Health Workers Compliance Towards Infection Prevention and Control in Indonesia

Lailawidar[1], Irwan sahputra[2], Said Usman[2], Nurjannah[2], Martoenis[3]

[1]Postgraduate Student, Faculty of Medicine, [2]Faculty of Medicine, [3]Faculty of Nursing, Universitas Syiah Kuala, Banda Aceh, Indonesia

Abstract

Background: Hospital acquired infections (HAI) are main safety problems for health care providers and patients.

Objectives: To identifyfactors related to the compliance of health workers in implementing infection prevention and control in the district general hospital.

Study Method: This study is quantitative research using a correlational design with a cross sectional approach study. All included people in this study are all health workers who provide direct healthcare services to patients and work in the district general hospital, which amounts to a total of 148 people, consisting of 93 nurses, 41 midwives and 14 doctors, the sample is the entire population of health workers working in the district general hospital.

Result: There is no significant relationship between age and gender with compliance by health workers in implementing infection prevention and control ($p>0,05$), there is a significant relationship between education, employee status, training, years of experience, training, knowledge, attitude, and reward with compliance by health workers in implementing prevention and control on infections in the ward, emergency room, ICU, NICU and delivery room at the district general hospital in 2021 ($p\leq0,05$).

Conclusion: The most dominant factors that influence compliance by health workers in implementing infection prevention and control are reward variables.

Keywords: *Health workers; Indonesia; Infection control*

Background

Hospital acquired infections (HAI) are main safety problems for health care providers and patients. Considering the level of morbidity, mortality, increase in the length of treatment days and costs, an effort has to be made in order to make hospitals safe by taking measures to prevent the infections. The prevalence of HAI in developed countries variate between 3,5% to 12%. The prevalence of HAI in European countries are an average of 7,1%. In Europe it is estimated that 4.131.000 patients suffer from around 4.544.100 episodes of HAI each year. The estimated incidence rate of HAI in the US is 4,5% in 2019, or equal to 9,3 infections per 1.000 patient/days and as much as 1,7 million patients that were affected. *The proportion of patients that are infected in the ICU is as big as 51% and most of them happen in hospitals. Around 30%*

Corresponding Author:
Lailawidar
lailawidar@gmail.com

of patients in the ICU experience at least one episode of HAI. The longer the patient stays at the ICU, the higher their risk of contracting an infection. The high frequency of infection is associated with the use of invasive devices, more specifically central channel, urinary catheter and ventilators[1].

Further states that the prevalence of HAI in low and middle income countries in 2019 range between 5,7% and 19,1%. The proportion of HAI patients in the ICU range between 4,4%.to 88,9% with the total frequency reaching 42,7 episodes per 1000 patients per day. This number is almost three times higher than in high-income countries. In addition, in some developing countries, the frequency of infections that are associated with the use of central channels and ventilators as well as other invasive devices can reach 19 times higher than what was reported from German and the US[2].

The incidence rate of HAI or nosocomial infection inpublic hospitals (district general hospital) in 2019 recorded cases of phlebitis as much as 1,97%. While other types of infections were not recorded. In 2020 due to the Covid-19 pandemic there were limitations for treatment days so that the amount of infections could not be measured.Based on the data from 2020, there are currently 140 health workers that work in the district general hospital who provide health services directly towards patients, with the health workers consisting of 85 nurses, 41 midwives, 14 doctors. From the 140 health workers, only five people (2,3%) have ever gotten training about infection prevention and control .

Health workers play an important role in prevention and control of infection transmissions through the implementation of standard precautions and environmental maintenance of health workers. All health workers, in all roles and settings, are able to show leadership in infection prevention and control using knowledge, skills, and judgement to initiate appropriate and prompt infection control procedures. WHO has clarified several roles of health workers for infection control. A control committee needs to be formed to develop training programs for health workers, supervising the implementation of techniques for infection prevention[3].

Many infections caught from the hospital can be prevented through adherence to evidence-based infection prevention strategies. Compliance by health workers towards standard precautions, including hand hygiene, adherence to aseptic technique and use of protective equipment (including gloves, dresses, masks, eye protection and face shields) can play a key role in prevention of transmission of infections between patients and health workers [4].

Other issues related to the implementation of infection prevention and control in the hospital by health workers was also found in a research that was done by Chipfuwa, Manwere, and Shayamano (2014), i.e. lack of knowledge is one of the barriers for the practice of infection prevention and control, due to only 28% health workers that have sufficien knowledge about infection control principles. The use of infection control guidelines by health workers resulted in bad results due to 42% of health workers not using the infection control guidelines at all, either because they did not know (24%) or the guideline was not available (18%). The training on infection control did not host well due to 68% of health workers not attending any training about infection prevention and control that contributed towards bad practice of infection prevention and control. Other factors that hindered the practice of infection control was due to the lack of time.

