Analysis of Differences in the Adequacy of Single Use and Reuse to 1 Hemodialysis in Patients with Chronic Kidney Disease

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ABSTRACT

Background: Hemodialysis therapy is very expensive, so a new dialyzer that has been used by a patient must be recycled for use by the same patient again. The purpose of this study was to determine the effectiveness of the use of a new dialyzer and the 1st reused dialyzer on the adequacy of hemodialysis in patients in the hemodialysis unit of RSUD Ibnu Sina, Gresik. **Methods:** This research is a pre-experimental research using a two group post test only design approach. The research sample was 20 respondents, sampling in this study used purposive sampling type. The statistical test used was the Wilcoxon Rank Sum Test and the Mann Whitney test. The independent variable was the use of a new dialyzer and a reused dialyzer I. The dependent variable was adequacy of hemodialysis. **Results:** The test results showed a significance (α) of 0.037 so that <0.05, meaning that there was a significant difference in the use of a new dialyzer and a reused dialyzer I on hemodialysis adequacy in chronic kidney disease patients in the Hemodialysis Room of RSUD Ibnu Sina Kab. Gresik, it is proven that the reused diaizer I is more effective than the new dialer. **Conclusion:** The effectiveness of using a new and reused dialyzer I can influence whether or not the hemodialysis adequacy is adequate.

Keyword: Effectivness, hemodialysis adequacy, single use, reused

INTRODUCTION

Chronic Kidney Disease (CKD) is a progressive decline in kidney tissue function so that the remaining kidney mass is no longer able to maintain the body's internal environment. One of the therapies that can function like a kidney to help patients with CKD is called Hemodialysis (HD) therapy, which is carried out by flowing blood into an artificial kidney tube (dialyzer) which aims to eliminate the remnants of protein metabolism and correct electrolyte balance disturbances between the blood compartment and the dialysate compartment through a semipermiable membrane (Amalia, 2021). There are two tools used in this therapy, namely single use dialyzers and reuse dialyzers. So far, the most widely used in the hemodialysis process is the reuse dialyzer, to reduce the high cost of treatment. According to the Indonesian Nephrology Association (Pernefri, 2021), dialyzers can be used up to 7 times and the 8th time using a new dialyzer. The use of reuse dialyzers can result in patients and staff being exposed to germicides (One type of germicide such as formaldehyde can cause cardiac collapse, respiratory failure and hypotension. In addition to formaldehyde, peracetic acid can also damage the skin and eyes, upper respiratory tract inflammation, chemical pneumonitis and pulmonary edema), cause pyrogen reactions (pyrogen reactions such as fever, nausea, cough, hypotension, muscle pain or sepsis), bacteremia and cause the environment to be contaminated with the use of germicides (Levy, 2016).

In HD actions that require a lot of money, it is the cause of the recommendation to use dialyzers again (dialyzer reuse). BPJS (Badan Penyelenggara Jaminan Sosial Kesehatan) recommends using a new dialyzer once and then continuing to use recycling from the initial dialyzer (dialyzer reuse) 5 times, to 6 times usage. In addition to reducing costs, the use of reuse dialyzers also leads to increased membrane biocompatibility, thus reducing the rate of first use syndrome and can save the environment from dialyzer waste.

Kidney disease is the leading cause of death in the United States (US), affecting about 37 million people in the US. About 90% of them do not know they have kidney failure disease. In 2018, 785,883 people. Americans had kidney failure, and needed dialysis or a kidney transplant to survive (2 out of every 1,000 people). 554,038 of these patients received dialysis to replace kidney function and 229,887 lived with a kidney transplant. According to Data from the Indonesian Nephrology Association (Pernefri) shows the curve of kidney disease patients in 2017, the number of active patients was 77,892 and new patients were 30,831, in 2018 there were 135,486 and new patients were 66,433, and in 2019 it increased to 185,901 active patients, while new patients were 69,124 (Pernefri, 2021). According to a researcher survey on January 5, 2024, the number of patients at Ibnu Sina Hospital, Gresik Regency who performed HD therapy in 2021 was 279 people, in 2022 patients decreased to 254 people and in 2023 to 210 people. There were 9 patients who used single use, 201 patients who used reuse dialyzers.

