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Analysis of Factors Affecting the Incidence of Hais (Healthcare Associated Infections) in the Inpatient of Dr. Iskak Hospital Tulungagung

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ABSTRACT
One of the efforts to prevent and stop the incidence of infection in health care facilities is to break or eliminate the chain of transmission of infection consisting of 6 components (infectious agent, reservoir, portal of exit, transmission method, portal of entry, suscptible host). Prevention can also be done by observing the risk factors and characteristics of the patient. The purpose of the study was to analyze factors that affect the incidence of HAIs (healthcare associated infections) in the inpatient of RSUD dr Iskak Tulungagung. The research design is in the form of quantitative research with case control analytical observational research methods with a retrospective approach. The research samples were some employees at RSUD dr. Iskak Tulunggung Regency as many as 83 case groups and 83 control groups with sampling techniques using the simple random sampling method. The results showed that the factors that influence the incidence of HAIs at RSUD dr. Iskak Tulungagung is an invasive action, a type of microorganism germ and the length of the day of treatment. While the most dominant factor affects the incidence of HAIs at RSUD dr. Iskak is the length of days of treatment with an OR of 5.256, meaning that the factor of length of days of care is 5 times more influential on the increase in the incidence of HAIs at RSUD dr. Iskak Tulungagung. Providing appropriate prophylactic antibiotics, balanced nutrition and vaccination to patients are steps that must be taken to help the patient's immune system remain in a state of being able to fight infection.

Keywords: Healthcare Associated Infections, Length of Stay, Prophylactic Antibiotics

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INTRODUCTION

Infectious diseases related to health services or Healthcare Associated Infection (HAIs) is one of the health problems in various countries in the world, including Indonesia. In the Asian Pacific Economic Committee (APEC) or Global Health Security Agenda (GHSA) forum, infectious diseases related to health services have become the agenda discussed. This shows that the HAIs caused have a direct impact as a burden on the country's economy. In principle, the incidence of HAIs can actually be prevented if health care facilities consistently implement PPI programs. Infection Prevention and Control is an effort to ensure protection to everyone against the possibility of contracting infections from general public sources and