Meanwhile, research related to factors related to health worker compliance in infection prevention and control has never been implemented in the district

general hospital. Based on the previous research that has been described above, it can be concluded that factors associated with compliance by health workers in infection prevention and control includes the characteristics (age, gender, education, employee status, years of experience and training, knowledge, attitude and reward) for health workers. Therefore, this research wants to know about the analysis of factors associated with the compliance of health workers in the implementation of infection prevention and control in the district general hospital.

Methods

This research is a quantitative research using correlational design, with approach to cross sectional study to know the determinants of compliance in infection prevention and control in the district general hospital. All included people in this research are 148 health workers and paramedics, all the people will be sampled. The research media will be in the form of a questionnaire using google form https://bit.ly/3xhynXH and will be accompanied by an explanation, informed consent and charging guide. The data analysis that was carried out includes descriptive analysis and inferential analysis.

Results

Univariate Analysis

Respondents Characteristics

The results of the research towards the characteristics of age, gender, education, years of experience, and health worker training in the district general hospital in 2021 are in the following table 4.1:

TABLE 1: The Distribution of Characteristics of Age, Gender, Education, Years of Experience and Health Care Worker Training in The Ward, EU, ICU, NICU and Delivery Room in The District General Hospital Year 2021.

Characteristic	Category	Amount	
		f	%
Age	Early Adulthood	96	64,9
	Mid Adulthood	46	31,1
	Late Adulthood	6	4,1
Gender	Men	42	28,4
	Women	106	71,6
Education	S2	1	0,7
	S1	25	16,9
	DIV (Diploma)	22	14,9
	DIII (Diploma)	100	67,6
Employee Status	PNS (Permanent)	42	28,4
	NON PNS (Contract)	106	71,6
Years of Experience	Long	85	57,4
	Not Long	63	42,6

From the table 1 above, it is known that the age of most respondents that are used as subjects are Early Adults 64,9%. Women as much as 71,6%. DII education level as much as 67,6%. Non-PNS status as much as 71,6% and 57,4% have been working for a long time.

1. Training, Knowledge, Attitude, Rewards and Compliance by Health Workers About Infection Prevention and Control

The results of the research towards knowledge in the District General Hospital in 2021 are in the following table 2:

TABLE 2: The Distribution of the Frequency of Training, Knowledge, Attitude, Reward and Compliance by Health Workers About Infection Prevention and Control.

Variable	Category	Amount	
		F	%
Training	Available	100	67,6
	Not Available	48	32,4
Knowledge	High	101	68,2
	Low	47	31,8
Attitude	Good	100	67,6
	Not Good	48	32,4
Reward	Available	91	61,5
	Not Available	57	38,5
Compliance	Comply	105	70,9
	Not Comply	43	29,1

Source : Primary data, 2021

From Table 2 above, it is known that the knowledge of the respondents with the category high is 68,2%. Based on the respondents' attitude, it is known that most of the respondents have a good attitude, that is as big as 67,6%. Furthermore, based on the reward variable, it is known that most of the respondents said that there was a reward, namely 61,5%. Based on the compliance variable, it known that most health workers are obedient in implementing infection prevention and control in the District General Hospital, which is 70,9%.

Bivariate Analysis

Bivariate analysis uses the chi-square test to test the relationship between the variables of age, gender, education, years of experience and the training of healthcare workers with the knowledge of the compliance of health workers in implementing infection prevention and control in the District General Hospital year 2021, with a confidence level of 0,05 being:

1. The Relationship of Characteristics of Age, Gender, Years of Experience and Compliance by Health Workers in the Implementation of Infection Prevention and Control in the District General Hospital.

