

Relationship of Knowledge and Attitude of Nurses With Compliance With Standard Application of Precautions In Hospital

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ABSTRACT

The highest risk of occupational health hazards occurs in health care workers. Several studies explained that nurses' knowledge and attitudes were related to compliance with the application of standard precautions in hospitals. This study aimed to examine studies that explain the relationship between knowledge and attitudes of nurses with compliance with standard application of precautions in hospitals. This study used meta-analysis. Articles that were analyzed used cross-sectional design. The data sources used Garuda Portal, Google Scholar, PubMed, DOAJ and Science Direct published in last 5 years. Pooled Odds Ratio (pOR) was calculated using fixed-effect and random-effect model. Data were analyzed by Review Manager 5.4. Knowledge variable used 9 studies and attitude variable used 7 studies. The results showed that there was a relationship between nurses' knowledge and compliance with the application of standard precautions in hospitals with p value < 0,0001 and a pooled odds ratio value of 4,69 (95% CI = 2,52 – 8,74). The relationship between nurses' attitudes and adherence to standard precautions in hospitals with p value < 0,03 and pooled odds ratio value of 2.34 (95% CI = 1,11 – 4,91). The conclusion was there was relationship between knowledge and attitudes of nurses with compliance with the application of standard precautions in hospitals.

Keywords: Knowledge, attitude, nurse, compliance

INTRODUCTION

Efforts to protect workers' health and safety are contained in Law No. 36 of 2009 CHAPTER XII concerning Occupational Health Article 164 paragraph that occupational health efforts are aimed at protecting workers to live healthy and productive lives free from health problems and adverse effects resulting from a series of activities. in work. The highest potential risk of occupational health hazards is in health care workers with WHO data in 2002 there were 2 million (5,71%) health care workers experiencing viral infections of infectious diseases in health care facilities. The risk of workplace accidents occurring in health care facilities is due to non-compliance by health care providers, including nurses, in applying standard precautions in hospitals.¹

Standard precautions are the main precautionary strategies and basic protective measures for controlling the prevention of the

spread of infectious disease infections that are regulated according to the isolation precautions guidelines by the CDC and HICPAC thereby reducing the risk of occupational health hazards and ensuring safety for health care providers, patients and visitors according to Minister of Health Regulations of Indonesia number 27 of 2017 namely: hand hygiene, Personal Protective Equipment (PPE), decontamination of patient care equipment, environmental control, waste management, linen management, health protection of officers, patient placement, respiratory hygiene/cough etiquette, safe injection practices, and safe practices for lumbar puncture.

Based on Lawrence Green's and Gibson's theory, knowledge and attitude are the factors can cause compliance a nurse touse standard application of precautions in hospital.

The results of the study by analyzing several literatures in the form of research journals regarding the relationship between nurses' knowledge and compliance with the application of standard precautions in hospitals. The results of Anisa Fadila's research et al regarding the relationship between nurses' knowledge and adherence to standard precautions in hospitals with a p value of 0.005,¹ this is supported by the research of Wasiu Adebimpe et al that there is a relationship between nurses' knowledge and the implementation of standard precautions in hospitals with a p value of 0.039,² research by Dewi Siregar et al there is a relationship between the knowledge of nurses and the implementation of standard precautions in hospitals with a p value of 0.000,³ the research of Cristie Wuisan et al there is a relationship between the knowledge of nurses and the implementation of standard precautions with a p value of 0.002,⁴ the research of Tiurmaida Simandalahi et al there is a relationship between nurses' knowledge and the implementation of standard precautions in hospitals with a p value of 0.002,⁵ Kemal Jemal's research there is a relationship between nurses' knowledge and the implementation of standard precautions in hospitals with a p value of 0.001.⁶ and research by Kartika et al there is a relationship between nurses' knowledge and the implementation of standard precautions in hospitals with a p value of 0.003.⁷ However, this is contrary to the research of Kartika et al⁷ that there is no relationship between the knowledge of nurses and the implementation of standard precautions in hospitals with a p value of 0.139 and Sofiana's research that there is no relationship between knowledge of nurses and compliance with precaution standards with a p value of 0.124.⁸

The results of the study by analyzing several literatures in the form of research journals regarding the relationship between nurses' attitudes and compliance with the application of standard precautions in hospitals. Kemal Jemal's research that there is a relationship between nurses' attitudes and the implementation of precautionary standards in hospitals with a p value of 0.001 this is supported by the research of Wasiu et al there is a relationship between nurses' attitudes and the implementation of precautionary standards in hospitals with a p value of 0.007,⁶ Tiurmaida Simandalahi's research there is a relationship between attitudes and the implementation of universal precautions in hospitals with a p value

of 0.014,⁵ and Sofiana's research there is a relationship between attitude and the implementation of standard precautions in hospitals with a p value of 0.000.⁸ However, this is contrary to the research of Anisa Fadilla et al that there is no relationship between nurses' attitudes and compliance with the application of precautionary standards with p value of 0.619, Kartika et al's research⁷ that there is no relationship between nurses' attitudes and compliance with the precautionary standard application p value 1.00.¹