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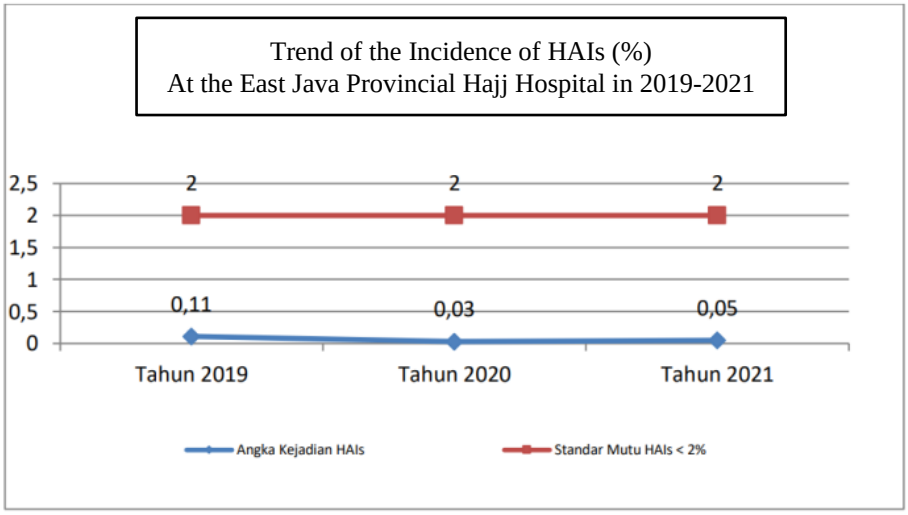
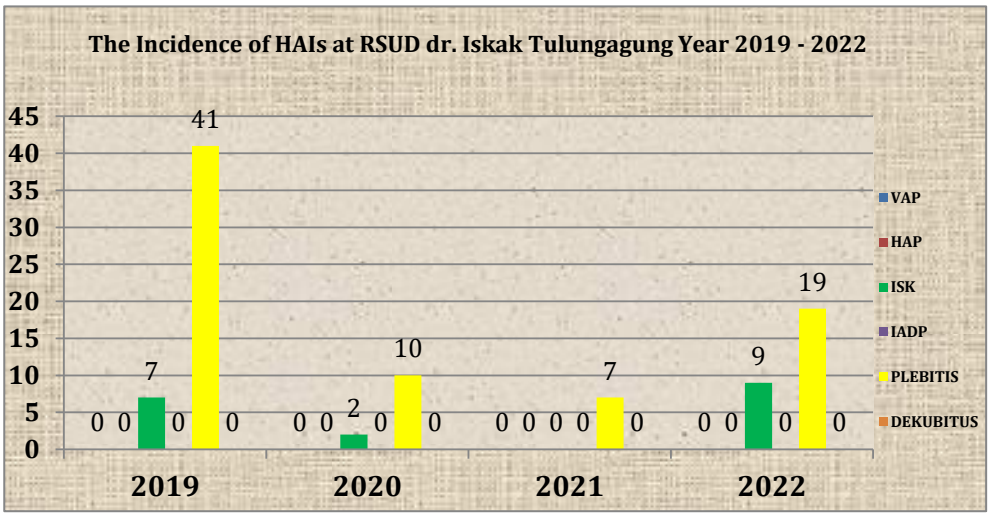
while receiving health services at various health facilities (Permenkes RI No 27, 2017).
The World Health Organization (WHO) says the impact of HAIs can cause long days of treatment, disability for a long time, increase resistance to microorganisms, increase the burden of treatment costs and the most dangerous can cause death (Sugiyono, 2017). Nosocomial infections also have an impact on losses due to emotional stress that can reduce the ability and quality of life of patients, increased use of drugs, the need for patient isolation and the increased need for supporting examinations (Rismayanti, 2019).
Nosocomial infections cause 1.5 million deaths every day worldwide. In developing countries, it is estimated that >40% of patients in hospitals develop nosocomial infections. 8.7% of hospital patients suffered from nosocomial infections during hospital treatment (Syahrir, 2018). Studies conducted in high-income countries found that 5% – 15% of hospitalized patients get HAIs which can affect 9% – 37% of those admitted to the ICU. Each year, ICU is diagnosed with about 0.5 million HAIs each year. Research at various universities in the United States states that patients treated in the ICU have a tendency to develop nosocomial infections 5-8 times higher than patients treated in ordinary rooms. Nosocomial infections occur mostly in the ICU in postoperative cases and cases with IV and catheter insertions that are not in accordance with standard infection prevention and control procedures applied in hospitals. In 2011 and 2012, the Centre for Disease Prevention and Control in Europe conducted prevalence surveys in 29 member states of the EU/European Economic Area and Croatia, totaling 231,459 patients in 947 participating hospitals and found 19.5% of patients in ICUs who had at least one healthcare-related infection (Delima, 2018).
The prevalence of HAIs in world hospitals reaches 9% or approximately 1.40 million inpatients in hospitals worldwide affected by nosocomial infections. Research conducted by WHO shows that about 8.70% of 55 hospitals in 14 countries located in Europe, the Middle East, Southeast Asia, and the Pacific show the presence of HAIs. The prevalence of HAIs is highest in the Eastern Mediterranean and Southeast Asia at 11.80% and 10% while in Europe and the Western Pacific at 7.70% and 9% respectively (Wahyuningsih, 2020). The incidence of nosocomial infections in hospitals in Indonesia is still very high, there is still an infection incidence rate of 55.1% for government hospitals and 35.7% for private hospitals. In developing countries including Indonesia, the average prevalence of infection is 9.1% with a variation of 6.1% - 16.0% (Ratnawati, 2018). Infectious diseases related to health services or Healthcare Associated Infection (HAIs) is one of the health problems in various countries in the world, including Indonesia. In principle, the incidence of HAIs can actually be prevented if health care facilities consistently implement the PPI program (Lakip Kemenkes RI, 2017).



