Duration of Infusion, Implementation of Bundle Prevention and Phlebitis Incidence

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Abstract
The phlebitis incidence in Jemursari Islamic Hospital Surabaya Inpatient is the highest compared to other nosocomial infection, which reach 3.3%. Hand hygiene is the most important thing to prevent the spread of infection. This study is aimed to analyse the duration of infusion and implementation of bundle prevention in Jemursari Islamic Hospital Surabaya Inpatient. The research design was a case-control, with a chi-square analysis. The phlebitis incidence was obtained from patient medical record period September 2015 until March 2016 which involves 300 phlebitis incidences. Sample of this study was 285 phlebitis incidence (cases) and 285 non-phlebitis incidence (control). The results of the research obtained the duration of infusion (p-value = 0.000 or p <0.05), the implementation of hand hygiene (p-value = 0.001 or p <0.05) and the use of personal protective equipment (PPE) (p-value = 0.001 or p <0.05) has a relationship with the incidence of phlebitis in the Jemursari Islamic Hospital Surabaya Inpatient. Based on the results of the study, the recommendation of effort to reduce the incidence of phlebitis in Jemursari Islamic Hospital Surabaya Inpatient are adding supervision programs in the prevention and control infection work program, adjusting infusion placement procedure, creating phlebitis prevention procedure, creating identification of phlebitis procedure, and evaluating the compliance implementation of hand hygiene, conducting evaluation of the implementation of safety injection procedure, and carrying out informed consent to patients with an indication of the use of restraint.
Keywords: Phlebitis, Duration of infusion, Hand hygiene

I. INTRODUCTION

Healthcare-Associated Infections (HAI) is an infection that develops as a result of medical care in a hospital or other health care facility (CDC, 2016). A hospital-Acquired Infection, also known as a nosocomial infection, is an infection that is acquired when the patients hospitalized (WHO, 2002). Hospital-acquired infection can also be interpreted as a patient-acquired infection from a hospital or other health service where the infection is not obtained or not during the incubation period when the patient is admitted. Indicators in HAI assessment based on the guidelines of surveillance prevention and control infections consist of Phlebitis, Urinary Tract Infections (UTIs), Surgical Wound Infection, The Incidence of Decubitus Ulcers and Pneumonia (RCN, 2010).

Phlebitis is one kind of Health Care Associated Infection. Most phlebitis are happened on patients who use intravenous insertion. The capability of nurses as health workers in practical, who insert intravenous line, give drug therapy administration and monitoring phlebitis incident every day become important part in order to prevent phlebitis as Health Care Associated Infection and automatically to fill up the principles of patient safety. Their knowledge and skills about treatment, care and prevention of phlebitis must be increased in order to take control for Health Care Associated Infection.

Based on Uslusoy dan Mete, 54.5 % patients infected phlebitis while using infusion and 4.4% after infusion is removed (Uslusoy,*et.al*, 2007). Based on research previously, the incidence of nosocomial infections in Indonesia, including developing countries, the average prevalence of nosocomial infections is 9.1% with a variation of 6.1% -16.0% (Fauzi *et.al*, 2015). The rate of phlebitis in Jemursari Islamic Hospital Surabaya Inpatient is the highest nosocomial infection rate compared to the others which reach 3.3%.

Phlebitis is inflammation of blood vessels, which can be caused by mechanical, chemical or bacterial influences. Phlebitis causes undesirable effects, such as pain, failure to administer infusion and prescribed therapy, until a new infusion is needed which ultimately increases the cost and time of service. Phlebitis that is not treated properly can cause infection in the bloodstream (bloodstream infection). Therefore, early detection of complications during infusion installed or after release is very important.

In implementing Infection Surveillance and Control Programs, hospital needs Infection Surveillance and Control Committee. The implementation of Infection Surveillance and Control Programs will be technically run by Infection Prevention Control Nurse (IPCN). An infection control nurse is a full time nurse that specializes in preventing the spread of infectious agents by doing surveillance and control infection program in the hospital. Jemursari Islamic Hospital Surabaya Inpatient nowadays already has 2 full time nurses as an Infection Prevention Control Nurse that focused on doing surveillance and control infection program.