Based on the facts, the research gap related to the relationship between knowledge and attitudes of nurses with compliance with the application of standard precautions in this hospital makes researchers interested in mapping research results through meta-analysis. This study aimed to examine studies that explain the relationship between knowledge and attitudes of nurses with compliance with standard application of precautions in hospitals.

METHOD

This study uses a meta-analysis research design with a correlation meta-analysis research design, which focuses on statistical analysis. Search and literature selection process in research in the form of Flow diagrams Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA). Analysis of the quality of the data in the study using the Duffy's Research Appraisal Checklist Approach table with the aim of grouping similar extracted data according to the results measured to answer the research objectives. The data synthesis in the research is presented in tabular form using SPIDER (Sample, Phenomenon of Interest, Design, Evaluation, Research type) with the process of grouping similar data that has been extracted to answer the research objectives.

Scientific literature that meets the inclusion criteria is then collected and a journal summary is made including the name of the researcher, the year the journal was published, the research title, the method and a summary of the results or findings. The summary of the research journals is entered into a table sorted alphabetically and the year the journal was published. The flow of the selection of articles is displayed in the form of a chart and then presented in the form of a table using SPIDER. Articles that meet these requirements are then meta-analyzed using the Statistical Review Manager (RevMan) 5.4 aplikasi application.

RESULT AND DISCUSSION

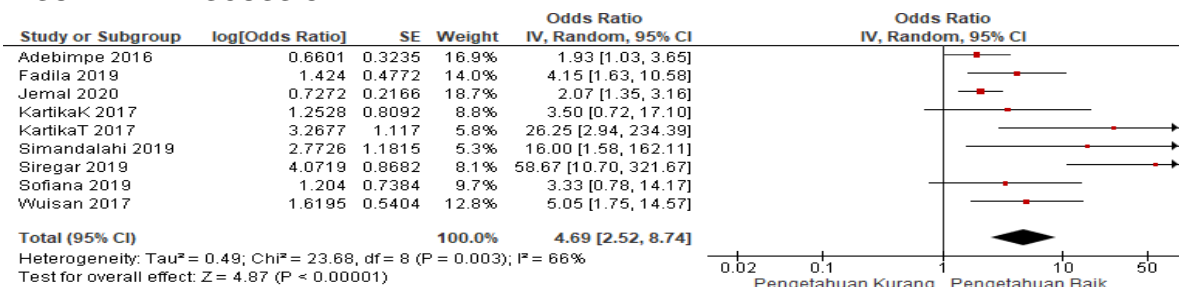


Figure 1. Forest plot relationship between nurse knowledge and compliance with standard precautions

Based on Figure 1 of 9 articles analyzed that good knowledge of nurses will increase adherence to the application of standard precautions by 4,69 times higher than nurses who lack knowledge, and statistically significant (OR=4,69; 95% CI=2, 52 – 8,74; p = <0,00001). The heterogeneity of the research data shows I² = 66%, thus the Random Effect Model is used in the data analysis in this forest plot.

The results of the meta-analysis of the heterogeneity test of the relationship between nurses' attitudes and compliance with the application of standard precautions in hospitals using the Random Effect Model analysis model obtained a heterogeneity test with a value of I² = 67% (high heterogeneity) as follows:

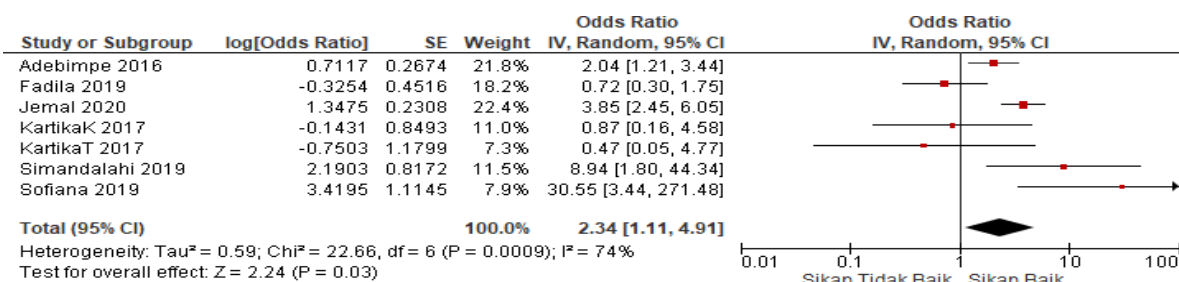


Figure 2. Forest plot relationship of nurses' attitudes with compliance with the implementation of standard precautions (total)

Based on results, articles analyzed that a good nurse attitude will increase the application of standard precautions by 2.34 times higher than a bad nurse attitude, and statistically significant (OR = 2,34; 95% CI = 1, 11 – 4,91; p= 0,03). The heterogeneity of the research data shows I² = 74%, thus the Random Effect Model is used in the data analysis in this forest plot.