TABLE 3: The Relationship with Age, Gender, Education, Years of Experience with Compliance by Healthcare Workers in the Implementation of Infection Prevention and Control in The District General Hospital.

variable	Category	Compliance				Total		P value	OR
		Compliant		Not Compliant					
		f	%	f	%	f	%		
Age	Early Adulthood	67	69,8	29	30,2	96	100	0,077	0,598
	Mid Adulthood	38	82,6	14	30,4	52	100		
Gender	Men	25	59,5	17	40,5	42	100	0,054	0,478
	Women	80	75,5	26	24,5	106	100		
Education	Bachelor/PG	23	92,0	2	8,0	25	100	0,014	5,750
	Diploma	82	66,7	41	33,3	123	100		
Employee Status	PNS	38	90,5	4	9,5	42	100	0,001	5,530
	NON PNS	67	63,2	39	36,8	106	100		
Years of Experience	Long	67	78,8	18	21,2	85	100	0,023	2,449
	Not Long	38	60,3	25	39,7	63	100		

Source : Primary data, 2021

The analysis showed that late-adulthood proportion that complied with infection prevention and control was 83.3% higher compared to the proportion that did not comply, which is 16.7%. From the table it is shown that the result of the chi-square test is p=0,077, which statistically is meaningless (p.0,05), it can be concluded that there is significant relationship between age and compliance by health workers in implementing infection prevention and control. The analysis showed that the women category in gender proportion did comply with infection prevention and control was 75,5% bigger than the proportion that did not comply which was 24,5%. From the table it is shown the result of the chi-square test is p=0,054, which statistically is not meaningful (p>0,05), it can be concluded that there is no significant relationship between gender and compliance by health workers in implementing infection prevention and control.

The analysis showed that the bachelor/post graduate category in the education proportion that did comply by the implementation of infection prevention and control was 92,0% bigger than the proportion that did not comply which was 37,0%. From the table it is shown the result of the chi-square test is p=0,014, so statistically it is meaningful (p<0,05), it can be concluded that there is a significant relationship

between education and compliance of health workers in implementing infection prevention and control.

The analysis showed that the category non-PNS in employee status that complied in the implementation of infection prevention and control was 63,2% bigger than the proportion that did not comply which was 36,8%. From the table it is shown the result of the chi-square test is p=0,001, which is statistically meaningful (p<0,05), it can be concluded that there is a significant relationship between employee status and compliance of health workers in implementing infection prevention and control.

The analysis showed that the category long in the years of experience proportion that did comply with the implementation of infection prevention and control was 78,8% bigger than the proportion that did not comply which was 21,2%. From the table it is shown that the result of the chi-square test is p=0<023, which statistically is meaningful (p<0,05), it can be concluded that there is a significant relationship between years of experience with compliance by health workers in the implementation of infection prevention and control.

2. The Relationship of Training, Attitude and Reward with Health Worker's Compliance with the Implementation of Infection Prevention and Control

Full chi-square test results can be seen in this table below:

TABLE 4: The Relationship of Training, Attitude and Reward with Health Worker's Compliance with the Implementation of Infection Control and Prevention.

Knowledge	**Compliance**		**Total**	***p value***	***OR***
	Comply	Not Comply			
High	80 (79,2%)	21 (20,8%)	101 (100%)	0,002	3,352
Low	25 (53,2%)	22 (46,8%)	47 (100%)		
Training	Comply	Not Comply	Total	*P value*	*OR*
There is	80 (80,0%)	21 (20,8%)	101 (100%)	0,023	3,680
There is not	25 (52,1%)	22 (46,8%)	47 (100%)		
Attitude	Comply	Not Comply	Total	*P value*	*OR*
Good	80 (80,0%)	20 (20,0%)	100 (100%)	0,001	3,680
Not Good	25 (52,1%)	23 (47,9%)	48 (100%)		
Total	105 (100%)	43 (29,1%)	148 (100%)		
Reward	Comply	Not Comply	Total	*P value*	*OR*
There is	82 (90,1%)	9 (9,9%)	91 (100%)	0,000	13,469
There is not	23 (40,4%)	34 (59,6%)	57 (100%)		
Total	105 (70,9%)	43 (29,1%)	148 (100%)		

Source : Primary data, 2021

The analysis showed that the category high in the knowledge proportion that did comply with the implementation of infection prevention and control was 79,2% bigger than the proportion that did not comply which was 20,8%. From the table it is shown that the result of the chi-square test is p=0,002, which statistically speaking is meaningful (p<0,05), it can be concluded that there is a significant relationship between knowledge and compliance of health workers in the implementation of infection prevention and control.

The analysis showed that the category 'there is' in the training proportion that did comply with the implementation of infection prevention and control was 80,0% bigger than the proportion that did not comply which was 20,0%. From the table it is shown that the result of the chi-square test is p=0,023, which is statistically meaningful (p<0,05), it can be concluded that there is a significant relationship between training and compliance by health workers in the implementation of infection prevention and control.

