International Journal of Nephrology Research

ISSN Print: 2664-6692
ISSN Online: 2664-6706
IJNR 2025; 7(2): 05-10
www.nephrologyjournal.in
Received: 10-04-2025
Accepted: 15-05-2025

Mohamed Sherif Mohamed Okasha
Internal Medicine Department, Faculty of Medicine, Tanta University, Tanta, Egypt

Loai Mohamed Mabrouk Al Ahwal
Internal Medicine Department, Faculty of Medicine, Tanta University, Tanta, Egypt

Nelly Desouky El Shall
Internal Medicine Department, Faculty of Medicine, Tanta University, Tanta, Egypt

Amal Abd Elmoniem Selim
Internal Medicine Department, Faculty of Medicine, Tanta University, Tanta, Egypt

Mohamed Sabry Abou El Nasr
Internal Medicine Department, Faculty of Medicine, Tanta University, Tanta, Egypt

Corresponding Author:
Mohamed Sherif Mohamed Okasha
Internal Medicine Department, Faculty of Medicine, Tanta University, Tanta, Egypt

Effect of health education on quality of life and clinical outcomes in Hemodialysis patients

Mohamed Sherif Mohamed Okasha, Loai Mohamed Mabrouk Al Ahwal, Nelly Desouky El Shall, Amal Abd Elmoniem Selim and Mohamed Sabry Abou El Nasr

DOI: https://www.doi.org/10.33545/26646692.2025.v7.i2a.26

Abstract
End-stage renal disease (ESRD) and hemodialysis (HD) are major public health problems globally, associated with complications such as anemia, metabolic acidosis, nutritional deficits, mineral-bone disorder, secondary hyperparathyroidism, and hypertension, which increase morbidity and mortality. Patients on hemodialysis often experience significantly lower quality of life (QoL) compared to the general population. Patient health education is considered a fundamental component of healthcare services. This study aimed to evaluate the impact of a well-designed health education program on clinical outcomes and quality of life scores in hemodialysis patients. An open-label multicentric randomized study was conducted with 100 adult ESRD patients on regular HD, divided into a study group (receiving standard care plus education) and a control group (receiving standard care only). Baseline clinical assessment and lab workup were performed. The study group participated in a structured health education program over 12 weeks, followed by a 12-month follow-up phase. At the end of the study, clinical outcomes were re-evaluated, and QoL was assessed using the KDQoL-SF 36 questionnaire. Results showed a significant improvement in anemia profile (hemoglobin, TSAT) and mineral and bone disorder profile (calcium, phosphorus) in the study group compared to controls. QoL scores were also significantly higher in most domains for the study group. The study concluded that a well-designed health education program positively impacts clinical outcomes and quality of life in hemodialysis patients.

Keywords: ESRD, Hemodialysis, health education, clinical outcomes, quality of life

Introduction
End-Stage Renal Disease (ESRD) and hemodialysis represent significant global public health challenges. ESRD is the late, non-curable stage of chronic kidney disease (CKD) requiring lifelong renal replacement therapy (RRT). Complications like anemia, metabolic acidosis, nutritional deficits, mineral-bone disorder, secondary hyperparathyroidism, and hypertension are common in ESRD, contributing to increased morbidity and mortality. The need for RRT has driven substantial growth in nephrology units.

Continuing medical education (CME) helps healthcare professionals stay competent and updated on new therapies. Patient education is also crucial, empowering patients to understand their medical condition, manage aspects of it, modify lifestyles, and improve compliance with treatment plans. Effective communication and education can enhance patient motivation. Clinical practice guidelines exist to offer recommended ranges for parameters in ESRD management, addressing aspects like hemodialysis adequacy, vascular access care, and management of anemia and bone/nutritional diseases.

Beyond survival and clinical indicators, patient Quality of Life (QoL) is a vital measure of medical care effectiveness. QoL in ESRD patients is affected by the disease and its management, including the type of RRT. Hemodialysis patients specifically have a much lower QoL than the general population. Engaging HD patients in well-designed programs encompassing medical treatment, patient education, counseling, exercise, and diet control can help them live longer, more productive lives. Assessing QoL is essential to understand the complex impact of ESRD and its treatment on patients' lives and to identify areas for

intervention. The Kidney Disease Quality of Life-Short Form (KDQoL-SF) is a validated instrument specifically designed for individuals with kidney disease on dialysis.

