

ORIGINAL ARTICLE

Analysis of Factors Related to Use of Personal Protective Equipment (PPE) in Laboratory

Atiya Thifal Rofifa, Putri Ayuni Alayyannur, Dani Nasirul Haqi

Safety and Health Department, Faculty of Public Health, Universitas Airlangga, Surabaya, Indonesia

ABSTRACT

Introduction: Laboratories are not inseparable from the risk of work hazards. Laboratory workers are exposed to a high risk of occupational accidents and with contracting occupational diseases originating from specimens or human body fluids, such as blood and urine. The availability of PPE is very important and needed to protect laboratory staff from possible unwanted events. This study describes what factors are associated with the use of PPE in the laboratory.

Methods: This research is an analytic study with a cross sectional study approach. 31 students from the Epidemiology Department of the Faculty of Health, Universitas Airlangga in 2018 were taken as respondents in this study. Data collection was done by using questionnaire method and interview with several students. The independent variables are knowledge, perceptions, compliance, motivation, attitudes, PPE regulations in the workplace, supervision, availability, and dissemination of PPE. **Results:** The results showed that there was a relationship between the use of PPE with several independent variables, which are, student perceptions, student compliance, student motivation, student attitudes, availability of PPE, and socialization of PPE. Several independent variables that have no relationship with the use of PPE are student knowledge, regulations on the use of PPE, and monitoring the use of PPE. **Conclusion:** Some independent variables that showed an association with the use of PPE included perceptions, compliance, motivation, attitudes, availability, and socialization of the use of PPE.

Keywords: PPE, Epidemiology Laboratory, The use of PPE, Occupational Health and Safety

Corresponding Author:

Putri Ayuni Alayyannur

Email: putri_a_a@yahoo.com

Tel: +6281331068808

INTRODUCTION

Every workplace presents their own risks or hazards that can be potentially threatening the health and safety of the people involved in it (1). The presence of risks at each workplace is a factor that cannot be eliminated. However, these hazards can be prevented or reduced in scale of the possible impacts.

Without question, the laboratory as a workplace is also inseparable from the potential hazards. Educational laboratories, hereinafter referred to as laboratories, are academic support units in educational institutions, in the form of closed or open spaces, permanent or mobile, managed systematically for limited-scale testing, calibration and/or production activities, using equipment and materials based on certain scientific methods in the context of education, research and/or community service (2). Hazards presenting in laboratories are not that different from hazards in other workplaces. All hazards can cause occupational accidents and occupational diseases, including hazards

found in the laboratory. Different sources of danger in the laboratory can cause different hazards.

Based on the interviews that have been conducted to the students of Epidemiology Department in 2018, some of the dangers that have occurred in the laboratory of Epidemiology are the accidental contact with human body fluids, such as urine and blood that will be used as lab objects. The urine samples is used to determine a person's consumption of morphine and amphetamine in the last three months, to diagnose a person's disease, or to see a person's medical check-up, while the blood samples is used to see human blood cell forms and to diagnose a person's disease. This accidental event occurs quite often when students are in the Epidemiology laboratory. This is very necessary to note because body fluids can transmit diseases such as hepatitis B, hepatitis C, HIV/AIDS. This unwanted contact occurs because of the lack of alertness of students when taking human body fluids using pipettes.

One way to prevent or lessen the risk of occupational accidents is the use of Personal Protective Equipment (PPE). PPE is a tool that is capable of providing protection against the hazards that exist at work to the wearer. In order not to disturb the activities of workers while working, personal protective equipment must

meet requirements, such as being comfortable to wear, not disrupting work, and providing effective protection against certain type of hazard (3). Effective use of PPE means that it is appropriate with the source of the danger that is in the workplace, so that the PPE used can protect workers optimally.

The obligation to use PPE is regulated in Law Number 1 Year 1970 concerning Occupational Safety in Article 12 point b, that workers are required to wear PPE and it is also stated in article 13 that anyone who is about to enter a workplace is obliged to obey all safety instructions work and use the required PPE (4).

