# The Risk Assessment of Clinical Pathology Laboratory in Universitas Airlangga Hospital Surabaya

## *Analisis Risiko pada Unit Laboratorium Patologi Klinik Rumah Sakit Universitas Airlangga Surabaya*

**Teguh Satrio, M. Robiul Fuadi**
Universitas Airlangga Hospital
Jl. Dharmahusada Permai No.116, Mulyorejo, Campus C Mulyorejo, Surabaya City, East Java 60115, Indonesia

**ABSTRACT**

**Introduction:** Laboratory is a place for the analysis of a material that aims for research, education, quality testing and diagnose diseases. Working in the laboratory will always be faced with a variety of risk and sources of danger that can cause workplace accidents. The purpose of this study was to determine the hazards, hazard identification, risk identification, risk assessments, risk control, and residual risk in working at the clinical pathology laboratory. **Method:** Data collection method used was observational and descriptive research. When viewed from the time of the study, this study was cross sectional. The data used were primary and secondary data, in which the primary data were obtained by direct observation on site, while secondary data were obtained from SOPs available in the laboratory. **Results:** The results of the study can identify as many as 9 hazards. In the assessment of risk, it obtained the highest level of danger which was high risk. The level of risk was as high as 3 hazards including needling, splattered patient samples, and reagents or hazardous substances. **Conclusion:** The conclusion from the study is that this laboratory is classified as dangerous because it finds some of the highest risk levels, which is high risk. The existing risk control in this laboratory is quite complete and good, but it needs to be an improvement in terms of compliance in wearing Personal Protective Equipment (PPE) to minimize the risk.

**Keywords:** clinical pathology laboratory, hazard identification, risk assessment

***ABSTRAK***

***Pendahuluan:*** *Laboratorium merupakan tempat dilakukannya kegiatan analisa suatu bahan yang bertujuan untuk penelitian, pendidikan, uji mutu dan diagnosa penyakit. Pekerjaan di laboratorium akan selalu dihadapkan pada risiko dan sumber bahaya yang beragam yang dapat menimbulkan kecelakaan kerja. Tujuan penelitian ini adalah untuk mengetahui bahaya, identifikasi bahaya, risiko, penilaian risiko, pengendalian risiko, dan risiko sisa pada pekerjaan di laboratorium patologi klinik.* ***Metode:*** *Metode pengumpulan data yang digunakan adalah observasional dan termasuk penelitian deskriptif. Jika dilihat dari waktu penelitian, penelitian ini termasuk cross sectional. Data yang dipakai merupakan data primer dan sekunder, data primer didapat dengan pengamatan langsung di lokasi sedangkan data sekunder diperoleh dari Standar Operasional Prosedur (SOP) yang tersedia di laboratorium.* ***Hasil:*** *Hasil penelitian dapat mengidentifikasi sebanyak 9 bahaya. Pada penilaian risiko didapatkan tingkat bahaya tertinggi adalah high risk. Tingkat risiko high risk sebanyak 3 bahaya yakni tertusuk jarum, terciprat sampel pasien, dan tercipat reagen atau bahan B3.* ***Simpulan:*** *Laboratorium ini tergolong berbahaya karena ditemukan beberapa tingkat risiko tertinggi yakni high risk. Pengendalian risiko yang telah ada di laboratorium ini sudah cukup lengkap dan baik, namun perlu adanya perbaikan dalam hal kepatuhan mengenakan Alat Pelindung Diri (APD) untuk meminimalisir risiko.*

***Kata kunci:*** *identifikasi bahaya, laboratorium patologi klinik, pengendalian risiko*

**Corresponding Author:**
Teguh Satrio
Email: satrioteguh21@gmail.com
Telephone: +6285731103366

## INTRODUCTION

Technology and knowledge in the field of health will continue to grow. There has been a shift in trends which previously had a lot of work done manually, now replaced by using automatic tools. Automation of equipment in the health industry

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will greatly help users to accelerate and simplify the production process. In addition, many health industries use chemicals in the production process. Chemicals generally become raw materials or mixed materials in production. Many chemicals have many benefits, but if they are used incorrectly, they will also cause harm to humans and the environment.