The use of reuse dialyzers must follow the Indonesia Renal Registry and KDOQI (Kidney Disease Outcomes Quality Index) which targets the Kt / V value for 2 times a week 5 hours per HD session is 1.8 which is equivalent to 80% URR and 3 times a week with 4 hours per session Kt / V 1.2 or 1.4 which is achieved with 70% URR (Asman et al., 2021). If dialyzer reuse cannot reach the target or cannot achieve hemodialysis adequacy, it can cause patients and staff to be exposed to germicides (One type of germicide such as formaldehyde can cause cardiac collapse, respiratory failure and hypotension. Besides formaldehyde, peracetic acid can also damage the skin and eyes, upper respiratory tract inflammation, chemical pneumonitis and pulmonary edema), cause pyrogen reactions (pyrogen reactions such as fever, nausea, cough, hypotension, muscle pain or sepsis), bacteremia and cause the environment to be contaminated with the use of germicides. If reuse dialyzers can achieve dialysis adequacy, it can reduce costs, the use of reuse dialyzers also leads to an increase in membrane biocompatibility, thus reducing the rate of first use syndrome [First use syndrome is an anaphylactic reaction that occurs when

human blood cells come into direct contact with the membrane of a hemodialyzer for the first time. This may occur if a person has an allergy to curophane (an ingredient in hemodialyzers) or polyacrylonitrile (an ingredient in dialysis membranes). Symptoms that appear such as itching, sneezing, coughing, nausea and vomiting, diarrhea, muscle cramps, watery eyes, to severe symptoms such as shortness of breath, bronchospasm, full body heat and even cardiac arrest (Hermansyah et al., 2019)and can save the environment from dialyzer waste.

Many patients who undergo hemodialysis at RSUD Ibnu Sina Gresik Regency use BPJS (Badan Penyelenggara Jaminan Sosial Kesehatan) health insurance, which recommends the use of reuse dialyzers. The cleaning and sterilization of reuse dialysers at RSUD Ibnu Sina Gresik Regency has used an automatic machine and has implemented the use of reuse dialysers in accordance with the rules of (Pernefri, 2021). Based on the results of a survey conducted by researchers on December 11, 2021 in the hemodialysis room of Ibnu Sina Hospital, Gresik Regency, researchers found that there was no calculation of hemodialysis adequacy in the Kt / V value of each patient undergoing hemodialysis. So that it is not yet known the difference in hemodialysis adequacy in an effectiveness of using a new dialyzer and the first reuse dialyzer. For this reason, the authors are interested in examining the effectiveness of using new dialyzers and reuse dialyzers to I on hemodialysis adequacy in Chronic Kidney Disease patients undergoing hemodialysis at Ibnu Sina Hospital, Gresik Regency.

METHODS

This type of research is quantitative research using a pre-experimental research design using a two group post test only approach. The population of this study were patients who used single use dializer and reuse to 1 dializer in the Hemodialysis room at RSUD Ibnu Sina Gresik, a total of 21 respondents. The sample was taken with purposive sampling technique and obtained as many as 20 respondents. The sample was divided into 2 groups, namely the group that used single use dializer and reuse to

1 dializer. After being given treatment, respondents were observed to improve their hemodialysis adequacy. The research was conducted in the Hemodialysis room of Ibnu Sina Gresik Hospital from April to May 2024. The instruments used in this study is the SOP for the use of dialyzers and the hemodialysis adequacy observation sheet. Data analysis in this study used the Wilcoxon Rank Sum Test and the Mann Whitney U test.