Research Variation and Heterogeneity

The results of the analysis show different values of variance and weights. The theory expressed by Dahlan that the weight in a study is directly proportional to the number of research subjects (research sample).⁹ Research with 100 subjects will have a greater weight than research with 50 subjects. In addition to the number of subjects, the weight is also influenced by variations in the data. The weights are inversely proportional to the variation of the data. Research with more varied

data will have a smaller weight than research with smaller variations.

Objectively, determining the role of variation between studies was tested by heterogeneity test. If the results show p>0,05 then it is declared homogeneous, meaning that the variation between studies does not play a role in the total variation, on the contrary if the heterogeneity test results show p<0,05, it is declared heterogeneous, which means that the variation between studies has a role in the total variation. In addition to the p value, the data variation also looks at the value of the variation between studies (I²). If there is a result of 50% below it can be categorized as homogeneous variation and if it is above 50% it is considered heterogeneous. The null hypothesis is rejected if the p value in the heterogeneity test is greater than 0,05.⁹

The results of the heterogeneity test on 7 research studies that stated the relationship between nurses' knowledge and adherence to the application of standard precautions in

hospitals was $I^2 = 75\%$ and p value = 0,0006 expressed heterogeneity with a high enough level that using random effect models in measuring the combined effect of the data in the data input model in the RevMan 5.4 computer application. The results obtained are $pOR = 5,34$ with 95% confidence interval: 2,52 – 11,34. The combined effect also produces a Z value of 4,36 and a p value of < 0,0001. Statistically, the combined effect is significant if the p value <0,05 and this means that the null hypothesis is rejected, in other words there is a relationship between nurses who have good knowledge and compliance with the application of standard precautions with the tendency of nurses who have good knowledge of standard precautions to increase the likelihood 5,34 times to comply with the application of standard precautions in hospitals compared to nurses who have poor knowledge. The variation of the seven research studies has an effect on the total variation after the combined effect. These seven studies have characteristics that are not the same with variations in the number of samples whose size does not match the population, so that in the end they have an effect after the merger.

While the results of heterogeneity tests on 2 research studies which stated that there was no relationship between nurses' knowledge and compliance with the application of standard precautions showed a p value = 0,02 and an I^2 value (variation between studies) of 0% was declared homogeneous so that using fixed effect models in measuring the combined effect from the data in the data input model in the RevMan 5.4 computer application. The results obtained are $pOR = 3,41$ with 95% confidence intervals from 1,17 – 9,93. The combined effect also produces a Z value of 2,25 and a p value of 0,02. Statistically, the combined effect is significant if the p value <0,05 and this means that the null hypothesis is rejected, in other words there is a relationship between nurses who have poor knowledge and compliance with the application of standard precautions in hospitals with a tendency for nurses to have poor knowledge standard precautions increase the risk 2,25 times to comply with the application of standard precautions in hospitals compared to nurses who have good knowledge. The results of the heterogeneity test on 4 research studies that state the relationship between nurses' attitudes and compliance with the application of standard precautions in hospitals is $I^2 = 67\%$ and p value = 0,03 is expressed heterogeneity with a high enough level so that using random effect models in measuring the combined effect of the data in the data input model in the RevMan 5.4

computer application. The results obtained are $pOR = 4,17$ with 95% confidence interval: 1,98 – 8,78. The combined effect also produces a Z value of 3,75 and a p value of 0,0002. Statistically, the combined effect is significant if the p value <0,05 and this means that the null hypothesis is rejected, in other words, there is a relationship between nurses who have good attitudes and adherence to standard precautions and the tendency of nurses who have good attitudes about standard precautions to increase the likelihood 4,17 times to comply with the application of standard precautions in hospitals compared to nurses who have a bad attitude. The variation of the four research studies has an effect on the total variation after the combined effect is carried out. These four studies have characteristics that are not the same with variations in the number of samples whose size does not match the population, so that in the end they have an effect after merging.