Besides the many benefits of tool automation and the use of chemicals, there will always be potential hazards (Wulandari and Widajati, 2017). This potential can come from the nature of the work done, the machines used, the work environment, the production process, and the way work is done. For this reason, it is necessary to minimize the potential dangers posed by applying occupational safety and health (OSH). Occupational safety and health (OSH) is science of which application in an effort to prevent the possibility of accidents and diseases caused by work in the workplace (Husni, 2003).

In Law number 1 of 1970 concerning Work Safety in Chapter 1 article 1 paragraph 1, it is explained the meaning of the workplace which is every room or field, closed or open, moving or permanent, where workers are entitled to protection (Minister of Manpower, 1970). The Government of the Republic of Indonesia has the objective to protect the safety of workers or laborers by passing Law number 13 of 2003 concerning manpower article 86 paragraph 2 namely "to protect the safety of workers or laborers in order to realize optimal work productivity, work safety and health needs to be organized". In addition, Article 87 Paragraph 1 explains that every company is required to apply a work safety and health management system (Minister of Manpower, 2003).

In Republic of Indonesia Government Regulation number 50 year 2012 article 7 paragraph 2, explains that the preparation of OHS policies, an entrepreneur must conduct an initial review of OHS conditions which includes first identification of potential hazards, risk assessment and risk control, second is a comparison of the application of OSH with companies and other good sectors. Third is a review of the cause and effect of a dangerous event. Fourth, competence and disturbance, as well as the results of previous assessments related to safety, and finally the assessment of the efficiency and effectiveness of the resources provided (Minister of Manpower, 2012).

Hazard identification is a process that can be carried out to recognize all situations or events that have the potential to cause workplace accidents and diseases that may arise in the workplace (Harrianto, 2008). In the health care industry such as hospitals, there are many units are run production services of the health sector. One of the central units in the hospital is the laboratory unit. In the hospital industry, the laboratory serves as a means of enforcing the diagnose of a disease suffered by analyzing samples from patients whether through blood, urine, sputum, or feces.

The laboratory unit of Universitas Airlangga Hospital Surabaya consists of 5 divisions namely clinical pathology blood bank, anatomical pathology, microbioloy, and parasitology. In the clinical pathology division, it is divided into several sub-units, including hematology, clinical chemistry, immunology, and urinalysis. Every sub division has automatic tools that need to be maintained for validity. So to maintain the validity of the results of the analysis, daily maintenance is carried out including turning off the tool, checking and disposing the equipment, replacing the reagents that are depleted, and quality control.

Work in the laboratory is very vulnerable to the potential risk for transmission of infectious diseases that can be transmitted from the body fluids of

**Table 1.** The Probability Scale of the AS/NZS 4360 Standard

| Level | Description | Information |
|---|---|---|
| 1 | Almost Certain | Can occur at any time |
| 2 | Likely | Often occurs |
| 3 | Possible | Can occur once in a while |
| 4 | Unlikely | Rarely occurs |
| 5 | Rare | Almost never occurs |

**Table 2.** The Scale of Severity in the AS/NZS 4360 Standard

| Level | Description | Information |
|---|---|---|
| 1 | Insignificant | No injuries occurred, little financial loss |
| 2 | Minor | Minor injuries, few financial losses |
| 3 | Moderate | Medium injury, need medical treatment, big financial loss |
| 4 | Major | Injury > 1 person, heavy loss, production disruption |
| 5 | Catastrophic | Fatal > 1 person, the loss is very large and the impact is very broad, the cessation of all activities |

**Table 3.** The Scale of Risk Matrix in the AS/NZS 4360 Standard

| Frequency of Risk | Impact of Risk | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| 5 | 5 | 10 | 15 | 20 | 25 |
| 4 | 4 | 8 | 12 | 16 | 20 |
| 3 | 3 | 6 | 9 | 12 | 15 |
| 2 | 2 | 4 | 6 | 8 | 10 |
| 1 | 1 | 2 | 3 | 4 | 5 |

Information: 1-6: Low Risk; 7-12: Medium Risk; 13-25: High Risk

patients who enter the worker by being injected, splashed, or other means. Data from the Indonesian Ministry of Health in 2009 showed that there were 2 million people infected with the hepatitis B virus, 0.9 million people with hepatitis C, 170,000 people with HIV/AIDS and around 8-12% of the worker working at hospital have allergies to the latex material used in gloves (Kementerian Kesehatan Republik Indonesia, 2009).