RESULT

Table 1 Data Demographic of Respondent (n=0)

Characteristic	N	%
Age		
25-40	2	10
41-60	11	55
>60	7	35
Total	20	100
Gender		
Male	8	40
Female	12	60
Total	20	100
Education		
Not educated	1	5
Elementary school	7	35
Junior High School	6	30
Senior High School	5	25
Bachelor Degree	1	5
total	20	100
Job		
Housewife	5	25
Private employee	2	10
Self employee	1	5
Public servant	1	5
Etc	5	25
Total	20	100
Difference weight before and after hemodialyzer		
Constant weight	6	30
Difference weight =0,5	1	5
Difference weight =1	9	45

Difference weight =1,5	2	10
Difference weight =2	2	10
Total	20	100

Table 1 shows that from the distribution of 20 respondents based on age, most of them were between 41-60 years old as many as 11 people (55.0%) and a small proportion were 25-40 years old as many as 2 people (10.0%). Then, the table shows that from the distribution of 20 respondents based on gender, most were female as many as 12 patients (60.0%) and almost half were male as many as 8 people (40.0%). Table 1 shows that from the distribution of 20 respondents based on education, almost half only had elementary school education as many as 7 patients (35.0%) and a small proportion had diploma / degree education and no school each as many as 1 person (5.0%). Then, it shows that from the distribution of 20 respondents based on occupation, most of them work as housewives as many as 11 people (55.0%) and a small proportion work as civil servants (PNS) and self-employed as many as 1 person (5.0%) each. Table 1 shows that from the distribution of 20 respondents based on the difference in weight before and after HD, almost half had a difference in weight of 1 kg (45.0%) and a small proportion had a difference in weight of 0.5 kg (5.0%).

Table 2. Adequacy of Hemodialysis Doses in the Use of Reuse Dializer 1 in the Hemodialysis Room of Ibnu Sina Hospital, Gresik Regency.

Adequacy	n	%
Yes	20	100
No	10	0
Total	20	100

Table 2 shows that from the distribution of 20 respondents using dializer reuse 1 in the Hemodialysis room of Ibnu Sina Hospital, Gresik Regency, all of their hemodialysis doses were sufficient (adequate) as many as 20 people (100.0%) and none of them were insufficient (inadequate) (00.0%).

Table 3 Effectiveness of Single Use Dializer and Dializer Reuse I on Hemodialysis Adequacy in Chronic Kidney Disease Patients in the Hemodialysis Room at RSUD Ibnu Sina Gresik

Adequacy	Single Use Dialyzer		Reuse 1 Dialyzer	
	n	%	n	%
Yes	16	80	20	100
No	4	20	0	100
Total	20	100	20	100

Statistic Test :
Wilcoxon Signed Ranks Test Sig. (α) = 0,046 < 0,05
Mann Whitney-U Sig. (α) = 0,037 < 0,05

Table 3 shows that from the distribution of 20 respondents using a single use dializer in the Hemodialysis room at Ibnu Sina Gresik Hospital, hemodialysis adequacy in chronic kidney disease patients has been achieved 80.0%, meaning that only 20.0% are inadequate. While respondents using dializer reuse I there was a significant increase in the achievement of hemodialysis adequacy, namely 100.0% and none of the respondents (0.0%) were inadequate.

Statistical tests in this study used the Wilcoxon Signed Ranks Test and the Mann Whitney-U Test with the help of the SPSS program to determine the difference in the effectiveness of the use of single use dializers and dializer reuse I on hemodialysis adequacy in chronic kidney disease patients in the Hemodialysis Room of Ibnu Sina Hospital, Gresik.

The test results showed a significance (α) of 0.046 so that α < 0.05 and a significance (α) of 0.037 so that α < 0.05 which means H1 is accepted and Ho is rejected, meaning that there is a significant difference in the use of single use dializer and dializer reuse I on hemodialysis adequacy in patients with chronic kidney disease in the Hemodialysis Room at RSUD Ibnu Sina Kab. Gresik, it is proven that dializer reuse I is more effective than single use dializer.

DISCUSSION

Effectiveness of Single Use Dializer Use on Hemodialysis Adequacy in Chronic Kidney Disease Patients in the Hemodialysis Room of Ibnu Sina Hospital, Gresik Regency.

