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In House Training In Nursing On Knowledge of Chemical Phlebitis In Giving Intravena Therapy

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ABSTRACT

Intravenous therapy is the provision of access that aims to provide fluid, electrolytes, nutrition and medication administration. The causes of chemical phlebitis are drugs that have acidic and alkaline pH, hypertonic infusion fluids and droplets that are too fast. The purpose of this study was to determine nurses' knowledge about intravenous therapy with the incidence of phlebitis. Pre-experimental descriptive analytical research method with one group pretest-posttest design with accidental sampling technique approach involving 89 nurses with career paths including PKI – PK IV. The variables studied were to find out the knowledge of nurses about phlebitis in administering intravenous therapy at the Bandar Lampung Advent Hospital. With the pretest and posttest questionnaire. Statistical test using Paired T-test. The results obtained before the seminar on PK I were 8.7 (80%) and after the seminar 9.43 (94%). The level of knowledge before the seminar on PK II was 7.92 (79%) and after the seminar 9.74 (97%). In PK III before the seminar the value was 7.97 (79%) and after the seminar 9.23 (92%). Whereas in PK IV before the seminar value 8.2 (83%) and after the seminar 9.47 (94%). The Paired T-test results have a significant difference between the knowledge of nurses before and after the seminar on IV PK I-PK with a p-value of 0.000 <0.05. Advice that nurses increase knowledge about intravena therapy and the causes of chemical phlebitis so that it can improve the quality of service.

Keywords: Chemical plebitis, In house training, Intravenous therapy

INTRODUCTION

Intravenous therapy is one of the actions that is often given to patients hospitalized as infusion therapy pathways, drug administration, fluid and blood products or blood sampling (Alexander, et al, 2010). The purpose of intravenous therapy is to replace body fluids containing water, electrolytes, vitamins. protein, fat, calories, which cannot be adequately maintained through oral, improve acid base, improve the volume of blood components, provide access to drugs into the body, and provide nutrition when the digestive system is disrupted (Perry & Potter , 2009). Therefore, this therapy is generally given to patients admitted to the hospital, where patients will get vascular access at several stages of treatment. Intravenous fluid infusion is the administration of a certain amount of fluid into the body through a needle into a vein to replace

fluids or food substances from the body. Intravenous therapy is done by installing a cannula or catheter as intravascular access (Kozier, 2010).

Along with the development of health technology with the emergence of a variety of different venous access devices, complex service systems, and the provision of treatments that are very specific to various patient conditions, have major implications for nursing practice. Nurses must have high clinical knowledge and competence so that the provision of infusion therapy will be more guaranteed (Alexander, et al, 2010). According to Perry & Potter 2001 (in Gayatri & Handayani, 2008) said infusion was instructed by doctors but nurses were responsible for giving and maintaining the therapy to patients. Whereas Scales (2009) explains the role of nurses in infusion therapy not only for the administration of medication agents, but more broadly include ng the installation of IV access, care, monitoring, and the most important thing is preventing infection.

Infusion therapy is included in one invasive action, therefore in carrying out its duties nurses must have knowledge related to assessment, planning, implementation, and evaluation in the treatment of infusion. When a nurse is given the task of providing infusion therapy, the only ability needed is to properly and skillfully attach the vein. Nurses also must have an agreement to provide safe, effective infusion therapy and quality infusion treatment (Alexander, et, el, 2010).

One complication of intravenous therapy is phlebitis. Phlebitis is inflammation of one or more layers of the vein wall that causes pain, the skin is red and hard, and the patient feels uncomfortable during administration of the drug (Higginson & Parry, 2011). Phlebitis is also a nasocomial form that often appears in hospitals and is a serious problem faced by hospitals all over the world, especially developing regions and used as an assessment of hospital service benchmarks (Kepmenkes RI No. 129 of 2008). Phlebitis can be divided into three types based on the causes, namely chemical phlebitis, bacterial phlebitis, mechanical phlebitis. Chemical phlebitis associated with osmolarity is defined as the concentration of a solution or the number of particles dissolved in a solution. The solution is categorized as an isotonic, hypotonic, and hypertonic solution. Bacterial phlebitis is an inflammation of the veins associated with bacterial colonization, which can be a serious problem as a complication due to a lack of aseptic levels during the installation of intravenous devices, either through the hands, intravenous fluids, and infusion puncture area. Mechanical phlebitis with regard to venous selection and cannula precision, the size of the cannula is too large with the size of the vein, inadequate cannabis fascination (Hankins, et, al, 2010). According to Jarumi Yati (2009) Phlebitis chemistry is

related to the response of the intima to the osmolarity of intravenous fluids. Inflammatory response can occur due to pH and osmolarity or drugs also because of the chemical properties of cannula materials used. Intravenous fluids that have extreme pH and osmolarity are always at risk for high phlebitis. Fluids or drugs with a pH <5 or> 9 or that have osmolarity> 900 mOsm / l can irritate the intima vein layer so that it can stimulate the inflammatory and thrombotic processes.

