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Analysis of Occupational Health and Safety Risk using HIRADC Matrix at Medical Record Installation in Nganjuk Hospital

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ABSTRACT

Background: Filing is part of the medical record installation in a hospital that functions as medical record storage and has the potential to have various potential hazards. During this period the management of the Nganjuk Hospital had not carried out a risk assessment on the medical record installation section. Therefore, a risk assessment is needed to minimize the hazard that occurs. This study aims to identify hazards, assess risks and control them with the HIRADC method in the filing section at the Nganjuk Hospital medical record installation.
Subjects and Method: This research is a qualitative descriptive with a case study design. This research was conducted at the Nganjuk Hospital in March-May 2023. The subjects in this study were 2 medical record officers, the Head of the Medical Record Installation, and the Head of the K3 Section. The sampling technique used was purposive sampling technique. Data analysis used Descriptive Analysis with HIRADC Matrix Analysis.
Results: Based on the HIRADC matrix, the Nganjuk Hospital medical record installation in the Filing section identified a potential hazard in the Moderate-High risk category, including; dusty filing shelves and medical records, poor environmental conditions (temperature, lighting, humidity), distance and height between shelves is not ergonomic, there are sharp objects (remaining staples) in the medical records.
Conclusion: The potential for danger in the filing room is found to be quite a risk to interfere with the work of the filing officer. This requires risk control, including; carry out elimination, substitution, technical control, administrative control and use of PPE.

Keywords: occupational safety and health, medical records, filing, Risk, HIRADC

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BACKGROUND

Hospitals are health service institutions that must be able to improve quality services and be affordable by the community in order to realize the highest degree of health) (Ilyas, 2017).

Occupational safety and health (K3) are all activities to guarantee and protect the safety and health of workers through efforts to prevent work accidents and work-related diseases (Permenaker, 2018). Occupational safety and health procedures are an effort to

improve and maintain the highest degree of health that must be implemented in hospitals, of course, also include the installation of medical records (Permenkes, 2016). The high number of work accidents in Indonesia shows that there are still many workers who ignore occupational safety and health (K3) issues (Saraswati, 2020).

Regulation of the Minister of Health of the Republic of Indonesia Number 66 of 2018 concerning Occupational Safety and Health in Health Service Facilities, Every Hospital is required to organize K3 in health service facilities which aims to carry out Occupational Safety and Health in Hospitals in an optimal, effective, efficient and sustainable manner. Hazards and health risks that occur to workers, patients, delivery personnel and hospital visitors can be in the form of potential physical, chemical, biological, ergonomic, psychosocial hazards (Permenkes, 2016). This of course requires attention to prevent the risks and dangers of accidents and health problems due to work.

Medical record installation is a document regarding the source of information on the patient's condition in the hospital (Suwignjo, 2019). Medical recorders are officers who are responsible for the management and implementation of activities at medical record installations (Kemenkes RI, 2013). In carrying out work, of course there are hazards and risks that have the potential to occur.

One of the most important parts of the medical record installation is the filing section (Rohman et al, 2021). Research that has been conducted by Zahroh et al., (2020) that the filing room of RSUP dr. Soeradji Tirtonegoro has a type of hazard at a low level of 16.6%, a moderate of 50% and a high level of 33.4%.

The hazard risk assessment of a series of risk evaluations that occur in the workplace is caused by the presence of a hazard by paying attention to meeting the needs for its control (Ihsan et al., 2020). Risk assessment analysis is used to analyze and identify hazard and risk factors to prevent failure or accidents at work (Triswandana, 2020). One method of risk assessment in employment is the HIRADC method

HIRADC (Hazard Identification Risk Assessment and Determining) is a procedure that provides comprehensive data regarding potential hazards, risk probabilities and controls in the work environment (Lestari et al., 2019). Research conducted by Hapsari, (2022) states that the application of HIRADC has several benefits, including; reduce the level of probability of hazards and risks that can occur and can determine preventive actions and control of work-related hazards in the company. Another benefit of HIRADC is that companies can build and evaluate work health and safety management processes by determining hazards and risks as well as controls for all company activities in order to reduce work accidents (Lazuardi et al., 2022). HIRADC is an important part of efforts to prevent and control hazards that are used to determine OSH goals and planning (Ihsan et al., 2020).

The results of the research, observations and interviews with filing officers in March-May, the K3 conditions in the medical record installation at Nganjuk Hospital were still not optimal. The K3 officer at Nganjuk Hospital said that the medical record section, especially in the filing room, during this period had not carried out an analysis of occupational health and safety risks. The Head of Medical Records at Nganjuk Hospital said in an interview that many work accidents, both physical and non-physical, occurred in the filing room.

