# Analysis of Factors Affecting the Establishment of Healthcare Associated Infections (HAIS) in Dr. Pirngadi Medan

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## Abstract

Healthcare-associatedinfections (HAIs) are one of the causes of the increase in morbidity rate and mortality rate in a hospital. This infection becomes a new health problem. HAIs in a hospital is caused by bacteria, virus, fungi, or parasite which come from patients' bodies and from exogenous factors, that is,from environment and polluted medical equipment. The objective of the research was to find out some factors which influenced the incidence of HAIs at RSUD dr. Pirngadi, Medan, in 2018. The research used observational analytic with case-control design. The samples were 69 patients with HAIs at RSUD dr. Pirngadi, Medan, in 2017. The result of multivariate analysis with logistic regression statistic test showed that some factors which influenced the incidence of HAIs were the use of antibiotics ($p=0.032 < 0.05$) and the number of treatment days ($p=0.014 < 0.05$). The factor which had the most dominant influence was the number of treatment days at OR-value = 5.516. The conclusion was that there as the influence of the use of antibiotics and the number of treatment days onthe incidence of HAIs. It is recommended that the hospital management pay attention to all aspects of infection in the hospital and prevent from infection which can endanger patients.

Keywords: Factors, Healthcare-Associated Infections

## Introduction

Hospitals are health facilities that provide individual health services including promotive, preventive, curative and rehabilitative services that provide inpatient, outpatient and emergency services (Ministry of Health, 2008). Hospitals in addition to seeking healing are also a source of various diseases. , who come from patients or from career-status visitors. These diseases can live and thrive in hospitals, such as air, water, floors, food and medical and non-medical equipment. (Nugraheni, Suhartono, & Winarni, 2012)

Infection is still one of the main causes of death and disease in hospitals and other health care facilities. Hospital infections are an important problem throughout the world. This infection continues to increase by 1% in several European and American countries, to more than 40% in Asia, Latin America and Africa. (MOH, 2011).

Judging from the origin or acquisition of infection can come from the community (community acquired infection) or come from the hospital environment (Hospital acquired infection) which was previously known as Nosocomial Infection. Hospital Acquired Infection) was replaced with a new term, "Healthcare Associated Infections" (HAIs). (Ministry of Health, 2011). In accordance with the Regulation of the Minister of Health of the Republic of Indonesia No. 27 of 2008 concerning Hospital Minimum Service Standards states that the standard number of incidents of hospital infection in inpatients is yaitu 1.5%. (Ministry of Health, 2008)

Hospital infection (IRS) or in a broader sense referred to as Healthcare Associated Infection (HAIs), is a type of infection that is closely related to the patient care process. So the target investigated in this case is mainly patients who are undergoing treatment. Thus the longer the risk of IRS treatment will also increase. Likewise, more invasive treatments will increase the occurrence of the IRS. For this reason, the risk of an IRS will be increased in large care centers or hospitals which will be increasingly enhanced with respect to the type of patient to be dealt with and the type of action to be taken. (Ministry of Health, 2011).

HAIs are one of the causes of increased morbidity and mortality (mortality) in hospitals. This infection can be a new health problem, both in developing countries and in developed countries. Therefore, hospitals are required to be able to provide quality services. in accordance with predetermined standards and must be applied by all health workers. (Salawati, 2012).

Many things can affect the occurrence of Healthcare-associated infections (HAIs) in patients in hospitals or other health care services. According to Sari et al (2015) it was found that the risk of HAIs is the urinary tract in patients with a urine catheter of> 7 days at 10, 52 times compared to patients with urinary catheter placement <7 days. "An indwelling urine catheter allows invading bacteria to colonize along the urinary catheter that stays in the urinary tract. The length of time the catheter is installed should not be too long, because the longer the patient is attached to a catheter, the higher the risk of urinary tract nosocomial infection. The presence of bacteria in the urinary tract is shown by the presence of bacteria in the urine (bacteriuria) "(Sari & Satyabakti, 2015).

