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THE IMPLEMENTATION OF VENTILATOR ASSOCIATED PNEUMONIA BUNDLE (VAP) IN THE ICU OF EKA HOSPITAL, PEKANBARU

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ABSTRACT

***Background**: Nosocomial infections or known as Hospital Acquired Infections (HAIs) is a worldwide problem. VAP is nosocomial pneumonia which occurs more than 48 hours after installation of mechanical ventilation, either through an endotracheal tube or tracheostomy. The patient in ICU have high risk on VAP infection and increasing morbidity, mortality and also prolonged length of hospital stay*
***Methods**: This research is an observational study evaluating conditions before and after a specific standard operating procedure being implemented in reducing VAP infection in ICU EKA Hospital Pekanbaru.*
***Results**: It's obtained from medical record data of 339 patients hospitalized at ICU of Eka Hospital Pekanbaru ranging from 2016 to 2017. There is significant decrease number of VAP infections in 2017 by 60%. The reduction occurred due to the application of a routine VAP Bundle covering 100% for all hospitalized ICU patients.*
***Conclusions**: Strict monitoring and supervision are required to maintain VAP bundle and reduce the incidence of VAP infection in ICU of Eka Hospital Pekanbaru.*

***Keywords**: Application of VAP Bundle, Nosocomial Infection, Infection Control*

INTRODUCTION

Nosocomial infections as known as hospital acquired infections (HAIs) is a worldwide problem. No advanced country even claims to be free from this nosocomial infection [1]. HAIs are defined as infections that occur in patients during the treatment process at a hospital or other health facilities which has not emerged at the time of admission [2]. Research obtained from Europe hospitals in 2016, there were as many as 8.4% of ICU patients infected by HAIs after treatment for more than 48 hours or 2 days [3].

The most important of HAIs is those associated with blood flow infection caused by intravascular device (IVD) which is central line-associated blood stream infection (CLABSI), urinary tract infections related to catheter use (CAUTI), VAP, Clostridium dificile-associated diseases (CDAD), urinary tract infection (UTI), hospitalized acquired pneumonia, multidrug resistance (MDR), Acinetobacter Baumani, and surgical wound infections (SSI) [4]. Pneumonia occupies 15% of all HAI infections and has increased from 17 to 30% in the last 5 years [4]. VAP is nosocomial pneumonia that occurs more than 48 hours after installation of mechanical ventilation, either through an endotracheal tube or tracheostomy [4]. It leads to some fatal impact such as morbidity, disability, and mortality

The mortality rate of VAP reached 13% of the existing cases according to ICU collaborative development project [5]. The Institute of Healthcare Improvement (IHI) reported that there was 45% reduction in VAP infection rate due to VAP bundle [6]. According to IHI, patients with installed mechanical ventilators, in addition to the existence of Endotracheal tube (ETT, decreased consciousness, as well as loss of cough reflex), microorganisms may develop due to the presence of dental plaque biofilm [6].

The VAP Diagnostic Criteria under CPSI are as follows [7]:

a. Radiographic abnormality: the appearance of opac on a new or progressive and persistent chest radiography image, compatible with pneumonia, such as infiltrate, consolidation or cavitation
b. The symptoms occurred at least 2 of the following signs:
    1) WBC ≥ 12,000 or <4,000
    2) Body temperature> 38º C with no other causes
c. The occurrence of 2 (two) following symptoms below:
    1) Tracheal secretion: the onset of a new purulent, or change in characteristics, or the addition of secretions
    2) Increased demand for absorption
    3) Rales respiratory on inspiration or bronchial breath sounds on auscultation
    4) Impaired gas exchange (e.g. desaturation of O2, PaO2/FiO2 <240) increased in demand

In order to minimize the risk of infection in hospitals, Prevention and Control of Infection (PPI) are applied [8]. PPI is an effort to prevent and minimize the occurrence of infection in patients, officers, visitors, and communities around health care facilities [9]. In addition, infection prevention and strategies applied consist of the following: increasing host resistance, inactivation of infectious agents, cutting of transmission chains, and post-exposure measures [10]. Besides, PPI activities consist of the following: planning, implementation, coaching, education and training, monitoring and evaluation [11].

