



PREVENTION COMPLIANCE FACTOR ANALYSIS AND CONTROL OF NOSOCOMIAL INFECTIONS IN HOSPITALS

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Abstract

Nosocomial infections were infections that occurred in the hospital environment. A person was said to have a nosocomial infection if the infection occurred while undergoing treatment in the hospital. Nosocomial infections could occur in patients, nurses, doctors, and hospital workers or visitors. To prevent nosocomial infections, namely stopping the transmission method by increasing staff compliance and equipment maintenance procedures, decontamination, cleaning, and sterilization of the tools used, or high-level disinfection had to be considered before the equipment was used to carry out maintenance actions. If a nosocomial infection occurred, it impacted the length of treatment days due to comorbidities during hospitalization. Nosocomial infections had to be avoided and prevented in patient care in hospitals with a target of zero cases, one of the efforts was through staff compliance. Considering the risk of nosocomial infections, a compliance review of care workers was carried out. This study aimed to analyze compliance with the prevention and control of nosocomial infections in one hospital in West Nusa Tenggara Province. The method in this research was quantitative survey research with a cross-sectional approach. The research population was all nurses who worked in inpatient treatment rooms. By using a simple random sampling technique, a large sample of 50 nurses was obtained in this study. Chi-Square and Logistic Regression analysis were conducted using SPSS. The research results showed that there was a significant relationship between the factors education, knowledge, supervision, infrastructure, and management support on officer compliance. The dominant factor was found in the availability of infrastructure.

Keywords: Nosocomial infections, nurse compliance, a cross-sectional approach

INTRODUCTION

Service is an activity or sequence of activities that occurs in direct interaction between a person and another person or physical machine and results in customer satisfaction (Atmadjati, 2018). One of them is by providing health services competently in terms of work quality and service quality, such as by providing services with the basic principles and rules that apply, such as when carrying out nursing actions and after carrying out nursing actions, carrying out prevention and control of the risk of infection for patients who are receiving treatment. care by doing six steps of washing your hands (Ministry of Health, 2022).

The impact of washing hands before and after nursing actions is very good for preventing

infections that can be transmitted from nurses to patients. This can be included in the application of infection prevention and control (PPI), which is an effort to prevent and minimize the occurrence of infections in patients, nurses, visitors, and the community around health service facilities (Permenkes, 2017).

According to Minister of Health Regulation Number 27 of 2017, infection is a condition caused by pathogenic microorganisms accompanied by or without clinical symptoms. Meanwhile, hospital infections, which are usually referred to as healthcare-associated infections (HAIs), are infections acquired in hospitals, either in the process of providing care services or from visitors who visit the hospital, or they can also be called infections acquired by



patients while being treated or receiving treatment at home. certain illnesses.

Hundreds of millions of patients worldwide are infected with HAIs each year, causing deaths and significant financial losses to health systems. A survey conducted in 183 hospitals in the United States with 11,282 patients reports that 4% of patients are infected with at least one type of HAI. In high-income countries, approximately 30% of patients in ICUs are infected with at least one type of HAI. Meanwhile, in low- and middle-income countries, the frequency of infections acquired in the ICU is at least 2-3 times higher than in high-income countries. In Asian countries, the incidence of nosocomial infections is as high as 10%. Meanwhile, in America, nosocomial infections occur in \pm 5% of the 40 million patients treated each year, with a mortality rate of 1% and treatment costs reaching 4.5 billion rupiah per year. The prevalence of HAIs infection in patients in developed countries varies between 3.5% and 12%, while in developing countries, including Indonesia, the prevalence of HAIS infection is 9.1% with variations of 6.1%–16%. According to data from the Ministry of Health, HAIs infections in Indonesia reach 15.74%, far above those in developed countries, which range from 4–15.5%.

Nurse compliance is a problem in implementing standard precautions. Standard precautions must be taken because they are susceptible to contracting infections, especially linen and uniforms, which are dangerous transmission media (Pinon, Gachet, Alexandre, Decherf, & Vialette, 2013). Nurses are also at risk of being stuck by needles (Motaarefi, Mahmoudi, Mohammadi, & Hasanpour-Dehkordi, 2016). Bacteriological images of 20% of nurses' hands are positive for staphylococcus epidermidis and Enterobacter aerogenes (Zuhriyah, 2004). Standard precautions as an effort to prevent the transmission of infection. Other research proves that washing hands (5 minutes) prevents infections (World Health Organization (WHO), 2009). Nurse compliance in service facilities is still minimal (36%) (Fauzia, Ansyori, & Hariyanto, 2014).

