1	Low
	Broken bones, bruises, minor cuts	3	3	6	Medium
	Respiratory tract infections (ARI), skin irritation	2	1	2	Low
	Musculoskeletal disorder (MSDS)	2	1	2	Low
	Pain, Not focused on work	1	1	1	Low
	Burns	3	1	3	Low
	Risk of injury due to improper use of machinery	2	1	2	Low
Dry/Wet Vacumming	Dermatitis	2	1	2	Low
	Musculoskeletal disorder (MSDS)	2	1	2	Low
	Pain, Not focused on work	1	1	1	Low
	Broken bones, bruises, serious injuries	3	1	3	Low
	Broken bones, bruises, minor cuts	3	1	3	Low
glass cleaning	Dermatitis	3	2	6	Medium
	Broken bones, bruises, minor cuts	3	2	6	Medium
	Musculoskeletal disorder (MSDS)	3	2	6	Medium
	Pain, Not focused on work	3	2	6	Medium
	Contracting the disease	1	2	2	Low
Bed Cleaning	Bruises, cuts	2	2	4	Medium
	Burns	3	1	3	Low
	Exposure to disease/contamination	3	2	6	Medium
Vomit Cleaning	Contracting the disease	3	2	6	Medium
Medical and Non-Medical Waste Disposal	Dermatitis, infection (disease transmission), Musculoskeletal disorder (MSDS),	3	2	6	Medium
Loading/ Unloading Goods	Minor to moderate injuries	1	2	2	Low
	Back pain	3	3	9	Medium
	Pain, Not focused on work	2	1	2	Low

The results of the HIRADC risk assessment table from the calculation are as follows;

There are 15 medium risk and 19 low risk. Although the risks identified in studies using the HIRADC method in the cleaning service work process tend to be low or medium, it is still important to implement appropriate risk control.

Risk Control

After obtaining the HIRADC table is to propose risk control measures. The risk control aims to improve the process structure and reduce the risk of hazards while minimizing the potential for work accidents. The control strategy is determined based on a control hierarchy involving elimination, substitution, engineering techniques, administrative actions, and personal protective equipment (PPE). All of these decisions still pay attention to field conditions. In this study, the proposed control efforts are based on the basic hierarchy of risk control. The results of the risk analysis and assessment process indicate that control measures will focus on administrative aspects and the use of personal protective equipment (PPE) as a whole.

To reduce the identified risks, several risk control measures can be carried out. First, it is necessary to conduct daily briefings to workers to provide a better understanding of the risks associated with their duties. Furthermore, it is important to provide appropriate personal protective equipment (PPE) and ensure its consistent use. Work equipment must also be adjusted to the posture and work attitude of workers, thereby reducing the potential for injury or fatigue that can arise.

In addition, regular inspections and periodic maintenance of equipment are essential to ensure safe working conditions. Fatigue control must also be considered by arranging adequate work schedules and providing adequate rest to workers. Correct work processes and clear work procedures must be adhered to to reduce the risk of errors or accidents.

Furthermore, training workers on hazard recognition, chemical handling, safe cleaning techniques, and use of equipment should be carried out regularly. To control risk, ensure that the PPE provided is used correctly and by the instructions given. At the risk control stage, it is important to apply the Hierarchy of Control based on the ISO 45001:2018 standard. The Hierarchy of Control includes risk control in an order based on its priority, namely elimination, substitution, technical control, PPE use, and health surveillance. By following this approach, risks can be reduced or eliminated as far as possible.

CONCLUSIONS

According to the results, this study found 15 medium risks and 19 low risks in the healthcare cleaning service workers. Still, the company should establish an appropriate risk control, such as a preventive measure to reduce the risks. In addition, awareness and participation of workers in maintaining occupational safety and health are also important factors in reducing the risk of work accidents. Finally, this study create a positive contribution to creating a safe and healthy work environment for cleaning service workers in the health sector.

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