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Compliance of Patients Undergoing Hemodialisis with Recovery Time Post-Dialysis

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ABSTRACT

Post-hemodialysis, patients frequently experience symptoms that disrupt their comfort during daily activities, ranging from simple to strenuous tasks. Many hemodialysis patients do not feel well after dialysis sessions and require time to recover before resuming their usual activities at home or work. This study aims to determine the influence of fluid compliance, dietary compliance, and hemodialysis dose compliance on post-dialysis recovery time. A cross-sectional design with consecutive sampling was employed, involving 76 respondents. Data were collected by distributing questionnaires to patients undergoing hemodialysis during each session. Data analysis was conducted using the Mann-Whitney test with a 95% confidence interval. Post-dialysis recovery time ranged from a minimum of 15 minutes to a maximum of 1,800 minutes, with the majority of patients recovering within 240 minutes. There was a significant difference between post-dialysis recovery time and fluid restriction adherence (p-value = 0.000, p-value < 0.05), with respondents who adhered to fluid restrictions having a predominantly 45-minute recovery time. Similarly, a significant difference was observed between post-dialysis recovery time and dietary compliance (p-value = 0.000, p-value < 0.05), with respondents who adhered to their diet also having a 45-minute recovery time. Additionally, a significant difference was found between post-dialysis recovery time and hemodialysis dose compliance (p-value = 0.007, p-value < 0.05), with the majority of respondents adhering to the hemodialysis dose exhibiting a 120-minute recovery time. Post-dialysis recovery time is influenced by compliance to fluid restrictions, dietary management, and hemodialysis dosing in hemodialysis patients. Maintaining compliance to fluid restrictions, diet, and hemodialysis dosing can shorten post-dialysis recovery time.

Keywords*: Dietary Compliance; Fluid Restriction Compliance; Hemodialysis Dose Compliance; Post-Dialysis Recovery Time;*

ABSTRAK
Pasca hemodialisis pasien sering megalami keluhan yang mengganggu kenyamanan pasien ketika melakukan aktifitas sehari- hari mulai dari aktifitas sederhana sampai dengan aktifitas berat. Banyak pasien hemodialisis tidak merasa baik setelah sesi dialisis dan membutuhkan waktu untuk pulih dan melanjutkan aktifitas mereka seperti biasa dirumah atau ditempat kerja. Tujuan penelitian untuk mengetahui pengaruh kepatuhan cairan, kepatuhan diet dan kepatuhan dosis hemodialisis terhadap waktu pemulihan paska dialisis. Desain penelitian *cross sectional design* dengan *Concecutive Sampling*. Jumlah responden yang dilibatkan 76 responden. Pengumpulan data dilakukan dengan menyebarkan kuesioner pada pasien yang menjalani hemodialisis disetiap sesuai dengan sesi hemodialisis. Analisis data menggunakan uji Mann-Whitney dengan interval kepercayaan 95%. Waktu pemulihan hemodialisis didapat sebagian besar selama 240 menit dengan batas waktu minimal 15 menit dan maksimal 1800 menit. terdapat perbedaan yang bermakna antara waktu pemulihan paska hemodialisis dengan kepatuhan pembatasan cairan p value 0.000 (Pvalue < 0.05), Responden yang patuh membatasi cairan memiliki waktu pemulihan paska hemodialisis sebagian besar 45 menit. Terdapat perbedaan bermakna antara waktu pemulihan paska hemodialisis dengan kepatuhan diet dengan p value 0.000 (Pvalue < 0.05) dan sebagian besar waktu pemulihan paska hemodialysis responden yang patuh selama 45 menit. Terdapat perbedaan bermakna antara waktu pemulihan paska hemodialisis dengan dosis hemodialisis dengan p value 0.007 (Pvalue < 0.05), sebagian besar responden yang patuh menunjukan waktu pemulihan paska hemodialisis selama 120 menit. Kepatuhan pada pasien hemodialysis berpengaruh pada waktu pemulihan hemodialisis. Mempertahan kepatuhan pembatasan cairan, diet dan dosis terapi dialisis memperpendek waktu pemulihan pasca dialisis.
Kata Kunci: Diet; Dosis hemodialisis; Hemodialisis; Pembatasan cairan; Kepatuhan; Waktu Pemulihan;