Another regulation concerning the use of PPE is in Minister of Manpower and Transmigration Regulation Number 8 of 2010 written in article 5. In the article, it is written that the employer or manager must announce in writing and install signs regarding the obligation to use PPE at work. In addition, Article 6 paragraph 1 states that workers and other people entering the workplace must use or wear PPE in accordance with potential hazards and risks (5).

MATERIALS AND METHODS

Study Design and Settings

This study is a analytics study with a cross-sectional study approach because data is collected only in one period of time. In its execution, this research was carried out without any interventions applied during the conduct of research, thereby it was categorized as a non-experimental research (6).). The research data was obtained from a questionnaire and through unstructured interview to know some of the hazard that have occurred in the laboratory of Epidemiology. Questionnaire was distributed to respondents and filled by respondents themselves. The variables studied include perception, knowledge, obedience, motivation, regulation, attitude, supervision, availability of PPE, and the socialization of the use of PPE.

Data Collection

The population used in this study were all students of the Faculty of Public Health of Universitas Airlangga of Epidemiology Department specialization in 2018 which had used Epidemiology laboratories of Faculty of Public Health, Universitas Airlangga, amounting to 32 students. Sampling using the convenience sampling method. In its execution, there were only 31 students who were willing to become a respondent because one student is not willing to fill out the questionnaire given. The following data collection were used Questionnaire methods and interview. The questionnaire used is a questionnaire with a closed nature and uses a Likert scale. The total questions in the questionnaire were 79 questions. The questions in the questionnaire are divided into several independent variables that will be examined. Interview have been conducted to the students of Epidemiology

Department in 2018, about some of the dangers that have occurred in the laboratory of Epidemiology.

Data Analysis

The independent variables in the study of the use of PPE in the laboratory of Faculty of Public Health of Universitas Airlangga are basic cause factors in the theory of the ILCI Loss Causation Model, which consist of personal factors and job factors. Independent variables including personal factors are perceptions of PPE, knowledge about PPE, compliance to PPE, motivation to use PPE, and attitudes regarding PPE. While the independent variables included in the job factors are PPE regulations in the workplace, supervision of the use of PPE, availability of PPE, and dissemination of PPE. The dependent variable in this study is the behavior of the use of PPE, which is an immediate cause factor in the substandard acts category.

The variable is tested by using Rank Spearman test to determine the correlation. The results of the study will be categorized according to the percentage of the total score of the answer from the instrument questionnaire consisting of low (if the total answer is correct <33.3%), moderate (if the total answer is correct 33.3% - 66.6%), and high (if the total answer is correct > 66.6%).

Ethics Considerations

The research was conducted after the approval of ethics committee, Faculty of Public Health, Universitas Airlangga (Reference No: 38-KEPK 2018).

RESULTS

Distribution of Perception, Knowledge, Compliance, Motivation, Regulations, Attitudes, Supervision, Availability of PPE, Dissemination, and The Use of PPE

Table I shows the majority students have high perception about PPE, knowledge about PPE, compliance about PPE, motivation to use PPE, attitude to use PPE. The availability of PPE in laboratory, dissemination of PPE, and use of PPE were high too.

Table I: Variables Distribution of Faculty of Public Health Universitas Airlangga Students in 2018

Variables	Categories		
	Low	Moderate	High
	n (%)	n (%)	n (%)
Perception	0	4 (12.9%)	27 (87.0%)
Knowledge	0	0	31 (100%)
Compliance	0	5 (16.1%)	26 (83.9%)
Motivation	0	9 (29.0%)	22 (71.0%)
Regulation	0	16 (51.6%)	15 (48.4%)
Attitudes	0	8 (25.8%)	23 (74.2%)
Supervision	0	17 (54.8%)	14 (45.1%)
Availability of PPE	0	8 (25.8%)	23 (74.2%)
Dissemination	0	8 (25.8%)	23 (74.2%)
Use of PPE	0	9 (29.0%)	22 (71.0%)

Correlation between Perception and Personal Factors

Personal factors consist of perceptions of PPE, knowledge about PPE, compliance to PPE, motivation to use PPE, and attitudes regarding PPE. Table II shows that high perception of PPE are analogous with high use of PPE (22 students [71%]). While 5 students (16.1%) reported high perception with moderate use of PPE and 4 students (12.9%) reported moderate perception with moderate use of PPE. From the Spearman Rank test, it was found that there was a strong correlation between perception and use of PPE with significance value of $(0.000) < \alpha (0.05)$. This indicates that students' perceptions correlate with their actions in using PPE.