Since the beginning of 2000, several strategies have been undertaken to prevent and reduce VAP, one of them by carrying out the "bundle" strategy which was already implemented in the ICU for VAP prevention [12]. Bundles are a structured way to improve patient nursery outcomes and patient outcomes, performed with a set of evidence-based practiced directly to patients. In general, it includes three to five stages. After collectively and routinely administered, the result indicates that it can improve patients' outcomes. [13]

The high incidence rate of HAI's at Eka Hospital, Pekanbaru constitutes the number of VAP infections. Each year the incident rates of VAP increase and become a major problem in 2016. The infection source as result from the use of mechanical ventilator through contact, hands, and instruments. In order to overcome the problem, Eka Hospital Pekanbaru has implemented and performed routine VAP bundle activities. The establishment of VAP criteria at Eka Hospital, Pekanbaru based on criteria of PMK No.27 of 2017 on Guidelines on Infection Prevention and Control which consists of the following: 1) the existence of new infiltrate found in X thoracic rays, 2) blood and sputum cultures contained pneumonia, 3) clinical diagnosis of lung specialist, 4) clinical symptoms found [11]. The benefit of applying VAP bundle according to Saad Rabie Samra, et al is reducing nosocomial infection caused by pneumonia infection. This reduction also resulted in the decreasing rate of mortality, maintenance cost and LOS (length of stay) or shorter treatment term [16]. This study aimed to analyze the application of VAP bundle in VAP control program in ICU Eka Hospital Pekanbaru eith an expectation that it will reduce pneumonia infection especially VAP in the hospital so that it could decrease LOS number and improve hospital quality.

RESEARCH METHOD

This research is an observational study evaluating conditions before and after a specific standard operating procedure being implemented in reducing VAP infection at ICU Eka Hospital Pekanbaru. The selection of descriptive research method is to get an image of the application level of VAP bundle technique in ICU patients using installed mechanical ventilator at Eka Hospital, Pekanbaru.

The data were taken from medical record from all ICU Hospital patient Eka Hospital, Pekanbaru treated by using installed mechanical ventilator from 2016 to 2017. The sampling of this research utilized inclusion criteria and exclusion criteria. The following were several criteria in sample selection:

A. Inclusion Criteria:

1. Patients with an installed mechanical ventilator start on the day of ICU admission
2. Age of patient more than 18 years
3. No pneumonia occurs at first admission to ICU
4. Completed medical record

B. Exclusion criteria in this research are

1. Patient died in ICU < 48 hours
2. Patient with past history illness of pneumonia, bronchopneumonia.

According to government regulation by Indonesian Ministry of Health No. 27, Eka Hospital Pekanbaru follows the procedure VAP bundle to reduce VAP infection at ICU. All the nurse and health worker in ICU have been trained to do hand washing before and after procedures to patient as a general precaution procedure and especially ICU nurses have been trained to follow the VAP bundle procedures, consisting of elevating head bed patient into 30^0, avoiding suctioning mucous in airway if not necessary, performing oral hygiene by applying chlorhexidine 6 times a day as the antiseptic, training patient to take deep inhale and cough before and after operation procedure, performing percussion and postural drainage to stimulate a cough, doing early mobilisation after the operation, and monitoring and evaluating sedation and extubation daily. After nurses did the procedure above, they should fill the activity into a worksheet in the computer called Vesalius. There are 5 elements should be filled and completed by the ICU nurses.

RESULT

Eka Hospital, Pekanbaru has a Committee of Prevention and Controlling Infection (CPCI) that aims to protect patients, health workers and visitors and families of patients from the risk of contracting the infection while in hospital. One of the program targets of CPCI is to decrease the HAIs number by implementing VAP bundle according to the standard procedure set by the hospital. First of all, CPCI team make a guideline to complete VAP bundle program since early 2015 and insert the program into hospital information technology. The end of 2015, CPCI started training the health worker and nurse, especially who worked in ICU and make socialization. Since July 2016, this program has been being started and implemented to ICU patients until today. The VAP bundle was applied to ICU patient with inclusion criteria every day. Total patients who administered to ICU Eka Hospital Pekanbaru during 2016 - 2017 accounted for 339 people.