While the results of heterogeneity tests on 3 research studies which stated that there was no relationship between nurses' attitudes and adherence to the application of standard precautions showed a p value = 0,92 and an I^2 value (variation between studies) of 0% was declared homogeneous, thus using fixed effect models in measuring effects combination of data in the data input model in the RevMan 5.4 computer application. The result obtained is $pOR = 0,72$ with 95% confidence interval 0,34 – 1,50. The combined effect also produces a Z value of 0,88 and a p value of 0,38. Statistically, the combined effect is significant if the p value <0,05 and this means that the null hypothesis is accepted, in other words there is no relationship between nurses who have bad attitudes and non-compliance with the application of standard precautions in hospitals. Although there is no relationship, nurses who have a bad attitude have a risk or tendency of non-compliance with the application of standard precautions by 0,72 times compared to nurses who have a good attitude.

Analysis of research results

This study is the first meta-analysis study that analyzes the relationship between nurses' knowledge and adherence to standard precautions in hospitals. Many studies have analyzed the knowledge of nurses associated with compliance with the application of standard precautions in hospitals. For this reason, statistical analysis was carried out using meta-analysis to prove the quality of each study so that new quantitative data were obtained with a larger sample size and more accurate conclusions could be drawn.

The results of journal searches from various sources ultimately resulted in 47 studies and 10 studies that met the inclusion criteria which could be analyzed into meta-analysis with RevMan 5.4 application software. The nine nurse knowledge studies were analyzed involving 822 research samples from the total number of samples in each research study. The results of the analysis for 7 research studies which stated that there was a relationship between nurses' knowledge and adherence to the application of standard precautions after a combined analysis showed that the results had a relationship with moderate heterogeneity of data variation, while 2 studies which stated that there was no relationship between knowledge after a combined analysis still showed no relationship weak data heterogeneity.

For 7 research studies which state that there is a relationship between nurses' knowledge and compliance with the application of standard precautions, the total sample is 746 samples. The results of the combined effect concluded that nurses' knowledge was related to compliance with the application of standard precautions with $p < 0,0001$ and $pOR = 5,34$ and a 95% confidence interval (2,52 – 11,34) on the forest plot. It can be concluded that nurses who have good knowledge of standard precautions have a tendency to increase the risk 5,34 times to comply with the application of standard precautions in hospitals compared to nurses who have poor knowledge of standard precautions.

For 2 research studies which stated that there was no relationship between nurses' knowledge and adherence to the application of standard precautions in hospitals, the total sample was 46 samples. The combined effect results concluded that good nurse knowledge was associated with adherence to standard precautions in hospitals with p value = 0,02 and $pOR = 3,41$ and a 95% confidence interval (1,17 – 9,93) in the forest plot. Although the two research studies each stated that there was no relationship, after a combined analysis, the results showed a relationship with a p value $< 0,05$, namely $p = 0,02$. It can be concluded that nurses who have good knowledge of standard precautions have a tendency to increase the risk of 3,41 times to comply with the application of standard precautions in hospitals compared to nurses who have less knowledge of standard precautions.

From the results of the funnel plot, there is a publication bias which is indicated by the asymmetry of the left and right plots where all 2 plots are located in the vertical center line. The standard error is between 0,7 – 0,8. Publication bias can be seen from the imbalance in the

distance between studies from both the right and left sides of the funnel plot. The seven nurse attitude studies were analyzed involving 601 research samples from the total number of samples in each research study. The results of the analysis for 4 research studies which stated that there was a relationship between nurses' attitudes and adherence to the application of standard precautions after a combined analysis, while the 3 studies which stated that there was no relationship between attitudes after a combined analysis showed that there was no relationship between nurses' attitudes and adherence to the application of standard precautions. For 4 research studies which state that there is a relationship between nurses' attitudes and compliance with the application of standard precautions, the total sample is 511 samples. The results of the combined effect concluded that nurses' attitudes were related to compliance with the application of standard precautions with p value = 0,0002 and $pOR = 4,17$ and 95% confidence interval (1,98 – 8,78) on the forest plot. It can be concluded that nurses who have a good attitude about standard precautions have a tendency to increase the risk 4,17 times to comply with the application of standard precautions in hospitals compared to nurses who have less attitudes.

For 3 research studies which stated that there was no relationship between nurses' attitudes and adherence to the application of standard precautions in hospitals, the total sample was 90 samples. The results of the combined effect concluded that the attitude of nurses who were not good was related to compliance with the application of standard precautions in hospitals with p value = 0,38 and $pOR = 0,72$; and 95% confidence interval (0,34 – 1,50) on the forest plot. Although the three research studies each stated that there was no relationship, after a combined analysis, the results showed that there was no relationship with the value of $p > 0,05$, namely $p = 0,38$. It can be concluded that there is no relationship between nurses' attitudes and adherence to standard precautions in hospitals. Although there is no relationship, nurses who have a bad attitude reduce the risk or have a tendency to not comply with the application of standard precautions by 0,72 times compared to nurses who have a good attitude.