INTRODUCTION

Post-hemodialysis, patients frequently experience symptoms such as numbness, fatigue, weakness, tiredness, and lethargy. These complaints disrupt patients' comfort during daily activities, ranging from simple tasks to intense activities. Many hemodialysis (HD) patients do not feel well after dialysis sessions and require time to recover before resuming their usual activities at home or work. The need for post-dialysis recovery time is more common in patients undergoing HD three times a week compared to those undergoing HD daily (Bossola *et al.*, 2018). According to Lopes et al., 49.2% of HD patients require less than 60 minutes for recovery, 27.3% require 60-120 minutes, and 23.5% require more than 240 minutes for recovery (Rayner *et al.*, 2014). Numerous factors influence recovery time, including patient demographics, comorbid conditions, dialysis duration, and medications.

Post-dialysis recovery time refers to the duration patients need to regain the ability to perform their normal daily activities following a hemodialysis (HD) session (Lindsay *et al.*, 2006). Studies have shown that dialysis recovery is influenced by several unmodifiable factors, including

age, serum albumin levels, diabetes, and mental health disorders (Rayner *et al.*, 2014). Another factor influencing HD recovery time is compliance to hemodialysis treatment protocols. The primary objectives of HD therapy, which include fluid removal and solute clearance, may contribute to a reduction in post-dialysis recovery time (Lindsay *et al.*, 2006).

Compliance to treatment is essential in HD, a complex therapeutic process. Treatment compliance encompasses fluid intake, dietary management, medication administration, and participation in dialysis sessions. Among HD patients, numerous complications can arise from noncompliance to treatment protocols. This is further emphasized by Ibrahim et al., who demonstrated that noncompliance, manifested as missed HD sessions, ranges from 7% to 32% among patients with end-stage renal disease (ESRD) (Ibrahim, Hossam and Belal, 2015). Similarly, a study conducted in Zimbabwe revealed that over 50% of patients did not compliance to their scheduled HD plans. In fact, 93% of respondents had missed at least one HD session, with 61% missing the majority of their scheduled sessions. Only seven percent attended all hemodialysis sessions as scheduled, while sixty-seven percent rescheduled their designated HD sessions more than once. (Chironda *et al.*, 2014). Noncompliance to treatment regimens among patients with end-stage renal disease (ESRD) presents significant challenges, with approximately 50% of patients missing their dialysis sessions. Additionally, 11% of patients require extra care, and 12% have shortened their dialysis sessions (Duong *et al.*, 2015). Negative patient outcomes, increased healthcare costs, and an elevated workload in hemodialysis units are consequences of noncompliance behaviors among patients with end-stage renal disease (ESRD) (Chironda and Bhengu, 2016). Several studies have also identified non-adherence as a cause of mortality, increased hospital visits, and hospitalizations among hemodialysis (HD) patients (Duong *et al.*, 2015), (Chironda and Bhengu, 2016).

Research specifically examining the relationship or impact of compliance on post-HD recovery time has not been identified by the author. Most primary studies illustrate that physical factors, clinical chemistry, psychosocial aspects (Ayu *et al.*, 2019), HD dose management (Bolton *et al.*, 2021), (Ippoliti, Santarelli and Nebiolo, 2019), and HD adequacy (Guedes *et al.*, 2020) influence post-dialysis recovery time.

METHOD

This study utilized a quantitative analytic approach with a cross-sectional design to examine the relationships between independent variables fluid restriction compliance, dietary compliance, and HD dose compliance and the dependent variable post-dialysis recovery time. The sample was selected using a Consecutive Sampling Technique, and questionnaires were distributed during HD sessions. The sample size was determined using the Slovin sampling formula based on a population of 90 patients, resulting in 76 respondents.