The growing burden of ESRD in countries like Egypt, where Diabetes Mellitus (DM) and Hypertension are leading causes, underscores the need for effective management strategies. While guidelines exist, adherence can be a challenge. Well-designed educational activities have been shown to impact clinical outcomes and QoL. This study aimed to investigate the specific effect of a structured health education program on clinical outcomes and quality of life scores among hemodialysis patients.

Patients and Methods

Study Design and Participants: This was an open-label multicentric randomized study conducted from October 2021 to September 2022. The study included 100 adult patients (age ≥ 18 years) with ESRD on regular hemodialysis (3 sessions/week, 4 hours/session, for ≥ 3 months). Patients were recruited from Tanta University hospital, Kenanah HD unit (Tanta), Dar El-Shefaa HD unit (El-Santa), and Noor Al-Islam hemodialysis unit (Badr Elbuhayra). Patients with dementia, psychotic disorders, learning disabilities, or temporary visitors were excluded. Participants were randomly assigned equally to a control group (Group A, n=50) and a study group (Group B, n=50) using computer randomization.

Intervention: Both groups received standard medical care. The study group additionally received a planned patient education program conducted in two phases. The Induction phase involved organized educational sessions over 12 weeks (one session/week), each with defined contents and learning objectives. Sessions were conducted in groups during HD time (1-2 hours after starting, max 40 minutes) using projectors, with printed materials available for patients and caregivers. Treating staff and family members were encouraged to attend.

Key topics covered included: Hemodialysis process, common complications and prevention, blood pressure and fluid balance control, anemia control, nutrition, MBD prevention/treatment, HD access care, diabetes control, and physical exercise. The Follow-up phase lasted 12 months, allowing patients to review educational content videos.

Data Collection: Baseline clinical assessments and lab workups were performed for both groups at the beginning of the study. Lab workup included assessment of anemia profile (Hemoglobin, Transferrin saturation, Ferritin) and mineral and bone disorder (MBD) profile (Serum Calcium, Serum phosphorus, Intact Parathyroid hormone - PTH) according to KDIGO and NKF-KDOQI guidelines. These parameters were re-evaluated at the end of the study.

Quality of life was assessed subjectively at the end of the study using the Kidney Disease Quality of Life-Short Form (KDQoL-SF) questionnaire. The KDQoL-SF includes a 36-item generic core (SF-36) assessing physical and mental health status across 8 domains: Physical functioning, Role limitations caused by physical health problems, Role limitations caused by emotional health problems, Social functioning, Emotional well-being, Pain, Energy/fatigue, and General health perceptions. It also includes kidney disease-specific items (though the results section focused on the main domains). Scores were transformed to a 0-100 range, with higher scores indicating better QoL.

Statistical Analysis

Data were coded, verified, and analyzed using SPSS program version 20.0. Statistical tables were designed for analysis at a 95% confidence interval. Statistical significance was assessed using appropriate tests, likely including Chi-square for categorical data and t-tests or ANOVA for continuous data, as suggested by the results tables.

Ethical Considerations: Approval was obtained from Nephrology units. All procedures followed the Declaration of Helsinki. Verbal and written consent were obtained after explaining the study aims and procedures. Complete confidentiality was maintained.

Results

One hundred participants were enrolled and completed the study. Demographic characteristics and dialysis duration were comparable between the control and study groups at baseline, with no statistically significant differences. Males constituted 64% and females 36% in both groups. Mean age was approximately 50-51 years. The majority had elementary or were illiterate (62% study, 54% control). Duration on HD averaged 2.7-2.8 years. Causes of ESRD and comorbidities were also similar between groups.

Laboratory Workup

At the study onset, no statistically significant differences were found in anemia or MBD profiles between groups. For example, the percentage of patients achieving target hemoglobin was low (<40% in both groups).

By the end of the study, after the education program, the study group showed statistically significant improvements compared to the control group.

Anemia Profile

Significant improvement was seen in hemoglobin (Hb) and TSAT values in the study group. The percentage of non-anemic patients (achieving target Hb) increased from 38% to 82% in the study group, a statistically significant difference compared to the control group (P<0.001). TSAT target achievement also significantly improved in the study group (P<0.001). Ferritin levels showed no significant difference between groups after intervention.