Comparison of meta-analysis results

In five studies which state that there is a relationship between nurses' knowledge and compliance with the application of standard precautions, it can be seen that the largest P -OR number is owned by Sri Dewi's research³ et al with a value of 58,67 which means that nurse

respondents who have knowledge have 58 times the opportunity to apply compliance with the application of standard precautions in hospitals. While the smallest P-OR value which states that there is a relationship between nurses' knowledge and compliance with the application of standard precautions is a study by Kemal Jemal et al⁶ with a value of 2,25 which means that nurses who do not have knowledge of standard precautions have a 2,25 times greater chance than nurses who have knowledge of standard precautions. After merging in the meta-analysis test, research studies which state that there is a relationship between nurses' knowledge and compliance with the application of standard precautions have p value = <0,00001 and a pooled odds ratio value of 4,69 (95% CI 2,52 – 8,74) which shows that there is a relationship between nurses' knowledge and compliance with the application of standard precautions with a moderate level of relationship where nurses who have knowledge have a 4,69 times greater chance of complying with the application of standard precautions than nurses who do not have knowledge..

The majority of research studies that show that there is a relationship between nurses' knowledge and compliance with standard precautions are supported by the opinion put forward by Notoatmodjo (2011) that knowledge can be obtained in formal and informal ways. Experience is one factor in the formation of knowledge. The learning experience in work that is developed provides professional knowledge and skills as well as learning experiences that will be able to develop decision-making abilities which are a manifestation of the integration of scientific and ethical reasoning that departs from real problems in the nursing field. Education is also a supporting factor. Knowledge can be measured by levels, namely low knowledge levels and high knowledge levels.⁵

This is also in line with Sukardi (2014) in Siregar (2019) that knowledge is the result of sensing a certain object will greatly affect a person's behavior in making decisions and acting appropriately, in their actions.³

According to the researcher's analysis, more than half of the respondents who have high knowledge are because most nurses already have good knowledge obtained from training and sharing knowledge with colleagues and superiors. Meanwhile, there are nurses who have low knowledge due to education that is still D3 Nursing accompanied by lack of experience in training on standard precautions/universal precaution and also lack of knowledge and information from colleagues.

The results of this study are in accordance with the theory issued by Green et.al (2012) in Kartika (2017) and the self-protection model in the workplace (McGovern et.al 2000) which states that knowledge is one of the factors related to one's health behavior, in this case one's compliance with the application of universal precautions in the workplace.⁷

Two research studies, namely the research conducted by Kartika et al⁷ (2017) with p value = 0,139 and P-OR = 3,50 and Sofiana (2019) with p value = 0,124 which has contradictory results which state that there is no statistically significant relationship between nurses' knowledge and adherence to standard precautions in hospitals.⁸ After the three research studies were included in the RevMan 5.4 meta-analysis statistical test, the combined statistical results showed that there was still a relationship with the p value <0,05, namely p = 0,02 and the pooled odds ratio value of 3,41 (95% CI 1,17 – 9,93), so it can be concluded that nurses who have less knowledge about standard precautions increase the risk or tend to be 3,41 times more likely to comply with the application of standard precautions in hospitals compared to nurses who have good knowledge of standard precautions.

Research by Kartika et al (2017) stating that there is no relationship between nurses' knowledge and adherence to standard precautions in hospitals, highlighting the power of the study.⁷ If viewed from the CI value, it shows a wide precision, this is probably due to the small number of samples, so the research power is low (0%). Where the number of samples in this study was only 30 samples. The difference in the results of this study is not in line with both theory and previous research, it can be caused because even though nurses have good knowledge, there are other factors that affect compliance such as workload, level of education, so that they have not received complete information about general precautions, long working hours. related to lack of experience in applying general precautions.¹⁰ According to Notoatmodjo (2011) in Tiurmaida (2019) nurses with low knowledge but implementing universal precautions, this is because nurses get support from colleagues or superiors to do universal precautions and nurses also see their colleagues doing universal precautions so they follow what their colleagues do. Lack of knowledge about implementing universal precautions so that the desire to do universal precautions for patients is hampered because of fear of their ignorance about the advantages and disadvantages of implementing universal precautions for themselves and patients.⁵

Respondents who have a high level of knowledge and implement universal precaution are caused by respondents who have a high level of knowledge obtained from education and training as well as sharing knowledge with colleagues and from superiors so that the nurse understands and understands the importance of implementing universal precaution for nurses and patients. Respondents who have high knowledge but do not implement universal precaution according to the researcher, this is influenced by the nurse's indifference to the implementation of universal precaution in their patients.