Compliance is action according to procedures (Budiman, 2013). Compliance is determined by predisposing factors (individual characteristics, knowledge, attitudes, and beliefs), enabling factors (health facilities and facilities), and reinforcing factors (attitudes,

behavior, and support). The research results prove that individual characteristics are not related to the application of universal precautions. Perceptions of the completeness of infrastructure and perceptions of nurses' self-efficacy are related to nurses' behavior in implementing universal precautions (Runtu, Haryanti, & Rahayujati, 2013). Five Research proves that training, work motivation, and supervision are strongly related and have a significant relationship with IPCLN performance (Mustariningrum & Koeswo, 2015). Standard precautions are determined by socialization (Jamaluddin et al., 2012). Facility factors also determine infection prevention and control (Herman & Handayani, 2016).

Research at Roemani Hospital Semarang in 2017 proves that the implementation of standard precautions is not sufficient because nurses believe that not all actions have to use handsoons and masks, so the use of masks and handsoons is not carried out obediently (Arifianto, 2017). Research at Banyumas Regional Hospital also shows that some nurses do not comply with standard precautions (Purnomo, 2015). Research at RSUP by Dr. Kariadi finds that 30.5% of nurses do not comply with standard precautions (Sujianto, 2014).

Nosocomial infections can also cause patient care days to be longer, which will result in increased service costs. Based on data from the NTB Provincial Regional Hospital in 2018, the incidence of nosocomial infections in hospitals should not be more than 1.5%. In 2018, the number of incidences of nosocomial infections was 0.09% and decreased by 0.05% when compared to 2017. Meanwhile, data on nosocomial infections in hospitals is 8.19%; in 2022, the same will be the case for patients with confirmed COVID-19. For the period January to December 2020, there will be 300 cases; in 2021, from January to December, there will be 962 cases; and in 2022, from January to July, there will be 444 cases. The highest data is in February 2022, with 407 cases. Likewise, 54 nurses will be infected with COVID-19 in 2021. Likewise, cases exposed to COVID-19 who are in close contact with their families are also exposed to COVID-19 in as many as four cases.

This data shows a large percentage of infection rates, so researchers want to conduct research with the aim of analyzing factors related to compliance with the prevention and control of nosocomial infections in one of the hospitals in West Nusa Tenggara Province, Indonesia.

Researchers suspect that there are several factors that have an important role in influencing the compliance of nurses in the inpatient room at the University Hospital regarding compliance with the prevention and control of nosocomial infections that exist there.

From a preliminary study conducted by researchers sourced from the performance report of the infection prevention and control committee, secondary data are found in the form of the average nurse hand hygiene compliance rate for the period January to July 2022, which is 80%; the average nurse compliance rate for the period January to July 2022 in using PPE is 96%. However, there are obstacles where nurses' awareness and compliance still vary. Likewise, the management of patient care equipment and other medical equipment still shows that compliance with patient equipment management from the January–July 2022 period for critical equipment is 80%, semi-critical equipment is 75%, and non-critical equipment is 75%. The evaluation finds that each room still does not have the same way of cleaning equipment after carrying out procedures on patients; namely, some clean them with soap and others soak them directly in chlorine liquid.

This research differs from several previous studies. Previous research (Dachirin, 2019) focuses on analyzing compliance in preventing HAIs and phlebitis infections and uses descriptive surveys. Meanwhile, this study examines nosocomial infection using a cross-sectional approach. This approach is used because it is quite relevant when researchers want to study factors preventing and controlling an infection.

RESEARCH METHODS

This research was quantitative, using a cross-sectional approach. The population in this study was all nurses in the inpatient room, consisting of 7 people in the VIP room, 14 people in Class 1, 2, and 3 rooms, 15 people in the children's room, 11 people in the ICU room, and 10 people in the NICU room. By using the Slovin formula with the probability sampling technique of simple random sampling, the total number of nurses in the inpatient room at one hospital in West Nusa Tenggara Province, Indonesia, was 50.