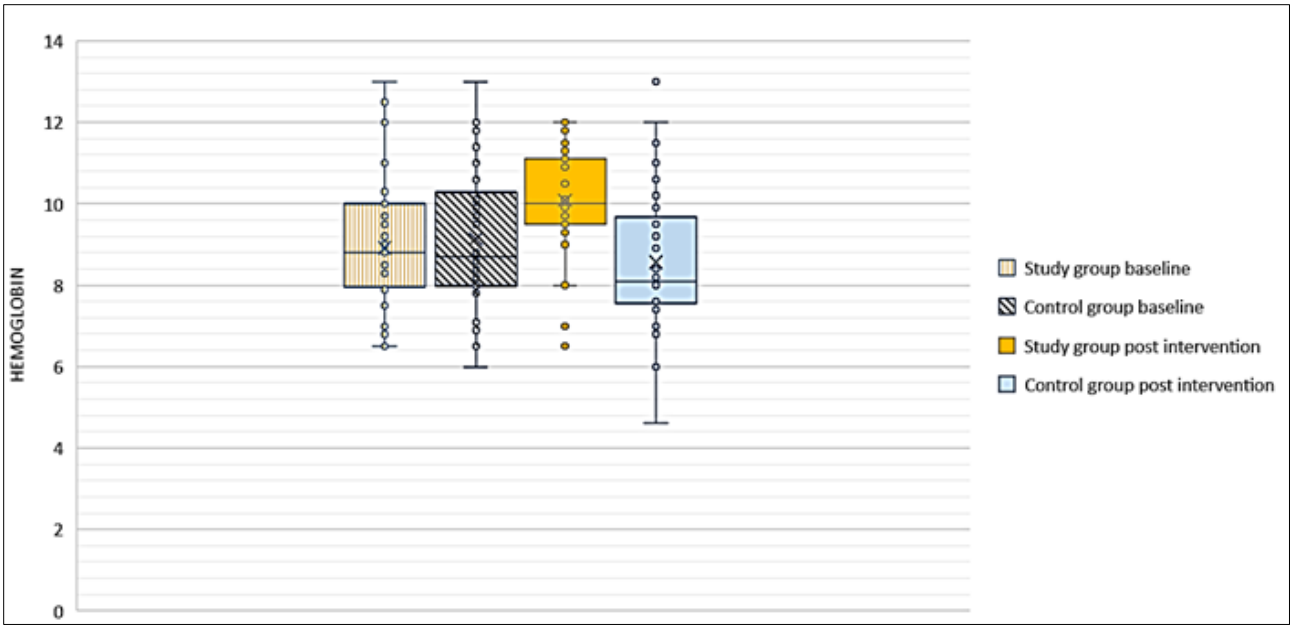

Fig 1: Box and whisker plot of hemoglobin values (g/dL) of both study and control groups before and after the health education program.

MBD Profile: Study group patients achieved better control of serum calcium and phosphorus levels. The percentage of patients with normal phosphorus values increased from 50% to 70% in the study group, significantly different from the control group (P<0.001). Patients in the study group with in-target calcium levels increased from 68% to 86%, also a significant difference compared to the control group (P = 0.003). While PTH levels improved in the study arm (target increased from 34% to 52%), the difference compared to the control group was not statistically significant (P = 0.252).