Based on the potential risk that can affect the workers in the clinical pathology laboratory, it is necessary to conduct a risk assessment so that various types of potential risk can be identified and controlled. The purpose of this study was to determine the hazards, identification of hazards, potential risk, risk assessments, risk control, and residual risk at work in the clinical pathology laboratory in Universitas Airlangga Hospital Surabaya.

## METHOD

This study was an observational study because the data obtained came from direct observations. Based on the nature of the problem and the way the data was analyzed, this research was descriptive, which aimed to describe the situation objectively. If viewed in terms of time, this research was cross sectional because the research process was carried out in one particular time.

The location of this study was carried out in the clinical pathology laboratory of Universitas Airlangga Hospital Surabaya in October 2019. This study used primary and secondary data. Primary data were obtained from observing objects using observation form without giving any treatment to the population during the observation process. Whereas, secondary data were obtained from SOPs available at the Clinical Pathology Laboratory in Universitas Airlangga. Hazard identification variable data were taken using direct observation method while risk control variable data were taken using the direct observation method and secondary data from the available SOPs.

Variables that was examined including hazards, hazard identification, risk, risk assessment, risk control, and residual risk on working in the Clinical Pathology Laboratory. The instruments in this study were guided by the Australian Standard/New Zealand Standard for Risk Management (Cross et al., 2004). There were 2 parameters used in risk assessment, which is likelihood and severity. Scale risk assessment and a statement that were used can be seen in Table 1, Table 2 and Table 3. The results of the analysis are presented in tabular form and proceed to determine the level of risk by multiplying the probability (likelihood) and the level of severity, then drawn through risk control, and then the remaining risk was calculated. The results of data processing was analyzed in the form of narration which was then used to draw conclusions as the end of the study.

## RESULT

### Hazard Identification in Clinical Pathology Laboratory in Universitas Airlangga Hospital Surabaya

Clinical Pathology Laboratory in Universitas Airlangga Hospital Surabaya is one of the units in the hospital which is a means of enforcing disease diagnosis. This location has many potential dangers. Because each laboratory has various potential hazards, it is necessary to map and identify the potential hazards in each laboratory.

#### *Noise Generated from Automated Equipment in the Clinical Pathology Laboratory*

Every automated analysis equipment in the clinical pathology laboratory makes noise, both alarms of completion, the sound and vibration of the serum separator (centrifuge), the sound of the engine from the refrigerator and freezer, and vortex. The refrigerator will sound an alarm when the temperature comes out of the recommended temperature, both cold and too hot. The centrifuge emits an alarm when the sample is finished playing, and there was a centrifuge that makes a loud noise because the outer cover is not installed properly so that it vibrates and makes a noise. Vortex that is used

to homogenize the sample will make a sound when turned on.

***Electric Current is Struck and A Short Circuit Occurs Due To the Position of the Cable that is Scattered Behind the Appliance***

Electrical installations that are not arranged properly on the back of the tool allows the condition of the cable that goes unnoticed and can sting the worker. In addition, worker will find it difficult to identify the presence of exposed cables so that it will be dangerous and cause a risk of stinging the workers in the Clinical Pathology Laboratory. Cables that are scattered and plugged into overlapping electrical outlets also have short circuite risk, which will trigger a fire in the Clinical Pathology Laboratory.

The source of danger can come from electrical energy. Electrical energy can cause various hazards such as fire, electric shock, and short circuit. In the work environment, there are many electrical hazards, both from the electricity grid and work equipment or machines that use electrical energy.

***Slipped Due to Slippery Floors Exposed to Spills of Material or Water***

In laboratory work, spills and samples are not uncommon. Spills in large quantities will endanger the worker or anyone who visits the Clinical Pathology Laboratory. Slippery floors due to spills can cause the worker to slip. From observations, spills were often seen around the waste storage, around the sink, and RO water storage in addition to clinical chemicals.

