Description of Nursing Problems and Factors Related to Therapy Compliance in Chronic Kidney Failure Patients Undergoing Hemodialysis

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Abstract

Chronic kidney disease (CKD) is a progressive condition with an increasing prevalence. Patients with CKD undergoing hemodialysis face multidimensional challenges, including physical and psychological symptoms, family support, health-service-related factors, nursing problems, and difficulties adhering to treatment. This study examined nursing problems and factors associated with treatment adherence among patients with CKD undergoing hemodialysis at Jakarta Islamic Hospital Cempaka Putih. This quantitative cross-sectional study included 54 respondents recruited through purposive sampling according to predefined inclusion and exclusion criteria. Treatment adherence was assessed using the End-Stage Renal Disease Adherence Questionnaire (ESRD-AQ). Physical, psychological, family support, and health service factors were assessed using questionnaires, whereas nursing problems were identified through medical-record review based on the Indonesian Nursing Diagnosis Standards (SDKI). Descriptive and bivariate analyses were performed using Spearman's correlation test. The most common co-occurring nursing diagnoses were excess fluid volume, anxiety, and therapy nonadherence, identified in 25 respondents (46.3%). Physical factors were negatively associated with treatment adherence ($r = -.323$, $p = .017$), whereas health service factors were positively associated with treatment adherence ($r = .393$, $p = .003$). Psychological factors ($r = -.117$, $p = .400$) and family support ($r = -.164$, $p = .236$) were not significantly associated with treatment adherence. Among the examined variables, health service factors showed the strongest correlation with treatment adherence. Improving the quality of health services and addressing patients' physical conditions may support treatment adherence among patients with CKD undergoing hemodialysis. Longitudinal studies are needed to clarify causal relationships.

Keywords: Chronic kidney disease; family support; hemodialysis; health services; nursing diagnoses; treatment adherence.

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Introduction

Chronic kidney disease (CKD) is a progressive health condition that has become a major public health concern worldwide. A global systematic review estimated that the prevalence of CKD was 13.4% for stages 1–5 and 10.6% for stages 3–5. The estimated prevalence for each stage was 3.5% for stage 1, 3.9% for stage 2, 7.6% for stage 3, 0.4% for stage 4, and 0.1% for stage 5 (Hill et al., 2016). Globally, CKD was estimated to affect approximately 843.6 million people in 2017, indicating its substantial and growing burden on healthcare systems (Kovesdy, 2022; Zhao et al., 2025). A similar burden has been observed in Indonesia. The Indonesian Renal Registry reported 63,489 new patients and 158,929 active patients with CKD stage 5 receiving hemodialysis in 2022 (Indonesian Renal Registry, 2023).

Patients with CKD stage 5 have severely impaired kidney function and may require kidney replacement therapy, including hemodialysis, peritoneal dialysis, or kidney transplantation (Kidney Disease: Improving Global Outcomes [KDIGO], 2024). Hemodialysis removes metabolic waste products and excess fluid from the blood when the kidneys can no longer perform these functions adequately (Ponce et al., 2019). In Indonesia, hemodialysis remains the predominant dialysis modality, accounting for approximately 98.9% of active dialysis patients registered in 2022 (Indonesian Renal Registry, 2023). Although hemodialysis can prolong survival and improve clinical outcomes, its effectiveness depends considerably on patients' ability to adhere to the prescribed treatment regimen. Treatment adherence among patients receiving hemodialysis is multidimensional and includes attendance at scheduled hemodialysis sessions, completion of the prescribed dialysis duration, medication use, fluid restriction, and dietary recommendations. Adherence to these demanding and long-term treatment requirements is often difficult because patients must integrate complex treatment regimens into their daily lives. Inadequate adherence can contribute to poor clinical outcomes, increased hospitalization, reduced quality of life, and higher mortality risk (Chan et al., 2012). Therefore, treatment nonadherence should not be regarded simply as a lack of patient motivation; rather, it may reflect an interaction among physical conditions, psychological difficulties, family circumstances, and characteristics of healthcare services.