From the graph below can be seen that there was a significant decrease in VAP events in 2017. The decline in VAP numbers is the main focus of CPCI program in 2017.

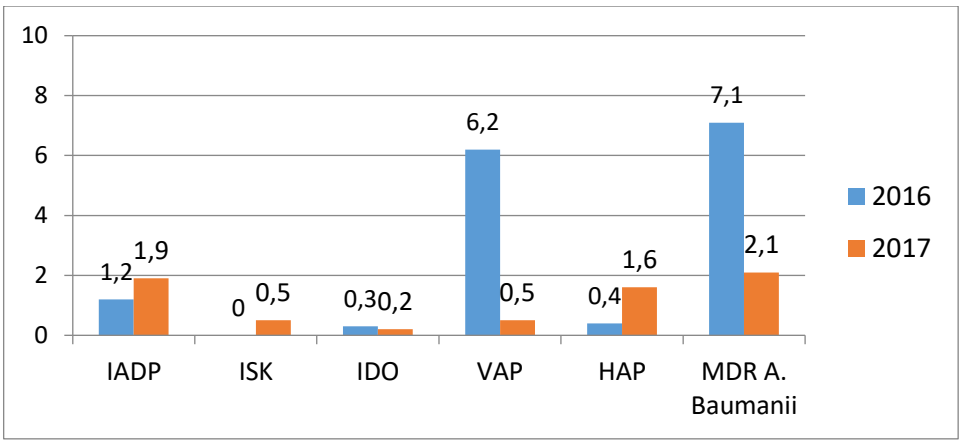
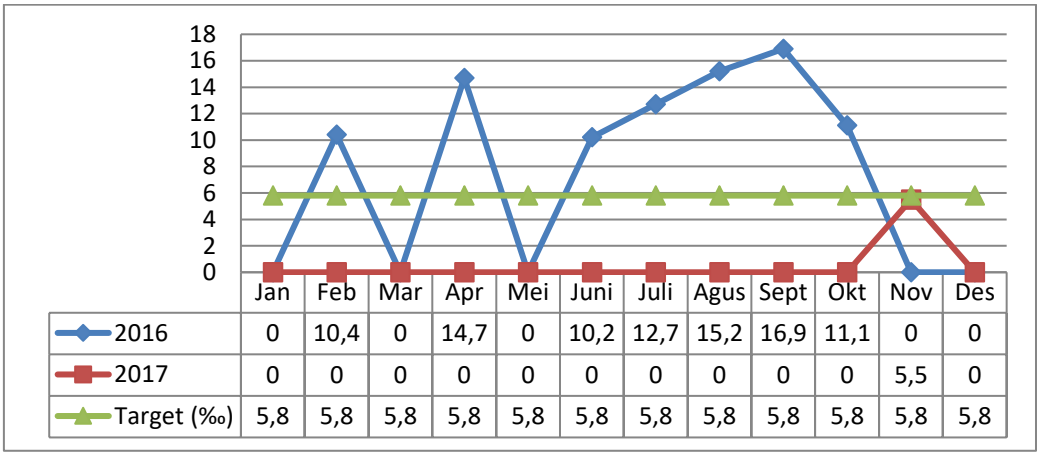


Figure 3. Comparison of HAI's Scores and Quality Indicators of Eka Hospital, Pekanbaru in 2017

There was a reduction of VAP incidents at the end of 2016 and became the basis for improvement in the following year. The VAP incidence rates experienced an increase in November 2017, only by 5.5‰. This figure 4 below, shows EKA Hospital's quality indicator figure which was less than 5.8‰. There was an average of 60% reduction in VAP incidents in ICU of Eka Hospital, Pekanbaru from 2016 to 2017.