The incidence of HAIs at the Hajj Hospital of East Java Province from 2019 to 2021 has decreased as presented by figure 1. However, when compared to 2020, the incidence of HAIs has increased from 0.03 to 0.05 (HAJI, 2021).



Picture 2. The Incidence of HAIs at RSUD dr. Iskak Tulungagung Year 2019 - 2022

From the results of data collection at RSUD dr. Iskak by IPCLN validated by IPCN. The incidence of HAIs from figure 1.2 shows that the average plebitis incidence rate is 19 events. The UTI incidence rate shows that the average is 5 events. As for VAP, HAP, IADP and Decubitus it is 0 which means there is no occurrence. These HAIs can occur due to several factors including ventilator installation techniques that are not in accordance with SPO, not optimal implementation of VAP bundles, lack of compliance in washing hands, facilities and infrastructure and patient care techniques with ventilators are not in accordance with standards, patient care techniques that MRS >2 days, installation techniques, facilities and infrastructure and urinary catheter treatment techniques are not up to standard, Infusion treatment techniques that are not yet up to standard. In this study, researchers are interested in conducting research on the analysis of factors that affect the incidence of HAIs (healthcare associated infections) in the hospitalization of RSUD dr Iskak Tulungagung.

METHODS

The design used is a case-control study. In the case-control study, identification of subjects (cases) who have been affected by the disease (effects), then traced retrospectively the presence or absence of risk factors that are thought to play a role. In this design, the measurement of the dependent variable is called the effect while the independent is sought retrospectively. Retrospective is carried out based on past data, by referring to secondary data or existing data in the form of medical records of HAIs patients during treatment at RSUD dr. Iskak Tulungagung from January 1, 2019 to December 31, 2022. The dependent variable in this study is the incidence of HAIs in hospitalization, while the independent variables in this study are comorbidities, invasive actions, types of germs and length of days of treatment. The population of this study is all documents of inpatients with the incidence of HAIs RSUD dr. Iskak Tulungagung in 2019 - 2022 totaled 95 patients. The sample calculation in this study used an unpaired categorical analytical formula, after calculating a total of 83 case samples and 83 control samples, so there were a total of 166 samples. The sampling technique in this study uses a simple random sampling technique that meets the inclusion criteria, namely inpatients and patients who received invasive procedures. The instrument in this study used the HAIs surveillance form with a standard format from the Committee for Infection

Prevention and Control (PPI) RSUD dr. Iskak. Data analysis in this study used chi-square test, Odds Ratio, and multiple regression test using SPSS 25. This research has passed the ethical test by the health research ethics commission and obtained ethical feasibility.

RESULTS

Univariat Analysis

Table 1. Characteristics of Respondents by Gender

No	Gender	Sum	Percentage
1.	Man	70	42%
2.	Woman	96	58%
	Total	166	100%

Based on the table above, it can be seen that most respondents are female with 96 (58%) respondents, while the remaining 70 (42%) respondents are male.

Table 2. Characteristics of Respondents by Age

No	Age	Sum	Percentage
1.	1-25 years	11	7%
2.	26-40 years	22	13%
3.	41-50 years	19	11%
4.	>50 years	114	69%
	Total	166	100%

Based on the table above, it can be seen that most respondents are aged >50 years with a total of 114 (69%) respondents, while the remaining 22 (13%) respondents are aged 26-40 years, 19 (11%) respondents are aged 41-50 years, 11 (7%) respondents are aged 1-25 years.

Table 3. Characteristics of Respondents by Room Type

No	Room Type	Sum	Percentage
1.	Intensif Room	46	28%
2.	Non Intensif Room	120	72%
	Total	166	100%

Based on the table above, it can be seen that most respondents are from the Non-Intensive room with a total of 120 (72%) respondents, while the remaining 46 (28%) respondents are from the Intensive room.