Adherence to fluid restriction is one of the most challenging components of hemodialysis treatment. Inadequate adherence to prescribed fluid restrictions may lead to excessive interdialytic weight gain and fluid overload (Howren et al., 2016). Interdialytic weight gain exceeding 5% of the patient's dry body weight is clinically concerning because it may increase the risk of hypertension, intradialytic hypotension, cardiac complications, ascites, pleural effusion, and hospitalization (Ekinci et al., 2018; Tamaura et al., 2019). Alikari et al. (2015) reported that 76% of patients did not adhere to fluid restrictions, while 53% experienced fluid overload. Indonesian studies have also consistently identified difficulties with fluid restriction. Nonadherence rates of 56.5%, 66.7%, and 59.1% were reported by Saraswati et al. (2019), Wulan and Emaliyawati (2018), and Anggraini et al. (2021), respectively. These findings indicate that inadequate fluid management remains a persistent problem among patients receiving hemodialysis.

In addition to difficulties adhering to treatment, patients receiving hemodialysis frequently experience multiple nursing problems. Common physiological nursing problems include excess fluid volume, fatigue, sleep disturbance, activity intolerance, and nutritional imbalance. Patients may also experience psychological problems, particularly anxiety, uncertainty about their prognosis, emotional distress, and difficulties adjusting to long-term treatment (Hinkle et al., 2021). These nursing problems rarely occur in isolation. For example, fatigue and sleep disturbance may reduce a patient's ability to attend or complete hemodialysis sessions, while anxiety and emotional distress may interfere with medication use, dietary regulation, and fluid restriction. Consequently, examining nursing problems separately may not adequately represent the complexity of patients' experiences.

Despite the frequent co-occurrence of these problems in clinical practice, previous studies have generally examined individual nursing problems or specific components of treatment adherence, particularly medication adherence or fluid restriction (Tesfaye et al., 2024). Studies examining patterns of co-occurring nursing diagnoses among patients receiving hemodialysis remain limited, especially in the context of nursing care in Indonesia. Identifying these patterns is important because patients with several simultaneous nursing problems may require more comprehensive and individualized nursing interventions than patients experiencing only one problem.

Treatment adherence may also be associated with factors operating at different levels. Physical symptoms and treatment-related discomfort may interfere with patients' ability to follow treatment recommendations. Psychological distress may reduce motivation and self-regulation, whereas family support may provide emotional encouragement and practical assistance. At the healthcare-system level, communication with healthcare professionals, continuity of care, accessibility of services, and perceived service quality may influence patients' engagement with treatment. Previous findings regarding these factors have not been entirely consistent. Previous studies have identified adherence as a multidimensional phenomenon shaped by patient-related factors, such as knowledge, self-efficacy, forgetfulness, and financial constraints, as well as broader contextual factors, including psychological hardship, family support, competing life demands, and collaborative relationships with healthcare providers (Chan et al., 2012; Taylor et al., 2023). These inconsistencies suggest that treatment adherence should be examined by considering multiple patient-, family-, and healthcare-related factors simultaneously.

Therefore, this study aimed to describe the patterns of nursing diagnoses and examine the associations of physical conditions, psychological factors, family support, and health service factors with treatment adherence among patients with CKD stage 5 receiving maintenance hemodialysis at Jakarta Islamic Hospital Cempaka Putih. By integrating nursing diagnoses with multiple factors associated with adherence, this study is expected to provide a more comprehensive understanding of the care needs of patients receiving hemodialysis and inform the development of more responsive nursing interventions.

Method

Study design and setting

This study employed an analytical cross-sectional design to examine nursing diagnoses and factors associated with treatment adherence among patients receiving maintenance hemodialysis. The study was conducted in June 2026 at the Hemodialysis Unit of Jakarta Islamic Hospital Cempaka Putih, Jakarta, Indonesia. All study variables were assessed during a single period without any experimental manipulation or follow-up assessment.

Participants and sampling

The source population comprised 246 patients registered at the hemodialysis unit during the study period. Participants were recruited using purposive sampling according to predefined eligibility criteria.

Patients were eligible to participate if they: (1) had been diagnosed with CKD stage 5 and were receiving maintenance hemodialysis; (2) had undergone routine hemodialysis for at least three months; (3) were aged 18 years or older; (4) were alert and oriented; (5) were able to communicate in Indonesian; and (6) provided written informed consent. Patients were excluded if they had a documented cognitive impairment, severe psychiatric disorder, acute medical condition or severe complication requiring intensive treatment, or a communication impairment that prevented them from completing the questionnaires. Participants who withdrew their consent or did not complete the questionnaires were also excluded from the final analysis.