Table 1 shows that from the distribution of 20 respondents using a new dializer in the Hemodialysis room of Ibnu Sina Hospital, Gresik Regency, almost all of their hemodialysis doses were fulfilled (adekuasi) as

many as 16 people (80.0%). According to the Yang, J; He, W. (2020), at this stage the blood flow from the body to the dialyzer through the vascular tube must be circulated smoothly, stable with proper circulation from the beginning of implementation. The instability of a new device is usually due to the time lag between the device's adaptation to the composition of the flowing blood. The medical staff must conduct continuous observation until the device functions normally. In addition to being stable and smooth, the volume of blood flowing into the dializer must also be considered. The working blood pump requires observation to produce sufficient blood volume flowing into the dializer. The right volume greatly affects the dose of hemodialysis given.

According to Pernefri (2021), the use of a new dializer requires adequate reprocessing procedures. The blood entering the new dializer must be observed continuously to ensure that the process in the dializer is able to provide an adequate dose of hemodialysis. The reprocessing procedure of the new dializer often experiences an imbalance or mismatch with the performance of the blood pump so that medical staff must continue to monitor, then if necessary, reprocess the dializer so that the performance of the new dializer can immediately compensate for other devices. Also, the calibration of blood flow speed/dialysate in the use of a new dializer also needs to be considered. The blood flow velocity in the use of a new dializer must be rechecked because it is usually too low or even too high. If not carefully considered, the calibration error of blood flow velocity/dialysate will result in the adequacy of hemodialysis dose will not be met.

And the use of new dialyzers in the Hemodialysis room at Ibnu Sina Hospital, Gresik Regency, a small proportion was insufficient (inadequate) as many as 4 people (20.0%). First, based on the results of research by Asman et al. (2021) that with an increase in age a person will experience a decrease in susceptibility to a particular disease. Age cannot be used as a benchmark for the cause of chronic kidney disease. Based on the findings of researchers, there were 3 respondents who did not achieve hemodialysis adequacy aged 41-60

years and 1 person aged 25-40 years.

Second, in this study respondents who did not meet the same adequacy were 2 men and 2 women. According to research by Jha VK and Shashibushan in India, showed that of 130 patients with stage 5 CKD undergoing hemodialysis, 76.2% of patients were male with a male-to-female ratio of 3.19: 1.3. Research by Chaudhari ST et.al., in India, also showed that out of 50 patients with stage 5 CKD in India, male patients were more than women with a ratio of 1.77: 1 (Suandewi et al., 2020). Clinically, male patients with chronic kidney disease can experience a risk of chronic kidney disease 2 times greater than women, where women pay more attention to health and maintain a healthy lifestyle than men, besides that women are more compliant than men in taking medicines. This does not match the results found by researchers, so it is possible that there are also women who pay less attention to their health and maintain their lifestyle, so that in the hemodialysis process they cannot achieve adequacy.

Third, based on the results of this study, respondents who did not achieve hemodialysis adequacy consisted of 3 people with the last education of elementary school and 1 person with the final education of junior high school. There is no relationship between education level and protein intake of chronic renal failure patients undergoing hemodialysis. This can be caused by the factor that the last education taken by respondents is mostly basic education. The higher one's education, the higher one's knowledge will be. However, someone with a low education is not necessarily low knowledge. This is in accordance with the results of the researcher's study which states that even though a person's education is low, it does not necessarily mean that a person's knowledge is low.

Fourth, the results of this study that did not achieve adekuasinya based on work there were 2 people as housewives and 2 people as private employees. The majority of chronic kidney disease patients who perform hemodialysis do not work because they experience health problems such as fatigue, anemia, history of diabetes and others. In this study, it was found

that respondents who were still working were 2 civil servants (5.9%) and 7 private employees (20.6%), who looked physically and psychologically better than those who were not working. Hemodialysis patients who choose to continue working have a very important impact because working is one of the social supports and contributes to higher quality and self-confidence and more stable financial conditions (Asman et al., 2021). This is in accordance with the results of the research found by researchers. With a job that makes the body quite active, it can be used like exercise, because if the body is less active, the body will be weaker and more susceptible to disease. But if the body is used too much activity is also not good, resulting in fatigue and illness.