Waste from equipment that exceeds the limit should be disposed first. However, it was not uncommon because the location of the waste storage was behind the tool, so the laborers often forgot to dispose. As a result, waste that was not accommodated would gush out. Stagnant water also stayed around the sink. After washing hands, water which was not dried on the hands yet then dripped onto the floor and made the floor slippery. In addition, RO water was used for clinical chemistry equipment, so that when every tube of RO water runs out, it must be refilled manually by pouring RO water using a measuring class. In this process, spills often occurred around container.

***Needling***

Although some parameters in the laboratory used a tube for the sample, there were parameters that did not move the blood sample to the tube but instead it used a syringe together with a needle that was still attached because air contamination greatly affects the results of the analysis. There were several parameters including blood gas analysis, pleural fluid analysis and other fluids. There was a risk of being injected by a used needle if the worker was not careful and missed the needle-slip technique.

In addition, some sample analyzers also used needles to take samples to be examined. Workers were at risk of being injected by a tool if they tried to put their hand in the tool while it was still working.

***Stricken with Laboratory Equipment that was Located on the Lip of the Table or Being Lifted***

The risk of goods being hit was quite large in the Clinical Pathology Laboratory. Some tools were placed on the table, not infrequently since there were many tools and so that the tools were easily accessed, these tools are placed on the lip of the table. If it was touched, the tool risk falling and affecting the limbs of the worker. Danger is anything that has the potential to cause loss, damage, injury, illness, and even death related to work processes and systems.

***Cut by Broken Glass***

The intended glass tool is a blood sample collection tube, reagent bottles, volume pipettes, cover glass, and glass objects. The condition of the equipment in the laboratory was very diverse, some were new or old but were still suitable to be used.

Glass material is very susceptible to cracking or breaking. Cracked or broken glass can be caused due to falling or colliding with hard objects. Cracks and broken glass that are left will endanger the worker because of their sharp nature which can cut off the limbs of the worker.

***Splattered Patient Sample***

The work in the Clinical Pathology Laboratory certainly always intersects with samples from the patient's body in the form of blood, urine, or other body fluids. Material that is liquid has the risk of spilling or splashing. Splashes that occur can affect the body parts of the workers. Workers never know what kind of illnesses suffered by patients with these samples. Therefore, every sample that was examined in Clinical Pathology Laboratory was infectious.

Samples that were splashed to the body are very dangerous. If it is exposed to the eye, it can

**Table 4.** The Hazard Identification of Clinical Pathology Laboratory in Universitas Airlangga Hospital Surabaya at 2019

| **Number 1** | **Job Risk Analysis** | | | | | | | | | | | **Page :** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Work : Medical Laboratory Institution** | | | | | | | | **Assessed by : Teguh Satrio** | | | | |
| **Activity tool facilities** | **Potential hazard** | **Danger consequence** | **Existing security** | **Risk Rating** | | | | **Suggestion** | **Residual risk** | | | |
| | | | | **LL** | **S** | **RR** | **Risk** | | **LL** | **S** | **RR** | **Risk** |
| Analyzing patient samples | Noise generated from automated equipment in the Clinical Pathology Laboratory | Discomfort, hearing loss | None | 5 | 2 | 10 | Medium | Checking the equipment noise level regularly and periodically | 5 | 1 | 5 | Low |
| | Electric current is struck and a short circuit occurs due to the position of the cable that is scattered behind the appliance | Shock, weakness, burns | Wires were wrapped and hands were not wet | 3 | 3 | 9 | Medium | Arrange the cables neatly, adhere to the SOP and put on PPE | 2 | 3 | 6 | Low |
| | Slipping due to slippery floors exposed to spills of material or water | Dropping, bruising, scratches | SOP for handling spills, rubber footwear | 4 | 2 | 8 | Medium | SOP compliant, wear ing footwear that is not slippery, not drained and always be careful | 2 | 2 | 4 | Low |
| | Needling | Puncture wounds, infectious disease infections | PPE, SOP for shipping and sample processing, needle opening pinchers | 4 | 4 | 16 | High | SOP compliant, openning the needle using claws provided, wearing PPE | 2 | 4 | 8 | Medium |
| | Stricken with laboratory equipment that was located on the lip of the table or being lifted. | Bruises and cuts on the skin | None | 1 | 3 | 3 | Low | Do not joke when working and taking a rest when feeling tired. | 1 | 3 | 3 | Low |
| | Cut by broken glass | Incision wounds, punctures, bleeding and skin irritation | PPE | 2 | 2 | 4 | Low | Wearing PPE while working and issuing SOPs for handling broken glass | 1 | 2 | 2 | Low |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Splattered patient sample | Contracting infectious diseases and irritation to the eyes | PPE | 4 | 4 | 16 | High | Wearing PPE provided, Provides eyewasher. Issuance of the first treatment SOP of being exposed to splashes of patient samples | 2 | 4 | 8 | Medium |
| | Splattered reagent/ hazardous substances | Health problems depend on the nature of the hazardous substances | PPE, MSDS Label, SOP hazardous substancesstorage | 4 | 4 | 16 | High | Wearing PPE provided, Provides eyewasher. Issuance of the first handling SOP of being exposed to splashes of hazardous substances, labeling reagents according to MSDS | 2 | 4 | 8 | Medium |
| | Allergy of latex material from gloves | Itching, thick taste on the skin, red bumps on the skin and cough when inhaled by nose | Wearing PPE, washing hands after wearing gloves | 5 | 2 | 10 | Medium | Replacing gloves with gloves that do not contain latex, rotate the allergic labor | 3 | 2 | 6 | Low |