Table 4. Characteristics of Respondents by Type of HAIs

No	Type of HAIs	Sum	Percentage
1.	ISK	16	10%
2.	Plebitis	67	40%
3.	None HAIs	83	50%
	Total	166	100%

Based on the table above, it can be seen that most respondents are HAIs with the Plebitis category with a total of 67 (40%) respondents, while the remaining 16 (10%) respondents with the UTI category.

Table 5. Characteristics of Respondents based on Comorbidities

No	Penyakit Penyerta	Sum	Percentage
1.	Comorbidities	154	93%
2.	Non Comorbidities	12	7%
	Total	166	100%

Based on the table above, it can be seen that most respondents have comorbidities with 154 (93%) respondents, while the remaining 12 (7%) respondents do not have comorbidities.

Table 6. Characteristics of Respondents based on Invasive Measures

No	Invasive Measures	Sum	Percentage
1.	PVC	132	80%
2.	Catheter	34	20%
	Total	166	100%

Based on the table above, it can be seen that most respondents received invasive PVC with 132 (80%) respondents, while the remaining 20 (34%) respondents did not get invasive catheters.

Table 7. Characteristics of Respondents by Germ Type

No	Germ Type	Sum	Percentage
1.	Conventional Patogens	45	27%
2.	Conditional Patogens	96	58%
3.	Oppurtunistic Patogens	14	8%
4.	No germs	11	7%
	Total	166	100%

Based on the table above, it can be seen that most respondents are Conditional Pathogenic germ types with a total of 96 (58%) respondents, while the remaining 45 (27%) respondents with Conventional Pathogenic germ types, 14 (8%) respondents with Oppurtunistic Pathogenic germ types, 11 (7%) respondents have no germs.

Table 8. Characteristics of Respondents based on Length of Stay

No	Length of Stay	Sum	Percentage
1.	≥7 days	54	32%
2.	<7 days	112	68%
	Total	166	100%

Based on the table above, it can be seen that most respondents have a length of patient stay of ≥7 days with a total of 54 (32%) respondents, while the remaining 112 (68%) respondents have a length of stay of <7 days.

Table 9. Characteristics of Respondents by Room Name

No	Room Name	Sum	Percentage
1.	Anggrek	2	2%
2.	Cempaka	6	7%
3.	Dahlia	8	10%
4.	Flamboyan	32	39%
5.	GM 2	1	1%
6.	GM 4	2	2%
7.	Graha	3	4%
8.	ICU 1	3	4%
9.	ICU 2	7	8%
10.	ICU 3	1	1%
11.	Pulmonary	3	4%
12.	RTI	6	7%
13.	Sedap malam	2	2%
14.	Wijaya kusuma	7	8%
	Total	166	100%

Based on the table above, it can be seen that most respondents are from the flamboyant room with a total of 32 (39%) respondents, while the remaining 8 (10%) respondents from the

dahlia room, 7 (8%) respondents from the wijaya kusuma room and ICU 2, 6 (7%) from the RTI and cempaka rooms, 3 (4%) respondents from the pulmonary room, ICU 1, Graha, 2 (2%) respondents from the sedap malam room and orchids, 1(1%) respondents from ICU 3 and GM 2.

Bivariat Analysis

Table 10. Chi-Square Test Results of Variable Comorbidities with the Incidence of HAIs

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	3.923[a]	2	.141
Likelihood Ratio	3.138	2	.208
Linear-by-Linear Association	.116	1	.734
N of Valid Cases	166		

a. 2 cells (33,3%) have expected count less than 5. The minimum expected count is 1,16.

Based on the output of the Chi-Square Test above, the Asymp value is known. Sig is 0.141 > 0.05, so based on the basis of the decision making above, it can be concluded that there is no influence between comorbidities and the incidence of HAIs at RSUD dr. Iskak Tulungagung. This can be interpreted even though patients have congenital diseases do not affect the increase in the incidence of HAIs at RSUD dr. Iskak Tulungagung.