Based on these problems, this research was conducted with the aim of knowing the results of potential hazard analysis, risk assessment and occupational safety and

health risk control using the HIRADC method in the filing room of the Nganjuk Hospital medical record installation.

SUBJECTS AND METHOD

1. Study Design

This research was conducted using a qualitative descriptive with a case study design. This research was conducted in March-May 2023 at the Nganjuk Regional Hospital.

2. Study Subjects

Respondents in this study were 2 filing officers, the Head of the Medical Record Installation and the Head of Occupational Health and Safety at Nganjuk Hospital. Two filing officers are designated as respondents who carry out work or activities directly in the filing room. The head of the Nganjuk Hospital Medical Record Installation was designated as the respondent who had general information on each part of work in the medical record, especially on filing. Finally, the Head of Occupational Safety and Health was determined as the respondent who had general information regarding the state of occupational safety and health at the hospital.

3. Data Collection Technique

Collecting data in this study is to conduct observations, interviews and study documentation. The data collection technique used in this study was a purposive sampling.

4. Data Validation

Data validation techniques were carried out using triangulation techniques.

5. Data Analysis

Data analysis used in this research is descriptive analysis. The method used in risk assessment is HIRADC (Hazard Identification Risk Assessment and Determining) with reference to the AS/NZS 4360-2004 risk assessment matrix concerning risk management with the addition of items according to research needs and ISO 45001: 2018 standards as a reference for risk control. The data used in this study are the potential hazards and risks that could potentially occur in the installation of medical records at Nganjuk Hospital. The process of analyzing the data begins with conducting interviews, observing and testing equipment at the Nganjuk Hospital medical record installation. After the data has been obtained, the researcher conducts a severity analysis through a risk assessment of the level of likelihood and severity using the matrix model that has been provided. Furthermore, control is given to reduce the level of risk from potential hazards.

RESULTS

The characteristics of the respondents in this study were two filing officers with more than 10 years of work experience, the head of the medical record installation with an educational background of D3 Medical Records and Health Information and work experience of more than 10 years and the head of the occupational safety and health department at Nganjuk Hospital with a background in S1 Public Health and S2 Occupational Safety and Health. This is in accordance with the safety and health criteria for human resources in the K3RS standard for Class B General Hospitals in the Decree of the Minister of Health of the Republic of Indonesia No. 1087/Menkes/SK/VIII/2010 concerning Occupational Safety and Health Standards.

Based on the results of observations and interviews with officers, the occupational health and safety conditions in the filing room are still not good and need attention and improvement.

Table 2. Sample characteristics (categorical data)

Characteristics	Category	Frequency	Percentage
1. More than 10 years experiences	2 Filing Officer	2	50%
1. More than 10 years experiences 2. D3 Medical Record and Health Information	Headmaster of Medical Record Installation	1	25%
1. S1 Public Health 2. S2 Occupational Safety and Health	Headmaster of Occupational safety and health departement	1	25%

Hazard Identification, Risk Assessment and Determining Control

The work process carried out in the filing room cannot be avoided from various potential hazards. Occupational safety and health must be implemented in accordance with applicable regulations.

HIRADC is a procedure that provides comprehensive data regarding potential hazards, risk probabilities, and controls in the work environment (Lestari et al., 2019). The procedure, the HIRADC Matrix has an analysis flow, namely Hazard Identification, Risk Assessment and Determining Control. Based on the HIRADC matrix, filing room in medical record installation at RSD Nganjuk identifed as having potential hazard. Following are the result of the HIRADC for filing room.

Table 1. Filling Room Hiradc Matrix

HIRADC		RISK ASSESMENT			DETERMINING CONTROL	RESUDIAL RISK		
Hazard	Risk	L	C	R		L	C	R
Filing rack and medical records Dusty	A. cause respiratory disease B. Skin irritation	3	3	9	a. Regular cleaning of shelves and air circulation b. Provision and use of masks, gloves and handsanitizer	2	1	2
The distance and height between the shelves is less ergonomic	a. Officers walked pinned down the shelves b. The officer's clothing has the potential to hang on the shelf c. Additional tools are required to reach the shelves d. The ergonomics of the officer's body are disturbed	3	3	9	a. Setting the shelves in the filing room b. Anthropometric calculations were carried out by officers with filing racks c. replacement of iron shelves with roll o pack	2	2	4
The presence of sharp objects (remaining contents of the stapler) in the medical record	Punctured hands of officers when taking or returning medical records	5	2	10	a. Cleaning the remaining contents of the staples in the medical record b. Substitute staples with more staff-friendly tools, such as paper clips or labels	2	2	4
Environmental conditions; such as poor Lighting, Temperature, Humidity	a. Room conditions are hot and dark b. The condition of the reception room c. Discomfort at work	5	2	10	a. Supply of air conditioners b. Creating air circulation c. Creating even lighting	2	2	4