cause infection or irritation. If it is exposed to the skin that has an open wound, it will also cause infection of the disease. Infectious diseases that can be transmitted through splashed samples include Human Immunodeficiency Virus (HIV), Hepatitis B, Hepatitis C and others.

### *Splattered Reagent/Hazardous Substances*

Reagents and other hazardous substances are very dangerous for worker. The risk of spills or splashes is very possible. Each hazardous substances has its own Material Safety Data Sheets (MSDS). It certainly makes its own dangers and ways of handling. Reagents in the tool are not always sufficient, but the reagents can be used up and must be replaced with new reagents. Installation of reagents in each tool is different, some are closed so the risk of splashes or small spills and there must also be a process of pouring reagents or mixing different reagent.

In addition to the risk involved in replacing and mixing reagents, there are other risks, such as when painting preparations, analyzing using manual equipment, and having to take reagents and samples with a pipette manually. Splashes that occur can be very dangerous for the body of worker. It can cause burns, irritations and so on depends on the nature of the hazardous substances. The handling that must be given also varies, depends on the nature of the material.

### *Latex Material Allergy from Gloves*

Data from the Indonesian Ministry of Health in 2009 showed that around 8-12% of the workers employed in hospitals had an allergy to the latex material used in gloves. As a result, the allergies can vary, ranging from itching, red spots if it is exposed to the skin of the hand to coughing when inhaled by the nose.

This is surely very dangerous for the health of the worker, but other than that, discomfort will

interfere the work process carried out. As a result, employment is often reluctant to wear gloves considered it as annoying. However, by not using gloves, new risk will occur.

Based on the table 4, there were 9 risks that can occur during working in the Clinical Pathology Laboratory. It can be categorized into 3 high risk categories, 4 medium risk categories, and 2 low risk categories. Existing risk can result in health problems such as: the spread of infectious diseases from a patient sample, diseases caused by chemical exposure, incision wounds caused by sharp objects and electric shock, bruising due to slipping or falling on goods, and the inconvenience of working.

Based on the observations, to minimize the risk that can occur to workers, the OSH of the hospital has carried out risk control. The Clinical Pathology Laboratory has been equipped with automated analysis equipment, thereby reducing the risk of workers working on samples manually. This can reduce the risk of splashing a patient sample or reagent and being injected by a needle. In addition, there was also a hazardous substances spillkit, which was prepared in the event of a sample spill or reagent can be carried out cleaning procedures with the equipment. In addition, eyewasher was provided which can be used to rinse the eye if it is splashed by a patient sample or reagent while working.

The Clinical Pathology Laboratory already has a PPE to prevent procedural errors in working such as gloves, laboratory coats, masks, rubber shoes. This is useful to reduce the risk of direct exposure in the event of splashes of patient samples or reagents. In addition, workers were required to complete minimum education requirements, have a Registration Certificate, a Practice License so that the competency and knowledge of workers are guaranteed. There are procedures for separating infectious, non-infectious waste, safety boxes for used needles.