Table 11. Invasive Chi-Square Test Results with the Incidence of HAIs

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	59.253[a]	2	.000
Likelihood Ratio	56.575	2	.000
Linear-by-Linear Association	.312	1	.576
N of Valid Cases	166		

a. 1 cells (16,7%) have expected count less than 5. The minimum expected count is 3,28.

Based on the output of the Chi-Square Test above, the Asymp value is known. Sig is 0.000 < 0.05, so based on the basis of the decision making above, it can be concluded that there is an influence between invasive actions and the incidence of HAIs at RSUD dr. Iskak Tulungagung. This can be interpreted as patients who are subjected to invasive CVC / PVC actions affect the increasing incidence of HAIs at RSUD dr. Iskak Tulungagung.

Tabel 12. Chi-Square Test Results of Variable Germ Type with the Incidence of HAIs

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	32.487[a]	6	.000
Likelihood Ratio	35.815	6	.000
Linear-by-Linear Association	.042	1	.838
N of Valid Cases	166		

a. 4 cells (33,3%) have expected count less than 5. The minimum expected count is 1,06.

Based on the output of the Chi-Square Test above, the Asymp value is known. Sig is 0.000 < 0.05, so based on the basis of the decision making above, it can be concluded that there is an influence between the type of microorganism germs and the incidence of HAIs at RSUD dr. Iskak Tulungagung. This can be interpreted as patients who have types of microorganism germs affect the increasing incidence of HAIs at RSUD dr. Iskak Tulungagung.

Table 13. Chi-Square Test Results of Variable Germ Type with the Incidence of HAIs

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	21.943[a]	2	.000
Likelihood Ratio	22.699	2	.000
Linear-by-Linear Association	21.786	1	.000
N of Valid Cases	166		

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 5,20.

Based on the output of the Chi-Square Test above, the Asymp value is known. Sig is 0.000 < 0.05, so based on the basis of the decision making above, it can be concluded that there is an influence between the length of days of treatment and the incidence of HAIs at RSUD dr. Iskak Tulungagung. This can be interpreted as patients who have prolonged treatment affect the increasing incidence of HAIs at RSUD dr. Iskak Tulungagung.

Regresi Logistik Berganda Analysis

Table 14. Multiple Logistic Regression Test Results

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[a]	Jenis Kuman	.233	.222	1.100	1	.294	1.262	.817	1.951
	Lama Rawat	1.759	.388	20.552	1	.000	5.807	2.714	12.423
	Tindakan Invasif	.177	.212	.703	1	.402	1.194	.789	1.808
	Constant	-3.680	.938	15.399	1	.000	.025		
Step 2[a]	Jenis Kuman	.255	.220	1.345	1	.246	1.290	.839	1.985
	Lama Rawat	1.748	.387	20.446	1	.000	5.743	2.692	12.252
	Constant	-3.455	.890	15.057	1	.000	.032		
Step 3[a]	Lama Rawat	1.659	.373	19.753	1	.000	5.256	2.529	10.927
	Constant	-2.808	.666	17.786	1	.000	.060		

a. Variable(s) entered on step 1: Jenis Kuman, Lama Rawat, Tindakan Invasif.

There are 3 modeling steps, the first there are 3 independent variables then a large P-Value is obtained, namely the invasive action variable, meaning meaningless, which is 0.402, therefore the invasive action variable is issued in step 2. In step 2 the germ type variable has a greater P-value than the old treatment variable, therefore the germ type variable is excluded in step 3. In step 3, it can be seen that the variable length of OR treatment is 5,256 which is the most meaningful, meaning that after analysis with other independent factors, the length of stay factor is 5,256 times more influential on the increase in the incidence of HAIs at RSUD dr. Iskak Tulungagung.

DISCUSSION

The effect of comorbidities on the incidence of HAIs (Healthcare Associated Infections) in the hospitalization of RSUD dr Iskak tulungagung.

