The Effect of VAP BUNDLE Use on the Prevention of VAP Incidents in Hospitalized Patients

Human Rights Hospital ICU

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Abstract- **Introduction**Nosocomial infection is a serious problem and one of the causes of increased morbidity and mortality rates in hospitals. VAP occurs due to the risk of inoculating oropharyngeal microorganisms, subglottis, sinuses, and the gastrointestinal tract, especially in the supine position. One of the prevention measures that has been published by The Institute for Healthcare Improvement (IHI) is to create a VAP Bundle which is a series of evidence-based interventions, if implemented together for all patients with mechanical ventilation

Method This research is a cross-sectional study with secondary data from medical records which assesses the incidence of VAP in ICU patients who underwent VAP bundles which will be compared with the incidence of VAP in ICU patients who do not have VAP bundles.

Results193 samples of medical records were obtained, 43 samples were carried out by the VAP bundle and 150 samples were not carried out. In the VAP bundle group, 4 samples experienced VAP and in the group that did not, 59 samples, then the data were analyzed by chi-square and a P value of 0.001 was obtained which indicated a significant difference between the two groups.

Discussion The VAP bundle can prevent VAP by preventing migration of germs on the ventilator to the patient's lungs in a multimodal way.

Index Terms- VAP bundle, Ventilator Ascociated Pneumonia

I. PRELIMINARY

Nosocomial infection is a serious problem and one of the causes of increased morbidity and mortality rates in hospitals. CDC in 2002 reported that there were 5 to 6 cases of nosocomial infection for every 100 visits to the hospital1

The CDC conducted a survey regarding nosocomial infections in the Intensive Care Unit (ICU) in the US and found that of the 427 nosocomial infections identified, pneumonia was the most common infection with 32% of them being related to a ventilator. Ventilator Associated Pneumonia (VAP) is a subset of pneumonia and this term refers to nosocomial pneumonia in mechanically ventilated patients. Endotracheal intubation is a risk factor for VAP where critically ill patients who were intubated for more than 24 hours were found to have a 6 to 21 times higher risk of developing VAP and patients who were intubated for less than 24 hours increased by 3 times the risk of developing VAP. VAP occurs due to the risk of inoculating oropharyngeal microorganisms, subglottis, sinuses, and the gastrointestinal tract, especially in the supine position. VAP has significant consequences for increasing morbidity rates, lengthening ICU stays, lengthening hospital stays, and increasing health care costs. The problem of antibiotic resistance which is increasing in prevalence also makes it more difficult to treat ventilator-associated pneumonia1,2

One of the preventive measures that has been published by The Institute for Healthcare Improvement (IHI), namely the VAP Bundle which is a treatment based on evidence that if implemented for all patients with mechanical ventilation, will result in a drastic reduction in the incidence of VAP. The VAP Bundle consists of the following five main treatments: (1) Head of bed height between 30° and 45°; (2) daily "sedation reduction" and assessment of weaning readiness; (3) peptic ulcer disease prophylaxis; (4) prevention of deep vein thrombosis; and (5) daily oral treatment with chlorhexidine. According to a study conducted by Khan et al, the VAP Bundle can reduce the incidence of VAP where from 142 samples 90.3% experienced a decrease in VAP rates with (p <0.001) after implementing the VAP Bundle3,4

II. METHOD

The research carried out was a retrospective analysis in which the researchers used secondary data obtained from medical records at the Haji Adam Malik Hospital in Medan from January 2021 to December 2021, the target population in this study were trauma patients treated in the ICU at Haji Adam Malik Hospital. The reachable population was all ICU inpatients at Haji Adam Malik General Hospital who had mechanical ventilation installed during the study. Samples were trauma and non-trauma patients

treated in the ICU at Haji Adam Malik General Hospital who met the inclusion criteria. Sampling was carried out using the total sampling method where the research sample consisted of the entire population being treated at the ICU of Haji Adam Malik General Hospital in Medan using a mechanical ventilation device from January 2021 to December 2021. The data that has been collected is analyzed using a computer program. Analysis using paired t-test if the data is normally distributed. If the data is not normally distributed, the Wilcoxon test will be performed.Numerical data is displayed as an average standard deviation, while categorical data is displayed as a percentage.

III.   RESULTS

Table 1 Characteristics of the Research Sample

	N	%
Gender		
Man	95	49.2
Woman	98	50.8
Anticoagulants		
heparins	39	19.7
Enoxaparin	4	2.0
warfarin	1	0.5
Not receiving anticoagulants	154	77.8
Culture Results		
Pseudomonas aeruginosa	41	21.4
Stenotrophonas maltophilia	22	11.5
Candida parapsilosis	6	3.1
Proteus mirabilis	26	13.5
Candida albicans	12	6.3
Staphylococcus equorum	20	10.4
No growth	65	33.9
VAP		
Yes	63	32.6
Not	130	67.4
VAP Bundles		
Yes	43	22.3
Not	150	77.7
Final Condition		
Get out of ICU	3	1.2
Die	190	98.4