Based on the results of a preliminary survey conducted at Dr. Pirngadi Medan, get the HAIs data that still passes the standard target indicator. According to the current Ministry of Health as an indicator used by Dr. Pirngadi Medan, the target number of HAIs in a hospital must be <10 / mile. With the incidence of surgical area infections (IDO) <2%, then the survey data from Dr. Pirngadi, infection surgery area (IDO) in August 2017 on digestive surgery there were 4.5%, October 2.6% and December 2017 11.1%.

Target on incident of Primary Blood Flow Infections (IADP) Due to Central Vein Catheter (CVC) Installation ≤10 ‰. Based on data from RSUD Dr. Medan Medan, Primary Blood Flow Infection (IADP) in January in intensive space was 25.9 ‰, February 12.69 ‰, March 20.17 ‰, July 34.48 ‰, October 11.59 ‰ and November 18.45 ‰.

Phlebitis figures occurred in the ICCU room on January at 22.7 ‰, in February in the ICCU room at 35.08 dan, and in the USC room at 16.81 ‰, March in the USC room was 11.9 ‰, and in May in the room USC is 15.3‰.

Formulate the research problem as follows: "What are the factors that influence the occurrence of Healthcare Associated Infections (HAIs) in Dr. Pirngadi Medan in 2018 "? The purpose of this study was to determine the factors that influence the occurrence of Healthcare Associated Infections (HAIs) in Dr. Pirngadi Medan in 2018

**Methods**

This research is an observational analytic study with case control design. This study was conducted to determine the factors that influence the incidence of Healthcare Associated Infections (HAIs) in Dr. Pirgadi Medan in 2018 by looking at medical records using a data collection tool in the form of a checklist. Independent variables (independent) in this study which are independent variables are: Age, Gender, Chronic Disease, Action Procedures and Number of Days of Care, dependent variable is Healthcare Associated Infections (HAIs).

Case population in this study were all patients who were exposed to Hospital Infections / Healthcare Associated Infections (HAIs) in the intensive room of Dr. Pirngadi Medan in 2017. Sample in this study all patients who were exposed to Hospital Infection / Healthcare Associated Infections (HAIs) in the intensive room of Dr. Pirngadi Medan in 2017, amounting to 81 people. Data collection methods in this study include primary data and secondary data. Primary data was obtained by giving questionnaires to respondents while the secondary data obtained from the medical record data of Dr. Pirngadi Medan Hospital.

**Result**

Table 1. Characteristics of Patients Based on Age and Gender

| Characteristics | Case | % | Control | % |
|---|---|---|---|---|
| Age | | | | |
| • < 16 year | 39 | 56,5 | 39 | 56,5 |
| • > 17 – 46 year | 7 | 10,1 | 3 | 4,3 |
| • > 46 year | 23 | 33,3 | 27 | 29,1 |
| Gender | | | | |
| • Man | 33 | 47,8 | 35 | 50,7 |

| | | | | |
|---|---|---|---|---|
| • Woman | 36 | 52,2 | 34 | 49,3 |
| **Total** | 69 | 100 | 69 | 100 |

Characteristics of respondents in this study consisted of age and gender. Based on research that has been done on patients in RSUD dr. Pirngadi Medan found results from 138 patients consisting of case patients and controls. For the age category, the highest proportion of sample patients in the age group <16 years was 69.5%, then the highest age group> 46 years were 33.3% and the smallest in the age group> 17-46 years were 10.1%. Then for 69 control patients, the proportion of control sample age at most in the age group <16 years was 56.5%, then the highest age group> 46 years was 39.1% and the least in the age group> 17 - 46 years was 4.3%.

For the gender category, of the 69 cases, the proportion of sexes in the sample cases was almost the same, namely for male sex, 47.8% and female gender 52.2%. Kemudiandari of 69 control patients was also almost the same, namely for male gender amounting to 50.7% and female gender as much as 49.3%.