The variables in this research were level of education, knowledge, implementation of supervision, facilities and infrastructure, management support, as well as nurses'

compliance in implementing the prevention and control of nosocomial infections. To get information on the level of education, knowledge, supervision, facilities and infrastructure, management support, and nurse compliance in preventing and controlling nosocomial infections, questionnaire sheets were used that had been shown to be valid and likely to be reliable. Data collection was carried out by distributing questionnaire sheets to respondents by first asking them to sign informed consent. To make it simpler for participants when they had queries about the questionnaire, the researcher himself distributed the questionnaire.

A questionnaire sheet consisting of three questions was used to measure education level. The questionnaire consisted of ten questions using the Guttman Scale to measure knowledge. A questionnaire consisting of eight questions on a Likert scale was used to measure the implementation of supervision. A questionnaire consisting of five questions using the Guttman scale was used to measure facilities and infrastructure. The questionnaire sheet, consisting of five questions, was measured using the Guttman scale to measure management support. Meanwhile, a questionnaire consisting of 25 questions on a Likert scale was used to measure nurses' compliance in preventing and controlling nosocomial infections. The data was then analyzed using univariate, bivariate, and multivariate analyses. Univariate analysis in this research used a frequency distribution table. Bivariate analysis was carried out using the Chi-Square test. Meanwhile, multivariate analysis was tested using logistic regression analysis.

RESULTS AND DISCUSSION

Univariate Test Results

Based on the results of the univariate test, Table 1 was obtained, which contained the frequency distribution of the research sample.

Table 1. Univariate Test Results

Research Variable	Category	%
Education Level	DIII	21
	S1/ Nurse	29
Knowledge	Low	16
	Currently	11
Implementation of Supervision	Tall	23
	Low	9
	Currently	15
	Tall	26

Research Variable	Category	%
Infrastructure	Incomplete	17
	Complete	33
Management Support	Not enough	16
	Good	34
Obedience	Low	18
	Tall	32

Based on Table 1, it was known that the total number of respondents was 50. The number of respondents with high compliance in implementing the prevention and control of nosocomial infections was 32 (64.0%), while respondents with low compliance in implementing the prevention and control of nosocomial infections were 18 (36.0%). Respondents with a DIII education level were 21 people (42.0%), and those with a bachelor's or nursing education level were as many as 29 people (58.0%). Respondents with a low level of knowledge were 16 people (32.0%), those with a sufficient level of knowledge were 11 people (22.0%), and those with a high level of knowledge were 23 people (46.0%). Respondents who answered that the implementation of low supervision was 9 people (18.0%), the implementation of moderate

supervision was 15 people (30.0%), and the implementation of high supervision was 26 people (52.0%) Respondents who answered that infrastructure was incomplete were 17 people (38.0%), and 33 people (62.0%) were complete. Respondents with less management support were 16 people (32.0%), and 34 people had good management support (68.0%).

Bivariate Test Results

The bivariate test in the following study used Chi-Square analysis, which was carried out using the licenced SPSS program. Bivariate analysis was carried out to look for correlation or influence between the two variables studied, in this case, the dependent and independent variables. If the calculation showed that the significance value was smaller than 0.05, then there was an influence of the independent variable on the dependent variable. Test result data is presented in Table 2. All p-values were smaller than 0.05. Because the p-value for all variables was smaller than 0.05, it could be concluded that all variables were suitable for multivariate analysis.

Table 2. Bivariate Test Results

Variable	Category	Nurse Compliance				p
		Low		High		
		F	%	F	%	
Level of Education Knowledge	DIII	13	72,2	8	25,0	0,003
	S1/Nursing	5	27,8	24	75,0	
	Low	10	55,6	6	18,8	
Implement of Supervision	Middle	5	27,8	6	18,8	0,005
	Tall	3	16,7	20	62,5	
	Low	8	44,4	1	3,1	
Infrastructure	Middle	5	27,8	10	31,3	0,001
	Tall	5	27,8	21	65,6	
	Incomplete	14	77,8	3	9,4	
Mangement Support	Complete	4	22,2	29	90,6	0,000
	Not enough	10	55,6	6	18,8	
	Good	8	44,4	26	81,3	0,018

Multivariate Test Results

The multivariate test in the following research used logistic regression analysis, which was carried out using the SPSS program. All

variables were analyzed in multivariate analysis because the significance value of all variables in bivariate analysis was less than 0.05. Test result data were presented in Table 3.