The high level of knowledge of students translates into high use of PPE with 22 students (71%) and the moderate level of knowledge of students with high use of PPE was found in 9 students (29%). However, by using the Spearman Rank Test, it can be seen that there is no correlation between knowledge and the use of PPE. This shows that the knowledge possessed by 2018 Faculty of Public Health, Universitas Airlangga students in Epidemiology specialization is not related to the use of PPE.

22 students (71%) had high compliance with high use of PPE. While 4 students (12.9%) had a high level of

Table II. Correlation between Personal Factors and the Use of PPE

	Use of PPE Categories			Total N (%)
	Low	Moderate	High	
	n (%)	n (%)	n (%)	
Perception				
Low	0	0	0	0
Moderate	0	4 (12.9%)	0	4 (12.9%)
High	0	5 (16.1%)	22 (71.0%)	27 (87.1%)
Total	0	9 (29.0%)	22 (71.0%)	31 (100%)
Knowledge				
Low	0	0	0	0
Moderate	0	0	9 (29.0%)	9 (29%)
High	0	0	22 (71.0%)	22 (71.0%)
Total	0	0	31 (100%)	31 (100%)
Compliance				
Low	0	0	0	0
Moderate	0	5 (16.1%)	0	5 (16.1%)
High	0	4 (12.9%)	22 (71.0%)	26 (83.9%)
Total	0	9 (29.0%)	22 (71.0%)	31 (100%)
Motivation				
Low	0	0	0	0
Moderate	0	8 (25.8%)	1 (3.2%)	9 (29%)
High	0	1 (3.2%)	21 (67.7%)	22 (71.0%)
Total	0	9 (29.9%)	22 (71.0%)	31 (100%)
Attitudes				
Low	0	0	0	0
Moderate	0	7 (22.6%)	1 (3.2%)	8 (25.8%)
High	0	2 (6.5%)	21 (67.7%)	23 (74.2%)
Total	0	9 (29.0%)	22 (71.0%)	31 (100%)

compliance with moderate use of PPE and 5 other students (16.1%) had moderate levels of compliance with moderate use of PPE. In addition, after Spearman Rank test was done, it can be seen that there is a strong correlation between compliance and use of PPE with significant results $(0.000) < \alpha (0.05)$.

Most students have high motivation with high use of PPE (21 students [67.7%]). A total of 8 students (25.8%) had moderate levels of motivation with moderate use of PPE. While 1 student (3.2%) had high motivation with moderate use of PPE and 1 other student (3.2%) had moderate motivation with high use of PPE. From the Spearman Rank Test it can be seen that there is a strong correlation between motivation and use of PPE with significant results $(0.000) < \alpha (0.005)$.

There are 21 students (67.7%) with high attitudes with high use of PPE. There are 2 students (6.5%) with high attitudes with moderate use of PPE, 1 student (3.2%) with moderate attitude with high use of PPE, and 7 students (22.6 %) with moderate attitude with moderate use of PPE. From the Spearman Rank Test, it can be seen that there is a strong correlation between attitudes and use of PPE with significant results $(0.000) < \alpha (0.05)$.

