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Differences in the Number of Germs in the Insertion Area of *Pivc* Done by Polyurethane Transparent and Plaster Gauze Dressing

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Abstract— *Peripheral Intra Venous Catheter (PIVC) is the intravascular device most widely used in hospitals. The use of PIVC can cause complications including phlebitis, infiltration, extravasation, local infections, septicemia / sepsis, air embolism, fluid overload, pulmonary edema and speed shock. However, when managed properly, PIVC is safe and rarely causes serious complications, such as infection. Infection can occur through the intraluminal and extraluminal pathways. One way of preventing infection on the extraluminal route from PIVC is a dressing. Based on the above background, the researcher wanted to investigate the difference in the number of germs in the PIVC insertion area which was done by dressing using transparent polyurethane and gauze plaster. Sampling technique used is purposive sampling with each group was 11 patients. The independent variable of this study was the intervention of dressing PIVC insertion areas with transparent polyurethane and plaster gauze. The variable dependent in this study is the difference in the number of germs in the PIVC insertion area. The instrument used in this study was a petri dish. The results of this study, which were analyzed using unpaired t-test with a Z score of 0.96, showed that there was no difference in the mean of the difference (Δ pretest and posttest) the number of germs in the PIVC insertion area in the control group (dressing with plaster gauze) and the intervention group (dressing with transparent polyurethane). Based on these results indicate both dressing both transparent polyurethane and gauze bandage can be used as a dressing area with the insertion PIVC in patients, since there is no significant difference between the mean difference in the number of germs (Δpretest and posttest).*

Keywords— *Insertion area PIVC; dressing; number of germs; gauze plaster; transparent polyurethane.*

I. INTRODUCTION

Peripheral Intra Venous Catheter (PIVC) is the most widely used intravascular device in hospitals, because 80% of patients hospitalized require intravenous therapy[1]. The use of PIVC can cause complications, including phlebitis, infiltration, extravasation, local infections, septicemia/sepsis, air embolism, fluid overload, pulmonary edema, and speed shock [2,3,4].

Proper management of PIVC use is safe and rarely causes serious complications. However, complications such as plebsis, extravasation, infiltration and infection in general are common. The PIVC compilation accounts for 38% of catheter associated blood stream infections (CABSI) caused by Staphylococcus aureus (S.aureus)[5].

CABSIs can increase the risk of patient mortality, length of stay in hospital, and increase in hospitalization costs[6]. The dominant bacterial species associated with CABSIs are Staphylococcus aureus, S.epidermidis, Pseudomonas aeruginosa, Acinetobacter spp and Bacillus spp[7]. In most cases, the bacteria that cause CRBSIs come from the patient's skin or from health care staff[8].

When bacteria are on the skin, they usually do not cause serious illness. However, when the skin is passed by invasive equipment, bacteria can cross the skin and enter the systemic[9]. Furthermore, patients in the hospital can also be immunocompromised[10].

Infection that may occur can occur through the intraluminal and extraluminal. One way of preventing infection on the extraluminal route from PIVC is a dressing. Based on observations made at PKU Muhammadiyah Hospital Yogyakarta, the dressing PIC room used two types of dressings, namely gauze and tape (gauze and plaster) and using transparent polyurethane dressings.

Based on the results of interviews with the nurse administrators, they could not yet ascertain which type of dressing was more effective in preventing germ contamination in the patient's PIVC insertion area.

Based on the aforementioned background, the researcher wanted to know about the difference in the number of germs in the PIVC insertion area which was done by dressing using transparent polyurethane and gauze plaster.

II. METHODS

The research design used in this study was a Quasi Experiment. The quasi experiment used in this study was the nonequivalent control group pretest-posttest design[11].

The population in this study were patients who had PIVC installed in several rooms at PKU Muhammadiyah Yogyakarta Hospital. Sampling in this study was non-random (non-probability), that is, sampling was not random. The Technique sampling used was purposive sampling. Purposive sampling is carried out by taking the subject not based on strata, random or regional, but based on objectives certain[12].

The determination of the sample size according to Roscoe in Sugiyono[13] for the number of samples of simple experimental research with the intervention group and the

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control group[13], the number of samples for each group was 11. The inclusion criteria in this study were: 1) Patients who were followed by installation PIVC from scratch; 2) Patients who had a PIVC in hand. The exclusion criterion in this study were patients with wet PIVC wounds. Meanwhile, the criteria drop out in this study where the patient died before the applied post dressing was or the patient refused to continue following the research process.