Table 3. Multivariate Test Results

Variable	B	Wald	Exp (B)	p	95% C.I. for Exp (B)	
					Lower	Upper
Education Level	2.255	3.587	9.534	0.058	0.924	98.333
Knowledge	0.681	1.193	1.975	0.275	0.582	6.699
Implement of Supervision	0.392	0.241	1.480	0.623	0.309	7.085
Infrastructure	3.969	5.038	52.930	0.025	1.654	1693.824
Management Support	-0.710	0.246	0.492	0.620	0.030	8.137

Based on Table 3, information was obtained that the Facilities and Infrastructure variable influenced Nurse Compliance in Implementing the Prevention and Control of Nosocomial Infections with a p-value of 0.025 (<0.05). From the results of the multivariate test, it was known that the variable with a p-value <0.05 meant that this variable influenced nurses' compliance in implementing the prevention and control of nosocomial infections in hospitals, where the dominant variable that influenced the dependent variable (nurses' compliance) was the Facilities and Infrastructure variable with a p-value of 0.025. Infrastructure was the only significant variable because the p-value was smaller than 0.05. Inadequate infrastructure increased the risk of nurses not complying with measures to prevent and control nosocomial infections in hospitals.

If you look again at Table 3, you will find that the distance between lower and upper for the infrastructure variable is quite far. This could be due to the quality of the internal validity of the instrument used. In addition, these results could be caused by participant factors. The quality of facilities and infrastructure is actually less relevant for participants to assess because each participant has varying assessments. In fact, facilities and infrastructure are fixed and do not change, so data related to these facilities and infrastructure should use existing data at the hospital.

Relationship between Educational Level Factors and Nurse Compliance in Preventing

and Controlling Nosocomial Infections in Hospitals

Based on the results, it was found that there was no a relationship between educational level factors and nurses' compliance in preventing and controlling nosocomial infections. Higher education not provided good results for nurses' compliance in preventing and controlling nosocomial infections. Higher education would provide a difference in terms of knowledge compared to lower education. The results of this research were not in line with research (Pundar, 2019), which stated that education was related to an individual's mindset and thinking patterns were related to a person's behavior; in other words, the mindset of someone who was highly educated would be different from that of someone who was highly educated. Nursing education has a big relationship with the quality of nursing services. It was hoped that a nurse's higher education would produce optimal service.

Relationship between Knowledge Level Factors and Nurse Compliance in Preventing and Controlling Nosocomial Infections in Hospitals

Based on the results, it was found that the level of knowledge had no an influence on nurses' compliance in preventing and controlling nosocomial infections at the hospital. This proved that the level of knowledge of nurses had no an influence on nurses' attitudes in terms of nurses' compliance at work. The results of this research were not in line with the results of

Utami (2017) at Raden Said Sukanto Hospital, who found that there was a relationship between knowledge and the prevention of nosocomial infections. And it was also not in line with Fitri's (2020) research that there was a significant relationship between nurses' knowledge and efforts to prevent post-operative infections in the Sidikalang RSU Inpatient Room.

This research was also not in line with the theory in Notoatmodjo (2012), which concluded that if the acceptance of new behavior or adoption of behavior through the process of awareness, interest, evaluation, trial, and adoption was based on knowledge, awareness, and positive attitudes, then the behavior would be lasting. On the other hand, if behavior was not based on knowledge and awareness, it would not last long.