The analysis showed that the category 'good' in the attitude proportion that did comply with the implementation of infection prevention and control was 89,0% bigger than the proportion that did not comply which was 20,0%. From the table it is shown that the result of the chi-square test is p=0,001, which is statistically meaningful (p<0,05), it can be concluded that there is a significant relationship between attitude and compliance by health workers in the implementation of infection prevention and control.

The analysis showed that the category 'there is' in the reward proportion that did comply with the implementation of infection prevention and control is higher than the proportion that did not comply, it can be concluded that there is a significant relationship between reward and compliance by healthcare workers in implementing infection prevention and control.

Multivariate Analysis

Multivariate Analysis was meant to observe and learn the relationship between a few independent variables with one dependent variable, where it will be known which variable is the most dominant which has a relationship with the compliance of health workers in the implementation of infection prevention and control, the test that was used is the logistic regression test with the backward stepwise (conditional) method. Multivariate Analysis with the logistic regression test is carried out as a follow-up from the bivariate test by including all variables that were statistically significant (p<0,05) and variables that have the value of p<0,25 as a selection limit to include variables that are substantially considered important. Variables that meet the requirements to be tested multivariately are:

TABLE 5: Variables That Meet the Requirement

No	Variable	P value
1	Education	0,014
2	Employee Status	0,001
3	Years of Experience	0,023
4	Training	0,023
5	Knowledge	0,002
6	Attitude	0,001
7	Reward	0,000

The final model of logistic regression analysis is as follows:

TABLE 6: The Final Model of Logistic Regression Analysis Determinants of Health Worker Compliance in Implementing Prevention and Control in the District General Hospital.

No	Variable	Odd Ratio	CI 95%	P value
1	Reward	12,66	7,10-22,2	0,000
2	Employee Status	10,36	1,20-22,15	0,001

Source : Primary data, 2021

In this analysis, the relationship between independent variables and dependent variables with value -2 log likelihood was as big as 0,000, cox & Snell R Square which was as big as 0,615 with the value of the overall percentage being 87,8%. From the value of the overall percentage, the ability of this study to predict the compliance of health workers in implementing infection prevention and control is as big as 87,8%, and the other 12,2% is caused by other factors. Based on the result of the multivariate test, it is known that the most influencing factor in the compliance of health workers in implementing infection prevention and control is the reward factor with the value OR as big as 12,66, meaning that existing officers who receive rewards is 12 times more likely to be more compliant compared to other existing officers that did not receive a reward.

Discussion

1. The relationship of characteristics with the compliance of health workers in implementing infection prevention and control.

The results of the study have shown that there is no significant relationship between age and compliance by health workers in the implementation of infection prevention and control. The result of the analysis obtained shows that the proportion of gender in the category female respondents that did comply in the implementation of infection prevention and control was bigger than the proportion that did not comply. The result of the chi-square test shows that there was no significant relationship between gender and compliance by health workers in implementing infection prevention and control.

The result of the analysis that has been obtained states that the proportion of education shows there is a significant relationship between education and compliance by health workers in implementing infection prevention and control. The analysis showed that the category non-civil servant in employee status that did comply with the implementation of infection prevention and control was bigger than the proportion that did not comply. It can be concluded that there is a significant relationship between employee status and compliance by health workers in implementing infection prevention and control.

The analysis showed that the category ‘long’ in the years of experience proportion that did comply with the implementation of infection prevention and control was higher than the proportion that did not comply, the analysis showed that the category ‘there is’ in the training proportion that did comply with the implementation of infection prevention and control was bigger than the proportion that did not comply. It can be concluded that there is a significant relationship

between employee status, training, and compliance by health workers in the implementation of infection prevention and control.

Several studies have found that age showed no relationship and is negatively related to performance. Regardless the workers' age, everyone showed that they comply with infection prevention procedures both for self-protection or when contact with patients. In addition, gender factor also showed similar pattern as age although some studies show that age does have a relationship with performance. This is because older workers increasingly have more specifications, experience, consideration, work ethic, and even stronger commitment. For certain tasks and until the certain age limit, there is a belief that the older the person is, the more their performance goes down. Because of this, nurses who are in late adulthood are generally not being placed in technical positions.

The results of the analysis states that there is a significant relationship between education, employee status, years of experience and participation in training with the compliance of health workers in the implementation of infection prevention and control. Education and training affects the performance of a nurse. Education and training is one of the most important parts in the development of staff and education and the 10 trainings that nurses participate in are expected to improve their abilities as a nurse, both in knowledge, skills, and attitude.

2. The relationship of knowledge with the compliance of health workers in the implementation of infection prevention and control.