Hazard Identification is the process of identifying potential hazards. Potential hazards that occur in the filing room. According to Permenkes no 48 of 2016 concerning Office K3 Standards, types of hazards, among others; physical, biological, chemical, ergonomic and psychosocial.

Based on the results of the HIRADC Matrix, it shows that the potential hazards that could occur include; dusty filing shelves and medical records, poor environmental conditions (temperature, lighting, humidity), distance and height between shelves is not ergonomic, there are sharp objects (remaining staples) in the medical records.

Filing Rack and Medical Record Dusty

The first potential hazard is dusty filing racks and medical records. This happened because there was still residual dust found by the filing staff while working. The following are the results of interviews with officers;

“If it is filed, there is a lot of dust"

"There is no (malfunction) of air circulation to come out, so the air is circling inside“

According to the results of the interview, the remaining dust was identified because there was insufficient air circulation to function as a room filter. Of course, this can interfere with the performance of the filing officers who work.

Figure 1. Air Circulation Condition

The Distance and Height between the Shelves are Less Ergonomic

According to the observation results show that the distance and height between the shelves are not ergonomic. This of course can lead to inefficient filing officer performance, especially officers on the front filing. Following are the results of observations on the distance and height between the shelves that are not ergonomic.

Figure 2. Distance between shelves

Figure 3. Track for Officer

The presence of sharps object (Remaining contents of stapler) in the medical record room

Based on the results of interviews with officers, many complained about the presence of sharp objects in the form of staples left in the medical record. Following are the results of interviews with officers;

.. Once, when we were looking for the status, we had not pulled out many staples, the hand was seeing, it was hot.

.. When I got to the file, I got a staple in my hand.

Figure 4. Air Conditioner is off

Figure 5. Condition of lighting

Poor environment condition (lighting, temperature, humidity)

The results of observations, interviews and documentation studies show that the condition of the front filing is more potentially dangerous than the back filing. As the results of interviews that have been conducted with filing officers related to

physical hazards, such as temperature, lighting and humidity;
"he standard (front filing condition) is still warm, and the humidity is not yet ideal."
"..yes, the temperature inside feels warm, even though there's already air conditioning and a fan. This is because there's no proper air circulation for the air to flow out, so it just circulates within the room.."
The lighting conditions on the front filing are worse than the back filing. Following are the results of interviews with officials regarding the lighting conditions in the filing room;
".Yes, it's inadequate—the lighting is insufficient."
"Yes, it's lacking. I think the lighting is inadequate; it feels dim, very dim."
This is the facilities and infrastructure in the front filing room.

The results of interviews with officers and results of room observations are in line with the results of physical measurements (lighting, temperature and humidity) in the filing room.

Table 2. The result of physical measurements filing room

Filing	Date		Lux	Celcius	%	Time
Front Filing Room	May 08, 2023	A	280.9	28.8	66.8	11:03
		B	58.7	28.5	67.4	11:03
		C	231.8	28.4	66.9	11:04
		D	56.8	28.3	66.9	11:04
		E	43.4	28.4	68.9	11:05
	May 09, 2023	A	114.7	28.1	68.9	11:15
		B	61.2	28.1	66.7	11:15
		C	227.4	28.1	67.4	11:16
		D	34.5	28.1	67.8	11:17
		E	63.4	28.6	70.1	11:59
	May 11, 2023	A	113.6	28.9	69.4	09:48
		B	51.3	28.5	69.3	09:37
		C	43.0	28.5	68.9	09:38
		D	54.1	28.4	70.5	09:39
		E	68.0	28.9	69.4	09:40
Back Filing Room	May 08, 2023		56.8	26.8	56.6	12:15
	May 09, 2023		41.8	26.4	56.3	11:00
	May 23, 2023		60.3	26.1	58.2	09:19

Notes:
Lux : Exposure measurement
Celsius : Measurement of temperature
% : Moisture measurement

Risk Assesment is a risk assessment process that is guided by a table that can formulate a risk level by calculating the multiplication of Likelihood and Severity. Likelihood is the level of probability that it will occur and Severity is the severity of the risk. The following is the level of likelihood and severity according to the AS/NZS 4360-2004 standard regarding risk management.

