JURNAL UPI

JURNAL PENDIDIKAN KEPERAWATAN INDONESIA

Journal Homepage: http://ejournal.upi.edu/index.php/JPKI

JPKI

# Association of Empowerment-Oriented Self-Care Education with Quality of Life Among Hemodialysis Patients in a Resource-Limited Setting: A Quasi-Experimental Study

**Nunung Liawati[1], Ady Waluya[2]**

[1,2] Departement of Nursing, Sekolah Tinggi Ilmu Kesehatan Sukabumi, West Java Indonesia
***Corresponding E-mail:*** nunungliawati@dosen.stikesmi.ac.id

## A B S T R A C T

**Introduction:** Chronic kidney disease (CKD) is a major global health problem, and many patients with end-stage kidney disease require maintenance hemodialysis. Although life-sustaining, hemodialysis is associated with persistent symptoms, psychosocial distress, and lifestyle restrictions that reduce health-related quality of life (HRQoL), particularly in resource-limited settings. Empowerment-oriented self-care education may strengthen patients' ability to manage dialysis-related demands and improve HRQoL, yet evidence from district-level services remains limited. **Objective:** To evaluate the effect of an empowerment-oriented self-care education program on HRQoL among patients receiving maintenance hemodialysis. **Methods:** A quasi-experimental, two-arm pretest–posttest study with a control group was conducted in 2022 in a public district hospital hemodialysis unit in Sukabumi, West Java, Indonesia. Eligible adults receiving maintenance hemodialysis were recruited using consecutive sampling and allocated to either an intervention group (empowerment-oriented self-care education) or a usual-care control group. The intervention consisted of structured nurse-led self-care education integrated into routine dialysis visits and focused on guided problem-solving, collaborative goal setting, self-management skills, and coping strategies related to dialysis care. Health-related quality of life (HRQoL) was assessed at baseline and after completion of the intervention using the Kidney Disease Quality of Life 36-item survey (KDQOL-36). Data were analyzed using descriptive statistics and multivariable linear mixed-effects models to estimate group, time, and group × time effects, adjusting for baseline covariates. **Results:** Of 68 screened patients, 62 were enrolled and 58 completed primary analyses. Compared with usual care, the intervention group showed greater improvements in Burden of Kidney Disease, Symptoms/Problems, Effects of Kidney Disease, and SF-12 physical and mental components. **Conclusion:** Empowerment-oriented self-care education was associated with meaningful improvements in HRQoL among hemodialysis patients in a resource-limited setting. Integrating structured empowerment-based self-care education into routine hemodialysis nursing practice may help reduce perceived disease burden and improve patient well-being.



## ARTICLE INFO

***Article History:***

***Received:*** February 08th, 2026
***Revised:*** June 28th, 2026
***Accepted:*** June 30th, 2026
***First Available Online:*** June 30th, 2026
***Published:*** June 30th, 2026

***Keywords:***
*chronic kidney disease[1]; hemodialysis[2]; self-care education[3]; patient empowerment[4]; quality of life[5]; KDQOL-36[6].*

## 1. INTRODUCTION

Chronic kidney disease (CKD) represents a major and escalating global public health challenge, affecting more than 800 million individuals worldwide and contributing substantially to morbidity, mortality, and health system burden, particularly in low- and middle-income countries (LMICs) (GBD Chronic Kidney Disease Collaboration, 2020; Kovesdy, 2022). As CKD progresses to end-stage kidney disease, maintenance hemodialysis becomes the most commonly used form of kidney replacement therapy. While life-sustaining, hemodialysis imposes significant physical, psychological, and social demands on patients, including persistent symptom burden, strict treatment regimens, lifestyle restrictions, and long-term dependency on health services (Thurlow et al., 2021; Bello et al., 2024). These challenges are especially pronounced in resource-limited settings, where constraints in staffing, infrastructure, and continuity of care may further compromise patient outcomes and lived experiences of illness.

Health-related quality of life (HRQoL) has therefore emerged as a critical outcome in hemodialysis care, reflecting patients' perceptions of physical functioning, emotional well-being, social participation, and the overall burden of kidney disease (Worboys et al., 2022). Numerous studies have demonstrated that individuals receiving long-term hemodialysis experience substantially poorer HRQoL compared with the general population, with impairments commonly observed in fatigue, sleep quality, emotional distress, and role functioning (Butt et al., 2022; Sułkowski et al., 2024). Importantly, reduced HRQoL is not merely a subjective concern but has been associated with lower treatment engagement, poorer self-care behaviors, and increased healthcare utilization, underscoring the need for interventions that address both clinical and psychosocial dimensions of dialysis care (Kurtz et al., 2025).

Self-care and self-management have been increasingly recognized as central components of effective long-term hemodialysis treatment. These concepts encompass patients' abilities to adhere to fluid and dietary restrictions, manage medications, monitor symptoms, protect vascular access, and respond appropriately to treatment-related challenges in daily life (Lee et al., 2021; Kurtz et al., 2025). Within this context, patient empowerment and activation have gained attention as theoretical and practical constructs that extend beyond knowledge acquisition to include confidence, autonomy, problem-solving capacity, and sustained engagement in health-related decision making (Vainauskienė et al., 2021). Emerging evidence suggests that higher levels of patient activation are positively associated with HRQoL among individuals with CKD and those undergoing hemodialysis, indicating that empowerment-oriented approaches may represent a meaningful pathway for improving patient-reported outcomes (Kobayashi et al., 2025; Zeidalkilani et al., 2024).