Relationship between Supervision Implementation Factors and Nurse Compliance in Preventing and Controlling Nosocomial Infections in Hospitals

Based on the results, it was found that there was no influence between the implementation of supervision and nurse compliance in preventing and controlling nosocomial infections at the hospital. The implementation of supervision was not a factor that influenced nurses' compliance in preventing and controlling infections in the inpatient room at Hospital. The results of the research showed that low levels of supervision also resulted in low levels of nurses' compliance in preventing and controlling nosocomial infections at Hospital. On the other hand, high supervision also provided high results in nurses' compliance in preventing and controlling nosocomial infections at Hospital. Based on the respondents' answers regarding the answers on the questionnaire sheet that was given, motivation and encouragement from the supervisor were really needed by the nurses in the room to increase their compliance. The results of this research also showed that supervision activities carried out by supervisors must be carried out continuously or on a scheduled basis. Supervisory activities, which included supervision, guidance, direction, observation, motivation, and evaluation for staff, were very necessary to support compliance in carrying out daily activities.

This research was not in line with the results of research conducted by Razi (2019), which found that the better the supervision carried out by the head of the room, the better the behaviour of the nurses would be. This was also not in line with Lawrence Green's (1980) theory that the attitudes or behaviours of health workers or other officials who were the reference group for community behaviour were a driving factor that could influence a person's behavior. (Notoatmodjo, 2007). One of the behaviours of other staff, such as supervision by the head of the room, could also influence the behaviour of nurses in preventing infection. Supervision, according to Sudjana (2004) in Nursalam (2011), was an effort to help develop and improve the abilities of those being supervised so that they could carry out assigned activity tasks efficiently and effectively. The head of the room had an important role in this matter, as nursing staff also needed motivation from the leader. The existence of rewards and punishments that were carried out regularly would be a motivation for leaders, which would have an impact on the quality of nurses in carrying out actions, especially in preventing infection.

Therefore, with supervision from the head of the room, the nurse would continue to provide good services, especially in terms of reducing the number of nosocomial infections, especially wound infections in post-operative patients. Supervision carried out routinely would have an impact on nurses' actions, both positive and negative. The positive impact of this was that nurses could carry out their work in wound care professionally in accordance with established procedures. On the other hand, excessive supervision would also make nurses feel that they were not trusted to carry out their duties, so that nurses became unproductive in carrying out all their duties, especially in terms of preventing post-operative infections. Supervision could be carried out in stages to make it easier to control the prevention of post-operative infections.

Relationship between Infrastructure Factors and Nurse Compliance in Preventing and Controlling Nosocomial Infections in Hospitals

Based on the results, it was found that there was an influence of infrastructure factors on nurse compliance in preventing and controlling nosocomial infections at Hospital.

Comfort and ease in accessing facilities and infrastructure were factors that determined nurses' compliance in preventing and controlling nosocomial infections in hospitals. Based on research results, complete infrastructure showed high compliance rates. The results of this study were in line with research conducted by Fitri (2020), which stated that the occurrence of infections in post-operative wounds could be influenced by a lack of control from the head of the room or nurse as well as the tools available in the room. It was also necessary to note any developments experienced by post-operative patients. Wound care facilities were equipment that nurses needed to care for wounds and prevent infection. Complete equipment could help nurses in their efforts to reduce nosocomial infections. So the hospital, especially the hospital leadership, had to be responsible for providing it.

However, according to the researcher's assumption, there was no relationship between wound care facilities and nurses' actions because the minimum requirements for wound care facilities at Bhayangkara Hospital in Medan were available, but their use was not optimal. Apart from being equipment for wound care, the facility was also very useful for nurses in reducing the risks of nursing work. As personnel in preventing infections, especially post-operative wound infections, nurses were also very susceptible to infection because at any time they were in an environment where there were many germs, one of which was the cause of infection. So the function of another facility was as a universal precaution for nurses.

As previously described, if you look again at Table 3 in the lower and upper sections for the infrastructure variables, you can see quite a large distance. This indicates that there are problems related to the quality of internal validity in this research. It could be that the instruments used are not suitable for measuring infrastructure. Or it could be that infrastructure variables are less relevant to be associated with nosocomial infections. This is because internal validity is related to the degree of accuracy of the research design, including instruments or variables, and the results achieved.