## DISCUSSION

### Hazard Identification in Clinical Pathology Laboratory in Universitas Airlangga Hospital Surabaya

Based on the Regulation of Minister of Manpower No. 50 of 2012, the first step in managing risk is to identify workplace hazards or places that are likely to experience damage (Minister of Manpower, 2012). The results of potential risk identification was carried out by using primary data based on observations and studies of SOP literature available in the clinical pathology laboratory of Universitas Airlangga Hospital Surabaya. Potential risk that can cause health problems or work accidents are physical, chemical, biological, ergonomic, and psychological aspects (Bakhtiar and Sulaksmono, 2013).

Based on research located at the University of X's Agricultural Technology Laboratory using interview and observation methods to 56 respondents, it was found that 42.9% of respondents complained about ergonomic disorders due to non-ergonomic behavior while working (Phuspa, 2017). Whereas, in similar studies located at the Ergonomics and Design Laboratory of Industrial Engineering Work System at Universitas Muria Kudus in 2018, it was found that 42% of respondents complained about the occurrence of ergonomic disorders due to the practicum process in the laboratory (Sokhibi and Primadasa, 2018). This did not become a potential risk for workers in the clinical pathology laboratory in Universitas Airlangga Hospital Surabaya because during a risk assessment, no ergonomic behavior was found while working. More potential risk were caused because the material used for working such as infectious human body fluids and chemicals that can cause occupational diseases.

### *Noise Generated from Automated Equipment in the Clinical Pathology Laboratory*

In the Clinical Pathology Laboratory in Universitas Airlangga Hospital, there were also several sources of noise from existing equipment, it surely needs to be considered and monitored so as not to exceed the specified threshold value. In this case, in line with research suggesting that laboratory managers must constantly monitor the level of noise in the workplace (Permana, Nugraha and Hadiwidodo, 2013). Exposure to acute noise and exceeding prescribed limits can increase workers' blood pressure. The statement was proven by research conducted on PT. Muroco Jember. In this study, a significant increase in blood pressure of workers before and after the exposure to noise exceeded the specified limit (Mukhlish, Sudarmanto and Hasan, 2018).

Besides causing physical disturbance, noise that exceeds the limit can also affect the mentality of a company's workers. Mental disorders that occur can be in the form of work stress. This was proven through research conducted on porter ground

handling in Kokapura Ahmad Yani Semarang. In that study, it was found that as many as 39% of respondents experienced mild stress after working in noise exposure. In other studies conducted at the power house section of PT. Humbahas Bumi Energy Humbang Hasundutan District in 2015, it was found that as many as 3 workers experienced mild stress, 7 workers experienced moderate stress and 2 workers experienced severe strains after the noise exposure they received (Apladika, Denny and Wahyuni, 2016).

***Electric Current is Struck and A Short Circuit Occurs Due To the Position of the Cable that is Scattered Behind the Appliance***

In the clinical pathology laboratory room, there were many laboratory equipment that used electricity. Therefore, there were many cables used. If the electrical installation is installed poorly, it will endanger the employees. Employees may be electrocuted if there are exposed cables. This is often a risk of work in the laboratory, as in research conducted at the Laboratory of Biopharmaceuticals and Pharmacy Analysis, Faculty of Pharmacy, Universitas Airlangga revealed that the risk of working in the laboratory was quite high especially it can result in occupational diseases. There were other potential risk such as being shocked by electrical equipment (Putra, 2018). That is because in the laboratory, there were a lot of electrical equipment in which if the wires from the device were not neatly arranged, it would result in workers being electrocuted. In addition, other research conducted at Agency X in Semarang found that there was a risk of being electrocuted due to the installation of electrical installations that were not up to standard and the existence of a cable that was chipped so that it endangered the workers (Prasetyo, Suroto and Kurniawan, 2018).

In another study conducted during the construction of the Pagangsaan 2 Flyover, Kelapa Gading, North Jakarta, there was also a risk of being electrocuted which could cause burns to workers. From these studies, it was concluded that any work that uses electrical equipment can pose a risk of being electrocuted (Hakim, 2017).