Correlation between Job Factors and Use of PPE

Job factors consist of PPE regulations in the workplace, supervision of the use of PPE, availability of PPE, and dissemination of PPE. Table III shows a high level of regulation with high use of PPE practiced by 13 students (41.9%). While 9 students (29%) were in the moderate

Table III. Correlation between Job Factors with the Use of PPE

	Use of PPE Categories			Total N (%)
	Low	Moderate	High	
	n (%)	n (%)	n (%)	
PPE Regulations				
Low	0	0	0	0
Moderate	0	7 (22.6%)	9 (29.0%)	16 (51.6%)
High	0	2 (6.5%)	13 (41.9%)	15 (48.4%)
Total	0	9 (29.0%)	22 (71.0%)	31 (100%)
Supervision				
Low	0	0	0	0
Moderate	0	7 (22.6%)	10 (32.3%)	17 (54.8%)
High	0	2 (6.5%)	12 (38.7%)	14 (45.2%)
Total	0	9 (29.0%)	22 (71.0%)	31 (100%)
PPE Availability				
Low	0	0	0	0
Moderate	0	6 (19.4%)	2 (6.5%)	8 (25.8%)
High	0	3 (9.7%)	20 (64.5%)	23 (74.2%)
Total	0	9 (29.0%)	22 (71.0%)	31 (100%)
Dissemination				
Low	0	0	0	0
Moderate	0	7 (22.6%)	1 (29.0%)	8 (25.8%)
High	0	2 (6.5%)	21 (67.7%)	23 (74.2%)
Total	0	9 (29.0%)	22 (71.0%)	31 (100%)

regulation with high use of PPE, 2 students (6.5%) were in the high level of regulation with moderate use of PPE, and 7 students (22.6%) were also in the moderate level of regulation with moderate use of PPE use. From the Spearman Rank Test, it can be seen that there is no correlation between regulation and use of PPE with a significant result ($0.066 > \alpha (0.05)$).

There was a high level of supervision with high use of PPE use in 12 students (38.7%). While 10 students (32.3%) were in moderate supervision with high use of PPE, 2 students (6.5%) were in high supervision level with moderate use of PPE, and 7 students (22.6%) were in moderate level of supervision with equally moderate use of PPE. From the Spearman Rank Test, it can be seen that there is no correlation between supervision and use of PPE with significant results ($0.107 > \alpha (0.05)$).

High availability of PPE with high use PPE in as many as 20 students (64.5%). Meanwhile, the moderate availability of PPE with high use of APD was reported by 8 students (25.5%), high availability of PPE with moderate use of APD was reported by 3 students (9.7%), and the moderate availability of PPE with moderate use of PPE was reported by 6 students (19.4%). From the Spearman Rank Test, it can be seen that there is a strong correlation between the availability of PPE and the use of PPE with significant results ($0.00 < \alpha (0.05)$).

The percentage of high dissemination with high use of PPE in 21 students (67.7%). While there was a high level of dissemination with moderate use of PPE in as many as 2 students (6.5%), there was moderate dissemination with high use of APD in just 1 student (29%), and moderate dissemination with moderate use of PPE in 7 students (22.6%). From the Spearman Rank Test, it can be seen that there is a strong enough correlation between dissemination and use of PPE with significant results ($0.000 < \alpha (0.05)$).

DISCUSSION

Distribution of Perception, Knowledge, Compliance, Motivation, Regulations, Attitudes, Supervision, Availability of PPE, Dissemination, and The Use of PPE

Table 1 shows that the majority of students' perceptions of PPE are considered in the high category, with as many as 27 students (87.0%). For knowledge variable related to PPE, all students fall into the high knowledge category of 100%. In the compliance variable related to the regulation and use of PPE, the majority fall into in the high compliance category with 26 students (83.9%). 22 students (71.0%) fall into the high category when it comes to the motivation related to PPE in the laboratory. In the regulatory variable related to PPE, 16 students (51.6%) are in the moderate category. For attitude variable related to PPE in the laboratory, the attitude of the majority of students are in the high category, amounting 23 students (74.2%). However,

PPE supervision variable in the laboratory is in moderate category with 17 students (54.8%). Other studied variable, such as the availability of PPE in the laboratory, according to 23 students (74.2%), is in the high category. According to 23 students (74.2%), the dissemination of PPE in the laboratory is considered high and the use of PPE among the students is also in the high category, with 22 students (71.0%).