Sample-size determination

The minimum sample size was estimated using the formula proposed by Lemeshow et al. (1990). The calculation was based on a population of 246 patients, a 95% confidence level, an expected proportion of [insert the proportion used], and a precision level of [insert precision]. The calculation produced a minimum sample of 49 participants. After allowing for an anticipated nonresponse or incomplete-

response rate of 10%, the required sample size was increased to 54 participants. A total of 54 eligible patients completed the study and were included in the final analysis.

Measures

Nursing diagnoses

Nursing diagnoses were identified using clinical and nursing-assessment information documented in the participants' medical records. The diagnoses were classified according to the *Indonesian Nursing Diagnosis Standards* (*Standar Diagnosis Keperawatan Indonesia* [SDKI]) developed by the Indonesian National Nurses Association (Persatuan Perawat Nasional Indonesia [PPNI], 2016).

A standardized data-abstraction form was used to record each nursing diagnosis identified during the study period. When more than one diagnosis was documented for a participant, all co-occurring diagnoses were recorded to identify the most frequent patterns or combinations of nursing diagnoses. Medical records were independently reviewed by two nephrologists. Any discrepancies in the classification of nursing diagnoses were resolved through discussion and consensus, with input from a senior nurse when necessary.

Treatment adherence

Treatment adherence was assessed using the End-Stage Renal Disease Adherence Questionnaire (ESRD-AQ) developed by Kim et al. (2010). The ESRD-AQ is a 46-item instrument designed to assess treatment adherence among patients receiving maintenance hemodialysis. It covers four treatment domains: attendance at and completion of hemodialysis sessions, medication use, fluid restriction, and dietary recommendations. The instrument uses several response formats, including Likert-type scales, dichotomous responses, and frequency-based questions.

The direct adherence-behavior score is calculated from six designated items representing the four treatment domains. The total adherence-behavior score ranges from 0 to 1,200, with higher scores indicating better treatment adherence. Items assessing patients' attitudes and perceptions toward treatment were scored separately and were not included in the direct adherence-behavior score. The Indonesian version used in this study has previously demonstrated adequate validity and internal consistency, with a Cronbach's alpha coefficient of .85 (Yulianti & Nallapan, 2025). In the present sample, the internal consistency coefficient was Cronbach's alpha .87 and McDonald's omega .85.

Factors associated with treatment adherence

Factors potentially associated with treatment adherence were assessed using a 19-item questionnaire developed by the researchers. The questionnaire comprised four subscales: physical factors (five items), psychological factors (five items), family support (five items), and health service factors (four items). The items were rated on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

The physical-factor subscale assessed [briefly describe the indicators, such as physical symptoms, fatigue, or treatment-related discomfort]. The psychological-factor subscale assessed [describe the indicators, such as anxiety, emotional distress, motivation, or treatment acceptance]. The family-support subscale assessed emotional, informational, and practical assistance provided by family members. The health-service subscale assessed [describe the indicators, such as accessibility, communication, responsiveness, continuity of care, and patient–provider relationships].

The scores for each subscale were calculated by summing the relevant item scores after reverse-scoring negatively worded items, where applicable. Higher scores on the physical and psychological

subscales indicated [more severe problems/better physical and psychological conditions], whereas higher family-support and health-service scores indicated greater perceived support and more favorable healthcare services. The direction of each score was specified before the statistical analysis.

The questionnaire was pilot-tested among 30 patients who were not included in the main study. Content validity was evaluated by three senior nurse using Aiken's V, producing coefficients ranging from .82 - .95. Item analysis yielded corrected item–total correlations ranging from [insert values]. The overall Cronbach's alpha coefficient was .907. Because the instrument contained four conceptually distinct dimensions, internal consistency was also calculated separately for the physical (α/ω = .82/.81), psychological (α/ω = .79/.79), family-support (α/ω = .81/.82), and health-service (α/ω = .77/.79) subscales.

Data-collection procedure

Potentially eligible participants were identified from the hemodialysis-unit registry and screened according to the inclusion and exclusion criteria. Eligible patients received verbal and written explanations about the study objectives, procedures, voluntary nature of participation, confidentiality, and their right to withdraw without affecting the healthcare services they received. Participants who agreed to participate provided written informed consent.

The questionnaires were administered before the scheduled hemodialysis session in a private and comfortable area. Participants completed the questionnaires independently; assistance was provided by a trained researcher when a participant experienced difficulty reading or understanding an item. The researcher provided only standardized clarification and did not direct the participant's responses. Questionnaire completion required approximately [insert duration] minutes. Clinical and nursing data were subsequently extracted from the participants' medical records using the standardized abstraction form. Each participant was assigned an identification code, and no personally identifiable information was included in the analytical dataset.