This research was conducted in several rooms in PKU Muhammadiyah Hospital Yogyakarta. Microbiological observation sites to check the number of germs are carried out at the Yogyakarta Health Laboratory. The data collection process in this study was carried out in June-August 2018.

The independent variable in this study was the intervention for dressing the PIVC insertion area with transparent polyurethane and dressing PIVC insertion area with plaster gauze. The variable dependent in this study is the difference in the number of germs in the PIVC insertion area.

The instrument used in this study was a petri dish. Petri dish is a small shallow dish which is used mainly in the field of microbiology for planting microorganisms on solid media. The synonym for this petri dish is petri plate[14]. Petri dishes are used to grow microbes. Petri dishes consist of two parts, namely the base and the lid[15].

The data sample collection pre-test and post-test for all samples was carried out by researchers to avoid bias (carried out by 1 assistant). Dressing is carried out by the nurse in the research room according to the SOP.

The univariate analysis in this study consisted of data on age, gender, PIVC installation room and patient PIVC treatment room. Bivariate analysis was carried out on two variables that were suspected of having a relationship or correlation[12].

Prior to data analysis, the data normality test is performed first. The normality test was carried out as a consideration for conducting parametric or non-parametric tests. The data normality test used in this study was the Shapiro-Wilk test because the sample size in this study was < 50, with a significance value $p>0.05$[16] .

The comparative test is used to determine the difference in mean (difference Δ pre-post). The number of germs in the intervention group and the control group used an unpaired numerical comparative test with 2 groups (use unpaired t test because the two data were normally distributed).

The study was approved by the Institutional Ethics Committee from POLTEKKES KEMENKES YOGYAKARTA with number LB.01.01 / KE-01 / X / 162/2018. The permission from the RS PKU Muhammadiyah Yogyakarta was secured prior to the study, as well as informed consent from all respondents.

III. RESULT

This chapter describes the results of the study "the difference in the number of germs in the PIVC insertion area which was carried out by dressing using transparent polyurethane and gauze plaster. The number of respondents involved in the study was 22 respondents, consisting of 11 respondents who received dressings with transparent polyurethane as the intervention group and 11 respondents as the control group who received dressings with plaster gauze. The following is an explanation of the results of the research conducted as follows:

Characteristics of respondents based on age and gender. The following is the frequency distribution of patients based on age, sex in the intervention group and control group:

TABLE 1. Distribution of age, sex, PIVC installation room, and PIVC treatment room (N = 22)

Variable	Category of	Intervention Group (n = 11)		Control Group (n = 11)		Total	Percentage
		n	%	n	%	n	%
Age	18-39 years	1	9.1	2	18.2	3	13.6
	40-61 years	5	45.4	4	36.4	9	41
	62-83 years	5	45.4	5	45.4	10	45.4
Gender	Male	10	90.9	9	81.8	19	86.4
	Female	1	9.1	2	18.2	3	13.6

The characteristics related to the installation of PIVC in patients based on the installation and treatment rooms of PIVC in the intervention group and the control group are as follows:

TABLE 2. Distribution of PIVC Installation and Care Rooms (N = 22)

Variable	Category	Intervention Group (n = 11)		Control Group (n = 11)		Total	Percentage
		n	%	n	%	n	%
Installation Space for PIVC	Non Emergency Room	4	36.4	11	100	15	68,2
	Emergency Room	7	63.6	0	0	7	31.8
Treatment Room PIVC	Non Emergency Room	11	100	11	100	22	100
	Emergency Room	0	0	0	0	0	0

Table 3 below describes the results of the analysis of the difference in the mean number of germs in the PIVC installation area in the intervention group using transparent polyurethane and the control group using gauze plaster. Based on the results of the normality test, data on the difference in the number of germs in the intervention group with a value of p = 0.456 and also in the control group with a value of p = 0.610. Because the p value> 0.05, it can be concluded that the distribution of the number of germs in the control and intervention groups has normal data distribution. So the statistical calculations carried out to test the difference in mean difference (Δ pretest and posttest) of the number of germs in the control group and the intervention group are unpaired t-test.

