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Exploring the Relationship Between Dialysis Related Factors and Quality of Life Patients With Chronic Kidney Disease

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Abstract

Dialysis sustains life in advanced chronic kidney disease, but the characteristics of treatment can substantially influence how patients function and experience daily living. This article explores relationships between dialysis-related factors and quality of life among adults with chronic kidney disease. Relevant factors include modality, treatment frequency and duration, dialysis adequacy, ultrafiltration and interdialytic weight gain, intradialytic complications, vascular access, residual kidney function, dialysis vintage, symptom burden, anemia, nutritional status, comorbidity, adherence, travel, waiting time, scheduling, and continuity of care. These variables interact with psychological, family, social, and economic circumstances rather than operating independently. The Kidney Disease Quality of Life 36-item survey is particularly useful in correlational research because it measures generic physical and mental health together with kidney-specific symptoms, effects, and treatment burden. Correlational analysis can identify patterns and modifiable predictors; however, cross-sectional associations cannot establish causality and require careful control of confounding variables. The evidence supports a patient-centered model in which laboratory indicators are interpreted alongside fatigue, recovery time, sleep, emotional distress, functional independence, and participation in meaningful activities. Nurses have an essential role in systematic assessment, symptom monitoring, education, vascular-access care, treatment coordination, and referral. Quality improvement should aim not only to deliver technically adequate dialysis but also to reduce treatment burden, preserve residual function, prevent complications, and align the dialysis prescription with patient priorities.

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Keywords

Keywords: chronic kidney disease; correlational study; dialysis adequacy; dialysis-related factors; health-related quality of life; maintenance dialysis

Introduction

Chronic kidney disease (CKD) is a persistent disorder of kidney structure or function with consequences for health. When kidney function becomes insufficient to maintain metabolic, fluid, and electrolyte balance, kidney replacement therapy may be needed. Maintenance hemodialysis (MHD) and peritoneal dialysis (PD) replace selected kidney functions and extend survival, yet they do not fully reproduce normal renal physiology. Patients continue to experience symptoms, comorbid illness, treatment restrictions, and disruption of ordinary life. As the global burden of CKD grows, evaluation of dialysis must therefore extend beyond survival and biochemical targets to include health-related quality of life (HRQOL) (GBD Chronic Kidney Disease Collaboration, 2020; Kidney Disease: Improving Global Outcomes [KDIGO] CKD Work Group, 2024).

Quality of life (QOL) is a multidimensional perception shaped by health, autonomy, relationships, culture, expectations, and personal goals (The WHOQOL Group, 1995). In dialysis care, HRQOL reflects physical functioning, energy, emotional well-being, social participation, role performance, symptoms, and the perceived effects and burden of kidney disease. Studies across dialysis populations have consistently shown marked impairment in several HRQOL domains, particularly physical functioning (Fukuhara et al., 2003). Because dialysis is repetitive and lifelong for many patients, treatment-related characteristics can either reduce or intensify this impairment.

A correlational approach is appropriate for examining how dialysis-related factors vary with QOL. It can identify clinically meaningful associations, generate hypotheses, and highlight modifiable targets. Nevertheless, dialysis variables are intertwined with age, socioeconomic conditions, comorbidity, depression, nutrition, and social support. Sound interpretation requires a conceptual model, validated instruments, adequate sampling, and multivariable analysis.

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Purpose and Conceptual Perspective

The central purpose is to examine the direction and strength of relationships between selected dialysis-related factors and patient-reported QOL. The independent variables may include modality, frequency, session duration, dialysis vintage, adequacy, ultrafiltration, access type, complications, residual kidney function, adherence, travel, scheduling, and continuity of care. QOL or its domain scores form the dependent outcomes. Sociodemographic, clinical, psychological, and social characteristics should be treated as potential confounders or effect modifiers.

A useful conceptual perspective views QOL as the result of interacting treatment exposure, symptom experience, functional capacity, psychological appraisal, and environmental resources. For example, a long dialysis session may improve solute and fluid management but reduce time for employment or family activity. A central venous catheter may permit immediate treatment while increasing infection anxiety and limiting bathing or activity. Thus, the same technical factor can have different meanings depending on the patient's clinical condition, preferences, and context.

Dialysis Adequacy and Treatment Prescription

Dialysis adequacy is commonly evaluated through urea clearance measures, treatment time, volume management, clinical status, and symptom control. Adequate delivery is necessary to control uremia and prevent avoidable complications. However, a satisfactory clearance value does not guarantee good QOL. Fatigue, pruritus, pain, sleep disturbance, depression, and prolonged recovery may persist despite technically adequate treatment. Contemporary guidance therefore encourages individualized assessment rather than dependence on a single numerical target (Daugirdas et al., 2015; KDIGO CKD Work Group, 2024).