According to Simamora in Sulistiyani and Rosidah (2009) in Tiurmaida (2019) that knowledge gained from training and education is an important part of staff or organizational development. The training aims to improve employee performance, so that there is a process of updating employee skills in line with technological advances. In this case the training on the application of universal precautions when providing nursing care to patients is aimed at increasing the competence of nurses which includes determinants of abilities and skills in order to prevent the transmission of infection.⁵

Inconsistent research results from the relationship of knowledge with compliance with the application of standard precautions apart from the weight and power of the research which are not yet ideal, also relate to differences in factors that influence behavior. The results of this meta-analysis are in accordance with the theory of Lawrence Green in Notoatmodjo (2012) who has developed an approach model used to make health planning known as the PRECEDE framework which stands for Predisposing, Reinforcing, and enabling causes in educational diagnosis and evaluation. In this framework, behavioral factors are influenced by several factors, namely predisposing factors, enabling factors and reinforcing factors.⁵ Pengetahuan yang termasuk kedalam predisposing factors merupakan salah satu domain yang penting dalam membentuk perilaku seseorang. Walaupun pengetahuan tidak berdiri sendiri namun pengetahuan merupakan salah satu faktor yang perlu diperhatikan dalam mengarahkan perilaku terutama perilaku dalam memberikan pelayanan kesehatan.

Meta-analysis of the factors most related to compliance with the application of standard precautions in hospitals

The meta-analysis of the factors most related to compliance with the application of

standard precautions in hospital results is described in Table 1.

Research variation and heterogeneity

The results of the heterogeneity test on 4 research studies which stated that there was a relationship between nurses' attitudes and adherence to the application of standard precautions in hospitals was $I^2 = 67\%$ and p value = 0,03 expressed heterogeneity with a moderately high level. The variation of the four research studies has an effect on the total variation after the combined effect is carried out. These four studies have different characteristics with variations in the number of samples whose size is the same as the population, so that in the end they have an effect after merging.

The test results show a fairly high heterogeneity so that using random effect models in measuring the combined effect of the data in the data input model in the Revman 5.4 computer application. The results obtained are p OR = 4,17 (95% CI 1,98 – 8,78). The combined effect also produces a Z value of 3,75 and a p value of 0,000002. Statistically, the combined effect is significant if the p value <0,05 and this means that the null hypothesis is rejected, in other words, there is a relationship between nurses who have an attitude with compliance with the application of standard precautions and the tendency of nurses who have standard precautions to increase the risk 4,17 times to comply with the application of standard precautions in hospitals compared to nurses who do not have standard precautions.

Analysis of research results

This study is the first meta-analysis study that analyzes the relationship between nurses' attitudes and adherence to standard precautions in hospitals. Many studies have analyzed the attitudes of nurses associated with compliance with the application of standard precautions in hospitals. For this reason, statistical analysis was carried out using meta-analysis to prove the quality of each study so that new quantitative data were obtained with a larger sample size and more accurate conclusions could be drawn.

The results of data analysis from 4 research articles stated that there was a relationship between nurses' attitudes and adherence to the application of standard precautions in hospitals and analyzed using a random effect model. The results of the heterogeneity test showed that the study variation was heterogeneous, with a p value of 0,05 smaller than the heterogeneity test, namely $p = 0,03$ and the value of variation between studies (I^2) of 67%. The results of the

analysis of the data displayed on the forest plot show that there is a significant relationship between the attitude of nurses and compliance with the application of standard precautions in hospitals with a p value $<0,05$, namely $p = 0,0002$ and a pooled odds ratio value of 4,17 (95% CI 1,98 – 8,78), so it can be concluded that nurses who are positive or support standard precautions increase the risk or tend to be 4,17 times more likely to comply with the application of standard precautions in hospitals compared to nurses who do not have positive attitudes or support standard precautions.

In the combined funnel plot, it can be seen that the plots are symmetrical on the right and left of the vertical line where the number of plots on the left is 2 plots on the left and 2 plots on the right and no plot touches on the vertical line. According to Notoadmodjo (2011) in Tiurmaida (2019) Attitude is a difficult condition to measure because it is very personal, is perceived differently by everyone and is very secretive. God created man with all the advantages and disadvantages of both male and female. Attitude is not yet an action or activity but is a disposition of action or behavior. That attitude is still a closed reaction, not an open reaction or open behavior.⁵