***Slipping Due To Slippery Floors Exposed To Spills of Material or Water***

In the clinical pathology laboratory room, there were many liquid materials such as spills of reagents, samples or water which can cause the floor to become slippery. In previous studies in the laboratory, there were many reports of falling risk that would be experienced by employees. Based on research located at the Laboratory of Biopharmaceuticals and Pharmacy Analysis, Faculty of Pharmacy, Universitas Airlangga revealed that the risk of working in the laboratory was quite high especially that it can result in occupational diseases. There were other potential risk such as being slipping and fall down (Putra, 2018).

Other research conducted in the production area of PT. Pelita Cengkareng Paper, obtained a report of work accidents that have occurred in the period of 2013 to s.d. 2014, one of them slipping on a slippery floor (Marbun, Puspitasari and Budiawan, 2015). In addition, work accidents with the same case of slipping on a slippery floor have also been recorded at PT. Malindo Intitama Raya based on a 2012 work accident report study at the company. The report states that during 1 year period, there were 3 workers who became victims of workplace accidents (Kurniawati, Sugiono and Yuniarti, 2014). Work accidents in the form of slipping on the floor can occur often due to liquid spills on the floor or slippery footwear. This is classified into the basic causes of work accidents as physical work environment factors.

***Needling***

More potential risk are caused because the material used for working is infectious human body fluids and chemicals that can cause occupational diseases. This is in line with research at the Dr. RSUD Laboratory H. Abdul Moeloek Lampung Province. From the risk assessment process, it was found that there was a risk of swallowing a sample of human body fluids and injected by a used needle that was infectious (Muhani, Nuryani and Indriyani, 2018). This can lead to the transmission of infectious diseases to workers as has been stated by WHO/ILO that being injected by a needle on a health worker can cause the transmission of diseases such as HIV/AIDS. In addition, according to another research, needle pricking can cause infection and disease transmission (Winarno, Suryoputro and Shaluhiyah, 2008).

Needle injuction events also occurred in Mangun Kusumo Hospital. There was still a high level of disease in health workers due to needling when taking blood, or actions related to needles in areas where there were wounds so that blood enters through these wounds resulting in the transmission

of a disease. It was also stated that there are some factors that can influence the occurrence of accidents in blood sampling. The factors are fatigue at work resulting in unfocused officers at work, negligence of officers at work, and a lack of caution (Sarastuti, 2016).

### *Stricken with Laboratory Equipment that is Located on the Lip of the Table or Being Lifted*

In the laboratory room, there was a risk of overwriting laboratory equipment which can cause injury to the members of the employee's body. The risk of goods being hit was quite large in the Clinical Pathology Laboratory. Some tools were placed on the table, not infrequently because there were many tools and in order to be easily accessed, these tools were placed on the lip of the table. If it was touched, the tool risk falling and would affect the limbs of the worker. Danger is anything that has the potential to cause loss, damage, injury, illness, and even death related to work processes and systems. Based on research conducted to dentists in Probolinggo District and City, it was found that one of the risks was that workers were being hit by sharp work equipment. This is because when performing actions, the equipment used by dentists is mostly made of metal and sharp. As a result, injuries to workers' limbs (Sawitri and Mulyono, 2019) can occur. In clinical pathology laboratories, there were also tools made of metal and sharp. In addition, there were also equipment with a size large enough and heavy which can cause risk of falling on the workers. Thus, workers will experience blunt force trauma to their limbs.

There is always a risk of being hit by objects on workers, because every job often uses certain equipment or materials. The risk was also found in the risk assessment conducted in the production section of PT. Thanks to Manunggal Jaya, in which workers have risk of being hit by heavy materials, box panels and busbars (Marpaung, Purwanggono and Rumita, 2016). Other research conducted in the kiln area of PT. X 2017, found that almost all work (installation of scaffolding, installation and removal of damaged equipment) in the area posed a risk of being hit by blunt or sharp objects (Martalina, Yetti and Lestari, 2018).