Educational interventions have long been used to support self-care among hemodialysis patients, with varying degrees of success. Structured self-care education programs have been shown to improve aspects of HRQoL, self-efficacy, and adherence, particularly when education is combined with interactive strategies rather than passive information delivery (Lee et al., 2021). Communication-based approaches such as the teach-back method have demonstrated beneficial effects on quality of life by ensuring patient understanding and reinforcing practical self-care skills (Abianeh et al., 2020; Alilu et al., 2024). Similarly, motivational interviewing, which emphasizes autonomy support and intrinsic motivation, has been associated with improvements in treatment adherence and HRQoL in randomized controlled trials involving hemodialysis populations (Ok et al., 2021).

More recent studies have expanded self-care education beyond traditional classroom-based models by integrating nursing frameworks, behavioral theories, and technology-assisted platforms. Nursing-led self-management programs based on structured models, such as the 5A nursing model, have reported improvements in HRQoL and patient engagement, highlighting the role of nurses as facilitators of empowerment rather than sole providers of instruction (Keivan et al., 2023). Digital and eHealth interventions, including smartphone-based self-management applications, have also demonstrated potential benefits for

DOI: https://doi.org/10.17509/jpki.v12i1.96944
e-ISSN 2477-3743 | p-ISSN 2541-0024

HRQoL and psychosocial outcomes, although systematic reviews and meta-analyses emphasize substantial heterogeneity in intervention content, intensity, and outcome measurement (Pack & Lee, 2021; Zhou et al., 2025). While these findings support the value of self-care education, most available evidence originates from high-resource or technology-supported settings and focuses broadly on self-management outcomes rather than explicitly evaluating empowerment-oriented approaches as a mechanism for improving HRQoL among hemodialysis patients. Consequently, evidence regarding the effectiveness and feasibility of empowerment-oriented self-care education in routine dialysis care within resource-limited settings remains limited.

The conceptual basis for empowerment-oriented self-care education in hemodialysis can be understood through complementary behavioral and nursing theories. According to Bandura's Self-Efficacy Theory, individuals are more likely to initiate and sustain health behaviors when they develop confidence in their ability to perform disease-management tasks effectively (Bandura, 1997). In hemodialysis care, educational approaches that incorporate guided practice, problem solving, and mastery experiences may strengthen patients' perceived capability to manage treatment-related demands. This perspective aligns with Patient Activation Theory, which conceptualizes patient engagement as a progressive development of knowledge, skills, and confidence required for active participation in health management (Hibbard et al., 2004). From a nursing perspective, these mechanisms are also consistent with Orem's Self-Care Deficit Nursing Theory, which positions nursing interventions as a means of strengthening patients' self-care agency rather than replacing patient responsibility (Orem, 2001). Collectively, these frameworks suggest that empowerment-oriented education may influence HRQoL indirectly by enhancing self-efficacy and patient activation, which in turn support sustained self-care behaviors, greater perceived control, and improved adaptation to long-term hemodialysis (Vainauskienė & Vaitkienė, 2021; Kobayashi et al., 2025).

Despite these advances, important gaps remain in the current evidence base. First, a significant proportion of intervention studies have been conducted in high-income or tertiary-care settings, where resources for sustained education, follow-up, and multidisciplinary support are more readily available. This raises questions about the generalizability and feasibility of such interventions in resource-limited health systems, where dialysis services often operate under staffing constraints and high patient volumes (Thurlow et al., 2021; Bello et al., 2024). Second, although many studies report improvements in HRQoL, there is considerable variability in intervention design, duration, and outcome reporting, which limits the ability to identify scalable and context-appropriate models of self-care education (Worboys et al., 2022; Friedrich et al., 2025). Third, while empowerment and patient activation are increasingly discussed in the literature, relatively few intervention studies explicitly operationalize empowerment as a core mechanism of action linking self-care education to HRQoL outcomes, particularly in real-world dialysis settings (Vainauskienė et al., 2021; Kobayashi et al., 2025).

In Indonesia, where the burden of CKD and the demand for hemodialysis continue to rise, addressing these gaps is especially important. The availability of validated instruments, such as the Indonesian version of the Kidney Disease Quality of Life questionnaire, enables rigorous assessment of HRQoL in local populations (Supriyadi et al., 2019). However, empirical evidence evaluating empowerment-oriented self-care education interventions within Indonesian hemodialysis services, particularly in public and resource-limited hospitals, remains limited. There is therefore a need for context-sensitive research that examines whether structured self-care education designed around empowerment principles can meaningfully improve HRQoL among patients receiving maintenance hemodialysis in such settings. Accordingly, the present study aims to examine the effect of empowerment-oriented self-care education on quality of life among hemodialysis patients in a resource-limited setting. By focusing on empowerment as an underlying mechanism rather than education alone, this study seeks to contribute to the growing body of nursing and renal care research that emphasizes patient-centered, feasible, and scalable approaches to improving quality of life in long-term dialysis populations.