The results showed no influence between comorbidities and the incidence of HAIs at RSUD dr. Iskak Tulungagung. This can be interpreted even though patients have congenital diseases do not affect the increase in the incidence of HAIs at RSUD dr. Iskak Tulungagung. This research in in line with Rashella's research which obtained a p value of 0,701 which shows there is no relationship between congenital diseases and nosocomial infections (Rashella, 2012).

The effect of invasive measures on the incidence of HAIs (Healthcare Associated Infections) in the hospitalization of RSUD dr Iskak tulungagung.

The results showed that there was an influence between invasive measures and the incidence of HAIs at RSUD dr. Iskak Tulungagung. This can be interpreted as patients who are subjected to invasive actions affect the increasing incidence of HAIs at RSUD dr. Iskak Tulungagung. In a clinical study found that nosocomial infections are caused by infections from the installation of urinary catheters, infection with the use of infusion needles, respiratory tract infections, infections of the skin, infections from surgical wounds and septicemia. The use of non-sterile equipment is also the cause of nosocomial infections (Ema, 2022).

The influence of the type of microorganism germs on the incidence of HAIs (Healthcare Associated Infections) in the hospitalization of RSUD dr Iskak tulungagung.

The results showed that there was an influence between the type of microorganism germs and the incidence of HAIs at RSUD dr. Iskak Tulungagung. This can be interpreted as patients who have types of microorganism germs affect the increasing incidence of HAIs at RSUD dr. Iskak Tulungagung. Normal flora can turn into disease pathogens when there is a displacement or when the body's defenses are weak. Starting from the occurrence of bacterial contamination in the surgical wound, an inflammatory response arises to fight bacteria. Infection occurs when the number of bacteria and virulence exceeds the body's ability to defend against bacteria. It usually takes >10 microorganisms per gram of tissue to cause a nosocomial infection (Randi, 2023).

The effect of length of stay on the incidence of HAIs (Healthcare Associated Infections) in the hospitalization of RSUD dr Iskak tulungagung.

The results showed that there was an influence between the length of days of treatment and the incidence of HAIs at RSUD dr. Iskak Tulungagung. This can be interpreted as patients who have prolonged treatment affect the increasing incidence of HAIs at RSUD dr. Iskak Tulungagung. Patients with long hospital stays are at risk of infection. This is because the longer a patient is in the treatment room, the more likely they are to be exposed to bacteria from other patients or from medical interventions carried out (Fildzah, 2017).

The most dominant factor affects the incidence of HAIs (Healthcare Associated Infections) in the hospitalization of RSUD dr Iskak tulungagung.

The results showed that after analysis with other independent factors, the length of stay factor was 5,256 times more influential on the increase in the incidence of HAIs at RSUD dr. Iskak Tulungagung. This is because the longer the patient is in the treatment room, the more likely it will be exposed to bacteria from other patients or from medical interventions carried out (Fildzah, 2017).

CONCLUSIONS

There is no influence between comorbidities and the incidence of HAIs at RSUD dr. Iskak Tulungagung. There is an influence between invasive procedures and the incidence of HAIs at RSUD dr. Iskak Tulungagung. There is an influence between the type of microorganism germs and the incidence of HAIs at RSUD dr. Iskak Tulungagung. There is an influence between the length of days of treatment and the incidence of HAIs at RSUD dr. Iskak Tulungagung. The most dominant factor affecting the incidence of HAIs (Healthcare Associated Infections) in hospitalization at RSUD dr Iskak tulungagung is the variable length of stay of hospitalization.

SUGGESTION

Limit the number of patients in one treatment room. Patient density affects the transmission of infection from one patient to another. Pay attention to personal hygiene. Washing hands,

not lengthening nails, doing antiseptic, sterilization and disinfection measures will minimize the possibility of bacteria colonizing and causing infection. Providing appropriate prophylactic antibiotics, balanced nutrition and vaccination to patients are steps that must be taken to help the patient's immune system remain in a state of being able to fight infection. Reducing invasive procedures in patients and using antimicrobials optimally to patients will reduce the risk of infecting bacteria.

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