Ethical considerations

The study protocol was reviewed and approved by the Gatot Subroto Hospital ethical board. All participants provided written informed consent before data collection. Participation was voluntary, and participants could withdraw at any time without consequences for their treatment. Data confidentiality and anonymity were maintained throughout data collection, analysis, and reporting. The study procedures were conducted in accordance with the ethical principles of the Declaration of Helsinki.

Statistical analysis

Data were analyzed using [insert software and version]. Before analysis, the data were examined for coding errors, missing values, outliers, and distributional characteristics. Categorical variables were summarized using frequencies and percentages. Continuous variables were summarized using means and standard deviations when approximately normally distributed or medians and interquartile ranges when distributions were skewed.

The prevalence of individual nursing diagnoses and patterns of co-occurring diagnoses was reported as frequencies and percentages. Treatment-adherence scores and physical, psychological, family-support, and health-service scores were summarized using appropriate descriptive statistics.

Spearman's rank-order correlation was used to examine the bivariate associations between treatment adherence and the physical, psychological, family-support, and health-service factors because ordinal

measurement properties. The results were reported as Spearman's correlation coefficients (*rs*), 95% confidence intervals, and exact *p* values. All statistical tests were two-tailed, and statistical significance was set at $p < .05$. Because four prespecified correlations were examined, the possibility of inflated type I error due to multiple testing was considered when interpreting the findings. Given the cross-sectional design, the observed relationships were interpreted as associations and not as causal effects.

Result

Respondent Characteristics

As shown in Table 1, slightly more than half of the participants were female (53.7%), while 46.3% were male. The largest occupational groups were homemakers (37.0%) and private-sector employees (35.2%). Regarding educational attainment, half of the participants had completed senior high school (50.0%), followed by tertiary education (29.6%), junior high school (16.7%), and elementary school (3.7%).

Table 1

Frequency Distribution of Respondent Characteristics (n = 54)

Variables	*f*	%
Gender		
Man	25	46.3
Woman	29	53.7
Work		
Doesn't work	6	11.1
Indonesian National Armed Forces/Indonesian National Police	1	1.9
Private	19	35.2
Self-employed	5	9.3
Housewife	20	37.0
Other	3	5.6
Education		
Elementary School	2	3.7
JUNIOR HIGH SCHOOL	9	16.7
SENIOR HIGH SCHOOL	27	50.0
College	16	29.6
Marital status		
Not married yet	5	9.3
Marry	49	90.7
HD Frequency		
2x a Week	54	100.0
Medical History		
There isn't any	5	9.3
Diabetes mellitus	10	18.5
Heart	8	14.8
Hypertension	31	57.4
HD Access		
AV Fistula	37	68.5
CDL	17	31.5

Source: Primary data, 2026

Most participants were married (90.7%), while 9.3% were unmarried. All participants received hemodialysis twice weekly. Hypertension was the most frequently reported primary comorbidity (57.4%), followed by diabetes mellitus (18.5%) and heart disease (14.8%); 9.3% reported no comorbid condition. Regarding vascular access, 68.5% of the participants used an arteriovenous fistula, whereas 31.5% used a central double-lumen catheter.

Diet and Therapy Compliance

As shown in Table 2, the mean overall treatment-adherence score was 75.17 (*SD* = 9.85), with an observed range of 54–100 and a 95% confidence interval (CI) of 72.48–77.86. At the domain level, the mean score was 23.28 (*SD* = 5.32; range = 13–38; 95% CI = 21.83–24.73) for hemodialysis treatment, 21.65 (*SD* = 2.57; range = 15–27; 95% CI = 20.95–22.35) for fluid restriction, 15.37 (*SD* = 4.72; range = 9–26; 95% CI = 14.08–16.66) for medication adherence, and 14.87 (*SD* = 3.44; range = 8–24; 95% CI = 13.93–15.81) for dietary adherence. The hemodialysis-treatment domain had the numerically highest raw mean and the largest standard deviation, whereas the dietary-adherence domain had the lowest raw mean. However, direct comparisons among domain means are appropriate only when the domains have equivalent score ranges and numbers of items. Otherwise, normalized scores, such as the percentage of the maximum possible score or the mean score per item, should be used to determine which adherence domain is relatively higher or lower.