	Jan	Feb	Mar	Apr	Mei	Juni	Juli	Agus	Sept	Okt	Nov	Des
2016	0	10,4	0	14,7	0	10,2	12,7	15,2	16,9	11,1	0	0
2017	0	0	0	0	0	0	0	0	0	0	5,5	0
Target (‰)	5,8	5,8	5,8	5,8	5,8	5,8	5,8	5,8	5,8	5,8	5,8	5,8

Figure 4. Comparison of VAP figures in 2016 to 2017

DISCUSSION

VAP is a frequent infection which occurs in the ICU. The incidents rate ranges from 10% - 40% in patients using installed mechanical ventilators. The disease can lead to a high rate of morbidity and mortality, so early prevention is required. Therefore, VAP bundle is one of the techniques employed to prevent VAP infection.

Eka Hospital, Pekanbaru implemented a program in reducing nosocomial infections (HAIs). A hospital regulation was established in October 2016 with No. 1230/KEPDIR/KBJ/PKU/X/2016 on Infection Prevention and Control Policy. In addition, the establishment of the Guidelines for Prevention and Control of Infection through regulation by Decree No. 1200/KEPDIR/PDU/X/2016. All programs refer to the Regulation of the Ministry of Health No. 27 of 2017 on Guidelines for Infection Prevention and Control at Health Service Facilities. Bundles for prevention and control of VAP according to the recommendation of PMK No.27 in 2017 contains 7 elements/stage but Eka Hospital, Pekanbaru only

employed 5 stages for several reasons such as the following: (1) the first point about hand washing was not included because hand washing was a universal action in carrying out all activities, (2) the seventh point about not providing deep vein thrombosis (DVT) prophylaxis was because it could lead to a great bleeding that will accelerate the death of the patient.

According to research that conducted by Saad Rabie Samra et al, August 2016, there were cumulative incidents of VAP in ICU before the implementation of VAP bundle in 2013 at 18.5% and the rate of infection reduced by 9% [16]. In addition, Kamel confirmed that reduced the rate of VAP infection from 34% to 8% [16].

From the literature, sex does not significantly affect the occurrence of VAP in hospital.[18]. A predisposing factor in a person who can cause a nosocomial infection is an invasive person. Intubation facilitates entry of germs to the lung due to contamination of the secretion around the end of the endotracheal tube. In addition, host factors such as disease severity, previous surgery actions, and antibiotic exposure are closely related to the risk of VAP occurrence. In patients with critical illness, phagocyte cell damage occurs so that the body's defense system decreases and facilitates the occurrence of nosocomial infection [19].

ICU nurse performs the VAP bundle to patients in ICU every day. The compliance rates of VAP Bundle was already 100%. Every 2 years the CPCI team will monitor and evaluate the programme. Based on an observational study conducted at Eka Hospital Pekanbaru got 8 patients who have been infected with ventilator-associated pneumonia during 2016-2017. The incident rates of VAP in ICU Eka Hospital, Pekanbaru in 2016 were 7.6%, on average. Meanwhile, there was a significant reduction of VAP incident rate by 0.5%. Despite the VAP incidence rate in November was 5.5 ‰, it was still below the indicator set at Eka Hospital, Pekanbaru, at 5.8 ‰. The result indicated that implementation of VAP Bundle could reduce the incidents of VAP in ICU Eka Hospital, Pekanbaru.

From 5 suggested activities, there was one activity rarely done by ICU nurse which was using ETT sucked if the time of ETT using more than 48 hours. The weakness of the program was compliance rates were not 100%. From 5 elements that ICU nurse should complete on VAP bundle, head elevation was already completed at 100%, oral hygiene was not given within 4 hours, but occasionally up to 6 hours, proton pump inhibitor sometimes was given to patients, and examination of weaning extubation has always been evaluated, but ETT sucked was only by 10% completed.

CONCLUSION

The implementation of VAP bundle at Eka Hospital, Pekanbaru Hospital from 2016 to 2017 has been done at 100%. However, the implementation of VAP bundle was not done completely.

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