Table 2. Frequency Distribution Overview of Antibiotic Use

| Antibiotic Use | Case | % | Control | % |
|---|---|---|---|---|
| There is | 58 | 84,1 | 37 | 53,6 |
| There is not | 11 | 15,9 | 32 | 46,4 |
| **Total** | 69 | 100 | 69 | 100 |

The description of antibiotic use was obtained by looking at the medical record using a data collection tool with a checklist. From 69 case patients almost all patients used antibiotics, namely 84.1% and did not use antibiotics as much as 15.9%. Kemudiandari 69 patients controlled the proportion of the use of antibiotics almost as many as for those who used antibiotics amounted to 53.6% and there were no 46.4%.

Table 3. Distribution of Frequency of Chronic Illness History

| Chronic Illness History | Case | % | Control | % |
|---|---|---|---|---|
| There is | 22 | 31,9 | 24 | 36,8 |
| There is not | 47 | 68,1 | 45 | 63,2 |
| **Total** | 69 | 100 | 69 | 100 |

A description of the history of chronic disease was obtained by looking at the medical record using a data collection tool in the form of a checklist. Of the 69 patients, most of them had no history of chronic disease, which was 68.1% while patients with a history of chronic illness were 31.9%. The majority of the 69 control patients were also largely without a history of chronic disease, which was 63.2% while patients with a history of chronic disease were 36.8%.

Table 4. Frequency Distribution Overview of Treatment Duration

| Treatment Duration | Case | % | Control | % |
|---|---|---|---|---|
| >48 hour | 66 | 95.7 | 48 | 69,6 |
| <48 hour | 3 | 4,3 | 21 | 36,4 |
| **Total** | 69 | 100 | 69 | 100 |

A long description of treatment was obtained by looking at the medical record using a data collection tool in the form of a checklist. Of the 69 patient cases almost all patients with length of stay> 48 hours were 95.7% while the length of stay <48 hours was only 4.3%. Kemudiandari of 69 patients, most of the patients with length of stay> 48 hours as much as 69.6% while patients with length of stay <48 hours were 36.4%.

**Analysis Bivariat**

Table 5. Age relation to HAIs events at Dr. Pirngadi Medan

| Age | HAIs | | | | Total | | p.value |
|-----|------|---|---------|---|-------|---|---------|
| | Case | | Control | | | | |
| | N | % | N | % | n | % | |
| <16 year | 39 | 28,3 | 39 | 18,3 | 78 | 56,5 | |
| 17 – 46 year | 7 | 5,1 | 3 | 2,2 | 10 | 7,2 | 0,383 |
| >46 year | 23 | 16,7 | 27 | 19,6 | 50 | 36,2 | |
| **Total** | 69 | 50,0 | 69 | 50,0 | 138 | 100 | |

From the results of cross tabulation between ages and the incidence of Healthcare Associated Infections (HAIs) it was found that for the age group> 46 years more control respondents were 19.6% while respondents j cases 16.7%. For the 17-46 year age category, there were more in the case respondents, namely 5.1%, while the control respondents amounted to 2.2% and for the age group <16 years 28.3% cases and control 18.3%

Age with the occurrence of Healthcare Associated Infections (HAIs) obtained p = 0.383. Because of the p value (0.383)> α (0.05), it can be concluded that there is no relationship between age and the incidence of Healthcare Associated Infections (HAIs).

Table 6. Gender relationship to the incidence of HAIs in Dr. Pirngadi Medan

| Gender | HAIs | | | | Total | | p.value | OR |
|--------|------|---|---------|---|-------|---|---------|-----|
| | Case | | Control | | | | | |
| | N | % | n | % | n | % | | |
| Man | 33 | 23,9 | 35 | 25,4 | 68 | 49,3 | | |
| Woman | 36 | 26,1 | 34 | 24,6 | 70 | 50,7 | 0,865 | 0,890 |
| **Total** | 69 | 50,0 | 69 | 50,0 | 138 | 100 | | |

From the results of cross tabulation between sexes with the incidence of Healthcare Associated Infections (HAIs), it was found that for female sex a little more in case respondents was 26.1% while case respondents were 24.6%. For male sex a little more in control respondents, namely 25.4%, while case respondents amounted to 23.9%.