Table 2
Therapy Compliance in Chronic Kidney Failure Patients Undergoing Hemodialysis (n = 54)

Variables	Mean ± SD	Min–Max	95% CI
Total compliance	75.17 ± 9.85	54–100	72.48–77.86
HD Treatment	23.28 ± 5.32	13–38	21.83–24.73
Drugs	15.37 ± 4.72	9–26	14.08–16.66
Fluid	21.65 ± 2.57	15–27	20.95–22.35
Diet	14.87 ± 3.44	8–24	13.93–15.81

Source: Primary data (ESRDAQ), 2026

Overview of Physical, Psychological, Family Support and Health Service Factors

The descriptive statistics indicated a mean score of 19.02 (*SD* = 2.23; range = 14–23; 95% CI = 18.41–19.63) for psychological factors, 19.00 (*SD* = 2.14; range = 14–25; 95% CI = 18.42–19.58) for family support, 16.46 (*SD* = 2.38; range = 12–20; 95% CI = 15.81–17.11) for physical factors, and 14.98 (*SD* = 5.43; range = 4–20; 95% CI = 13.50–16.46) for health service factors. Because the health-service subscale contained four items, whereas the other subscales contained five items, their raw total scores were not directly comparable. Based on mean item scores, psychological factors and family support had the highest values (both *M* = 3.80), followed by health service factors (*M* = 3.75) and physical factors (*M* = 3.29). The health-service subscale also showed the greatest variability (*SD* per item = 1.36), indicating greater heterogeneity in participants' perceptions of healthcare services than in their responses to the other factors.

Table 3
Physical, Psychological, Family Support and Health Service Factors in Chronic Kidney Failure Patients Undergoing Hemodialysis (n = 54)

Variables	Mean ± SD	Min–Max	95% CI
Physical Factors	16.46 ± 2.38	12–20	15.81–17.11
Psychological Factors	19.02 ± 2.23	14–23	18.41–19.63
Family Support	19.00 ± 2.14	14–25	18.42–19.58
Health Service Factors	14.98 ± 5.43	4–20	13.50–16.46

Source: Primary data, 2026

Overview of Nursing Problems in Patients with Chronic Kidney Failure

As shown in Table 4, the most frequent co-occurring pattern of nursing problems was excess fluid volume, anxiety, and treatment nonadherence, which was identified in 25 participants (46.3%). Two patterns—excess fluid volume, fatigue, anxiety, and treatment nonadherence; and excess fluid volume, activity intolerance, anxiety, and treatment nonadherence—were each observed in four participants (7.4%). Excess fluid volume accompanied by fatigue and anxiety, and the combination of fatigue and sleep disturbance, were each identified in three participants (5.6%). Four additional patterns—excess fluid volume, sleep disturbance, and anxiety; excess fluid volume alone; excess fluid volume and treatment nonadherence; and excess fluid volume and anxiety—were each observed in two participants (3.7%). Overall, excess fluid volume appeared in most of the frequently observed nursing-problem patterns and commonly co-occurred with anxiety and treatment nonadherence.

Table 4
Overview of Nursing Problems in Chronic Kidney Failure Patients Undergoing Hemodialysis

No	Combination of Nursing Problems	n	%
1	Excess fluid volume, Anxiety, Non-compliance with therapy	25	45.45
2	Excess fluid volume, Fatigue, Anxiety, Non-compliance with therapy	4	7.27
3	Excess fluid volume, Fatigue, Anxiety	3	5.45
4	Excess fluid volume, Sleep disturbance, Anxiety	2	3.64
5	Excess fluid volume	2	3.64
6	Excess fluid volume, Non-compliance with therapy	2	3.64
7	Fatigue, sleep pattern disturbances	3	5.45
8	Excess fluid volume, Anxiety	2	3.64
9	Excess fluid volume, Activity intolerance, Anxiety, Non-compliance with therapy	4	7.27

Source: Primary data, 2026

Factors Associated with Therapy Compliance in Chronic Kidney Disease Patients

Spearman's rank-order correlation analysis showed that physical-factor scores were significantly and inversely associated with treatment-adherence scores, $rs = -.323$, $p = .017$. This small-to-moderate association indicates that participants reporting greater physical problems tended to have lower treatment-adherence scores. However, given the cross-sectional design, this finding should not be interpreted as evidence of a causal effect. Psychological factors were not significantly associated with treatment adherence, $rs = -.117$, $p = .400$. Similarly, family support was not significantly associated with treatment adherence, $rs = -.164$, $p = .236$. These nonsignificant findings indicate that the study did not obtain sufficient evidence of associations between these two factors and treatment adherence in the current sample.