Correlation between Perception and Use of PPE

Perception is the brain's ability to translate stimuli or processes in translating stimuli that enter the five human senses (7). Perceptions come from interpretations of things that are sensed or perceived by humans (8). Perception involves interpreting sensory information. From sensory events that have been captured, they are then processed according to the knowledge that humans have, thus producing meaning for the sensory experiences that they have.

In relation to the use of PPE, the brain is informed that there are dangers presenting in the Epidemiology laboratory, giving rise to perception of need to protect themselves during activities in the laboratory by using Personal Protective Equipment (PPE). The perception of the sensory experience process felt combined with knowledge possessed will protect and make students always be careful when working in the laboratory.

In the theory of the ILCI Loss Causation Model, perceptions are included in the basic causes that lie in personal factors that can influence the likelihood of occupational accidents. Perception is classified as a personal factor because the emergence of this perception comes from the individual and does not originate from factors outside the individual, although this perception can be influenced by the environment.

This study shows a relationship between perceptions and the use of PPE. The higher the perception of students, the higher the level of use of PPE when working in the laboratory. The results of this study are not in line with the research conducted by Laranova in 2018 which stated that there is no correlation between perceptions and the use of PPE (9).

Correlation between Knowledge and Use of PPE

Knowledge, is the result of the human senses (eyes, nose, ears) or the results of one's knowing from the senses they have towards an object (10). Knowledge can be obtained from education received, mass media or information obtained, existing social and cultural, environment, experience, and age. Knowledge will encourage someone to do an action that he thinks is right, in accordance with the sense of knowledge he has. A person's knowledge is considered as a personal factor of the ILCI Loss Causation Model theory, because it comes from personal feelings and experiences that can influence a person's decisions and actions.

In this study, it was found that knowledge had no correlation with the use of PPE in students while working in epidemiology laboratories. This result is in line with the research conducted by Alhayati, et al. (2014) which stated that there is no correlation between knowledge and use of PPE in the laboratory (11). However, the results of this study are not in line with previous research, conducted by Nizar, et al. (2016) which stated that one's knowledge is related to the use of personal protective equipment in the laboratory (12).

Correlation between Compliance and Use of PPE

Obedience or compliance is an attitude that will emerge as a form of one's response on the rules that must be obeyed or complied (13). This attitude will appear personally if there is a stimulus that demands an individual reaction. Many things can affect an individual's compliance, such as age, education, work, accommodation, and family support (14).

The compliance that emerges in each individual is classified as a personal factor in the ILCI Loss Causation Model theory. This is because the level of compliance differs between one individual to another individual, because, as already stated, compliance is a response toward a stimulus that occurs personally. In ILCI theory, individual factors or personal factors are included in the basic causes of occupational accidents, so it is important to pay attention to personal factors exhibited by individuals in the workplace.

The results of the research conducted on students in the Epidemiology laboratory showed that there was a correlation between compliance with the use of PPE. The higher the compliance, the higher the level of use of PPE.

Correlation between Motivation and Use of PPE

Motivation is a desire from within an individual to do something or as a form of encouragement to achieve something that comes from self-stimulation (15). Motivation possessed by an individual can come from within himself and also from environmental (external) influences, thereby, motivation will differ between one individual and another individual.

This difference in motivation between individuals makes it categorized as a personal factor in ILCI Loss Causation Model theory. From this study, the motivation to use PPE between one student and another student could be different, because similar to compliance, motivation also occurs due to stimulation as an individual response.

The research conducted on 31 Epidemiology specialization students showed a correlation between motivation and the use of PPE. The higher the motivation of students, the higher the use of PPE practiced by students. The results of this study are not in line with previous research conducted by Putri (2017) which

stated that there is no correlation between motivation and the use of PPE (16).

Correlation between Attitudes and Use of PPE

Attitude is a form of one's readiness in acting to deal with something (18). Attitude is a one's reaction or response to a stimulus that comes from the object they receive (19). An individual's attitude can manifest negatively or positively, depending on the response or reaction produced by the body to the object it receives. This response can be influenced by individual views and feelings towards an object (20).