Treatment frequency and duration can influence hemodynamic stability, fluid control, dietary flexibility, and post-dialysis recovery. More frequent in-center HD improved selected cardiovascular and patient-reported outcomes in the Frequent Hemodialysis Network trial, but it also increased treatment exposure and access-related procedures (Chertow et al., 2010). The relationship with QOL is therefore not uniformly positive. Benefits depend on symptom response, travel, employment, caregiver demands, and whether the schedule reflects informed patient preference.

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Ultrafiltration is another important treatment variable. Large fluid gains between sessions may necessitate rapid removal, contributing to cramps, dizziness, hypotension, headache, nausea, and post-dialysis exhaustion. Recurrent intradialytic hypotension may increase fear of treatment and reduce physical activity afterward. Assessment should include the patient's usual recovery time, not merely whether the session was completed. Education regarding individualized fluid and sodium management should be practical and nonjudgmental, because adherence is influenced by thirst, climate, diet, health literacy, and social circumstances.

Dialysis Modality and Treatment Setting

HD and PD differ in routine, location, responsibility, flexibility, and complication profiles. Facility-based HD offers direct professional supervision and social contact but requires fixed schedules, travel, waiting time, repeated cannulation, and recovery after treatment. Home HD may offer flexibility and gentler schedules for selected patients, although it demands training, space, equipment, and support. PD can allow greater mobility and employment continuity, yet it requires daily self-management, storage of supplies, attention to asepsis, and adaptation to an abdominal catheter.

No modality guarantees superior QOL for every patient. Selection effects complicate comparisons because healthier, more independent, or better-supported individuals may be more likely to receive home therapies. Modality research should therefore measure baseline function, health literacy, socioeconomic resources, caregiver support, and patient preference. Shared decision-making is essential because the best clinical option may still produce poor QOL if it conflicts with the person's daily responsibilities or values.

Vascular Access and Dialysis Complications

Vascular access affects comfort, body image, treatment reliability, and fear of complications. An arteriovenous fistula is generally preferred for long-term HD when clinically appropriate, but maturation failure, difficult cannulation, pain, bleeding, aneurysmal change, and repeated interventions may affect QOL. Catheters avoid needle insertion but carry infection and dysfunction risks and may restrict bathing or physical activity. Grafts have their own surveillance and

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intervention burden. Access type should therefore be analyzed together with access age, complications, hospitalization, cannulation pain, and the patient's perception of safety.

Intradialytic complications can condition patients to anticipate each session with anxiety. Hypotension, cramps, chills, headache, access alarms, and early termination reduce confidence and may impair adherence. Recurrent hospitalization separates patients from family and employment and is associated with functional decline. Because symptom burden is often underestimated by clinicians, standardized patient reporting is necessary. Weisbord et al. (2005) documented the high prevalence and importance of multiple symptoms among people receiving chronic HD, while Abdel-Kader et al. (2009) demonstrated close relationships among symptom burden, depression, and QOL.

Residual Kidney Function Dialysis Vintage and Recovery

Residual kidney function can support fluid removal, phosphorus and solute clearance, endocrine function, and dietary flexibility. Its preservation may reduce ultrafiltration stress and improve well-being. Patients with urine output may experience fewer restrictions than those who are anuric, although residual function commonly declines over time. Correlational studies should record urine output or measured residual clearance rather than treating all patients with the same dialysis vintage as clinically equivalent.

Dialysis vintage, defined as time since dialysis initiation, has a complex relationship with QOL. Early months may involve adjustment, uncertainty, access procedures, and disruption of family roles. Longer exposure may produce treatment familiarity and coping skills, but it may also bring declining residual function, cumulative access problems, comorbidity, and treatment fatigue. Post-dialysis recovery time is a particularly patient-relevant indicator because it directly affects the usable portion of non-treatment days. Long recovery can limit work, exercise, caregiving, and social interaction even when laboratory goals are met.

Symptoms Nutrition Anemia and Comorbidity

Fatigue is among the most disabling experiences in maintenance dialysis. It may result from anemia, inflammation, inadequate sleep, depression, low activity, malnutrition, comorbidity, or the

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dialysis procedure itself (Jhamb et al., 2008). Pruritus, restless legs, pain, nausea, appetite loss, constipation, breathlessness, cognitive difficulty, and sexual dysfunction can cluster and produce a cumulative effect. A systematic review found strong relationships between CKD symptoms and HRQOL, emphasizing the need to measure both symptom frequency and severity (Yapa et al., 2020).

Nutritional status influences strength, immunity, treatment tolerance, and recovery. Poor appetite and dietary restrictions can reduce intake, while inflammation and dialysis-related losses contribute to protein-energy wasting. At the same time, overly rigid counseling can make eating socially difficult and reduce enjoyment. Nutritional care should combine clinical safety with culturally acceptable choices and periodic reassessment by a renal dietitian.

Anemia can intensify fatigue, dyspnea, weakness, and impaired concentration. Diabetes, cardiovascular disease, neuropathy, bone and mineral disorders, frailty, and recurrent infection may independently lower QOL and also change the effect of dialysis factors. Consequently, simple bivariate correlations may overstate treatment relationships unless comorbidity and functional status are considered. Depression must also be measured because it is common in CKD and strongly associated with poorer patient-reported outcomes (Palmer et al., 2013).