Phlebitis can arise spontaneously or is a result of medical procedures. Some factors that affect phlebitis are intravenous catheter type (IV), catheter size that is installed more than 72 hours, catheter attached to lower leg, do not heed antiseptic principle, hypertonic infusion fluid, and blood transfusion because it is a microorganism growth medium (Saryono and Angriyana, 2011). The consequences of complications from phlebitis in patients are to increase the length of stay in the hospital or Length of Stay (LOS), increase therapy and increase nurse responsibility, and can cause patients to risk other health problems (Alexander, et al., 2010). Phlebitis also causes thrombus which subsequently becomes thrombophlebitis, the course of the disease is usually benign, however if the thrombus is released then transported in the bloodstream and into the heart it will cause a ball valve that can suddenly block atrioventricular causing death (Synder, 2010).

A WHO study showed that around 8.7% of 55 hospitals from 14 countries from Europe, the Middle East, Southeast Asia and the Pacific showed 10.0% of Nosocomial Hospital acquired Infection (HAIs) and Southeast Asian infections (Rimba Putri, 2016). Based on the Republic of Indonesia Ministry of Health in 2013 the incidence of phlebitis in Indonesia was 50.11% for Government Hospitals while for Private Hospitals it was 32.70%. According to foreign research, such as Uslusoy & Mete (2008) in the General Surgery Department of the Dokuz Eylul University Hospital in Turkey, the incidence of phlebitis was 54.5% (309 out of 568 patients), which was based on location which caused more phlebitis in the Antekubital Fossa (63.2%, 79 of 125), then arm (56.9%, 99 of 174), wrist (48.7%, 56 of 115), and on the back of the hand (48.7%, 75 from 154). Based on the body part, the right body is more at risk for phlebitis (57.5%, 115 of 200) than the left body (52.7%, 194 of 368).

Chemical phlebitis, Osmolality is defined as the concentration of a solution or the number of particles dissolved in a solution. Normal blood pH is located between 7.35-7.45 and tends to be alkaline. The pH of the liquid needed in administering therapy is 7 which means neutral. Sometimes a solution requires a more acidic concentration to prevent caramelization of dextrose in the autoclave sterilization process, so that solutions containing glucose, amino

acids, and lipids that can be used in parenteral nutrition are more phytitogenic. In healthy people, human plasma concentrations are 280 to 300 mOsm / L. Solutions are often categorized as isotonic, hypotonic, or hypertonic solutions, according to the total osmolality of the solution compared to plasma osmolality. The tonicity of a solution not only affects the client's physical status but also influences the intima of blood vessels. The wall of the intima will experience trauma in the administration of hyperosmolar solution which has an osmolality of more than 900 mOsm / L, with higher osmolality there will be damage to the peripheral vein wall. Because the solution is hypertonic, through the central vein the blood flow becomes fast so it does not damage the wall (Darmawan, 2010). In simple terms, chemical phlebitis means inflammation of the veins which results in microparticles in the infusion solution. The causes of chemical phlebitis are irritation by drugs, hypertonic intravenous fluids, and droplets that are too fast (Graber, 2010).

The trigger factor for the occurrence of chemical phlebitis is 1) Irritation by drugs. Extreme fluid pH and osmolarity always follow the risk of high phlebitis. The pH of dextrose solution ranges from 3–5, where acidity is needed to prevent caramelization of dextrose during the autoclave sterilization process, so that solutions containing glucose, amino acids and lipids used in parenteral nutrition are more phlebitogenic than normal saline. Injectable drugs that can cause severe venous inflammation include potassium chloride, vancomycin, amphotrecin B, cephalosporins, diazepam, midalozam and many chemotherapy drugs. With osmolarity> 900 mOsm / L it must be given through a central vein. Microparticles formed when the drug particles do not dissolve completely during mixing are also contributing factors to phlebitis. By using a filter size of 1 to 5 microns in the infusion set it will reduce or minimize the risk of phlebitis. (Darmawan, 2010). 2) Hypertonic Infusion Fluid. Hypertonic infusion is an intravenous fluid whose osmolarity is higher than serum, so that it can draw electrolyte fluid from tissues and cells into the blood vessels. This fluid can stabilize blood pressure, increase urine production, and reduce edema (swelling). 5% dextrose is added to normal saline or Ringer's solution, its total osmolality exceeds the osmolality of extracellular fluid. However, dextrose is rapidly metabolized and only isotonic solution is left. Therefore, any effect on the intracellular compartment is transient in nature. Similarly, 5% dextrose is usually added to multiple hypotonic electrolyte solutions. This solution is very hypertonic and must be given to the central vein so that it can be diluted with rapid blood flow. Saline solution is also available in higher osmolar concentrations than extracellular fluids. These solutions draw water from the intracellular compartment to the extracellular compartment and cause the cells to shrink. If