In relation to the theory of ILCI Loss Causation Model, attitude is a personal factor that comes from within the individual and each individual will express an attitude as a different response. In this study the attitude was explained as the body response of students working in the laboratory. The existence of a stimulus from the object, that is the source of danger produces the body's response to protect itself by using PPE that has been provided in the laboratory. However, a negative attitude will ignore the stimulus so that students will not wear PPE to protect themselves while in an epidemiological laboratory.

From this study, it was known that there was a correlation between attitudes and use of PPE. The higher the attitude, the higher the use of PPE in epidemiology laboratories. This is in line with the research conducted by Putri (2017), which stated that there is a relationship between attitudes and use of PPE (16).

Correlation between Regulation and Use of PPE

Regulations are guidelines, rules and regulations made for regulating purposes (17). According to this definition, the existence of regulations is very important to define the things that should and should not be done while in laboratories as a workplace because each workplace must have its own source of danger (1). In the ILCI Loss Causation Model theory, the existence of regulations is regarded as job factors in basic causes which ultimately can lead to occupational accidents. Regulations are regarded as a job factor because their existence is regulated by a supporting institution, not from within an individual, thereby, institutions and agencies really need to pay attention to the regulations that will be made. In this study, the regulations for students while working in a laboratory is regulated by the Faculty of Public Health. If the presence of this regulation is not strong enough to ensure students' use of PPE while in the laboratory, there is a high probability of a work accident.

Correlation between Supervision and Use of PPE

Supervision, is a process of monitoring of an activity carried out continuously to see its compliance with the rules that have been set and to make improvements if a violation occurs (21). In the theory of the ILCI Loss Causation Model, supervision is a straightforward aspect

of job factors because the presence or absence of this supervision depends on the institution that houses it. Supervision needs to be done so that students who are working in the laboratory can comply with the regulations that have been set, by wearing a complete set of PPE.

However, this study shows that supervision does not affect the use of PPE. In other words, the presence or the absence of supervision by an agency will not affect the use of PPE in epidemiological laboratories. A similar study was conducted by Harlan (2014) which showed that there was no correlation between supervision and the use of PPE (22). The research also explained that the use of PPE is getting better if laboratory staff are not aware of any supervision.

Correlation between Availability and Use of PPE

Availability is one of the supporting factors that can influence a person in behaving (19). According to the Minister of Health Regulation Number 411 of 2011, it is explained that PPE must be available in sufficient quantities according to the number of users of the PPE (23). PPE that must be in the laboratory are laboratory coats, gloves and masks. In the ILCI Loss Causation Model theory, the availability of PPE is regarded as a job factor because its availability depends on the institution that houses it. Availability of PPE can cause problems if the procurement is not met.

The results of this study state that there is a correlation between the availability of PPE and the use of PPE in epidemiological laboratories. The higher the availability of PPE provided by related institutions, the higher the use of PPE for students working in epidemiology laboratories. The results of this study are not in line with previous studies conducted by Putri (2017) which explained that the availability of PPE was not related to the use of PPE in the laboratory (16).

Correlation between Dissemination and Use of PPE

Dissemination is a process to study habits and ways of life, thereby dissemination can be interpreted as a learning process experienced by someone to adapt in their environment in order to participate optimally (24). Dissemination in the laboratory needs to be done because the source of the danger can also be found in the laboratory. In the ILCI Loss Causation Model theory, dissemination is regarded as a job factor that must be considered by the institution. The dissemination of sources of danger in the workplace will increase the awareness of students when doing work in the laboratory. Dissemination of PPE also needs to be done so that students know how to protect themselves.

The results of this study prove that there is a correlation between the familiarization with the use of PPE on students while working in the laboratory. The higher the familiarization conducted by the institution, the higher

the level of use of PPE in students when in the laboratory. However, this study is not in line with the research conducted by Harlan (2014) which stated that the more respondents think that there is no familiarization, the better the behavior of the use of PPE is applied (22).