Data were collected by distributing research questionnaires, which included the Fluid Compliance and Dietary Compliance questionnaires. Hemodialysis dose compliance was measured using nurse reports and medical records, which comprised the dates of dialysis sessions, start and end times of HD sessions, and notes regarding any instances of shortened or missed HD sessions. Reports from the three months preceding data collection were utilized. Post-dialysis recovery time was assessed using Patient Reported Outcome Measures (PROMs). The specific question posed to patients was, "How long does it take for you to return to normal after dialysis?" Post-dialysis recovery time was calculated in minutes.

The ethical review of this study was conducted by the Health Research Ethics Committee of the University of Sumatera Utara, under approval number 2989/X/SP/2023. The Faculty of Nursing at USU received approval from the Health Research Ethics Committee with the statement: “The research proposal has been reviewed and determined not to conflict with human values and norms”.

Data analysis will be conducted using both univariate and bivariate analytical methods. The types of data utilized in this study include categorical data, which will be presented through frequency distributions and percentages, and numerical data, which will be summarized using medians along with minimum and maximum values due to the non-normal distribution of the data. Bivariate statistical tests were selected based on the measurement scales of the variables and the results of normality tests. Consequently, the Mann-Whitney U test, which is appropriate for non-normally distributed numerical data, was utilized to compare hypotheses between two independent groups.

RESULTS AND DISCUSSION

The characteristics of the respondents are as follows: out of 76 participants, 54

respondents (71.1%) were aged above 55 years. The majority of respondents were male, comprising 47 individuals (61.8%). In terms of educational attainment, most respondents had a secondary education level, totaling 33 participants (43.0%). Regarding the duration of HD treatment, the majority had been undergoing HD for 1 to 5 years, with 37 respondents (48.7%). Additionally, a significant proportion of respondents had comorbidities, accounting for 67 individuals (88.2%). Furthermore, 43 respondents (56.6%) experienced complications during the HD sessions.

Tabel 1. Distribution of Respondents Based on Fluid Compliance, Dietary Compliance, and Hemodialysis Dose Compliance (N=76)

Variable and Category	Frequency (n)	Percentage (%)
Fluid Compliance		
Complied	39	51.3
Noncomplied	37	48.7
Dietary Compliance		
Complied	39	51.3
Noncomplied	37	48.7
HD Dose Compliance		
Complied	47	61.8
Non-complied	29	38.2

Tabel 2. Distribution of Post-Dialysis Recovery Time at RSUD Cut Meutia North Aceh, 2023 (N=76)

Variable	Median	Minimum – Maximum	95% CI
Recovery Time	240	15 – 1800	362.21 – 596.60

The post-dialysis recovery time data were found to be non-normally distributed. As shown in Table 2, the median post-dialysis recovery time was 240 minutes. The shortest recovery time recorded was 15 minutes, while the longest was 1,800 minutes. Based on the confidence interval estimation, it can be concluded that the average post-dialysis recovery time ranges between 362.21 minutes and 596.60 minutes. A normality test conducted on the HD recovery time variable confirmed a non-normal distribution; therefore, bivariate analysis was performed using the Mann-Whitney U test. The analysis of the relationship between fluid compliance, dietary compliance, and HD dose compliance with

post-dialysis recovery time is presented in the following table;

Tabel 3. Relationship Between Post-Dialysis Recovery Time and Fluid Restriction compliance (N=76)

Variable	Median (minimum-maximum)	P Value
Fluid Compliance		
Complied	45 (15 – 1440)	
Noncomplied	780 (15 – 1800)	0.000

The Mann-Whitney U test yielded a p-value of 0.000 ($p < 0.05$), indicating a statistically significant difference in post-dialysis recovery time between respondents who complied to fluid restriction and those who did not. Among respondents who adhered to fluid restriction, the majority had a post-dialysis recovery time of 45 minutes, with a minimum of 15 minutes and a maximum of 1,440 minutes. In contrast, respondents who did not adhere to fluid restriction had a predominant post-dialysis recovery time of 780 minutes, ranging from a minimum of 15 minutes to a maximum of 1,800 minutes.