given quickly or in large quantities, it will cause excess extracellular volume and trigger excess circulatory fluid and dehydration. Hypertonic solutions produce greater osmotic pressure than extracellular fluids (Brunner and Suddarth, 2008). Other fluid distribution is based on the group, namely crystalloids are isotonic, where the fluid is effective in filling the volume of fluid into the blood vessels in a short time, and useful for patients who need fluids immediately. Examples of crystalloid fluids, namely Ringer-Lactate and physiological salts, the size of the colloid is large enough so that it will not come out of the capillary membrane, and remain in the blood vessels, and can draw fluid from outside the blood vessels, for example albumin and steroid.3). Drops that are too fast. achieving accurate flow velocity is always an important concern in intravenous therapy because the accuracy of reducing the incidence of complications, such as infiltration, phlebitis, patency is reduced, and metabolic problems and excess circulation can be caused by infusion too quickly (Joanne, 1998). The rate of administration of intravenous solutions is also considered to be one of the causes of phlebitis (INS, 2006). Nurses must look at the given set of droplets per ml, the droplet factor is very important to give infusions in the right time period to prevent infusion and excess . To better understand, we must first know the formula for calculating the amount of liquid droplets in minutes and hours (Wahit, 2015).

METHODS

The research method used in this study was pre-experimental with one group pretest-posttest design. The Accidental Sampling technique approach involved 89 nurses with career paths including PK I-PKIV . This study of the pre-experimental group was given an initial test before intervention. After the intervention is given, the final test is carried out to see the results or effects of the intervention. Interventions in the form of providing knowledge to nurses about chemical phlebitis in intravenous therapy. The population studied in this study were nurses at the Bandar Lampung Advent Hospital. Sampling is selected using the Total sampling technique. nurses with female and male sex, restrictions on PK I - PK IV with ages 25-60 years, and D3 and S1 Ners educated The instruments used in this study were questionnaire sheets which obtained primary data in this study using the test results of treatment (pre-test and post-test), namely: Pre-test question sheet (initial test before receiving treatment / in-service education). The questions given are taken from the question bank which has been tested for validity and reliability. Question sheet Post-test (final test after receiving treatment / in-service education). The questions given are taken from the question bank which has been tested for

validity and reliability. Quosioner (questionnaire) is a collection of written questions that are used to obtain information to respondents (Rian Adi, 2017: 121). Questioners contain closed questions that are made based on the theories of Higginson & Parry (2011), Dougherty (2008), Darmawan (2010), Perry & Potter (2015), Andina & Yuni (2017), Yuda (2010), Alexander (2010), and Robert (2014) with questions about nurses' knowledge about chemical phlebitis in intravenous therapy. The test statistic used is the Paired T-test.

After preparing the test, each item is given a score. The score is given for each level of cognitive ability by looking at the calculation results that will be interpreted with the percentage values obtained. 95-100 = perfect; 90-95 = Special; 84-89 = very good; 78-83 = good; 72-77 = good enough; 66-71 = more than enough; 60-65 = enough.

RESULTS

Reporting Research Results

Table 1. **Distribution of Percentage of Respondents by Age Group, Gender, Work Experience, Education, and Career Level**

No	Age	Frequency	Percentage
1	<25 year	19	21
2	>25-30 year	14	16
3	>30 year	856	63
Total		89	100
No	Gender	Frequency	Percentage
4	Male	17	19.1
5	Female	72	81
Total		89	100
No	Work Experience	Frequency	Percentage
6	1-3 year	29	33
7	4-7 year	10	11
8	8-10 year	9	10
9	>10 year	41	46
Total		89	100
No	Education	Frequency	Percentage

1	D-3	35	39
2	S-1 Ners	54	61
Total		89	100

No	Career Path	Frequency	Percentage
12	PK I	28	31
13	PK II	12	13
14	PK III	30	34
15	PK IV	19	21
Total		89	100

Table 2. **Mean Values of Pre-test and Post-Test Knowledge Level of Nurses PK-PKIV**