From the results of chi-square analysis between sexes with the incidence of Healthcare Associated Infections (HAIs) obtained p value = 0.865 with an OR value = 0.890. Because the value of p (0,000) <α (0,05), it can be concluded that there is no relationship between gender and Healthcare Associated Infections (HAIs)

Table 7. Relation of Antibiotic Use to Healthcare Associated Infections (HAIs) in Dr. Pirngadi Medan

| Antibiotic | HAIs | Total |
|------------|------|-------|

| | Case | | Control | | | | p.value | OR |
|---|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | | |
| There is | 58 | 42,0 | 37 | 26,8 | 95 | 68,8 | | |
| There is not | 11 | 8,0 | 32 | 23,2 | 43 | 31,2 | 0,000 | 4,560 |
| **Total** | 69 | 50,0 | 69 | 50,0 | 138 | 100 | | |

From the results of cross tabulation between the use of antibiotics and the incidence of Healthcare Associated Infections (HAIs) it was found that patients with more antibiotic use in the case respondents were 42.0% while the control respondents were 26.8%. For those who did not use antibiotics more control respondents were 23.2%, while the case respondents amounted to 8.0%.

From the results of chi-square analysis between the use of antibiotics with the incidence of Healthcare Associated Infections (HAIs) obtained the value of p = 0.000 and the value of OR = 4.560. Because the p value (0,000) <α (0,05), it can be concluded that there is a relationship between antibiotic use and the incidence of Healthcare Associated Infections (HAIs), where patients with long-term antibiotic use tend to suffer from Healthcare Associated Infections (HAIs) 4,650 times compared with patients without long-term antibiotic use.

Table 8. Relation of Chronic Disease to HAIs in Dr. Pirngadi Medan

| Chronic Disease | HAIs | | | | Total | | p.value | OR |
|---|---|---|---|---|---|---|---|---|
| | Case | | Control | | | | | |
| | n | % | n | % | n | % | | |
| There is | 22 | 15,9 | 24 | 17,4 | 46 | 33,3 | | |
| There is not | 47 | 34,1 | 45 | 32,6 | 92 | 66,7 | 0,718 | 0,878 |
| **Total** | 69 | 50,0 | 69 | 50,0 | 138 | 100 | | |

From the results of the cross tabulation between the history of chronic disease and the incidence of Healthcare Associated Infections (HAIs), it was found that patients with more chronic disease in the control respondents were 17.4% while the case respondents were 15.9%. For those who did not have a history of chronic disease, there were slightly more in the case respondents, namely 34.1%, while the control respondents totaled 32.6%.

From the results of chi-square analysis between the history of chronic disease and the incidence of Healthcare Associated Infections (HAIs) obtained the value of p = 0.718. Because the p value (0.718)> α (0.05), it can be concluded that there is no relationship between the history of chronic disease and the incidence of Healthcare Associated Infections (HAIs).

Table 9. Relationship between the length of treatment for the incidence of HAIs in Dr. Pirngadi Medan

| Length of stay | HAIs | | | | Total | | p.value | OR |
|---|---|---|---|---|---|---|---|---|
| | Case | | Control | | | | | |
| | N | % | n | % | n | % | | |
| >48 hour | 66 | 47,8 | 48 | 34,8 | 114 | 82,6 | | |
| <48 hour | 3 | 2,2 | 21 | 15,2 | 24 | 17,4 | 0,000 | 9,625 |

| Total | 69 | 50,0 | 69 | 50,0 | 138 | 100 |
|---|---|---|---|---|---|---|

From the results of the cross tabulation between the number of days of treatment and the incidence of Healthcare Associated Infections (HAIs), it was found that patients with treatment days> 48 hours, most of the respondents in the case were 47.8% while control respondents were 34.8%. For the number of treatment days <48 hours more in the control respondents, namely 15.2%, while the case respondents amounted to 2.2%.