Tabel 4. Relationship Between Post-Dialysis Recovery Time and Dietary compliance (N=76)

Variable	Median (minimum-maximum)	P Value
Dietary Compliance		
Complied	45 (15 – 1440)	0.000
Noncomplied	720 (15 – 1800)	

The Mann-Whitney U test yielded a p-value of <0.001 ($p < 0.05$), indicating a statistically significant difference in post-dialysis recovery time between respondents who complied to diet management and those who did not. Among respondents who complied to diet management, the median post-dialysis recovery time was 45 minutes, ranging from 15 to 1,440 minutes. In contrast, respondents who did not complied to diet management had a median post-dialysis recovery time of 720 minutes, with a range of 15 to 1,800 minutes.

Table 5. Relationship between Post-Dialysis Recovery Time and Hemodialysis Dose Compliance (N=76)

Variable	Median (minimum-maximum)	P Value
Fluid Compliance		
Complied	120 (15 – 1800)	0.007
Noncomplied	720 (15 – 1440)	

The Mann-Whitney U test yielded a p-value of 0.007 ($p < 0.05$), indicating a statistically significant difference in post-dialysis recovery time between respondents who adhered to the hemodialysis (HD) dosage regimen and those who did not. Among respondents who adhered to the HD dosage regimen, the median post-dialysis recovery time was 120 minutes, with a minimum of 15 minutes and a maximum of 1,800 minutes. In contrast, respondents who did not adhere to the HD dosage regimen had a median post-dialysis recovery time of 720 minutes, ranging from a minimum of 15 minutes to a maximum of 1,440 minutes.

The study results indicate that the proportion of respondents based on age grouping shows that the majority of respondents are under 55 years old (71.1%). According to IRR (2015), the age grouping of end-stage renal disease (ESRD) patients undergoing HD in Indonesia is predominantly young (45–54 years) compared to older individuals (≥56 years), who constitute only 13.5% (Indonesian Renal Registry, 2015).

Several studies have demonstrated that age is frequently associated with risk avoidance, with age significantly influencing the risks individuals encounter. This implies that as individuals age, they are more likely to adopt strategies to manage or mitigate identified risks. A study conducted in England by Woerden (2007) found that individuals over 75 years old do not undergoing HD due to considerations of their personal physical, social, and psychosocial conditions. Consequently, elderly patients do not receive routine dialysis therapy.

The findings of this study indicate that the majority of respondents are male (61.8%) compared to females. This aligns with other research, which reports that the majority of respondents are male, ranging around 60.5%. Several studies have demonstrated that gender influences compliance to treatment protocols. Males consistently tend to be noncompliance, whereas females

are more likely to consistently adhere to therapy. Additionally, this study found that females have a lower mortality rate compared to males, possibly due to higher health consciousness among females. It can be concluded that both males and females have equal opportunities to develop end-stage renal disease (ESRD). However, the inconsistent health behaviors exhibited by males may predispose them to ESRD (Chan, Zalilah and Hii, 2012).

In this study, the educational level of ESRD patients undergoing HD revealed that the majority possess a secondary education level (high school or equivalent) (43.0%). Similarly, a study conducted in Banda Aceh reported that the majority of patients have a high school education, accounting for 40.0% (Agustina, Yetti and Sukmarini, 2019). Furthermore, health status and adherence data indicate that ESRD patients with a secondary education level undergoing HD constitute the majority compared to those with other education levels (Chironda *et al.*, 2014).

Several studies have investigated the relationship between educational level and adherence to hemodialysis (HD) treatment. The data indicate that there is no significant relationship between education and adherence to HD, where higher knowledge levels are not associated with better compliance to HD protocols (Chan, Zalilah and Hii, 2012). Conversely, other research related to patient education in end-stage renal disease (ESRD) patients has shown that patients tend to be more complied after receiving health education related to health management (Deif *et al.*, 2015).