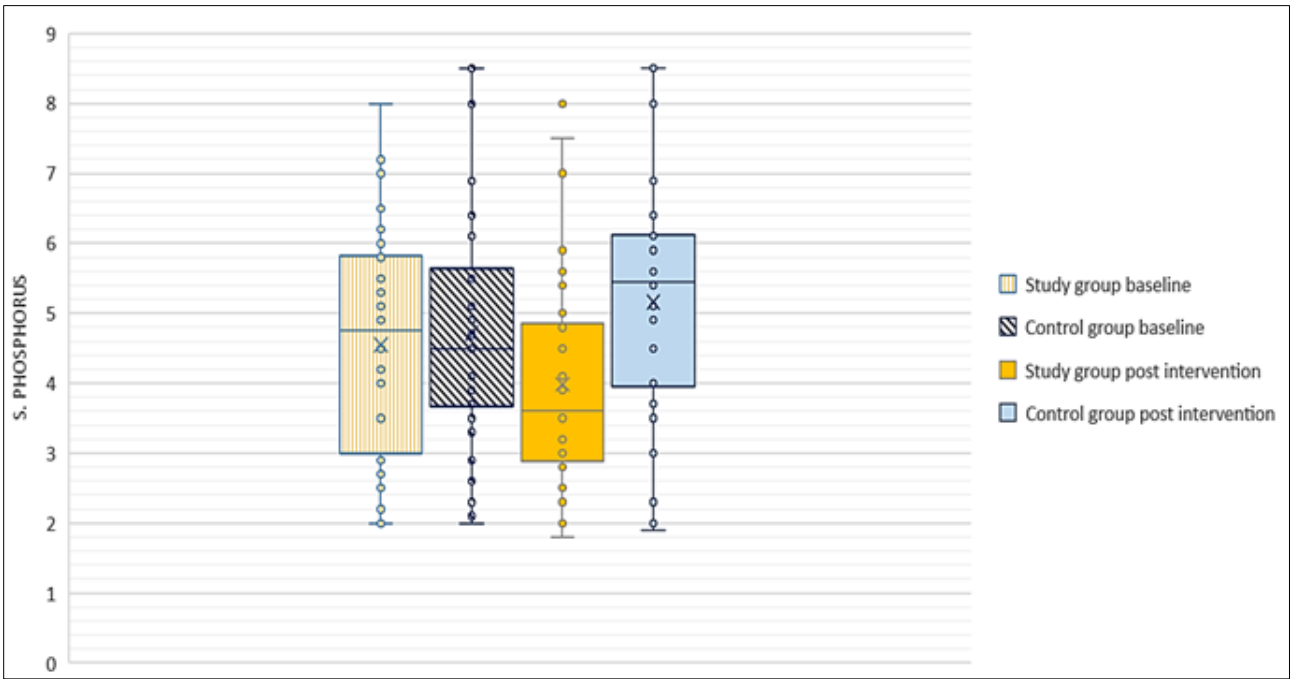

Fig 2: Box and whisker plot of serum phosphorus values (mg/dl) of both study and control groups before and after the health education program.

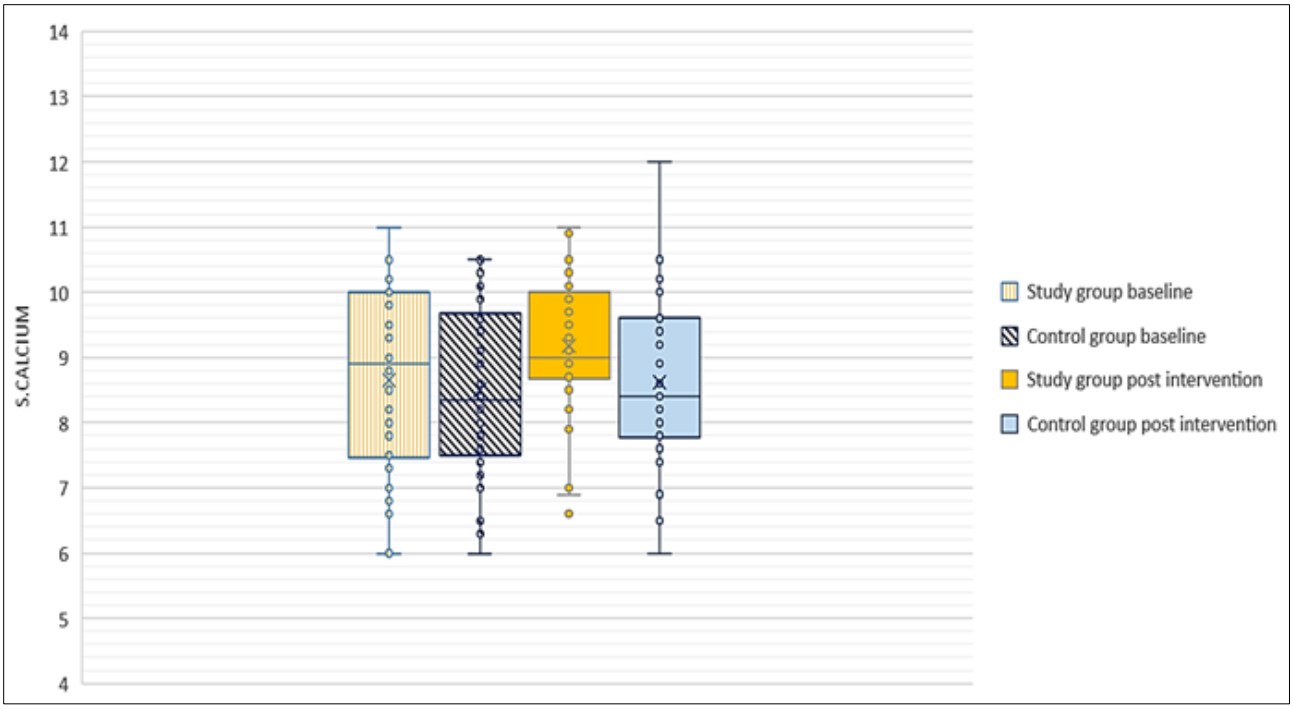

Fig 3: Box and whisker plot of serum calcium values (mg/dl) of both study and control groups before and after the health education program.