From the results of chi-square analysis between the number of days of treatment with the incidence of Healthcare Associated Infections (HAIs) obtained the value of p = 0,000 and the value of OR = 9.625. Because the p value (0,000) <α (0,05), it can be concluded that there is a relationship between the length of the day of treatment with the incidence of Healthcare Associated Infections (HAIs), where patients with a number of days of treatment> 48 hours tend to suffer from Healthcare Associated Infections (HAIs) 9,625 times compared to patients with treatment days <48 hours.

**Analysis Multivariat**

Multivariate analysis was carried out to see several variables which together influence the occurrence of Healthcare Associated Infections (HAIs). The variables included in the multiple logistic regression test are variables that have a p value <0.25 where the results of the selection of these variables can be seen in the following table.

Table 10. Table of Independent Variable Candidate Test Results

| Variabel | Score (p.value) | Information |
|---|---|---|
| Age | 0,144 | > 0,25 Not Modeling |
| Gender | 0,147 | > 0,25 Not Modeling |
| Antibiotic | 0,000 | < 0,25 Modeling |
| Chronic Disease | 0,718 | > 0,25 Not Modeling |
| Length of stay | 0,005 | < 0,25 Modeling |

Based on the table above it can be seen that of the five independent variables conducted by the candidate test, two independent variables were found which had p <0.25. Thus the variables that entered the multivariate test were variables of antibiotic use and length of stay.

Based on multivariate analysis of drug use variables with a value of p = 0.032 <0.05 and length of stay with a value of p = 0.014 <0.005, which means that both influence and the most dominant risk factors affect the incidence of HAI is length of stay with the value of β = 1.708 the largest and with the largest OR value of 5.516, which means that patients with a length of stay> 48 hours had the chance to have HAI 5,516 times greater than patients with treatment duration <48 hours.

**Conclusion**

1. There is no age effect on the incidence of Healthcare Associated Infections (HAIs) in Dr. Pirngadi Medan in 2018

2. There is no gender influence on the incidence of Healthcare Associated Infections (HAIs) in Dr. Pirngadi Medan in 2018
3. There is an effect of the use of antibiotics on the incidence of Healthcare Associated Infections (HAIs) in Dr. Pirngadi Medan in 2018
4. There is no influence of chronic diseases on the incidence of Healthcare Associated Infections (HAIs) in Dr. Pirngadi Medan in 2018
5. There is an influence on the length of treatment for the Healthcare Associated Infections (HAIs) incident at Dr. Pirngadi Medan in 2018
6. The most dominant factor influencing the occurrence of Healthcare Associated Infections (HAIs) is the length of treatment.

## Suggestion

1. It is expected that the hospital will better examine the diagnosis of the patient's disease correctly when he first enters the ICU so that he can provide a more accurate examination and treatment of the patient until the condition is stable and improved so that the patient's longer treatment will be longer resulting in nosocomial infection in patient care
2. It is expected that the doctors use antibiotics if more than one oil needs to be evaluated whether it needs to be continued, stopped or replaced according to the culture results.
3. It is expected for the hospital to pay attention to all aspects of infection in the hospital and prevent the emergence of infections that can endanger patients such as temperature regulation, tool sterility, and hygiene of health workers who directly interact with patients.
4. It is expected that the PPI Committee / Team in Dr. Pirngadi Medan City, can have extensive access to data sources and want to cooperate with all parts / units in the hospital, so that they can carry out surveillance properly or carry out an investigation of an outbreak.
5. It is expected that the PPI Committee / Team at Dr. Pirngadi Medan City continues to collect and analyze surveillance data as well as possible and related to an effort to prevent and control an infection.
6. For further researchers, it is hoped that they can conduct further research on Healthcare Associated Infections (HAIs) by looking at the limitations of this study by looking at whether there are other factors that are closely related to long-treated factors such as inappropriate antibiotic use factors that can lead to Healthcare Associated Infections (HAIs) so that they will extend the length of stay of patients in the hospital.

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