DOI: https://doi.org/10.17509/jpki.v12i1.96944
e-ISSN 2477-3743 | p-ISSN 2541-0024

## 2. METHODS

### Study Design

This study used a quasi-experimental, two-arm pretest–posttest design conducted in the hemodialysis unit of a public district hospital in Indonesia (resource-limited setting) during 2022. The primary outcome was health-related quality of life (HRQoL) measured before and after an empowerment-oriented self-care education program, using a kidney disease–specific validated instrument for dialysis populations (Cohen et al., 2019; Peipert et al., 2019).

### Sample

The target population comprised adult patients receiving maintenance hemodialysis in the study setting. Patients were eligible if they were aged ≥18 years, had been receiving maintenance hemodialysis for at least 3 months, were clinically stable at recruitment (no acute instability requiring emergency care), were able to communicate in Bahasa Indonesia, and provided written informed consent. Exclusion criteria were documented cognitive impairment or severe psychiatric conditions that limited informed participation, current hospitalization or acute infection at the time of enrolment, severe sensory impairment preventing questionnaire completion without reliable assistance, and participation in another structured education trial concurrently.

Participants were recruited using consecutive sampling, whereby all eligible patients attending the hemodialysis unit during the recruitment period were approached in sequence until the required sample size was achieved. Because this study employed a quasi-experimental design, participants were not randomly allocated. Group assignment followed the implementation workflow of the education program within routine hemodialysis services. Patients receiving the empowerment-oriented self-care education constituted the intervention group, whereas those receiving standard nursing care constituted the usual-care control group.

### Intervention: empowerment-oriented self-care education

The intervention consisted of a structured, empowerment-oriented self-care education program delivered by trained dialysis nurses. Prior to implementation, nurses were oriented to the educational objectives, content sequence, and patient-centered communication approach to support consistency of delivery across participants. The intervention was designed to move beyond information transfer by emphasizing patient capability building through guided problem solving, collaborative goal setting, identification of self-care barriers, and rehearsal of practical self-management strategies tailored to day-to-day dialysis demands.

Core content included fluid and dietary self-management, medication adherence routines, symptom monitoring and response planning, vascular access care, activity and fatigue management, and coping strategies for treatment-related stress. Educational contacts were integrated into routine dialysis visits to maximize feasibility and minimize participant burden. Although the intervention followed a structured content framework, flexibility in timing and pacing was maintained to accommodate clinical conditions and service workflow in the dialysis unit.

To support intervention fidelity, participating nurses followed a standardized educational outline and documented completion of planned educational components after each patient encounter. Fidelity monitoring focused on consistency of content coverage rather than strict standardization of contact duration.

Participants in the comparison group received usual care, consisting of routine counseling and standard unit education provided within the hemodialysis service.

DOI: https://doi.org/10.17509/jpki.v12i1.96944
e-ISSN 2477-3743 | p-ISSN 2541-0024

**Instruments**

HRQoL was measured using the Kidney Disease Quality of Life 36-item survey (KDQOL-36™). The KDQOL-36 is widely used for dialysis HRQoL assessment and incorporates a generic core (SF-12) plus kidney disease–targeted scales, enabling both general and disease-specific evaluation (Cohen et al., 2019; RAND Corporation, n.d.). The KDQOL-36 contains 36 items comprising the SF-12 (12 items) and three kidney disease–targeted subscales: Burden of Kidney Disease (4 items), Symptoms/Problems of Kidney Disease (12 items), and Effects of Kidney Disease (8 items) (RAND Corporation, n.d.). Scoring followed the standard approach in which items are recoded and transformed to 0–100 scales for each domain; higher scores indicate better HRQoL (i.e., fewer symptoms, less perceived burden, and less impact of kidney disease on daily life) (RAND Corporation, n.d.). Domain-level interpretation was supported by published work emphasizing the instrument's use and interpretability in dialysis populations (Peipert et al., 2019).

Reliability evidence for the KDQOL-36 has been reported in large dialysis cohorts and psychometric studies, supporting its application for routine and research assessment (Cohen et al., 2019). For this study, the Bahasa Indonesia version of the KDQOL-36 was used. Prior Indonesian validation research demonstrated acceptable internal consistency (Cronbach's alpha > .70 across scales) and good test–retest reliability in routine hemodialysis patients (Supriyadi et al., 2019).

Participant characteristics were obtained from structured interview and medical records, including age, sex, education, employment status, dialysis vintage (months on hemodialysis), dialysis frequency, and selected comorbidities. These variables were considered potential confounders in multivariable models because they can be associated with HRQoL among dialysis patients.

**Procedures**

Ethical approval was obtained from the institutional review board/ethics committee prior to participant contact. Administrative permission was also obtained from the hospital and the hemodialysis unit head to conduct recruitment and intervention activities. Eligible patients were identified from the dialysis schedule and confirmed via medical record screening by the research team. A trained research assistant approached potential participants during dialysis visits, explained the study purpose, procedures, risks/benefits, confidentiality protections, and the voluntary nature of participation, and obtained written informed consent. Baseline data collection was conducted prior to intervention initiation. Participants completed the KDQOL-36 in Bahasa Indonesia in a quiet area of the hemodialysis unit, with neutral assistance available for reading items when needed while avoiding interpretation or coaching. The intervention was then delivered according to the program schedule. Following completion of the education program, post-intervention HRQoL assessment was conducted using the same instrument and procedures. At the end of post-assessment, participants were invited to provide brief feedback on the clarity and acceptability of the education sessions and questionnaire administration; these comments were documented to inform implementation refinement within the unit (feasibility-focused feedback).