Relationship between Management Support Factors and Nurse Compliance in Preventing and Controlling Nosocomial Infections in Hospitals

Based on the results, it was found that there was no influence of management support factors on nurse compliance in preventing and controlling nosocomial infections at the hospital. The research results showed good satisfaction rates if management support was also good, so this high compliance would reduce the incidence of nosocomial infections at Unram Hospital. The results of this research were not in line with research (Hutahaean, 2022), which stated that there was a relationship between motivation and nurse compliance in infection prevention and control.

This was reinforced by Syamsulastri (2017), who stated in his research that there was a relationship between motivation and nurses' compliance in hand hygiene practices in the ER, ICU, and IBS at Ade Muhammad Djoen Sintang Regional Hospital, showing that there was a significant relationship between motivation and nurses' compliance in carrying out hand hygiene. With the statistical test results, the p -value was 0.07. The PR value was 1.890 with a 95% CI value, meaning that the proportion of respondents with low motivation tended to be disobedient in carrying out hand hygiene 1.890, or 2 times greater than the proportion of respondents with high motivation. Theory (Samsudin in Andriyani) Motivation was the process of influencing or encouraging someone or a work group from the outside so that they wanted to carry out something that had been determined. Meanwhile, according to Liang Gie in Samsudin, motivation was the work carried out by managers in providing inspiration, enthusiasm, and encouragement to other people, in this case employees, to take certain actions (Andriyani, 2015).

Analysis of the Most Dominant Factors Affecting Nurse Compliance in Preventing and Controlling Nosocomial Infections

Based on the research results and after carrying out a logistic regression test on the five factors that had an influence on nurses' compliance in preventing and controlling nosocomial infections at Unram Hospital, the results showed that infrastructure was the most dominant factor influencing nurses' compliance in preventing and controlling nosocomial infections in hospitals, with a value of 0.025. Infrastructure was the most dominant of several factors that had an influence on compliance with

the prevention and control of nosocomial infections at Unram Hospital. Infrastructure played a central role in increasing nurses' comfort in carrying out their work. Other research (Mulyaman, 2020) also provided the same results: infrastructure was the most dominant factor in nurse compliance.

The availability of facilities and equipment was the variable that most dominantly influenced nurses' compliance in implementing standard precautions at the Denpasar City General Hospital (adjusted OR = 5.31). On the management side, infrastructure was also the main factor in raising the class of a hospital because the completeness of the facilities and infrastructure also supported safety programmes for patients. In line with research conducted by Lestari in 2019 at the hospital, high hospital accreditation lay in the availability of infrastructure in the hospital, which could carry out patient safety programmes well.

This research has several advantages, such as the use of complete statistical analysis, starting from univariate, bivariate, and multivariate, so that the research results obtained are more reliable. Apart from that, this research also examines nosocomial infection, which is a problem that often occurs in hospitals. Apart from its advantages, this study has limitations, especially the limited sample size of only around 50 patients. This research also has other weaknesses, such as the distance between lower and upper for infrastructure variables, which is quite large, making it possible for this research to experience problems in terms of the quality of internal validity.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Based on the results of the research and discussion, it can be concluded that the education level variable influenced nurse compliance in implementing the prevention and control of nosocomial infections with a p-value of 0.003; the knowledge variable influenced nurse compliance in implementing the prevention and control of nosocomial infections with a p-value of 0.005; the implementation of supervision variable influenced nurse compliance in implementing the prevention and control of nosocomial infections with a p-value of 0.001; the facilities and infrastructure variable influenced nurse compliance in implementing

the prevention and control of nosocomial infections with a p-value of 0.000; and the management support variable influenced nurse compliance in implementing nosocomial infection prevention and control with a p-value of 0.003. The dominant variable was facilities and infrastructure, which influenced nurse compliance in implementing the prevention and control of nosocomial infections with a p-value of 0.025.

Recommendations

This research recommends that nurses in hospitals be more careful in implementing the prevention and control of nosocomial infections. Apart from that, the West Nusa Tenggara Provincial Health Service should also continue to improve the quality and increase the quantity of facilities and infrastructure in hospitals because it is closely related to reducing the number of nosocomial infections to 0. Therefore, future research should take a larger number of samples to better represent the population of a region or district. Moreover, this research is quantitative, which expects generalization of the findings. Apart from that, determining appropriate variables and instruments is an interesting study for future researchers because it relates to the internal validity of a study.

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