Fifth, the results of this study did not achieve adequacy based on the difference in weight before and after HD there was 1 person with a difference in weight loss of 0.5 kg, 2 people with a difference in weight loss of 1 kg and 1 person with a difference in weight loss of 2 kg. With the increase in interdialysis weight, it will increase vascular volume where decreased kidney function cannot remove excess body fluids so that excess fluid will be trapped in the tissue and will increase body weight. Body weight greatly affects the V value where the V value is obtained from multiplying the patient's body weight by the estimated amount of fluid in the body. A high V value will result in a decrease in hemodialysis adequacy (Ladesvita & Sukmarini, 2019).

In the use of new dialyzers, nausea, vomiting, back pain and chest pain were found to be more severe while in the use of reuse dialyzers the incidence of nausea, vomiting, cramps, shortness of breath was lower. Symptoms were found more during the first dialyzer use than after reuse (dialyzer reuse) (Yang, J; He, W., 2020). To support the achievement of hemodialysis adequacy in using a new dialyzer, patients should exercise lightly at home before the HD process, get enough rest and adhere to the recommended diet.

Effectiveness of Using Dialyzer Reuse to I on Hemodialysis Adequacy in Chronic Kidney Disease Patients in the Hemodialysis Room of Ibnu Sina Hospital, Gresik Regency.

Table 3 shows that from the distribution of 20 respondents using dialyzer reuse 1 in the Hemodialysis room of Ibnu Sina Hospital, Gresik Regency, all hemodialysis doses were sufficient (adequate) as many as 20 people (100.0%) and none of them were insufficient (inadequate) (00.0%). The use of a reuse dialyzer can be known for its effectiveness because it has been used before, does not result in exposure to residual manufacturing materials, although it can result in exposure to residual dialyzer sterilization materials if not cleaned properly. So medical staff must still observe the patient's condition, so that there is no reaction to the patient's body with residual material for dialyzer sterilization.

In the use of the 1st reuse dialyzer, those with the highest Kt/V values were mostly women, although the highest value of all Kt/V values was achieved by men. This supports the statement (Suandewi et al., 2020)that women pay more attention to health and maintain a healthy lifestyle than men, besides that women are more obedient than men in taking medicines. This allows female patients to better comply with the recommended diet during the HD examination, so that the HD process can achieve hemodialysis adequacy.

According to (Hermansyah et al., 2019)check the dialyzer if there are blood clots left in the hemodialyzer after being used in the initial hemodialysis. Including one of the ways that supports the achievement of hemodialysis adequacy in the use of dialyzer reuse. Examination of the device to support the hemodialysis adequacy of reuse dialyzer I by ensuring that before reuse it is free of blood clots left behind. Likewise, the remaining blood after the hemodialysis process is flushed using treated water (water treatment).

Another factor that determines the adequacy of hemodialysis is the dialysate flow velocity. In dialyzer reuse 1, this flow velocity is maximized because the device has been used before the blood is more adaptable to the device that has previously been in contact. Vascular access is an important component in HD, because through vascular access the blood in the patient's body can be flowed to the dialyzer. Likewise, the speed of blood flow accessed by

the vasculature also greatly affects hemodialysis adequacy. Vascular access is the most important part of the hemodialysis action process because access is the place where the patient's blood goes in and out during the process. The role of vascular access cannot be separated from the condition of the dializer used. The reuse dializer 1 is able to accommodate the blood flow from the vascular access so that the adequacy of hemodialysis can be met.

However, the reuse dializer I was used after the first time it was used. The effectiveness of the reuse dializer I is largely determined by the observation and assessment results from the first use. The reuse dializer I is indeed more effective for hemodialysis adequacy because it has gone through the first contact with fluid (blood), many adjustments, size adjustments, abilities and officers have found the characteristics of the dializer. So that in the use of both officers already have records about the dializer, and do not need a long time to prepare for its use. Short preparation time will increase hemodialysis adequacy. The results of this study are in accordance with Amalia (2021) who said that delays in starting dialysis, termination of hemodialysis that is too fast for certain reasons and miscalculation of total therapy time (which does not take into account interruptions during dialysis) will affect the dose of hemodialysis given.