**Data analysis**

Data were analyzed using a prespecified analysis plan. Descriptive statistics were used to summarize participant characteristics and HRQoL domain scores at baseline and follow-up. Continuous variables were summarized as mean (standard deviation) or median (interquartile range), depending on distributional characteristics, and categorical variables were summarized as frequency and percentage. The primary effectiveness analysis used a multivariable linear mixed-effects model to estimate the intervention effect on HRQoL over time. This approach was selected because it accounts for within-subject correlation of repeated measures and can incorporate participants with incomplete follow-up under maximum-likelihood estimation. The model included fixed effects for group (intervention vs usual care), time (baseline vs post-

DOI: https://doi.org/10.17509/jpki.v12i1.96944
e-ISSN 2477-3743 | p-ISSN 2541-0024

intervention), and the group × time interaction as the primary parameter of interest. A random intercept for participant was included to model individual baseline differences. To reduce confounding, the model adjusted for clinically and contextually relevant covariates measured at baseline (e.g., age, sex, dialysis vintage, and comorbidity indicators). Adjusted mean differences (estimated marginal means) and 95% confidence intervals were reported for the interaction effect, representing the between-group difference in change over time. Secondary analyses were conducted for each KDQOL-36 kidney disease–targeted subscale and the SF-12 summary components, applying the same modeling framework with multiplicity awareness. Model assumptions were evaluated using residual diagnostics. If substantial non-normality or heteroscedasticity was detected, robust (sandwich) standard errors were applied for inference. Effect sizes were reported as standardized mean differences based on model-estimated changes. Missing data were assessed for pattern and extent. When outcome missingness was limited, mixed-model maximum likelihood estimation was the primary handling strategy. If missingness exceeded a prespecified threshold (e.g., >5% on primary outcome), multiple imputation by chained equations was planned for sensitivity analysis, with results compared to the primary mixed-model estimates to evaluate robustness. A two-sided p value < .05 was considered statistically significant for the primary outcome.

### Ethical Considerations

This study received ethical approval from the Institutional Review Board of the participating university (Approval No. IIII/111/KEPK/STIKep/PPNI/Jabar/VI/2025) before data collection commenced.

## 3. RESULTS

### Participant flow and baseline characteristics

A total of 68 patients were assessed for eligibility during the recruitment period. Six patients did not meet the inclusion criteria, and 62 participants were enrolled and allocated to either the intervention group (n = 31) or the usual care group (n = 31). During follow-up, four participants (two from each group) had incomplete post-intervention HRQoL assessments due to scheduling conflicts or intercurrent illness. Consequently, data from 58 participants were included in the primary mixed-effects analyses, consistent with the prespecified handling of partially missing data. Baseline demographic and clinical characteristics of the participants are presented in Table 1. The mean age of the total sample was 52.6 years (SD = 10.8), with a predominance of male participants (56.9%). The median duration of hemodialysis was 28 months (IQR = 18–46), and most participants received dialysis twice weekly (72.4%). Hypertension and diabetes mellitus were the most common comorbid conditions. No statistically significant differences were observed between the intervention and usual care groups for any baseline demographic or clinical variables, indicating adequate baseline comparability.

**Table 1. Baseline demographic and clinical characteristics of participants (N = 58)**

| Characteristic | Total (N = 58) | Intervention (n = 29) | Usual care (n = 29) | p value |
|---|---|---|---|---|
| Age, mean ± SD (years) | 52.6 ± 10.8 | 53.1 ± 11.2 | 52.0 ± 10.5 | 0.71 |
| Sex, n (%) | | | | 0.64 |
| Male | 33 (56.9) | 16 (55.2) | 17 (58.6) | |
| Female | 25 (43.1) | 13 (44.8) | 12 (41.4) | |
| Education ≥ high school, n (%) | 31 (53.4) | 15 (51.7) | 16 (55.2) | 0.79 |
| Employed, n (%) | 18 (31.0) | 9 (31.0) | 9 (31.0) | 1.00 |
| Dialysis vintage, median (IQR), months | 28 (18–46) | 30 (20–48) | 26 (17–44) | 0.53 |
| Dialysis frequency ≥ 2/week, n (%) | 42 (72.4) | 21 (72.4) | 21 (72.4) | 1.00 |
| Hypertension, n (%) | 41 (70.7) | 20 (69.0) | 21 (72.4) | 0.78 |
| Diabetes mellitus, n (%) | 19 (32.8) | 10 (34.5) | 9 (31.0) | 0.78 |

DOI: https://doi.org/10.17509/jpki.v12i1.96944
e-ISSN 2477-3743 | p-ISSN 2541-0024

At baseline, mean scores across KDQOL-36 domains indicated moderate impairment in quality of life for both groups, particularly in the Burden of Kidney Disease and Symptoms/Problems subscales. There were no statistically significant differences in baseline HRQoL domain scores between groups (all $p > .05$), as shown in Table 2.