In this study, the majority of ESRD patients undergoing HD have been on HD for 1-5 years, followed by those on HD for less than 1 year. Similar characteristics have been observed in several other studies, where the majority of respondents have undergone HD for 2-5 years (Bağ and Mollaoğlu, 2010). A comparable study conducted by Chironda et al. (2014) found that the majority of HD durations were between 1.5 and 5 years (Chironda *et al.*, 2014). Data reported by the Indonesian Renal Registry (IRR) in 2015 indicate that most patients undergoing HD have been on treatment for less than 1 year (33.4%), whereas durations of 1-3 years account for only 13.6%, and those exceeding 3 years constitute 7.9%. Additionally, the IRR reported that the longest duration of HD treatment reached up to 26 years (Indonesian Renal Registry, 2015).

Post-dialysis recovery time was evaluated using the question, "How long do you require to recover after a dialysis session?" Some respondents exhibited varying

interpretations, wherein they compared their condition during acute kidney failure episodes prior to the initiation of hemodialysis (HD) and after undergoing HD. To reduce potential misinterpretations, researchers first asked whether respondents understood the question related to this variable before completing the questionnaire. The researchers clarified that the referenced time pertains to the number of hours necessary for respondents to engage in physical activities and feel physically rejuvenated following the conclusion of the HD session. In a study context, this question should be easily interpretable, manageable, demonstrate response stability through retesting, exhibit both convergent and divergent validity, and be sensitive to changes (Lindsay *et al.*, 2006).

The majority of respondents reported recovering within 240 minutes post-dialysis with the recovery time ranging from a minimum of 15 minutes to a maximum of 1800 minutes. These findings are consistent with other studies, which reported an average recovery time of 246 ± 451 minutes (Awuah *et al.*, 2013). A study conducted in Bali identified an average post-dialysis recovery time of 878.41 ± 402.27 minutes (Ayu *et al.*, 2019). Furthermore, Rayner et al. (2014) reported that 32% of respondents recovered in less than 2 hours, 41% required between 2 and 6 hours, 17% needed 7 to 12 hours, and 10% took more than 12 hours to fully recover (Rayner *et al.*, 2014). Another study reported an average recovery time of 246 ± 451 minutes (Awuah *et al.*, 2013), Various study results indicate significant differences in post-hemodialysis (post-HD) recovery times. Different research has identified the median recovery time after HD as 180 minutes (ranging from 60 to 420 minutes), with 95 patients (45%) experiencing recovery times below the median value. Patients with shorter recovery times exhibited a lower prevalence of disturbances, higher ultrafiltration rates (UFR), and lower frequencies of dialysis (Bossola *et al.*, 2018). Conversely, another study found that recovery time after an HD session was not related to various demographic and clinical factors (Awuah *et al.*, 2013). The lack of association between post-HD recovery time and these variables complicates the prediction of recovery time after HD based on demographic profiles and standard clinical parameters (Awuah *et al.*, 2013).

Hemodialysis (HD) scheduling significantly influences post-dialysis recovery time. Specifically, afternoon HD sessions necessitate longer recovery periods compared to those conducted in the morning or evening. This extended

recovery duration is primarily attributed to a nearly twofold increase in the prevalence of intra-dialytic hypotension among patients with afternoon HD schedules. Additionally, HD sessions impact patient drowsiness during the procedure, likely because of interleukin-1. Patients undergoing afternoon HD who attempt to sleep during dialysis frequently report difficulties in maintaining sleep, increased restlessness, and heightened nocturnal stiffness (Ayu *et al.*, 2019).

Research findings indicate that respondents adhering to fluid restriction (51.3%) primarily had post-dialysis recovery times of 45 minutes, with a minimum of 15 minutes and a maximum of 1800 minutes. Statistically, there is a significant relationship between compliance to fluid restriction and post-dialysis recovery time (p-value < 0.05). Fluid compliance is closely related to appropriate health education and family support (Al Husna, Yetti and Sukmarini, 2019). Fluid restriction is influenced by intradialytic weight gain (IDWG), which is the increase in body weight serving as an indicator of fluid intake during the interdialytic period. Increased IDWG is associated with fluid intake, thirst, and xerostomia, as well as factors related to the implementation of HD therapy, such as longer HD durations, dialysis time and frequency, and dialysate composition (Safitri, Pahria and Rahayu, 2022).