According to Tiurmaida (2019) nurses who have the attitude and perception that the implementation of universal precautions is very important to protect health workers, patients and staff from exposure to infectious objects during treatment procedures. So that nurses are really motivated to carry out universal precautions properly for their patients. While nurses who have a negative attitude because they still have the wrong perception about the importance of universal precaution for their patients so that it will lead to an attitude that is less concerned about the implementation of universal precaution.⁵

According to the Director General of P2 MPL (2010) in (Krisnata, 2016) in Tiurmaida (2019) The resources needed by health workers in implementing infection prevention and control in the workplace are the availability of hand washing facilities and infrastructure, Personal Protective Equipment (PPE), disinfectant and sterilization equipment, as well as equipment for sharp object management and waste disposal, both medical and non-medical. Most of the facilities and infrastructure in the implementation of universal precautions are already available, such as washbasins, running water, gloves, places for washing medical devices, sterilizers, sharps storage containers, trash bins according to color codes and final disposal sites. availability is inadequate or insufficient, so that nurses sometimes use, and

sometimes do not use, such as the availability of sterile gloves, clean gloves that are sometimes used up, face shields, glasses, head protection, aprons, protective shoes whose availability is limited. Sometimes nurses also see the type of case they are dealing with, if the case is a non-infectious patient, the nurse sometimes does not use a handscoon so that the action is faster and more comfortable, such as when installing an infusion,⁵ measuring the patient's vital signs, and so on.⁵

According to Nurkolis & Alimansur (2013) in Tiurmaida (2019) Knowledge and experience in work can make a person skilled because these actions are often carried out repeatedly and continuously. By having knowledge, a person will be increasingly able to handle and solve a complex problem, where the person will try to practice the material that has been received. With frequent repetition regularly and consistently can arise a new skill that makes a person skilled. So that the more a person has knowledge and is often trained repeatedly and continuously will make the implementation of the right action.⁵

According to Notoatmodjo (2011) in Tiurmaida (2019) predisposing factors that influence a person's behavior towards health are knowledge, attitudes, beliefs, beliefs and values. Attitude is a reaction or response that is still closed to someone to a stimulus or object. Someone who has a positive attitude will usually take positive actions towards an object, and vice versa if someone has a negative attitude then his actions towards an object will be negative.⁵

Nurses who have a negative attitude who implement universal precaution, this is because despite the negative attitude of nurses who are less concerned about the implementation of universal precaution, they see their co-workers who always apply universal precaution which ultimately makes them motivated to follow the co-worker and also there are demands from superiors to implement universal precautions. Respondents who have a negative attitude who do not implement universal precaution, due to nurses' lack of concern for the implementation of universal precaution and nurses who are not affected by the motivation and work performance of other nurses and also do not care about the orders of their superiors so that they are not indifferent and less concerned with the implementation of universal precautions that must be done for their own safety and the safety of their patients.

Respondents who have a positive attitude implement universal precautions, this is because respondents who have a positive attitude will certainly have the perception that

implementing universal precautions is very important in preventing the risk of contracting infection for themselves and for patients so that they actually apply the correct universal precautions. in carrying out their duties. Respondents who have a positive attitude who do not implement universal precaution, this is due to the limited time that nurses have so that nurses do not have time to always apply universal precaution according to the provisions and they only do things that they consider important, such as washing their hands without use personal protective equipment.

Nurses who have received training will certainly gain knowledge and knowledge on how important it is to implement universal precautions in preventing the risk of contracting infection for themselves and for patients so that they actually apply universal precautions in carrying out their duties. Respondents who have received training but do not implement universal precaution, this is due to the workload and limited time owned by nurses so that nurses do not have time to always apply universal precautions.

Availability means the readiness of a facility in the form of manpower, goods, capital, and budget to be used at a predetermined time. This shows that the available facilities must be in a ready-to-use condition, not damaged, not expired, and not lacking. Even a qualified capability, if it is not supported by adequate facilities, will not be able to increase work efficiency, effectiveness, and productivity. Likewise, health workers in implementing universal precautions in the workplace require qualified facilities and equipment.

Nurses who state that the facilities and infrastructure do not support but still implement universal precaution, this is because even though there are inadequate or insufficient facilities they still carry out universal precaution in accordance with the availability for the action to be taken. Respondents who stated that the facilities and infrastructure did not support and did not implement universal precaution, because they did not look for other alternatives to replace the lack of facilities with others so that they did not implement universal precaution.

Nurses with facilities and infrastructure support and implement universal precaution, this is because the respondent actually applies universal precaution in carrying out their duties with the facilities and infrastructure provided by the hospital. Respondents who stated that the facilities and infrastructure supported but did not implement universal precaution, this was due to the lack of care for nurses in using

existing facilities and infrastructure in implementing universal precaution.