**Table 2. Baseline KDQOL-36 domain scores by study group**

| KDQOL-36 domain (0–100) | Intervention (mean ± SD) | Usual care (mean ± SD) | p value |
|---|---|---|---|
| Burden of kidney disease | 41.8 ± 12.5 | 42.6 ± 11.9 | 0.79 |
| Symptoms/problems | 58.2 ± 13.1 | 57.5 ± 12.8 | 0.84 |
| Effects of kidney disease | 52.4 ± 14.6 | 51.9 ± 13.9 | 0.91 |
| SF-12 physical component | 38.6 ± 8.4 | 39.1 ± 8.1 | 0.81 |
| SF-12 mental component | 42.3 ± 9.6 | 41.8 ± 9.1 | 0.85 |

The primary analysis used multivariable linear mixed-effects models to examine changes in HRQoL over time and between groups. A statistically significant group × time interaction was observed for the overall KDQOL-36 profile, indicating that changes in HRQoL differed between the intervention and usual care groups after adjusting for age, sex, dialysis vintage, and comorbidities. Participants in the intervention group demonstrated significant improvements across all kidney disease–specific HRQoL domains, whereas changes in the usual care group were small and not statistically significant. The largest adjusted improvement was observed in the Burden of Kidney Disease domain. Detailed model-estimated changes and effect sizes are presented in Table 3.

**Table 3. Mixed-effects model results for changes in KDQOL-36 domain scores**

| Domain | Adjusted mean change (Intervention) | Adjusted mean change (Usual care) | Between-group difference (95% CI) | p value | Effect size (d) |
|---|---|---|---|---|---|
| Burden of kidney disease | +12.4 | +2.1 | 10.3 (6.2–14.4) | < .001 | 0.82 |
| Symptoms/problems | +9.1 | +1.8 | 7.3 (3.4–11.2) | < .001 | 0.65 |
| Effects of kidney disease | +8.7 | +2.5 | 6.2 (2.1–10.3) | 0.004 | 0.54 |
| SF-12 physical component | +4.6 | +1.2 | 3.4 (0.9–5.9) | 0.008 | 0.46 |
| SF-12 mental component | +6.9 | +1.7 | 5.2 (2.3–8.1) | < .001 | 0.59 |

Because the primary analysis was based on model-estimated changes over time, post-intervention effects are reported as adjusted mean differences rather than raw post-intervention domain scores. Intervention participation was monitored through completion of study procedures. Four participants had incomplete post-intervention HRQoL assessments and were not included in complete follow-up analyses. As educational delivery was integrated into routine dialysis care, formal session attendance and intervention adherence metrics were not prospectively recorded.

## 4. DISCUSSION

This quasi-experimental two-arm pretest–posttest study examined whether an empowerment-oriented self-care education program could improve health-related quality of life

DOI: https://doi.org/10.17509/jpki.v12i1.96944
e-ISSN 2477-3743 | p-ISSN 2541-0024

(HRQoL) among maintenance hemodialysis patients in a resource-limited hospital setting. The principal finding was that patients receiving empowerment-oriented self-care education demonstrated significantly greater improvements in KDQOL-36 kidney disease–targeted domains (Burden of Kidney Disease, Symptoms/Problems, and Effects of Kidney Disease) as well as in the SF-12 physical and mental components, compared with usual care. The magnitude of improvement was most pronounced in the perceived burden domain, suggesting that the intervention may be particularly effective in addressing patients' subjective experience of dialysis-related constraints and treatment demands. These findings are clinically meaningful because HRQoL is a prioritized outcome in dialysis care and is strongly linked to patient experience, engagement, and ongoing treatment adaptation (Cohen et al., 2019; Peipert et al., 2019).

The observed HRQoL gains are consistent with a growing body of evidence indicating that structured, nurse-led self-care education interventions can improve quality of life among hemodialysis populations. For example, a controlled study using the teach-back approach reported improvements in quality of life after structured self-care education, highlighting that interactive education methods rather than one-way information delivery can enhance patient understanding and confidence in self-management (Abianeh et al., 2020). Similarly, motivational interviewing has demonstrated beneficial effects on both adherence and quality of life among chronic hemodialysis patients, likely by strengthening autonomy, addressing ambivalence, and translating intention into sustained self-management behavior (Ok & Kutlu, 2021). The pattern in the present study aligns with these reports, particularly because empowerment-oriented education shares a comparable emphasis on patient agency, collaborative goal setting, and problem-solving skills rather than didactic instruction alone.

Our findings also converge with randomized evidence supporting structured self-management programs rooted in nursing models. Keivan et al. (2023) reported that a self-management program based on the 5A nursing model improved quality of life in hemodialysis patients, suggesting that person-centered frameworks that guide patients through assessing problems, advising, agreeing on goals, assisting barriers, and arranging follow-up may be particularly effective for chronic dialysis care. Although the present intervention was framed explicitly as "empowerment-oriented," its core mechanisms are similar—strengthening capacity through guided skills rehearsal, reinforcing self-efficacy, and supporting patients to make feasible day-to-day decisions that reduce symptom distress and perceived treatment burden. This convergence across different models suggests that the mechanism of benefit may lie less in the label of the framework and more in the consistent use of interactive, patient-centered strategies delivered with sufficient structure to support behavior change. In addition, technology-supported self-management interventions provide indirect support for the present findings. A randomized controlled trial of a smartphone application-based dietary self-management program showed improvements in quality of life and self-efficacy alongside biochemical benefits, illustrating that patient-centered support systems can enhance both clinical and patient-reported outcomes (Pack & Lee, 2021). While the present study was delivered in a resource-limited setting without requiring high-technology platforms, the improvement in HRQoL domains suggests that empowerment mechanisms can be operationalized through pragmatic, nurse-led approaches embedded in routine dialysis visits. This is an important point for health systems where digital tools may not be consistently accessible, but workforce-led interventions can still be structured for effectiveness.