TABLE 3. Test of Difference Average Difference (Δ Pre-Test and Post-Test) Number of Germs in the PIVC Insertion Area in the Control Group and the Intervention Group (N = 22)

Group	Difference *before* and after treatment Total Germs		Z	p
	Mean	SD		
Control	1.582	1.681	0.96	0.341
Interventions	0.621	0.598		

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Referring to Table 3 above shows that Ha is rejected because the value of p> 0.05 (p = 0.314). There is no difference in the mean of the difference (Δ pre test and post test) the number of germs in the PIVC insertion area in the control group and the intervention group. The difference in the mean or mean in the two groups is shown in column Z, namely 0.96.

IV. Discussion

The characteristics of critical patient respondents in the control group and the intervention group in this study have almost the same characteristics between the two groups. Patients in this study ranged in age from late adolescence to late elderly. The average age of the respondents was 62-83 years 10 people (45.4%), the sex of the respondents was male 19 people (86.4%). The most PIVC installation rooms are in the non emergency room with 15 people (68,2%), while the most PIVC treatment rooms are all in non emergency room .
According to the data from this research, Ha was rejected because the p value was> 0.05 (p = 0.314). This shows that there is no difference in the mean of the difference (Δ pre test and post test) the number of germs in the PIVC insertion area in the control group and the intervention group. The difference in the mean or mean in the two groups is shown in column Z, namely 0.96. There was no significant difference in the mean difference in the number of germs in the insertion area between those using transparent polyurethane and those using plaster gauze and dressing every day using normal saline (NaCl 0.9%).

Based on the results of this study, there was a decrease in the number of germs before and after dressing with transparent polyurethane. Dressing with transparent polyurethane has advantages; that to be able to see the wound, prevent moisture loss, protect it from external contamination, protect against abrasion, can be used as a dressing over the other dressing[17] .

Transparent polyurethane is semipermeable so that it can prevent contamination of bacteria, viruses, other foreign objects and is watertight while maintaining skin breath (can maintain skin integrity). This confirms that the dressing with transparent polyurethane has the advantage of protecting it from external contamination[17]. Based on important criteria (SSIVD), it is stated that the use of transparent dressings is choice of dressing the right to minimize the risk of infection[18].

There was a decrease in the number of germs before and after dressing because every day the done dressing was according to the Standard Operating Procedure (SOP) with normal saline for dressings with plaster gauze. The use of cleaning fluid for the insertion area of the skin with normal saline is quite effective for cleaning around the CVC insertion area. According to Simcock[19] recommends cleaning the outer area of insertion with normal saline and sterile gauze with the aim of removing blood, exudate or impurities that make infection possible. Including the initial efforts to prevent infection in the insertion area is to do dressings routine which are the outline of the Centers for Disease Control and Prevention and hospital policies. It is equally important to carry out the procedure in a sterile manner during insertion of the IV catheter line and to perform the dressing[20]. Change of dressings with sterile gauze and plaster is carried out every 24-48 hours or when wet, loose or dirty or when inspection of the insertion area is required[21]. According to Loveday et al[21] stated that sterile gauze and plaster dressing should be changed daily, and whenever it is loose, dirty, or damp.

Dressing the insertion area with gauze and plaster has the advantages of being inexpensive, easy to use and ideal for wrapping wounds[17]. Patients who are intolerant of transparent dressings use sterile gauze and bandages for dressing. Dressing with gauze is better than transparent dressings if the patient is sweating, or if it is bleeding[22].

The difference in the number of germs before and after dressing, there was no significant difference in the two groups because the PIVC insertion process from the beginning and the dressing and treatment processes were carried out according to standard operational procedures. This shows that both PIVC dressings, namely transparent polyurethane and plaster gauze, can both be used in the clinical care setting of patients requiring treatment with PIVC.

Therefore, the type of selection for dressing the PIVC insertion area is not only based on the consideration of the type of dressing that can minimize the risk of infection, it must also consider other factors in dressing selection, whether it provides comfort for the patient is safe to protect catheter, easy to use and open [18,23].

V. Conclusions

The difference in the number of germs before and after dressing, there was no significant difference in the two groups of this study because the PIVC insertion process from the beginning and the dressing and treatment processes were carried out according to standard operational procedures. This shows that both PIVC dressings, namely transparent polyurethane and plaster gauze, can both be used in the clinical care setting of patients requiring treatment with PIVC. Based on these results indicate both dressing both transparent polyurethane and gauze bandage can be used as a dressing area with the insertion PIVC in patients.

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