There are several researches that show contrasted result with the influence of infusion rate, gender, and patient's age to Inpatient phlebitis. Infusion liquid through infusion pump and catheter insertion on elbow raises the phlebitis risk. Besides, if the frequency of medication given to the patient increase, it will increase the phlebitis rate. Other factors for infection risk are hypertonic solution infusion and more than 24 hours infusion placement (Uslusoy,*et.al*, 2007). Hence, this research is aimed to analyse the duration of infusion placement and the implementation of bundle prevention in Jemursari Islamic Hospital Surabaya Inpatient.

II. METHODS

The research design was an observational analytic study with case-control. Incidence of phlebitis obtained in patient medical record period September 2015 until March 2016 was 300 phlebitis incidences. Sample of this study was 285 phlebitis incidence (cases) and 285 non-phlebitis incidence (control). In this study data collection on phlebitis was carried out using the following inclusion criteria. The criteria consist of the patient's medical record data was infused and treated in the Inpatient Room of Jemursari Islamic Hospital Surabaya in the period September 2015 to March 2016, documentation of medical records lists phlebitis incidence, and there was a Surveillance Form Healthcare-Associated Infections that were completely filled. Data were analysed by using chi-square analysis.

III. RESULT
A. *Duration of infusion with phlebitis incidence*
The duration of infusion to Inpatient the infective phlebitis is known when the patients use the infusion for the first time to indicate as phlebitis patient. If an infection is present, symptoms may include redness, fever, pain, swelling, or breakdown of the patient's skin. Those indications are noted in the Surveillance Infection Nosocomial Form. Beside that, identification of phlebitis is noted in the nurse's documents of patient's medical record. Then, based on Infusion Nursing Standard (2011), it is better for the patient routinely changes the infusion every 96 hours maximum (Infusion Nurse Society, 2011).

Table 1. Duration of Infusion with Phlebitis Incidence

Duration of infusion	Phlebitis				Total		p-value
	Yes		No				
	n	%	n	%	n	%	
<24 h	26	4.6	0	0	26	100	
1x24 h	41	7.2	37	6.5	78	100	
2x24 h	75	13.2	90	15.8	165	100	
3x24 h	89	15.6	114	20	203	100	0.000
4x24 h	39	6.8	39	6.8	78	100	
> 4x24 h	15	2.6	5	0.9	20	100	
Total	285	50	285	50	570	100	

Table 1 showed that the infusion for prolonged period will increase phlebitis risk. The result of research shows that there is a relationship between the duration of infusion with phlebitis incidence (p-value=0.000 atau p<0.05).

B. *Implementation of bundle prevention with phlebitis incidence*
Phlebitis bundle prevention is a group of activities to prevent phlebitis. There are 5 actions to prevent phlebitis such as hand hygiene; the use of personal protective equipment, the use of alcohol swab, not re-touch the disinfection area, and cover insertion area with dressing. The implementation of bundle phlebitis prevention can be found in the surveillance nosocomial infection form which is recorded by the nurse who places the infusion. If the form is not filled, then the implementation of bundle prevention of phlebitis is not valid while placing the infusion.

Table 2. Implementation of Hand Hygiene with Phlebitis Incidence

Hand hygiene	Phlebitis				Total		p-value
	Yes		No				
	n	%		%	n	%	
Yes	185	32.5	285	50	470	100	
No	100	17.5	0	0	100	100	0.001
Total	285	50	285	50	570	100	

Table 2 showed that the nurses who skip implementation hand hygiene will increase phlebitis risk. The result of research shows that there is a significant relationship between the implementation of hand hygiene with the phlebitis incidence (p-value=0.000 atau p<0.05).

Table 3. Use of Personal Protective Equipment (PPE) with Phlebitis Incidence

Use of personal protective equipment (PPE)	Phlebitis				Total		p-value
	Yes		No				
	n	%		%	n	%	
Yes	185	32.5	285	50	470	100	
No	100	17.5	0	0	100	100	0.001
Total	285	50	285	50	570	100	

Table 3 showed that the nurses who skip the use of personal protective equipment (PPE) will increase phlebitis risk. The result of research shows that there is a significant relationship between the use of personal protective equipment (PPE) with phlebitis incidence (p-value=0.001 atau p<0.05).