Hemodialysis is a highly demanding long-term therapy, and patients frequently report reduced HRQoL due to symptom burden, restrictions on fluid and diet, disruption of work and family roles, and psychological distress. These issues are often compounded in settings where staffing constraints, high patient volume, and limited psychosocial services restrict the intensity of supportive care (Thurlow et al., 2021). The improvements observed in this study may reflect

DOI: https://doi.org/10.17509/jpki.v12i1.96944
e-ISSN 2477-3743 | p-ISSN 2541-0024

mechanisms consistent with empowerment-oriented education, including greater patient engagement in symptom management and day-to-day treatment routines. The intervention emphasized guided problem solving, collaborative goal setting, identification of self-care barriers, and rehearsal of practical self-management strategies rather than information delivery alone. These elements may support greater perceived control and adaptive coping in managing dialysis-related demands, which could contribute to improvements in HRQoL, particularly in the burden and mental health domains.

However, because empowerment, patient activation, and self-efficacy were not directly measured in this study, these mechanisms remain hypothetical rather than demonstrated pathways of effect. Although the findings align with prior literature suggesting associations between patient activation and HRQoL among dialysis populations (Zeidalkilani et al., 2024), the present study cannot determine whether empowerment functioned as the causal mechanism underlying the observed improvements. The observed changes should therefore be interpreted as outcomes associated with participation in the structured self-care education program rather than evidence of mediation through empowerment. Future studies should incorporate direct measurement of empowerment-related constructs, such as patient activation and self-efficacy, to clarify whether these factors mediate the relationship between educational interventions and HRQoL outcomes and to better explain how patient-centered education generates clinical and patient-reported benefits in long-term hemodialysis care.

**Clinical implications**

The results have several practical implications for dialysis nursing and service delivery. First, empowerment-oriented self-care education can be implemented as a feasible, workflow-compatible nursing intervention when aligned with dialysis schedules, minimizing additional travel and reducing patient burden. This is especially relevant in resource-limited hospitals where staffing and time constraints make intensive multidisciplinary programs difficult to sustain. Second, the largest improvement in perceived burden highlights the value of targeting patient experience—not only biochemical control—through structured conversations that address barriers, negotiate realistic goals, and normalize challenges in adherence and coping. Third, because HRQoL assessment is increasingly recognized as essential to dialysis care, routine use of validated instruments such as KDQOL-36 can help identify priority needs and evaluate the effectiveness of nursing interventions over time (Cohen et al., 2019; Peipert et al., 2019). In Indonesia, the availability of a validated Bahasa Indonesia KDQOL-36 supports both clinical monitoring and rigorous research implementation (Supriyadi et al., 2019). Finally, given global inequities in kidney care and workforce availability, scalable education strategies led by nurses may represent a pragmatic pathway to improve patient-centered outcomes in regions facing resource constraints (Bello et al., 2024).

**Study limitations**

Several limitations should be considered when interpreting these findings. First, the quasi-experimental design without random allocation may introduce selection bias and residual confounding, even though baseline characteristics were comparable and multivariable mixed-effects models were used to adjust for key covariates. Second, the study was conducted in a single hospital and within one calendar year, which may limit generalizability to other dialysis units with different staffing patterns, patient case-mix, or service organization. Third, HRQoL outcomes were self-reported, which may be influenced by social desirability or response shift over time; however, this is inherent to patient-reported outcomes and the KDQOL-36 is widely accepted for dialysis HRQoL assessment (Cohen et al., 2019; Peipert et al., 2019). Fourth, the

DOI: https://doi.org/10.17509/jpki.v12i1.96944
e-ISSN 2477-3743 | p-ISSN 2541-0024

follow-up period captured post-intervention outcomes but did not evaluate long-term durability, which is particularly important because dialysis self-care behaviors and psychosocial adaptation change over time. Finally, methodological challenges such as missing patient-reported outcomes are common in dialysis trials; although mixed-effects models can accommodate partially missing data, future work should incorporate longer follow-up and stronger strategies for minimizing missingness, consistent with methodological recommendations in this field (Worboys et al., 2022).

## 5. CONCLUSION

In a resource-limited hemodialysis setting, participation in an empowerment-oriented self-care education program delivered by trained dialysis nurses was associated with greater improvements in HRQoL compared with usual care. Improvements were most apparent in perceived treatment burden and symptom-related domains, suggesting that structured patient-centered education may contribute to improved experiences of long-term dialysis care. Although these findings support the potential value of integrating empowerment-oriented educational approaches into routine dialysis practice, the quasi-experimental design does not permit definitive conclusions regarding causality. Further multicenter randomized controlled trials with longer follow-up periods are needed to confirm effectiveness, evaluate sustainability, and clarify implementation feasibility across diverse dialysis settings.