### *Cut by Broken Glass*

The equipment used for the sample analysis process in clinical pathology laboratories is mostly made of glass and plastic. If the glass tube to be used breaks, there is a risk of injuring the employee at work and causing an incision to the skin. The wound will result in the entry of a dangerous infection virus into the employees' body. Based on research located at the Laboratory of Biopharmaceuticals and Pharmacy Analysis, Faculty of Pharmacy, Universitas Airlangga, it was revealed that the risk of working in the laboratory was quite high especially can result in occupational diseases.

There were other potential risk such as being cut by broken glass (Putra, 2018). The risk assessment carried out in testing the uranium content using a Titroprocessor tool found the risk of cutting the skin due to broken test tube debris (Ngatijo et al., 2016). Other research conducted on Juanda International Airport 2 Surabaya development project that there was a risk of being cut by glass in the installation of doors and windows (Windaryati, 2016). The nature of breakable and sharp glass must be treated with care so that if there is a break, it does not hurt the worker.

### *Splattered Patient Sample*

The work in the Clinical Pathology Laboratory certainly always intersects with samples from the patient's body in blood, urine, or other body fluids. Material that is liquid have risk of spilling or splashing. Splashes that occur can affect the body parts of the worker. Workers never know what kind of illnesses suffered by patients with these samples. Therefore, every sample that is examined in Clinical Pathology Laboratory is infectious.

This is in line with research conducted at the Dr. RSUD Laboratory H. Abdul Moeloek Lampung Province. From the risk assessment process, it was found that there was a risk of swallowing a sample of human body fluids, and injected by a used needle that was infectious (Muhani, Nuryani and Indriyani, 2018). Data from the Indonesian Ministry of Health in 2009 showed that there were 2 million people infected with the hepatitis B virus, 0.9 million people with hepatitis C, 170,000 people with HIV/AIDS (Kementerian Kesehatan Republik Indonesia, 2009). In another study conducted on dentists in Probolinggo District and City, it was found that there was a risk of splitting a patient's saliva which could result in contracting Tuberculosis (Sawitri and Mulyono, 2019). Although there were different types of samples, it still can cause health problems for workers.

### *Splattered Reagent/Hazardous Substances*

In the clinical pathology laboratory room, many dangerous chemicals can be found. Most of these chemicals are liquid, so there is a risk of splashing on the body of the employee. Reagents made from chemicals will also cause serious health problems if there is exposure that exceeds the recommended limit. This is in line with research which suggesting that laboratories with chemicals that are not well managed such as the provision of MSDS, can result to various risk such as swallowing, causing explosion, skin irritation and others (Subamia, Sriwahyuni and Widiasih, 2019). In addition, exposure to carcinogenic chemicals in the long term can endanger the health of workers (Kartikasari, Nurjazuli and Mursid, 2016). In a study conducted to determine the factors associated with the incidence of irritant contact dermatitis in PT. X Cirebon, found that skin exposed to certain chemicals can cause irritant dermatitis (Indrawan, Suwondo and Lestantyo, 2014). Every chemical surely has a risk to the health problems of workers.

### *Allergy Latex Material from Gloves*

Working in a laboratory requires complete personal protective equipment, one of them is gloves. Gloves are used so that the employees' hands do not directly come in contact with the patient sample. However, there are latex materials used in making gloves. This material can cause allergies to some people. Data from the Indonesian Ministry of Health in 2009 showed that around 8-12% of the worker working at hospital have allergies to the latex material used in gloves (Kementerian Kesehatan Republik Indonesia, 2009).

Based on research conducted at RSUD Sukoharjo, a relationship between the frequency of using latex gloves and the incidence of occupational contact dermatitis was found (Nursecha, 2013). Other studies mentioned that the protein content in latex can cause allergies namely contact dermatitis, allergic contact dermatitis and type 1 hypersensitivity reactions (Kusumadewi, 2017). As a result, the allergies can vary, ranging from itching, red spots if exposed to the skin of the hand to coughing when inhaled by the nose.

## CONCLUSION

From the results of observations and identification of risk carried out in the Clinical Pathology Laboratory in Universitas Airlangga Hospital Surabaya, 9 hazards are identified. In the risk assessment, there were 3 high risk categories, 4 medium risk categories, and 2 low risk categories. The hazards included in the high risk category are needling, splattering patient samples, and splattering reagents/hazardous substances. Since the high risk category is still found in the laboratory, this location is still classified as dangerous for workers who work there.

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