Effectiveness of Single Use Dializer and Dializer Reuse to I on Hemodialysis Adequacy in Chronic Kidney Disease Patients in the Hemodialysis Room of Ibnu Sina Hospital, Gresik Regency.

Table 3 shows that from the distribution of 20 respondents using a new dializer in the Hemodialysis room of Ibnu Sina Hospital, Gresik Regency, hemodialysis adequacy in chronic kidney disease patients has been achieved 80.0%, meaning that only 20.0% are inadequate. While respondents using dializer reuse I there was a significant increase in the achievement of hemodialysis adequacy, namely 100.0% and none of the respondents (0.0%) were inadequate. The test results showed a significance (α) of 0.037 so that $\alpha <$ 0.05, which means H1 is accepted and Ho is

rejected, meaning that there is a significant difference in the use of new dializers and reuse I dializers on hemodialysis adequacy in chronic kidney disease patients in the Hemodialysis Room of Ibnu Sina Hospital, Gresik, proving that reuse I dializers are more effective than new dializers.

Researchers get the highest hemodialysis adequacy value in respondents who use a new dializer 3.2 and the lowest hemodialysis adequacy value 0.7. This is in accordance with Pernefri (2021) data regarding the achievement of hemodialysis adequacy (Kt/V) > 1.8 / 1.4 and not hemodialysis adequacy (Kt/V) < 1.8 / 1.4 for hemodialysis 2 times / week. Not achieving adequacy may be due to men and women who pay less attention to health and maintain their lifestyle, so that the hemodialysis process cannot achieve adequacy. And a person's lack of understanding of how to improve his quality of life, regardless of how high his education is. It may be due to lack of activity, so that the body is susceptible to disease. And perhaps too much strenuous activity, so that the body is too tired and easily sick.

As well as the lowest hemodialysis adequacy value in respondents who used the 1st reuse dializer of 1.4 and the highest hemodialysis adequacy value of 3.2. The use of a reuse dializer can be known for its effectiveness because it has been used before, does not result in exposure to residual manufacturing materials, although it can result in exposure to residual dializer sterilization materials if not cleaned properly. So medical staff must still observe the patient's condition, so that there is no reaction of the patient's body with residual material for dializer sterilization. And the dializer sterilization process must be done correctly, so that no residual dializer sterilization substances are left behind.

The results of this study show that the use of reuse dializer I is more effective than a new dializer. The most prominent thing that causes the more effective use of the reuse I dializer compared to the new one is that the dializer has been used before and has shown its characteristics both shortcomings and advantages, if there are shortcomings or

weaknesses, there are automatically records to correct these shortcomings. Thus the use of reuse I dializers is mostly able to meet hemodialysis adequacy in Chronic Kidney Disease patients.

Another factor that determines the adequacy of hemodialysis is the dialysate flow velocity. In reuse dializer 1, this flow velocity is more optimal than a new dializer, because the device has been used before the blood is more adaptable to the device that has previously been in contact. Likewise, the speed of blood flow accessed by the vasculature also greatly affects hemodialysis adequacy. Vascular access is the most important part of the hemodialysis treatment process because it is the place where the patient's blood flows in and out during the process. The role of vascular access cannot be separated from the condition of the dializer used. Dializer reuse 1 is able to accommodate blood flow from vascular access so that hemodialysis adequacy can be met.

The use of reuse dializer I also showed no incidence of anaphylactic reactions. A person who has an allergy to hemodialyzer materials or dialysis membrane materials has a high risk for their health. (Asman et al., 2021)said the use of a new dializer can make first use syndrome or the occurrence of anaphylactic reactions when human blood cells come into direct contact with the membrane of the hemodialyzer for the first time, this may occur if a person has an allergy to curophane (hemodialyzer material) or polyacrylonitrile (dialysis membrane material).

The ineffectiveness of new dializers and 1st reuse dializers on hemodialysis adequacy can also be caused by the occurrence of blood clots in them. An attempt to reduce the risk of blood clots is with heparin. However, observation of the possibility of blood clots in new and reuse dializers should still be done. Blood clot is a serious factor in reducing the effectiveness of hemodialysis adequacy, because it inhibits and even stops the blood flow rate, so that the adequacy of hemodialysis is not achieved, not to mention that the termination of hemodialysis is too fast for certain reasons.