Table 3. Likelihood level of event

Level	Description	Detail
A	Almost Certain	Everyday
B	Likely	1 time/week
C	Possible	1 time/month
D	Unlikely	1 time/year
E	Rare	1 time/5year

Table 4. Severity of event

Level	Description	Detail Description
1	Insignificant	The incident did not cause any material loss or injury to humans
2	Minor	Causing minor injuries, moderate material losses, and no serious impact
3	Moderate	Serious injury requiring medical treatment, not causing permanent disability, financial loss is quite large
4	Mayor	Causing serious injury and permanent disability and large financial loss and has a serious impact
5	Severe	Resulting in fatalities and severe losses can even disrupt activities forever

As for the level and risk assessment using a risk matrix table by considering the possibility category with the level of severity. Determination of risk assessment on the AS/NZS 4360-2004 matrix guidelines regarding risk management, namely by calculating the multiplication of the likelihood with severity, the explanation is as follows.

Table 5. Likelihood and Severity Matriks

Likelihood(L)		Severity				
		Insignificant	Low	Moderate	High	Very High
		1	2	3	4	5
Almost Certain	A	M	H	H	VH	VH
Likely	B	M	M	H	H	VH
Possible	C	Lz	M	M	H	H
Unlikely	D	L	M	M	M	H
Rare	E	L	L	L	M	M

Based on the Hiradc matrix in image 1. it shows that the potential hazards identified in the filing room are in the moderate-high risk category. Of course, this needs to be repaired and attended to.

Determining Control is an important step in risk management. This step is the stage of risk control that occurs in the filing room. According to ISO 18001 of 2018 Hierarchy of Risk Control, among others; elimination, substitution, technical control, administrative control and use of PPE.

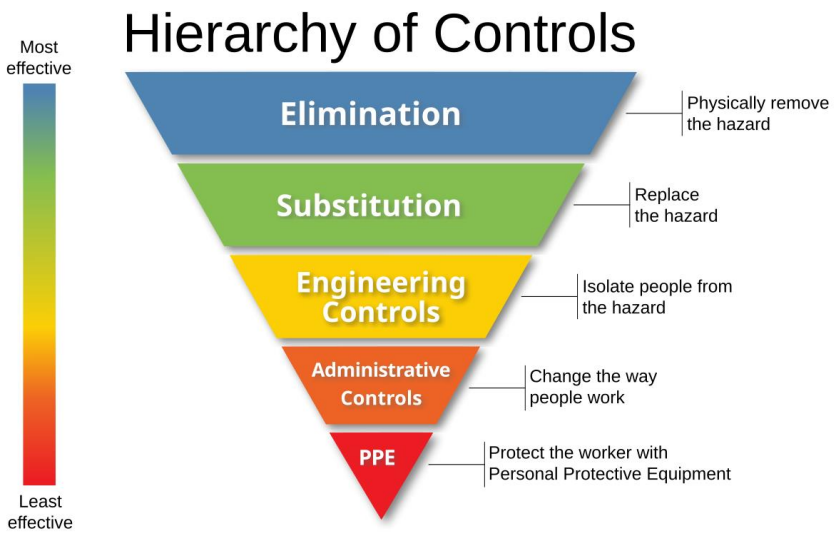

Figure 6. Hierarchy of Determining Hazard Control

Based on the HIRADC Matrix in image 1. it shows that the potential hazards that have been identified are recommended to use a risk control hierarchy in the form of elimination, substitution, technical control, administrative control and use of PPE.

DISCUSSION

1. Filling Rack and Medical Record Dusty

Based on the HIRADC matrix in image 1. it has shown dust on the shelves in the filing room, especially on the front filing. The dust found was caused by a lack of dust cleaning and malfunctioning of the ventilation in the filing room.

According to research conducted by Sari and Wulandari (2020) Dust is a chemical factor that is the main cause of health problems through a person's breathing. In addition, according to Anjani et al (2022) it is stated that dust and dirt that has been allowed to remain on the surface of the paper (medical record) for a long time will be difficult to clean and can cause the color of the paper to become dull, causing dust marks to obscure the writing on the medical record. The following is risk control according to ISO 45001 of 2018 for dust on shelves and medical records.