Meta-analysis factors most related to compliance with the implementation of standard precautions

Based on the results obtained in the Meta Analysis, it appears that the risk factor/tendency that is most related to compliance with the implementation of the largest standard precautions of the 2 variables studied, the first is the knowledge of nurses, nurses who have good knowledge increase the risk or tend to be 5,34 times compliance with the application of standard precautions compared to nurses who have less knowledge. Next is the attitude of nurses because good nurses' attitudes have a tendency to increase the risk 4,17 times to comply with the application of standard precautions in hospitals compared to nurses who have less attitudes. Then followed by nurses who have poor knowledge of standard precautions, nurses who have poor knowledge of standard precautions have a risk or tend to be 3,41 times more likely to comply with the application of standard precautions compared to nurses who have good knowledge. Furthermore, nurses who have less attitudes have a tendency to increase the risk of 0,72 times for non-compliance with the application of standard precautions.

This is in line with Fadilla's opinion¹ (2019) that a good level of knowledge of nurses will have an impact on the behavior of nurses in hospitals, especially in implementing universal precautions as an effort to prevent nosocomial infections. Knowledge is a very important factor in determining one's actions so that knowledge-based behavior will last longer than those without, meaning that the higher one's knowledge, the better the behavior shown. The knowledge gained while working as a nurse affects the implementation of the action. Knowledge or cognitive is a very important dominant for the formation of one's actions (overt behavior), if someone has good knowledge it will affect positive actions for him. Meanwhile, if someone has a poor level of knowledge, the behavior that is carried out is not good because doing something is not based on good knowledge so that it can cause behavior that is detrimental to the environment and himself. Nurses who have a good level of knowledge need to maintain and improve their knowledge. Meanwhile, nurses who have a poor level of knowledge need to get attention so that they get information or education regarding the prevention of nosocomial infections, especially in the application of Universal precautions. There is no relationship between

attitudes and behavior in the application of standards / universal precautions. This could be because the attitude is not yet an action, even though nurses have a good attitude, it is not necessarily in carrying out behavior, especially in implementing universal precautions, having good application behavior.

Attitude is a reaction or response of someone who is still closed to a stimulus or object. Attitude is not yet an action or activity, but is a 'predisposition' of action or behavior. Attitude is still a reaction to objects in a certain environment as an appreciation of the object. In order for an attitude to manifest in an action, supporting factors or enabling conditions are needed, such as the availability of facilities and facilities, as well as information and training.

Reinforced by other research shows that there is no relationship between attitudes and the application of standard precautions in nurses. This is likely to be influenced by the consistency of a person's attitude towards consistency behavior. Attitude is the compatibility between the attitude statement put forward and the response to the object. Attitudes obtained through experience will have a direct influence on behavior that will be realized only if conditions and situations allow. What conditions, what time, and what situation when the individual must express his attitude are some of the determinants that greatly affect the consistency between attitudes and statements and between attitudes and behavior statements.

Table 1. Comparison of research results whether or not there is a relationship between research variables and compliance with the application of standard precautions in hospitals

Research variable	There's a Relationship		No connection	
	heterogeneity test	Result	Uji heterogenitas	Result
nurse knowledge	P= 0,0006 I ² = 75% (heterogen)	P< 0,0001 p OR=5,34 (95% CI 2,52- 11,34)	P= 0,96 I ² = 0% (homogen)	p= 0,02 pOR=3,41 (95% CI (1,17-9,93)
nurse attitude	P= 0,03 I ² =67% (heterogen)	P=0,0002 p OR=4,17 (95% CI 1,98-8,78)	P= 0,92 I ² =0% (homogen)	p = 0,38 P OR=0,72 (95% CI 0,34-1,50)

CONCLUSION

There is a significant relationship between nurses' knowledge and compliance with the application of standard precautions in hospitals through an analysis of 9 articles that meet the requirements with the relationship between nurses' knowledge and compliance with standard precautions in hospitals with $p < 0,05$, namely $p < 0,00001$ and the pooled odds ratio value is 4,69 (95% CI 2,52 – 8,74) so it can be concluded that nurses who have good knowledge are at risk or have a tendency of 4,69 times to comply with the application of standard precautions in hospitals compared to nurses who have poor knowledge. There is a significant relationship between nurses' attitudes and compliance with the application of standard precautions in hospitals through an analysis of 7 articles that meet the requirements with the relationship between nurses' attitudes and compliance with the application of standard precautions in hospitals with p value $< 0,05$, namely $p = 0,03$ and pooled odds ratio of 2,34 (95% CI 1,11 – 4,91) so it can be concluded that nurses who have a good attitude are at risk or have a tendency of 2.34 times to comply with

the application of standard precautions in hospitals compared to nurses who have bad attitude.

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