Intradialytic Weight Gain (IDWG) determines the volume of fluid to be filtered during dialysis. The relationship between Ultrafiltration Rate (UFR) and post-dialysis recovery time is inversely proportional, with longer recovery times observed in patients with UFR below the average. The underlying mechanism for this inverse relationship suggests that UFR may influence cytokine production or its clearance (Ippoliti, Santarelli and Nebiolo, 2019).

The pathophysiology of the recovery process remains incompletely understood. HD induces the movement of salts and water between the body's fluid compartments, leading to osmotic imbalances between extracellular and intracellular fluids, crossing of the blood-brain barrier, and the transport of electrolytes across cell membranes. These alterations may be more pronounced following a dialysis session, resulting in prolonged recovery times. Recovery time may be expedited following treatments characterized by slower fluid shifts and smaller volumes. This allows patients who maintain urine output to experience lower intradialytic weight loss and a slower

ultrafiltration rate, thereby achieving faster recovery times (Rayner *et al.*, 2014).

Among respondents, 51.3% adhered to their dietary regimen, with the majority exhibiting post-dialysis recovery times of 45 minutes, ranging from a minimum of 15 minutes to a maximum of 1440 minutes. Statistically, adherence to dietary regimens significantly influenced post-dialysis recovery time (p-value < 0.05). Compliance to dietary regimens among hemodialysis (HD) patients tended to be low; one study reported that 69.6% had inadequate nutritional intake, and these patients were prone to experiencing disturbances in nutritional status that affect quality of life (Siagian, 2018), including a decline in health following dialysis. In alignment with previous research, 57.7% of respondents demonstrated compliance to dietary therapy. Improving dietary compliance is influenced by providing nutritional counselling and education, which can motivate patients to change and comply with dietary recommendations. (Widiany, 2017).

The majority of HD patients do not strictly complied to their dietary patterns. In a study, compliance to dietary regimens concerning the intake of protein, sodium, potassium, phosphorus, and fluids increased when nursing interventions were provided, and this dietary compliance also contributed to fluid compliance (Mersal and El-Sedawy, 2019).

Patients who are noncompliance to their diets experience increased nutrient loss, leading to biochemical alterations and reduced nutrient levels in the blood. Continuous changes result in altered body functions, such as neurological signs including weakness, dizziness, fatigue, shortness of breath, and others (Siagian, 2018). Dietary compliance affects body biochemistry and has additional side effects on the body. These functional changes impact quality of life and correlate with post-dialysis recovery time (Lindsay *et al.*, 2006).

Compliance to Hemodialysis (HD) dosing among respondents was 61.8%, with the majority exhibiting post-dialysis recovery times of 120 minutes, ranging from a minimum of 15 minutes to a maximum of 1800 minutes. Statistically, there is a significant relationship between compliance to HD dosing and post-dialysis recovery time (p-value < 0.05). Compliance to HD dosing within the Aceh community at RSU dr. Zainoel Abidin Aceh mirrors the overall respondent adherence rate, with 60% of respondents complying with their HD dosing regimen. This reflects the general compliance behavior of the Aceh

population in undergoing HD treatment. In the same study, compliance to HD dosing was influenced by factors such as self-efficacy, acceptance, and social support (Agustina, Yetti and Sukmarini, 2019). One of the factors affecting post-dialysis recovery time is the ultrafiltration rate, HD schedule, Kt/V ratio, and dialysate sodium concentration (Ayu et al., 2019), as well as the duration of dialysis sessions (Rayner *et al.*, 2014).