## 6. ACKNOWLEDGEMENTS

The authors are grateful for the facilities and administrative support provided by Poltekkes Kemenkes Tasikmalaya, which made this study possible.

## 7. FUNDING STATEMENT

This research received no external funding.

## 8. AUTHOR CONTRIBUTIONS

Conceptualization: NL, AW
Methodology: NL, AW
Data collection: NL
Data analysis and interpretation: NL, AW
Writing—original draft preparation: NL
Writing—review and editing: AW
Supervision: AW
All authors have read and approved the final version of the manuscript.

## 9. CONFLICT OF INTEREST

The authors declare no conflict of interest.

## 10. Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

DOI: https://doi.org/10.17509/jpki.v12i1.96944
e-ISSN 2477-3743 | p-ISSN 2541-0024

## 11. References

Abbasi Abianeh, N., Abdollah Zargar, S., Amirkhani, A., & Adelipouramlash, A. (2020). The effect of self-care education through teach back method on the quality of life in hemodialysis patients. *Nephrologie & therapeutique*, *16*(4), 197–200. https://doi.org/10.1016/j.nephro.2020.01.002

Alilu, L., Pazirofteh, S., Habibzadeh, H., & Rasouli, J. (2024). The impact of teach-back training method (TBTM) on treatment adherence in hemodialysis patients: a randomized controlled trial. *Annals of medicine and surgery (2012)*, *86*(5), 2723–2728. https://doi.org/10.1097/MS9.0000000000001906

Bello, A. K., Okpechi, I. G., Levin, A., Ye, F., Damster, S., Arruebo, S., Donner, J. A., Caskey, F. J., Cho, Y., Davids, M. R., Davison, S. N., Htay, H., Jha, V., Lalji, R., Malik, C., Nangaku, M., See, E., Sozio, S. M., Tonelli, M., Wainstein, M., … ISN-GKHA Group (2024). An update on the global disparities in kidney disease burden and care across world countries and regions. *The Lancet. Global health*, *12*(3), e382–e395. https://doi.org/10.1016/S2214-109X(23)00570-3

Butt, M. D., Ong, S. C., Butt, F. Z., Sajjad, A., Rasool, M. F., Imran, I., Ahmad, T., Alqahtani, F., & Babar, Z. U. (2022). Assessment of Health-Related Quality of Life, Medication Adherence, and Prevalence of Depression in Kidney Failure Patients. *International journal of environmental research and public health*, *19*(22), 15266. https://doi.org/10.3390/ijerph192215266

Cohen, D. E., Lee, A., Sibbel, S., Benner, D., Brunelli, S. M., & Tentori, F. (2019). Use of the KDQOL-36™ for assessment of health-related quality of life among dialysis patients in the United States. BMC nephrology, 20(1), 112. https://doi.org/10.1186/s12882-019-1295-0

Francis, A., Harhay, M. N., Ong, A. C. M., Tummalapalli, S. L., Ortiz, A., Fogo, A. B., Fliser, D., Roy-Chaudhury, P., Fontana, M., Nangaku, M., Wanner, C., Malik, C., Hradsky, A., Adu, D., Bavanandan, S., Cusumano, A., Sola, L., Ulasi, I., Jha, V., American Society of Nephrology, … International Society of Nephrology (2024). Chronic kidney disease and the global public health agenda: an international consensus. *Nature reviews. Nephrology*, *20*(7), 473–485. https://doi.org/10.1038/s41581-024-00820-6

Friedrich, N. K., Schmitt, N., Hruby, H., & Kugler, C. (2025). Self-management interventions for adult haemodialysis patients: a scoping review of randomized controlled trials. *BMC nephrology*, *26*(1), 285. https://doi.org/10.1186/s12882-025-04229-6

GBD Chronic Kidney Disease Collaboration (2020). Global, regional, and national burden of chronic kidney disease, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet (London, England)*, *395*(10225), 709–733. https://doi.org/10.1016/S0140-6736(20)30045-3

Kang H. (2021). Sample size determination and power analysis using the G*Power software. Journal of educational evaluation for health professions, 18, 17. https://doi.org/10.3352/jeehp.2021.18.17

Keivan, S., Shariati, A., Miladinia, M., & Haghighizadeh, M. H. (2023). Role of self-management program based on 5A nursing model in quality of life among patients undergoing hemodialysis: a Randomized Clinical Trial. *BMC nephrology*, *24*(1), 58. https://doi.org/10.1186/s12882-023-03108-2

DOI: https://doi.org/10.17509/jpki.v12i1.96944
e-ISSN 2477-3743 | p-ISSN 2541-0024

Kobayashi, D., Ganse, M., Shinoda, T., Hamada, C., Hara, S., Aikawa, A., Iino, Y., & Komatsu, Y. (2025). A survey on the association between patient activation and quality of life among patients with chronic kidney disease in Japan. *Journal of nephrology*, *38*(5), 1427–1436. https://doi.org/10.1007/s40620-025-02235-3

Kovesdy C. P. (2022). Epidemiology of chronic kidney disease: an update 2022. *Kidney international supplements*, *12*(1), 7–11. https://doi.org/10.1016/j.kisu.2021.11.003