No	PK	Respondents	Pre Test		Post Test	
			F	%	F	%
1	I	28	226	80.7%	264	94.2%
2	II	12	96	79.1%	117	97.5%
3	III	30	239	79.6%	277	92.3%
4	IV	19	158	83.1%	180	94.7%
Total		89	719	80.7%	838	94.1%

Table 3. **Before and After with the Paired t-test**

		Mean	Std. Deviation	Std. Error Mean	T	Df	Sig.(2-tailed)
Paired Samples Test							
Paired Differences							
Pair 1	PK1PreTest - PK1PostTest	-1.35714	1.47106	.27800	-4.882	27	.000
Pair 2	PK2PreTest - PK2PostTest	-1.83333	1.64225	.47408	-3.867	11	.003
Pair 3	PK3PreTest - PK3PostTest	-1.26667	1.65952	.30299	-4.181	29	.000
Pair 4	PK4PreTest - PK4PostTest	-1.15789	1.21395	.27850	-4.158	18	.001

In table 2 shows the average value of Pre-test and Post-test Knowledge Level Nurses PK I-PK IV on knowledge of Chemical Plebitis in intravenous therapy. In Table 3, there is a significant difference between the knowledge of nurses before and after in-house training on phlebitis

chemistry in intravenous therapy, using the t-Paired test, p value = 0.00 <0.05. where PK I 0,000, PK II 0,0003, PK PK 0,000 and PK IV 0,001.

DISCUSSION

The data analysis above in table 2 shows that before the seminar on nurses' knowledge about chemical phlebitis on intravenous therapy related to the type of fluid was good. This is possible because the respondent's pare did not know the full extent of chemical phlebitis on intravenous therapy related to the type of fluid. The results of the presentation before the seminar action on PK I were 80.7%, PK II was 79.1%, PK III was 79.6% and PK IV was 83.1%. according to the 2015 UNAI scale including good categories.

Lack of nurse knowledge about how to prevent chemical phlebitis can be one factor in this. Chemical phlebitis occurs because veins are irritated by drugs and intravenous fluids that have too high or low pH or osmolarity (Higginson, 2011). Pasaribu (2008) said that the incidence of phlebitis at Haji Field Hospital was 52%. Fitria (2007) said that the incidence of phlebitis in Mokopindo Tolotoli General Hospital was 42.4%. Putra (2011) said that the incidence of phlebitis in Dr M. Yunus Hospital Bengkulu was 44.5%.

Phlebitis is an inflammation caused by chemical, bacterial, or mechanical irritation, which is often caused by complications from intravenous therapy (La Rocca, 2008). Chemical plebitis is related to the response of the intima to the osmolarity of intravenous fluids. Inflammatory response can occur due to pH and osmolarity or drugs also because of the chemical properties of cannula materials used. Intravenous fluids that have extreme pH and osmolarity are always at risk for high plebitis. Fluids or drugs with a pH <5 or> 9 or that have osmolarity> 900 mOsm / l can irritate the intima vein layer so that it can stimulate the inflammatory process and thrombosis as we will discuss more clearly in the next sub-chapter (Jarumi.Y, 2009) .

The results of the presentation after the seminar actions are found in table 2, PK I scores 94.2%, PK II scores 97.5%, PK III scores 92.3%, and PK IV scores 94.7%. according to the 2015 UNAI scale the value includes a special category. Analysis of the data above shows that after the seminar nurses' knowledge about chemical phlebitis and fluid therapy has provided increased knowledge.

Abdulah (2008) said that in increasing knowledge possessed, individuals will try to obtain information. Information obtained can be through the desire to read books, drug brochures, attend seminars and training. Hidayat (2007) said that the seminar was an effective method to

increase knowledge because in attending seminars besides reading seminars, seminar participants could listen to the explanation of the material.

The results of the study by Asri, Triyanti and Upoyo about the analysis of factors that influence the incidence of plebitis in Purbalingga Hospital 2016, which states that intravenous fluids given are one of the causes of plebitis. This occurs because the fluid enters endothelial cells, causing rupture. Irritation can also occur when hypotonic fluids such as 0.45% NaCl are mixed with water which is included in intravenous therapy. Hypertonic fluids such as D5% in NaCl and D5% in RL can cause plebitis with endothelial cells damage that is the blood vessel membrane shrinks and opens. Both hypotonic and hypertonic fluids can cause irritation to blood vessels.