IV. DISCUSSION

Duration of treatment is the time needed by patients starting from the first hospital admission until the patient returns home. Patients with prolonged treatment can cause an increased risk of nosocomial infections. One of the nosocomial infections that can occur is phlebitis. The result of this study shows that there is a significant relationship between the duration of infusion with phlebitis incidence. There are factors that can influence phlebitis incidence such as kind, size and catheter material; the duration of catheterisation, as a dominant factor; the place of insertion; dressing; the sterilization of treatment intravenous therapy; intravenous liquid; parenteral drugs; and the frequency of intravenous therapy (Trianiza, 2013).

This result was similar to Uslusoy dan Mete research there is a difference in intravenous catheter placement less than 24 hours and more than 24 hours (Uslusoy *et. al*, 2007). The replacement of infusion must be done routinely and also note the other factors such as the infusion liquid, the continuous or intermittent infusion placement and infection or contamination, and also the infusion onto the patients. Infusion Nurses Society suggested to replace infusion routinely every 96 hours. Infusion replacement less than 96 hours lower infection risk. However, infusion replacement in emergency room is suggested routinely replaced in every 24 hours (Infusion Nurse Society, 2011). Intravenous catheter should be replaced routinely every 72-96 hours or faster if there is a complication and replacement of catheter should be done quickly (RCN, 2010). Erdogan & Denat also reported that phlebitis is increased when intravenous catheter still placed in a vein for 49-72 hours (Endorgan *et, al*, 2016).

This study also shows that the implementation of bundle prevention in this case hand hygiene presents significant relationship with phlebitis incidence. Infection prevention and control can be applied in 6 steps of hand washing and 5 moment for hand hygiene, the use of personal protective equipment (PPE), single use material for each patient and then waste it into special disposal, skilled and competence nurses based on standard operating procedure for the infusion placement, and also evaluating and reporting on phlebitis incidence (Neopane, 2013).

This result was in accordance with the theory that the implementation of a bundle for prevention of phlebitis, which consists of using PPE, implementing hand hygiene, not holding back the insertion area after disinfection, and closing the insertion area with dressings, is part of the infusion routine. must be done to patients during infusion (Jackson, 1998). If the prevention of phlebitis bundle is not done, phlebitis will occur. For this reason, it is important for infusion nurses at Jemursari Hospital in Surabaya to carry out a bundle to prevent phlebitis as an effort to reduce the risk of phlebitis.

Neopane research found that main roles in 6 steps of hand washing before doing cannula insertion significantly lower the thrombophlebitis incidence (Neopane, 2013). The important role of hand hygiene before the catheter placement can reduce the complication rate due to prevention the contamination during palpation (Wewalka, 2013). Related to health nursing if nurses don't have time to wash their hand using water, they can use alcohol-base-hand-rub (ABHR) before inserting vein catheter to prevent the infection (Theresia *et.al*, 2015). These ideas are supported by Maywald who said that ABHR using 60-90% alcohol is effective for hand decontamination in medical care.

The use of personal protective equipment (PPE) has relationship with phlebitis incidence (p-value=0.001 atau p<0.05). Based on Hirschmann, et al (2001), the use of gloves before insertion of peripheral venous catheters shows a significantly lower risk of complications (Hirschmann *et, al,* 2001). This shows that using gloves will prevent recontamination from the infected spot during vein palpation.

Another research shows that 9.7% patients infected phlebitis because the open spot for microorganism invation to Inpatient nosocomial infection through nurse's hand, droplet or air infection (Theresia, *et.al,* 2015). Protocol standarization in inserting peripheral infusion is not well applied in inpatient room to prevent phlebitis. CDC recommended to use sterile gloves as aseptic technique. Those recommendation can be used as a basic guidelines in standard operational procedure.

V. CONCLUSION

Phlebitis incidence is a serious problem for hospital that should be handled because phlebitis can influence the duration of treatment, financial and patients' satisfaction. Nurses are responsible to prevent and reduce the occurring of phlebitis incidence. The recommendations given are monitoring and evaluating the phlebitis prevention, such as doing hand – hygiene before and after treating the patient, changing the infusion regularly 3x24 hours and evaluating the nurse's obedience in doing hand – hygiene and the usage of personal protective equipment (PPE).

VI. ACKNOWLEDGEMENT

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