CONCLUSION

Based on all independent variables studied, some independent variables that showed an association with the use of PPE included student perceptions of PPE, compliance to the use of PPE, motivation regarding the use of PPE, attitudes in the use of PPE, availability of PPE in the laboratory, and socialization of the use of PPE. The independent variable needs to be considered so that the application of interventions to maximize the use of PPE in epidemiology laboratories can be carried out correctly. While independent variables that have no association with the use of PPE are knowledge to use of PPE, regulation regarding the use of PPE, and supervision to use of PPE in laboratory.

ACKNOWLEDGEMENTS

The authors thank the Dean of Faculty of Public Health Universitas Airlangga, Prof. Dr. Tri Martiana, dr., M.S., for her permission to publish this article. We would also like to thank the participants involved this study.

REFERENCES

1. Suma'mur. Industrial Hygiene and Occupational Health. Jakarta: CV Sagung Seto; 2009.
2. Regulation of the Minister of State for the Use of State Apparatus and Bureaucratic Reform Number 03 of 2010. Functional Position of Educational Laboratory Staff and Credit Numbers. Jakarta
3. Suma'mur PK. Industrial Hygiene and Occupational Health. Jakarta: PT Toko Gunung Agung; 1996.
4. Law Number 1 Year 1970. Work Safety. Jakarta.
5. Regulation of the Minister of Manpower and Transmigration of the Republic of Indonesia Number 8 Year 2010. Personal Protective Equipment. July 6, 2010. Jakarta.
6. Notoatmodjo S. Health Research Methodology. Revised Edition. Jakarta: Rineka Cipta; 2012.
7. Sugihartono, et al. Educational Psychology. Yogyakarta: UNY Press; 2007.
8. Solso M, Maclin. Cognitive Psychology. 8th ed. Jakarta: Erlangga; 2008.
9. Laranova A, Afriandi I, Pratiwi YS. The Perception of Health Workers on the Use of Personal Protective Equipment and Accidents due to Work in One Hospital in the City of Bandung. 2018;3(4).
10. Notoatmodjo S. Health Promotion and Health Behavior. Jakarta: Rineka Cipta; 2012.
11. Alhayati DF, Tuti R, Fatmawati. Relationship between Knowledge and Attitudes of Clinical Pathology Laboratory Officers in Using Personal

- Protective Equipment at Arifin Achmad Hospital in Riau Province. 2014;1(2).
12. Nizar MF, Tuna H, Sumaningrum ND. Relationship of Characteristics of Workers with Compliance in the Use of Personal Protective Equipment (PPE) at Clinical Laboratory Officers at Kediri City Baptist Hospital. 2016;1(1).
 13. Azwar S. Human Attitude Theory and its Measurement. 2nd ed. Yogyakarta: Pustaka Pelajar; 2002.
 14. Niven N. Health Psychology: Introduction to Nurses and Professionals. Jakarta: EGC; 2008.
 15. Moekijat. Basics of Motivation. Jakarta: Pionis Jaya; 2002.
 16. Putri KDS. Analysis of Factors Associated with Compliance Using Personal Protective Equipment. 2017;6(3):312-322.
 17. KBBI. Kamus Besar Bahasa Indonesia (KBBI) [Internet]. Ministry of Education and Culture: Language Development Agency; 2018 [cited 2018 December 13]. Available from: <https://kbbi.web.id/atur>.
 18. Sarwono S. Adolescent Psychology. Jakarta: PT Raja Gravido Persada; 2003.
 19. Notoatmodjo S. Health Education and Behavior. Jakarta: Rineka Cipta; 2003.
 20. Maramis WF. Behavioral Sciences in Health Services. Surabaya: Airlangga University Press; 2006.
 21. Notoatmodjo S. Health Promotion and Behavioral Sciences. Jakarta: Rineka Cipta; 2007.
 22. Harlan AN, Paskarini I. Factors Relating to the Behavior of Using PPE in Surabaya PHC Hospital Laboratory Officers. 2014;1(1):107-119.
 23. Regulation of the Minister of Health of the Republic of Indonesia Number 411 Year 2010. Clinical Laboratory. March 25, 2010. Jakarta
 24. Chaplin JP. Complete Dictionary of Psychology. 6th prints. Translator: Kartiko, K. Jakarta: PT Raja Grafika Persada; 2002.