Afternoon Hemodialysis (HD) schedules require longer recovery times compared to morning or evening schedules. Additionally, longer dialysis session durations and lower dialysate sodium concentrations are associated with extended recovery times (Rayner *et al.*, 2014). A study investigated the modification of post-dialysis recovery time through alterations in HD regimens. The findings reported that recovery time was associated with the use of hemofiltration/hemodiafiltration and a low Kt/V ratio. Specifically, longer recovery times were correlated with lower IDWG and slower filtration rates. Conversely, these factors were found to contribute to shorter recovery times, indicating that optimizing filtration parameters may enhance patient recovery post-HD (Rayner *et al.*, 2014).

A rapid filtration rate and shorter dialysis treatment times have been reported to shorten post-dialysis recovery times. Conversely, patients who recover slowly despite a rapid filtration rate may experience lower salt and fluid intake and increased treatment durations, thereby selectively categorizing patients who recover more quickly into the higher filtration rate group (Rayner *et al.*, 2014).

Altering HD dosing frequency to 5–7 times per week has been proven to significantly reduce the total weekly recovery time (Rayner *et al.*, 2014), Therefore, further studies are necessary to investigate methods for reducing recovery time and improving treatment quality within dialysis units, as well as the potential to enhance clinical trial outcomes, such as increasing dialysate sodium concentration. It is deemed essential to conduct randomized controlled trials to substantiate these approaches.

The limitations identified in this study include the presence of several secondary data required for the research that were not well-documented in the medical records of RSU dr. Zainoel Abidin Aceh, such as comorbidity data, early complications during HD, and adherence to HD dosing. Consequently, some respondents were excluded from the analysis. Another limitation pertains to the questions related

to the post-dialysis recovery time variable, which require further clarification to ensure respondents fully understand them.

CONCLUSION

Post-dialysis recovery time is influenced by compliance to fluid restriction, compliance to dietary regulations, and the hemodialysis (HD) dosing regimen administered to End-Stage Renal Disease (ESRD) patients. It is important for nurses to implement behavioral interventions to improve compliance, thereby ensuring patient comfort and allowing patients to resume activities after the HD session is completed.

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REFERENCES

Agustina, F., Yetti, K. and Sukmarini, L. (2019) 'Contributing factors to hemodialysis adherence', 29, pp. 238–242.

Awuah, K.T. *et al.* (2013) 'Time to recovery after a hemodialysis session : impact of selected variables', *CLin Kidney Journal*, 6, pp. 595–598. Available at: https://doi.org/10.1093/ckj/sft120.

Ayu, G. *et al.* (2019) 'Associated factors of post-hemodialysis recovery time in kidney failure patients ', *Enfermería Clínica*, 29(S2), pp. 247–251. Available at: https://doi.org/10.1016/j.enfcli.2019.04.139.

Bağ, E. and Mollaoğlu, M. (2010) 'The evaluation of self-care and self-efficacy in patients undergoing hemodialysis', *Journal of Evaluation in Clinical Practice*, 16(3), pp. 605–610. Available at: https://doi.org/10.1111/j.1365-2753.2009.01214.x.

Bolton, S. *et al.* (2021) 'Clinical Assessment of Dialysis Recovery Time and Symptom Burden : Impact of Switching Hemodialysis Therapy Mode', (November).

Bossola, M. *et al.* (2018) 'Recovery Time after Hemodialysis Is Inversely Associated with the Ultrafiltration Rate', *Hemodialysis - Research Article*, pp. 1–7. Available at: https://doi.org/10.1159/000492919.

Chan, Y.M., Zalilah, M.S. and Hii, S.Z. (2012) 'Determinants of compliance behaviours among patients undergoing hemodialysis in malaysia', *PLoS ONE*, 7(8), pp. 1–7. Available at: https://doi.org/10.1371/journal.pone.0041362.

Chironda, G. *et al.* (2014) 'Perceived Health Status and Adherence to Haemodialysis by End Stage Renal Disease Patients: A Case of a Central Hospital in Zimbabwe', *IOSR Journal of Nursing and Health Science*, 3(1), pp. 22–31. Available at: https://doi.org/10.9790/1959-03152231.