Adherence Self Management and Service Burden

Attendance, completion of prescribed treatment, medication use, fluid management, and dietary behavior affect symptoms and complications. Labeling a patient as nonadherent without examining causes can obscure transportation failure, financial constraints, cognitive difficulty, low health literacy, depression, adverse effects, family demands, or treatment schedules incompatible with employment. A person-centered correlational study should therefore assess both behavior and barriers.

Service-level factors also shape QOL. Distance to the unit, travel time, waiting, shift allocation, staff continuity, privacy, communication, and responsiveness to symptoms can alter the treatment experience. Respectful communication and shared decisions strengthen trust and self-efficacy. In contrast, repeated schedule changes or poor symptom response can make patients feel powerless. These factors are particularly important where dialysis requires substantial out-of-pocket

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expenditure or long travel, because financial and time burdens may mediate the relationship between treatment and QOL.

Measurement and Statistical Analysis

The Kidney Disease Quality of Life 36-item survey (KDQOL-36) is suitable for this topic because it combines physical and mental health summaries with kidney-specific domains for symptoms, effects, and burden (Hays et al., 1994). It has been widely applied in dialysis services and can support routine population-level assessment (Cohen et al., 2019). Generic instruments such as the WHOQOL-BREF or Short Form surveys permit comparison with other populations but may be less sensitive to dialysis-specific concerns.

A cross-sectional correlational design can summarize participant characteristics and test associations at one point in time. Pearson correlation may be used for approximately normally distributed continuous variables; Spearman correlation is appropriate for ordinal or non-normal data. Group differences can be assessed with t tests, analysis of variance, or nonparametric equivalents. Multiple linear regression can identify independent predictors of domain scores after adjustment for age, sex, socioeconomic status, comorbidity, depression, nutrition, and functional status. Categorical low-QOL outcomes may require logistic regression. Results should include effect estimates, confidence intervals, model assumptions, collinearity assessment, and missing-data procedures.

Causal language must be avoided. Poor QOL may result from complications, but distress may also reduce adherence and increase reported symptom severity. Timing matters because assessment during dialysis, immediately afterward, or on a non-dialysis day can yield different responses. Multicenter and longitudinal designs improve generalizability and temporal interpretation. Qualitative interviews can further explain why patients with similar prescriptions report different experiences.

Nursing and Multidisciplinary Implications

Nurses can connect treatment indicators with the patient's lived experience through regular, structured assessment. Monitoring should include symptoms, intradialytic events, recovery time,

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sleep, access concerns, functional capacity, emotional distress, adherence barriers, and family support. A declining QOL score should trigger discussion and action rather than remain an isolated research result.

Interventions may include review of dry weight and ultrafiltration tolerance, access-pain management, anemia and nutrition evaluation, medication reconciliation, graded activity, sleep support, psychological referral, and social-work assistance. Education should use understandable language and teach practical self-monitoring. The nephrologist, nurse, dietitian, pharmacist, psychologist, physiotherapist, and social worker should coordinate plans so that one recommendation does not unintentionally worsen another domain. Patient priorities should guide scheduling and modality discussions whenever clinically feasible.

Quality-improvement programs can aggregate patient-reported data to detect recurring problems such as prolonged recovery, uncontrolled itching, transport difficulty, or fear of cannulation. Patient representatives should help interpret these patterns and design responsive services. International core-outcome work confirms that patients value fatigue, ability to work or study, and participation in life alongside survival and cardiovascular outcomes (Evangelidis et al., 2017).

Recommendations for Future Research

Future studies should use culturally validated instruments, adequate samples, multiple centers, and longitudinal follow-up. Dialysis exposure should be measured precisely, including modality, access, prescribed and delivered time, interruptions, ultrafiltration rate, complications, residual function, recovery time, and travel burden. Researchers should examine mediation and interaction, such as whether symptoms explain the relationship between rapid ultrafiltration and QOL or whether social support modifies the effect of treatment burden. Mixed-method studies can add patient explanations to statistical associations. Intervention trials should target modifiable factors and report clinically meaningful change, not only statistical significance.

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Conclusion

The relationship between dialysis-related factors and QOL is multidimensional and dynamic. Adequacy, prescription, modality, vascular access, symptoms, complications, residual kidney function, nutrition, anemia, recovery time, adherence barriers, and service organization may all influence how patients live with CKD. Their effects are shaped by comorbidity, psychological health, family support, socioeconomic resources, and personal goals. Correlational research can identify high-risk patterns and modifiable targets, provided that confounding and the limits of cross-sectional evidence are recognized. Dialysis care should therefore combine technical effectiveness with systematic patient-reported assessment and individualized multidisciplinary intervention. The ultimate aim is not merely to complete dialysis sessions, but to reduce burden, preserve function and autonomy, and support participation in a life the patient considers meaningful.

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