The analysis showed that the category high in the knowledge proportion that did comply with the implementation of infection prevention and control was bigger than the proportion that did not comply. It can be concluded that there is a significant relationship between knowledge and compliance towards the implementation of infection prevention and control. The higher the knowledge of the person, the more compliant the person will be in carrying out the effort due to the deeper understanding of the consequences, not following protocol will result in negative results towards the patient or their own self in order to apply all SOP well, high education ensures the will to take advantage of knowledge, performance and competence, while competence will take form from knowledge, skills, attitude, and experience to perform a job or role effectively. Meanwhile knowledge that an individual has is not only obtained from experience but the level of education they have.

Compliance of health workers in implementing infection prevention and control isrelated with knowledge as in Agung. In the research it was stated that almost all respondents had good knowledge about standard precautions. However, in practice the health workers were not consistent in closing used syringes that have been used correctly. This is also according to research where the relationship between nurses' knowledge and efforts to implement patient safety was obtained in the inpatient room. The respondents' knowledge began getting better along with the Covid-19 pandemic where one of the forms of transmission was due to direct contact and the influence of the patient's environment[5].

3. The relationship of attitude with the compliance of health workers in implementing infection prevention and control.

The analysis showed that the category of 'good' in the attitude proportion that did comply in the implementation of infection prevention and control was higher than the proportion that did not comply. It can be concluded that there is a significant relationship between attitude and compliance by health workers in the implementation of infection prevention and control. Related researches argue that attitude is an action or

deed done in everyday life towards their environment. A positive attitude from a nurse will make the nurse more compliant in keeping the patient's safety, even if there is a nurse with a negative attitude they can still keep their patient's safety without risk[6]

There are core values that all nurses have,naming: human dignity, integrity, autonomy, altruism, and social justice, where those values are needed for nurses in order to integrate caring behavior towards their patients and towards all the members of the healthcare team. Even with the same set of values and behaviors, we cannot underestimate the nurses' attitude towards other people, their patients and their colleagues [7]. All of the respondents have given good behaviors and will support the compliance for the safety of their patients as, stated, that there is a relationship with the nurse's attitude with the implementation of the patient's safety [8].The result of this study are in line with the research conducted where based on the values of Standardized Coefficients Beta, nurse's attitudes were more dominant as much as 0,309, which means that there is a positive relationship with knowledge and nurse's attitudes with the prevention of nosocomial infection [9].

4. The relationship of reward with the compliance of health workers in implementing infection prevention and control.

The analysis showed that the category 'there is' in the reward proportion that did comply in implementing infection prevention and control which was higher than the proportion that did not comply. It can be concluded that there is a significant relationship between reward with the compliance of health workers in the implementation of infection prevention and control.

The reward system is the mechanism that makes this happen. They can cover rewards in other forms such as approval, promotion, reassignment and non-monetary bonuses, for example holidays or a simple thank you. Based on the result of the data collection, it is known that the most answered statement with the answer 'never' is statement number 19 which states that hospitals provide educational assistance. Meanwhile the most answered statement with the answer 'often' is statement number 7, where the respondent does the work according to the standard design that has been set.

Rewards that are given will influence compliance with the prevention of transmitted diseases towards patients and their own selves. Although there are rewards in other forms such as praise or working honorarium for employees with contract status. It will still encourage compliance.The results of observations in the field states that the District General Hospital give rewards to employees in the form of providing opportunities for employees to take part in good training held within the hospital itself or availing them to be able to take part in out-of-hospital,even out-of-city training, giving the chance for employees to continue to pursue further education and give rewards every time they make training activities in the form of rewards.

Research Limitations

Limitations in conducting this research was that limitation itself in distributing questionnaires to respondents. The distribution of the questionnaire was carried out through google form, though within collecting data there were many obstacles, for example related to the network, the lack of ability of the respondents to fill out answers in digital questionnaires and also other shortcomings or limitations such as smartphone ownership, because there were respondents who still did not use a smartphone.

Conclusion

Award is the dominant factor that affects compliance, it is expected that hospital management can provide regular rewards to health workers in the form of appreciation for the performance of health workers or officers. Routine socialization needs to be carried out for all visitors and staff, both medical and non-medical which will increase the knowledge about disease prevention procedures in hospitals. For mutual progress, there should be appropriate rewards in the form of allowances that will continue to motivate employees in the compliance of health workers in carrying out infection prevention and control in Aceh, Indonesia.

Ethical Clearance: The study obtained ethical clearance from the Health Ethical Committee at the ZainoelAbidin General Hospital Banda Aceh, Indonesia.

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