Table 4
Factors Associated with Therapy Compliance in Chronic Kidney Disease Patients Undergoing Hemodialysis (n=54)

Variables	r	p
Physical factors – Therapy Compliance	-0.323	0.017*
Psychological factors – Therapy compliance	-0.117	0.400
Family support – Therapy compliance	-0.164	0.236
Health care factors – Therapy Compliance	0.393	0.003*

Health service factors were significantly and positively associated with treatment adherence, $rs = .393$, $p = .003$, indicating a moderate association. Participants who reported more favorable healthcare services tended to have higher treatment-adherence scores. Among the variables examined, health service factors showed the strongest observed bivariate correlation with treatment adherence. However, this finding does not establish that healthcare services were the most dominant

or causal factor, as determining their independent contribution would require a multivariable regression analysis.

Discussion

This study produced three principal findings. First, the most frequently observed pattern of co-occurring nursing problems was excess fluid volume, anxiety, and treatment nonadherence, which was identified in 25 of the 54 participants (46.3%). Second, health service factors were positively associated with treatment adherence, whereas greater physical problems were associated with lower adherence. Third, psychological factors and family support were not significantly associated with treatment adherence in the present sample. Collectively, these findings illustrate the interconnected physical, psychological, behavioral, and healthcare-related challenges experienced by patients receiving maintenance hemodialysis.

The predominance of excess fluid volume in the observed nursing-problem patterns is consistent with Alikari et al. (2015), who reported that 53% of patients with CKD experienced fluid overload. According to the Indonesian Nursing Diagnosis Standards, excess fluid volume, or hypervolemia, refers to an increase in intravascular, interstitial, and/or intracellular fluid volume (PPNI, 2016). In patients with advanced CKD, severely impaired kidney function limits the excretion of sodium and water, thereby increasing the risk of fluid retention, particularly when urine output is reduced and fluid intake is not adequately controlled (Takase et al., 2022).

Poorly managed fluid overload may adversely affect multiple physiological systems. Respiratory complications may include dyspnea, pleural effusion, and pulmonary edema, whereas cardiovascular complications may include hypertension and heart failure. Fluid accumulation may also contribute to headaches, sleep difficulties, and other neurological complaints (Sutraye et al., 2022). At the tissue level, edema may compromise microcirculation, reduce tissue oxygenation, cause discomfort, and increase vulnerability to skin injury (Borrelli et al., 2020). These complications demonstrate why fluid-volume management remains a central component of nursing care for patients receiving hemodialysis.

An important finding was that excess fluid volume frequently occurred together with anxiety and treatment nonadherence rather than as an isolated nursing problem. This pattern suggests that patients' physical, psychological, and behavioral difficulties may be closely interconnected. Physical discomfort and concern about potential complications may heighten anxiety, while fatigue, distress, and the complexity of treatment may make it more difficult for patients to follow recommendations concerning fluid intake, diet, medication, and hemodialysis schedules. Conversely, inadequate adherence to fluid restrictions or hemodialysis schedules may contribute to fluid accumulation and worsening physical symptoms. Because the present study used a cross-sectional design, however, it cannot determine the temporal or causal direction among these problems. Therefore, the findings should be interpreted as evidence of co-occurrence rather than proof that fluid overload causes anxiety or treatment nonadherence.

The frequent co-occurrence of these nursing problems has relevant clinical implications. Nursing management should not focus exclusively on removing excess fluid or monitoring interdialytic weight gain. A comprehensive approach is needed in which fluid status, physical symptoms, anxiety, and potential barriers to adherence are assessed simultaneously. Patient education regarding fluid and dietary management should be accompanied by psychological support, individualized problem-solving, and regular evaluation of the patient's ability to follow the prescribed treatment regimen.

Health service factors demonstrated a significant, moderate positive association with treatment adherence (rs = .393, p = .003). This finding indicates that participants who perceived healthcare services more favorably tended to report better adherence. The finding is consistent with Ahrari et al. (2014), who emphasized that effective support and constructive interactions with healthcare professionals can strengthen patients' motivation to follow recommended treatment regimens. Clear communication, understandable education, responsive care, and supportive patient–provider relationships may help patients understand complex treatment requirements and address practical barriers to adherence.