Table 1 shows the characteristics of the sample in this study, with female sex, the number obtained is greater than that of males, namely 98 subjects (50.8%) and males as many as 95 subjects (49.2%). In this study, it was also found that patients received several types of anticoagulants and 39 (19.7%) samples received heparin anticoagulants, 4 (2.0%) samples received enoxaparin anticoagulants, 1 (0.5%) samples received warfarin anticoagulants, and 154 (0.5%) samples received warfarin anticoagulants. 77.8%) did not receive anticoagulants. For pathogens obtained from culture results in this study, 41 (21.4%) samples had Pseudomonas aeruginosa culture results, 22 (11.5%) samples had Stenotrophonas maltophilia culture results, 6 (3.1%) samples had Candida parapsilosis culture results , 26 (13.5%) had Proteus mirabilis culture results, 12 (6.3%) had Candida albicans culture results, 20 (10.4%) had Staphylococcus equorum culture results, and 65 (33.9%) showed no growth of pathogenic bacteria. From this study, 43 (22.3%) samples were taken from the VAP bundle and the rest were not taken from the VAP bundle. The incidence of a VAP in this study was 63 (32.6%). And for the final condition in this study, 190 (98.4%) died during treatment. From this study, 43 (22.3%) samples were taken from the VAP bundle and the rest were not taken from the VAP bundle. The incidence of a VAP in this study was 63 (32.6%). And for the final condition in this study, 190 (98.4%) died during treatment. From this study, 43 (22.3%) samples were taken from the VAP bundle and the rest were not taken from the VAP bundle. The incidence of a VAP in this study was 63 (32.6%). And for the final condition in this study, 190 (98.4%) died during treatment.

Table 2 Characteristics of Age and Length of Treatment

	Means	±SD	Normality
Age	50.35	16.2	0.001
Length of Treatment	6.75	8.6	0.001

In table 2, the average age of the study sample is 50.35 ± 16.2 with a non-normal distribution of sample distribution with a P value of 0.001 (<0.005), and the average length of stay for each research sample is 6.75 ± 8.6 with non-distributed data normal with a P value of 0.001 (<0.005)

Table 3 Final Conditions of Patients with hospitalization <7 days and >7 days

Length of Treatment	Final Condition			P
	ICU discharge, n(%)	Died n(%)	N(%)	
<7 Days	0 (0)	12 (6.2)	12 (6.2)	0.824*
>7 Days	3 (1.6)	178 (92.2)	181 (93.8)	
N(%)	3	190 (98.4)	193 (100)	

Table 3 shows that 3 patients left the ICU after 7 days of treatment in the ICU, 12 (6.2%) patients died before the 7th day of treatment in the ICU, and 178 (92.2%) patients died after the 7th day of treatment. in ICU.

Table.4 VAP Bundle with VAP Numbers

VAP	VAP Bundles			P
	Yes, n(%)	No n(%)	N(%)	
Yes	4 (2.1%)	59 (20.2%)	63 (32.6)	0.001*
Not	39 (30.6%)	91 (47.2%)	130 (67.4%)	
N(%)	43 (22.3%)	150(67.4%)	193	

*Chi-Square

In Table 4, it was found that 4 (2.1%) patients who underwent VAP bundles had VAP, 39 (30.6%) did not experience VAP. For those who did not undergo the VAP bundle, 59 (20.2%) VAP infections occurred, and 91 (47.2%) did not experience VAP. And a comparison was made between groups and a P value of 0.001 (<0.005) was obtained, which means that there was a significant difference between the two groups.

IV. DISCUSSION

In this study aims to assess the effect of the VAP bundle in preventing the occurrence of VAP, the data used is in the form of secondary data, namely medical records. There were 193 medical records and 43 medical records of patients received VAP bundle treatment and the rest did not receive VAP bundle treatment.

Age itself does not have much influence on the occurrence of a VAP event, but in general, elderly patients are more likely to have comorbidities so that the presence of comorbidities in patients with comorbidities can increase the occurrence of a VAP5 event. *Ventilator Associated Pneumonia* is an infection that often occurs in patients treated in the intensive care unit with a ventilator attached with an incidence rate in the intensive care unit of 32%. It is also one of the causes of high mortality in the intensive care unit in the world, causing 24-76% of deaths in patients treated in the intensive care unit.

In this study, the highest number of pathogenic bacteria Pseudomonas aeruginosa was found as much as 24% and the second most was Stenotrophomonas maltophilia as much as 11.4%. The VAP bundle is a prevention strategy in overcoming the high incidence of VAP in the intensive care unit which includes elevation of the head 30-45o, Cessation of sedation to assess extubation readiness, Prophylaxis of peptic ulcer, Prophylaxis of deep vein thrombosis, and oral hygiene with chlorhexidine. So that it can reduce the incidence of VAP 5

In this study, lower VAP rates were found in patients who received the VAP bundle treatment compared to patients who did not receive the VAP bundle treatment. The results of the data analysis showed that there was a significant difference between the two sample groups.. Pthis study also obtained an average hospitalization day of 6.75 days, where this hospitalization day was also influenced by whether or not a VAP occurred where in a study conducted by Narang S in 2018 it was found that when a VAP bundle was performedcan significantly decrease the length of time the patient is mechanically ventilated7,8

V. CONCLUSION

From the results of research conducted on 193 samples at the HAM General Hospital, the following conclusions were drawn:

There was a significant effect between patients who underwent the VAP bundle treatment and the incidence of VAP in the ICU room at Haji Adam Malik General Hospital, Medan (P value = 0.001). The average treatment for patients with a ventilator in the ICU room of Haji Adam Malik General Hospital Medan is 7 days (6.75). The mortality rate in the ICU of Haji Adam Malik General Hospital in patients who were intubated with mechanical ventilation was 98.3%. There were 6.2% of patients who died before the 7th day of treatment. The most common pathogens that cause VAP in Adam Malik General Hospital are Pseudomonas aureginosa and Stenotrophonas maltophilia based on research results

Suggestion

For further research it is recommended to be carried out prospectively with a longer period of time to compare before a VAP bundle is carried out in an ICU room and after a VAP bundle is carried out. in ICU. For more meaningful research, research should be done with a larger number of samples and with a multicentre.

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