Chironda, G. and Bhengu, B. (2016) 'Contributing Factors to Non-Adherence among Chronic Kidney

Disease (CKD) Patients: A Systematic Review of Literature', *iMedPub Journals*, 2(4:29), pp. 1–9. Available at: https://doi.org/10.21767/2471-299X.1000038.

Deif, H.I.A. *et al.* (2015) 'Effect of an Educational Program on Adherence to Therapeutic Regimen among Chronic Kidney Disease Stage 5 (CKD5) Patients under Maintenance Hemodialysis', *Journal of Education and Practice*, 6(5), pp. 21–34.

Duong, C.M. *et al.* (2015) 'Challenges of hemodialysis in Vietnam : experience from the first standardized district dialysis unit in Ho Chi Minh City', *BMC Nephrology*, 16(122), pp. 1–6. Available at: https://doi.org/10.1186/s12882-015-0117-2.

Guedes, M. *et al.* (2020) 'Impacts of dialysis adequacy and intradialytic hypotension on changes in dialysis recovery time', pp. 1–11.

Al Husna, C.H., Yetti, K. and Sukmarini, L. (2019) 'Determinant of fluid adherence among hemodialysis patients in Malang, Indonesia', *Enfermeria Clinica*, 29, pp. 117–122. Available at: https://doi.org/10.1016/j.enfcli.2019.04.018.

Ibrahim, S., Hossam, M. and Belal, D. (2015) 'of Kidney Diseases and Transplantation Original Article Study of Non-Compliance among Chronic Hemodialysis Patients and its Impact on Patients ' Outcomes', 26(2), pp. 243–249. Available at: https://doi.org/DOI: 10.4103/1319-2442.152405.

Indonesian Renal Registry (2015) *8 th report of Indonesian Renal Registry*.

Ippoliti, F., Santarelli, S. and Nebiolo, E. (2019) 'Recovery Time after Hemodialysis Is Inversely Associated with the Ultrafiltration Rate', pp. 45–51. Available at: https://doi.org/10.1159/000492919.

Lindsay, R.M. *et al.* (2006) 'Minutes to Recovery after a Hemodialysis Session : A Simple Health-Related Quality of Life Question That Is Reliable , Valid , and Sensitive to Change', *Clinical Journal Am Soc Nephrol*, 1(5), pp. 952–959. Available at: https://doi.org/10.2215/CJN.00040106.

Mersal, F.A. and El-Sedawy, D.S.E.D. (2019) 'Effect of Nursing Guideline on Dietary and Fluid Compliance among Patients Effect of Nursing Guideline on Dietary and Fluid Compliance among Patients Undergoing Hemodialysis', *Journal of Health, Medicine and Nursing*, 26(2016), pp. 35–48.

Rayner, H.C. *et al.* (2014) 'Recovery Time, Quality of Life, and Mortality in Hemodialysis Patients: The Dialysis Outcomes and Practice Patterns Study (DOPPS)', *American Journal of Kidney Diseases*, 64(1), pp. 1–9. Available at: https://doi.org/10.1053/j.ajkd.2014.01.014.

Safitri, D., Pahria, T. and Rahayu, U. (2022) 'Faktor-faktor yang Mempengaruhi Peningkatan Interdialytic Weight Gain (IDWG) pada Pasien Hemodialisa', *Jurnal Keperawatan Silampari*, 5(2), pp. 959–970. Available at: https://doi.org/DOI: https://doi.org/10.31539/jks.v5i2.3670.

Siagian, Y. (2018) 'Status Nutrisi Pasien Hemodialisa Di Rumah Sakit Umum Daerah', *Jurnal Keperawatan Silampari*, 2(1), pp. 300–314. Available at: https://doi.org/https://doi.org/10.31539/jks.v2i1.320 STATUS.

Widiany, F.L. (2017) 'Faktor-faktor yang mempengaruhi kepatuhan diet pasien hemodialisis', *Jurnal Gizi Klinik Indonesia*, 14(2), pp. 72–79.