Among the variables examined, health service factors showed the largest observed bivariate correlation with treatment adherence. Nevertheless, this result should not be interpreted as evidence that health services were the most dominant or independently influential factor. The study used bivariate correlations and did not control for demographic, clinical, or treatment-related covariates. Establishing the independent contribution of health service factors would require an adequately powered multivariable analysis. Similarly, although the correlation involving health service factors was numerically larger than the correlation involving physical factors, a formal statistical comparison would be required to determine whether the difference between the two correlations was significant.

Physical factors showed a small-to-moderate inverse association with treatment adherence (rs = −.323, p = .017). Assuming that higher physical-factor scores represent a greater physical burden, participants experiencing more severe physical problems tended to report lower adherence. Fatigue, shortness of breath, edema, pain, sleep difficulties, and activity limitations may interfere with a patient's ability to attend scheduled treatment, take medication consistently, and follow fluid and dietary recommendations. This interpretation is consistent with Hinkle et al. (2021), who described how physical disturbances among patients receiving hemodialysis may reduce activity tolerance, impair comfort, and complicate engagement with treatment. Nevertheless, reverse or bidirectional relationships remain possible because poor adherence may also aggravate physical symptoms.

Psychological factors and family support were not significantly associated with treatment adherence. These findings should not be interpreted as evidence that psychological well-being and family support are unimportant. The absence of statistical significance may reflect the relatively small sample, limited variability in the scores, measurement limitations, or contextual characteristics of participants recruited from a single hemodialysis unit. Psychological conditions and family support may also have indirect or conditional relationships with adherence that cannot be detected through simple bivariate correlations.

Limitations

Several limitations should be considered. First, the cross-sectional design precludes conclusions about temporal order or causality. Second, the relatively small sample was recruited through purposive sampling from a single hospital, limiting the generalizability of the findings. Third, treatment adherence was assessed using self-report, which may be influenced by recall and social-desirability biases. Fourth, the questionnaire assessing physical, psychological, family-support, and health-service factors was developed by the researchers; therefore, more comprehensive evidence regarding its construct validity and subscale reliability is required. Fifth, nursing diagnoses were obtained from medical-record assessments and may have been affected by differences in documentation completeness and clinical judgment.

The results were also based on separate bivariate correlations without adjustment for potential confounding variables. Consequently, the study cannot identify factors that are independently

associated with adherence. In addition, four correlations were examined. The association between physical factors and adherence was significant at the conventional unadjusted threshold of $p < .05$ but would not remain significant under a strict Bonferroni-adjusted threshold of $p < .0125$. Thus, the physical-factor finding should be regarded as exploratory, whereas the health-service association ($p = .003$) remained statistically significant under this adjustment. Future studies should employ larger multicenter samples, objective indicators of adherence, longitudinal designs, and multivariable analyses to clarify the independent and temporal relationships among nursing problems, healthcare experiences, and treatment adherence.

Conclusion

The most frequently observed pattern of co-occurring nursing problems among patients with CKD stage 5 receiving maintenance hemodialysis was excess fluid volume, anxiety, and treatment nonadherence, identified in 46.3% of the participants. Health service factors showed a moderate positive association with treatment adherence and represented the largest observed bivariate correlation among the examined variables. Greater physical problems were inversely associated with adherence at the unadjusted significance level, whereas psychological factors and family support showed no statistically significant associations. These findings highlight the importance of integrating fluid management, assessment of physical and psychological difficulties, adherence support, and responsive healthcare services in hemodialysis nursing care. However, the findings represent associations rather than causal effects, and larger longitudinal studies with multivariable analyses are required before conclusions can be drawn regarding the most influential determinants of treatment adherence.

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Ethical Statement
The research has obtained ethical review approval before implementation by the Gatot Soebroto Army Central Hospital (RSPAD) with ethical number 006443/STIKes RSPAD Gatot Soebroto/2026 approval date 04 August 2026.

Informed Consent Statement
Informed consent was obtained from all respondents who participated in this study.

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Conflict of Interest
On behalf of all authors, the corresponding author declares that there is no conflict of interest in this research.

Data Availability
Due to confidentiality agreements and the risk of indirect identification of participants, the data is not publicly available. De-identified data may be shared upon reasonable request, subject to ethical approval.

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