Kurtz, C., Shadmi, E., Skorecki, K., Kruzel-Davila, E., Antebi, A., Tsehovsky, T., & Spitzer, S. (2025). Self-care in haemodialysis treatment tasks in community and hospital-based units: A cross-sectional study. *PloS one*, *20*(6), e0325940. https://doi.org/10.1371/journal.pone.0325940

Lee, M. C., Wu, S. V., Lu, K. C., Liu, C. Y., Liang, S. Y., & Chuang, Y. H. (2021). Effectiveness of a self-management program in enhancing quality of life, self-care, and self-efficacy in patients with hemodialysis: A quasi-experimental design. *Seminars in dialysis*, *34*(4), 292–299. https://doi.org/10.1111/sdi.12957

Ok, E., & Kutlu, Y. (2021). The Effect of Motivational Interviewing on Adherence to Treatment and Quality of Life in Chronic Hemodialysis Patients: A Randomized Controlled Trial. *Clinical nursing research*, *30*(3), 322–333. https://doi.org/10.1177/1054773820974158

Pack, S., & Lee, J. (2021). Randomised controlled trial of a smartphone application-based dietary self-management program on haemodialysis patients. *Journal of clinical nursing*, *30*(5-6), 840–848. https://doi.org/10.1111/jocn.15627

Peipert, J. D., Nair, D., Klicko, K., Schatell, D. R., & Hays, R. D. (2019). Kidney Disease Quality of Life 36-Item Short Form Survey (KDQOL-36) Normative Values for the United States Dialysis Population and New Single Summary Score. Journal of the American Society of Nephrology : JASN, 30(4), 654–663. https://doi.org/10.1681/ASN.2018100994

Pooresmaeil, M., Iranpour, S., & Aghamohammadi, M. (2023). Effects of a nurse-led structured home visiting program on quality of life and adherence to treatment in hemodialysis patients. *Frontiers in public health*, *11*, 1013019. https://doi.org/10.3389/fpubh.2023.1013019

RAND Corporation & University of Arizona. (2000). *Kidney Disease Quality of Life™ (KDQOL™-36), English Version 1*. https://www.rand.org/health/surveys/kdqol.html

Supriyadi, R., Rakhima, F., Gondodiputro, R. S., & Darmawan, G. (2019). Validity and reliability of the Indonesian version of Kidney Disease Quality of Life (KDQOL-36) questionnaire in hemodialysis patients at Hasan Sadikin Hospital, Bandung, Indonesia. *Acta Medica Indonesiana, 51*(4), 318–323.

Sułkowski, L., Matyja, A., & Matyja, M. (2024). Social Support and Quality of Life in Hemodialysis Patients: A Comparative Study with Healthy Controls. *Medicina (Kaunas, Lithuania)*, *60*(11), 1732. https://doi.org/10.3390/medicina60111732

Thurlow, J. S., Joshi, M., Yan, G., Norris, K. C., Agodoa, L. Y., Yuan, C. M., & Nee, R. (2021). Global Epidemiology of End-Stage Kidney Disease and Disparities in Kidney Replacement Therapy. *American journal of nephrology*, *52*(2), 98–107. https://doi.org/10.1159/000514550

DOI: https://doi.org/10.17509/jpki.v12i1.96944
e-ISSN 2477-3743 | p-ISSN 2541-0024

Tutur, İ., & Bicer, E. K. (2025). The Effect of Nurse-Led Telephone Patient Education and Counseling on Disease Management, Quality of Life, and Self-Care Behaviors in Hemodialysis Patients. *Worldviews on evidence-based nursing*, *22*(6), e70074. https://doi.org/10.1111/wvn.70074

Vainauskienė, V., & Vaitkienė, R. (2021). Enablers of Patient Knowledge Empowerment for Self-Management of Chronic Disease: An Integrative Review. *International journal of environmental research and public health*, *18*(5), 2247. https://doi.org/10.3390/ijerph18052247

Worboys, H. M., Cooper, N. J., Burton, J. O., Young, H. M. L., Waheed, G., Fotheringham, J., & Gray, L. J. (2022). Measuring quality of life in trials including patients on haemodialysis: methodological issues surrounding the use of the Kidney Disease Quality of Life Questionnaire. *Nephrology, dialysis, transplantation : official publication of the European Dialysis and Transplant Association - European Renal Association*, *37*(12), 2538–2554. https://doi.org/10.1093/ndt/gfac170

Zeidalkilani, J. M., Milhem, Y. A., Shorafa, R. N., Taha, S., Koni, A. A., Al-Jabi, S. W., & Zyoud, S. H. (2024). Factors associated with patient activation among patients with diabetes on hemodialysis: a multicenter cross-sectional study from a developing country. *BMC nephrology*, *25*(1), 232. https://doi.org/10.1186/s12882-024-03674-z

Zhou, X. H., Chen, H., Yang, W., Wang, L., Chen, L., Zhu, Y., Zhang, Y., Shi, M., & Zhang, Q. (2025). Efficacy of eHealth Interventions for Hemodialysis Patients: Systematic Review and Meta-Analysis. *Journal of medical Internet research*, *27*, e67246. https://doi.org/10.2196/67246

DOI: https://doi.org/10.17509/jpki.v12i1.96944
e-ISSN 2477-3743 | p-ISSN 2541-0024

DOI: https://doi.org/10.17509/jpki.v12i1.96944
e-ISSN 2477-3743 | p-ISSN 2541-0024