Based on the results of data interpretation using the t-Paired test it was found that the p-value of the PK I nurses was 0,000, in PK II was 0,003, in PK III was 0,000, and in PK IV was 0,001 which means significantly smaller than the significant rate 5 %. Thus the value of $p < 0.05$ then Ho is rejected and Ha is accepted so that the formulated hypothesis is proven to show there is a significant difference between nurses' knowledge before and after the seminar In House Training nurses knowledge of IV PK I-PK about intravenous therapy related to the type of fluid.

According to Yuda (2010), complications of intravenous therapy are: Local complications, 1) Local infections are infections due to contamination during installation, intravenous drug administration, dressing changes, or replacement of intravenous fluids. Signs and symptoms include pain, blockage of blood flow, swelling, redness, hardening and heat in place of stabbing. 2) Infiltration is the shift of needle and solution into subcutaneous tissue. Infiltration occurs due to the tip of the infusion needle passing through the blood vessels and is indicated by the presence of stabbing edema, discomfort, coldness in the infiltration area, and a marked decrease in flow velocity. 3) Hematoma is blood clots in body tissues due to rupture of arteries, veins, or capillaries. Occurs because the pressure is not right when inserting a needle or repeated puncture in a blood vessel. 4) Extravasation is the discharge of fluid from a vein into the surrounding tissue. The cause is the same as infiltration ie the tip of the catheter penetrates the vein so that the fluid comes out from the vein. Marked with pain, swelling, stiffness, feeling cold, flow slowing or stopping, and wet dressing. 5) Plebitis is a local reaction in the form of inflammation of the veins in the tunica intima which is characterized by heat, pain, swelling, and redness (rubor, dolor, heat and laesa function) with or without pus in the stab region. Plebitis is caused either by mechanical, chemical or bacterial factors. 6) Thromboplebitis or

swelling (inflammation) in the area of the veins caused by the infusion that is installed is not monitored closely and correctly. It is usually a sequelae of the occurrence of plebitis. Characterized by localized pain, redness, warmth, swelling, slowing flow, cyanosis in the extremities, immobilization of the extremities due to swelling, fever, malaise, and leukocytosis. 7) Thrombosis is the formation of blood clots in blood vessels. This is due to trauma to the endothelial cells of the vein wall which causes the attachment of fibrin and red blood cells to the wall which causes blockage of blood flow.

Systemic complications include: 1) Emboli is a sudden blockage of a vein by a foreign object such as a blood clot or other foreign matter such as air into the bloodstream. Marked by palpitration, dyspnea, tachypnea, wheezing, coughing, pulmonary edema, weakness, hypotension, loss of consciousness, chest pain, shoulders, and in the lower back. 2) Pulmonary edema can occur due to excess fluid caused by too fast intravenous fluids which results in an increase in the central vein to cause pulmonary edema. 3) Septicemia is a systemic infection caused by the presence of microorganisms that enter the body. Marked by sudden increase in body temperature, headache, increased pulse, nausea, vomiting, diarrhea, fever, chills, tremors, general malaise, vascular collapse, and hypotension. 4) Allergic reactions are local responses or general responses that occur due to allergies to drugs, disinfectant agents, substances that are dependent on intravenous fluids, and raw materials for intravenous catheter devices used (Yuda, 2010)

This is also supported by the results of a study conducted by Trimukaim (2009) which explains that the provision of training will affect the way a person makes decisions in planning efficient management actions. The results of research by Wahyunah (2013) about the level of knowledge of nurses about intravenous fluid therapy is known that as many as 50.8% have bad knowledge. This shows that nurses' knowledge about intravenous fluid therapy is still low, especially those related to the principles of vein selection and aseptic action. . In the prevention of chemical plebitis, most nurses who behave well in the prevention of chemical plebitis are nurses who are knowledgeable enough, while nurses who behave fairly well are well-informed nurses. This is not in line with the opinion of Notoatmodjo (2010) which states that behavior based on knowledge will be followed by behavior, meaning that good knowledge should be accompanied by good behavior as well.

CONCLUSION

The role of nurses in infusion therapy is not only for the administration of medication agents, but more broadly including the installation of IV access, care, monitoring, and the most important thing is preventing infection. Infusion therapy is included in one invasive action, therefore in carrying out its duties nurses must have knowledge related to assessment, planning, implementation, and evaluation in the treatment of infusion. When a nurse is given the task of providing infusion therapy, the ability needed is to do vein placement correctly and skillfully, provide safe, cost-effective infusion therapy, conduct quality infusion treatment. The causes of chemical plebitis are irritation by medication, hypertonic infusion fluid, and droplets that are too fast. By providing In Service Trainning to nurses can improve the performance of nurses in the management of intra intravenous fluid therapy.

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