Before the 1st reuse dializer is used, the remaining blood after the hemodialysis process of the new dializer is flushed using treated water (water treatment) and the dializer is sterilized. This results in the possibility of blood clots in the 1st reuse dializer being less than the use of a new dializer. Although heparin is given in every hemodialysis process to prevent blood clots, blood passes more easily through the 1st reuse dializer that has been rinsed with water treatment and given heparin than through a dializer that has never been rinsed with water treatment. Because blood is faster through the dializer membrane without the need to adapt first to the new dializer membrane, which takes a little longer.

In this study, there is a significant difference between the use of a new dializer and the 1st reuse dializer on hemodialysis adequacy. In contrast to the opinion according to Amalia (2021) on the results of the analysis of the effectiveness of the use of single use and reuse dializers at RSUD Mardi Waluyo Blitar City that there was no significant difference between the use of single use and reuse dializers on Kt / V values (p = 0.649), URR (p = 0.685) and hemoglobin levels (p = 0.789) in hemodialysis patients.

CONCLUSION

The use of Dializer reuse to I is more effective than the use of a new Dializer on Hemodialysis Adequacy in Chronic Kidney Disease Patients in the Hemodialysis Room of Ibnu Sina Hospital, Gresik Regency.

SUGGESTIONS

The hospital should make a policy or SOP related to the use of a new dialezer for the benefit of the next use (reuse 1) and so on, in order to obtain hemodialysis adequacy for chronic kidney disease patients.

REFERENCE

Amalia, A. (2021). ANALISIS EFEKTIVITAS SINGLE USE DAN REUSE DIALYZER PADA PASIEN GAGAL GINJAL KRONIK DI RSUD MARDI WALUYO KOTA BLITAR. *JCPS (Journal of Current Pharmaceutical Sciences)*, *5*(1).

Asman, D., Bayhakki, B., & Amir, Y. (2021). Perbedaan Adekuasi Hemodialisis Pada

Penggunaan Dializer Baru Dan Reuse. *Jurnal Ners Indonesia*, *11*(2), 119. https://doi.org/10.31258/jni.11.2.119-129

Hermansyah, Y., Ayu, D., Supriatiningsih, W., & Hermansyah, B. (2019). Perbedaan Kadar Kalium pada Pasien Penyakit Ginjal Kronik Stadium 5 yang Menggunakan Hemodialyzer Baru dan Re-Use di RSD dr. Soebandi Jember. *Journal of Agromedicine and Medical Sciences*, *5*(3), 148–153. https://jurnal.unej.ac.id/index.php/JAMS/article/view/9540

Ladesvita, F., & Sukmarini, L. (2019). Berat Badan Interdialisis Terhadap Adekuasi Hemodialisa Pada Pasien Hemodialisa Kronik. *Jurnal Keperawatan Widya Gantari Indonesia*, *3*(1), 1–6. https://doi.org/10.52020/jkwgi.v3i1.1080

Levy, J. (2016). *Oxford Handbook of Dialysis (4 edn) Oxford Handbook of Dialysis*. Oxford University Press.

Pernefri, P. N. (2021). World Kidney Day 2021, KPCDI: Mendamba Hadirnya Negara untuk Pasien Gagal Ginjal Kronik di Indonesia. *Https://Www.Newsmeter.Id/News/6049c161af8f89 5b41066418*.

Suandewi, D. A. S. A., Sugiarta, I. G. R. M., Astawa, N. T., & Ekariawan, I. P. (2020). Profil penderita Chronic Kidney Disease (CKD) stadium 5 yang menjalani hemodialisis reguler di Rumah Sakit Umum Daerah (RSUD) Klungkung, Bali, Indonesia. *Intisari Sains Medis*, *11*(2), 613–619. https://doi.org/10.15562/ism.v11i2.624

Yang, J; He, W., E. (2020). *Chronic Kidney Disease*. Springer.