Table 7. Determining Control for Filing rack and Medical Record Dusty

Determining Control	Description
Elimination	Eliminate staple contents from the medical record
Substution	Replacing staples with environmentally friendly tools, for example paper clips and label
Technical Control	Procurement of internal medicine and wound plasters if puncture
PPE	Use gloves to reduce the impact of puncture

2. The presence of sharps object

Based on the HIRADC matrix in image 1, it has been shown that sharp objects were found, namely staples remaining in the medical record. This can injure the hands of officers when working. Hands of filing officers at RSPAL dr. Ramelan Surabaya was punctured by the hand of the remaining contents of the staples which were still in the medical record (Febriyani, 2022).

In addition, the remaining contents of the staples can damage the quality of the medical record because it has the potential to tear the patient's medical record. Using too many staples in the folder (medical record) can cause the file (medical record) to be easily damaged (Kholifah et al, 2020).

These issues require appropriate risk control measures. The recommended risk control measures, as outlined in ISO 45001:2018, are as follows:

Table 8. Determining Control for The Presence of Sharps Object

Determining Control	Description
Elimination	Eliminate staple contents from the medical record
Substution	Replacing staples with environmentally friendly tools, for example paper clips and label
Technical Control	Procurement of internal medicine and wound plasters if puncture
PPE	Use gloves to reduce the impact of puncture

3. Poor environment condition (lighting, temperature, humidity)

In research with a systematic review design and meta-analysis with the topic of the effect of workload and work environment on job satisfaction in health workers. This study discusses the influence factors of job satisfaction on health workers.

Based on the analysis of 8 primary studies, it was found that health workers with high workloads reduced job satisfaction 0.47 times compared to health workers with low workloads (aOR=0.47; 95% CI=0.24 to 0.92; p=0.030). This is in line with Schafer et al., (2020) which revealed that health workers with a high workload reduced job satisfaction by 0.54 times compared to health workers who had a low workload. Another study conducted by Safitri and Astutik (2019) also shows that high workload reduces job satisfaction by 0.82 times compared to health workers with low workload. The same research by Said and El-Shafei (2021) on factors related to job satisfaction in nurses during the Covid-19 pandemic showed that nurse health workers with high workloads reduced job satisfaction 0.83 times compared to nurse health workers with low workload and significantly statistically significant (aOR=0.83; 95% CI=0.12 to 1.88; p=0.04). The impact of workload on task demands that are not in accordance with standards will have impacts such as the emergence of errors in reporting, physical and emotional fatigue, disruption of work processes, dissatisfaction of health workers with their work and the desire to move or leave their jobs (Sandra and Sondari, 2017).

Based on the analysis of 9 primary studies, it was found that health workers with a safe work environment increased job satisfaction 2.75 times compared to health workers with an unsafe work environment (aOR=2.75; 95% CI=1.59 to 4.78; p=0.003). The results of this study are in line with Ntopi et al., (2020) on health workers in Malawi which showed that nurse health workers with safe working conditions increased job satisfaction 1.24 times compared to health workers with unsafe working conditions and this was statistically significant (aOR= 1.24; 95% CI=0.72 to 2.14; p<0.05). Another study by Azagew (2020) showed that nurse health workers with good work environment security increased job satisfaction 6.56 times compared to nurse health workers with poor work environment safety and this was statistically significant (aOR=6.56; 95% CI=2.37 to 18.13; p<0.001). A safe work environment is assessed from a good physical work environment which includes cleanliness of the workplace, good lighting, appropriate room

temperature, a conducive work environment, away from noise which can cause disruption of the concentration of health workers in carrying out their work.

Several other studies have also stated that high workload and a safe work environment have an effect on job satisfaction in health workers. The limitations of this study are the presence of language bias because it only uses English-language articles, publication bias shown in the funnel plot results on asymmetric workload and work environment variables, and search bias because it only uses three databases. The conclusion in this meta-analysis study was that health workers with a high workload reduced job satisfaction 0.47 times compared to health workers with a low workload (aOR=0.47; 95% CI=0.24 to 0.92; p=0.030). Health workers with a safe work environment increased job satisfaction 2.75 times compared to health workers with an unsafe work environment (aOR=2.75; 95% CI=1.59 to 4.78; p=0.003). The results of this meta-analysis research can be used by policy makers so they can pay attention to appropriate workloads and safe work environments so as to increase job satisfaction in health workers.

AUTHOR CONTRIBUTION

Maulana Muhammad Sirojuddin Abbas serves as the principal researcher, responsible for coordinating the study, overseeing all stages of the research process, and completing the research documentation. Dian Herawati acts as the evaluator in this study.

CONFLICT OF INTEREST

All authors declare there is no conflict of interest in this manuscript.

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