Quality of Life Scores: QoL scores were assessed at the end of the study. Although scores were generally poor (below 68 points for the highest score), the study group consistently had higher scores than the control group across all main KDQoL-SF domains.

These differences were statistically significant in most domains, including Physical functioning (P = 0.002), Role limitation due to Emotional problem (P = 0.001), Energy / Fatigue (*P*<0.001), Emotional well-being (*P*< 0.001), Social functioning (*P*<0.001), Pain (P = 0.022), and General Health (*P*<0.001). The domain "Role limitation due to Physical Health" did not show a statistically significant difference (P = 0.133). "Social functioning" was the highest scored domain in both groups, while "General Health" was the lowest.

Table 1: QoL mean scores of both study and control groups:

QoL Domains	Control (A) group (n=50)	Study (B) group (n=50)	P value*
	mean ± SE	mean ± SE	
Physical functioning	30.5 ± 3.29	45.2 ± 3.36	0.002
Role limitation due to Physical Health	20.0 ± 5.10	32.0 ± 6.06	0.133
Role limitation due to Emotional problem	28.0± 5.07	53.3 ± 5.71	0.001
Energy / Fatigue	41.5 ± 0.56	49.8 ± 0.43	<0.001
Emotional well being	41.04 ± 1.03	52.3 ± 0.93	<0.001
Social functioning	55.5 ± 0.89	67.7 ± 1.24	<0.001
Pain	41.3 ± 3.49	53.7 ± 4.06	0.022
General Health	26.1 ± 0.69	32.7± 0.65	<0.001
**Independent t test.All scores were measured at 95% level of confidence.*			

Discussion

Quality of life is a critical indicator in the management of hemodialysis patients due to the significant negative impacts of long-term HD on social activities, financial stability, and independence. Previous studies consistently demonstrate poor health-related quality of life (HRQoL) among HD patients worldwide. HRQoL scores are lower in higher CKD grades and significantly lower than in the general population. Furthermore, QoL in HD patients is reported to be significantly lower than in transplanted patients.

Finding ways to improve this poor QoL status is crucial. Our findings support the evidence from numerous studies that patient education and counseling can lead to improved QoL scores and clinical characteristics. The structured health education program implemented in this study covered essential topics such as blood pressure and fluid balance, exercise, access care, anemia, bone diseases, nutrition, medication compliance, and comorbidities like diabetes.

Consistent with observations that HD patients often lack awareness about their condition and management, leading to poor adherence and negatively impacting QoL, this study showed that increasing awareness through an education program improved QoL in the study group. Studies have shown that health-related quality of life can improve significantly by increasing patient awareness through counseling and that family-centered education can help patients adhere to treatment plans and reduce complications. A systematic review also found a linear association between educational interventions, counseling, and QoL scores.

The significant improvement in the percentage of non-anemic patients and TSAT in the study group following the education program is particularly noteworthy. This aligns with previous research indicating that higher hemoglobin

levels are associated with improved QoL domains. While one review suggested anemia treatment hasn't consistently shown QoL improvement, others, including studies on ESA therapy, have reported significant QoL improvement associated with anemia correction. The current guidelines recommend maintaining hemoglobin levels above 11 g/dL.

The significant improvement in phosphorus and calcium control observed in the study group highlights the impact of patient education on dietary compliance and understanding of long-term complications. Hyperphosphatemia is a common problem in HD patients associated with increased cardiovascular and all-cause mortality. Effective control requires a multi-faceted approach including dietary restriction, phosphate binders, and adequate dialysis. Despite the complexity, adherence is often suboptimal. The education program in this study explicitly discussed the complications of high phosphate and provided detailed dietary information, which likely contributed to the improved control.

While PTH levels showed a relative improvement in the study group, the difference was not statistically significant. This suggests that while education about mineral bone disorders is important, other factors, including the availability and affordability of medications like cinacalcet (mentioned as potentially unaffordable for most patients in the source), may play a significant role in achieving target PTH levels, especially in severe hyperparathyroidism.

The significant improvement across most QoL domains in the study group reinforces the overall positive effect of comprehensive health education. These findings support the concept that empowering patients with knowledge about their condition and its management can profoundly impact their perceived well-being.

The study acknowledges limitations, including the absence of baseline QoL scores, potential confounding factors, the relatively small sample size, and being conducted in a single center (though the text mentions multicentric recruitment, the conclusion refers to a single center as a limitation). Despite these, the research serves as a valuable pilot study for future trials.

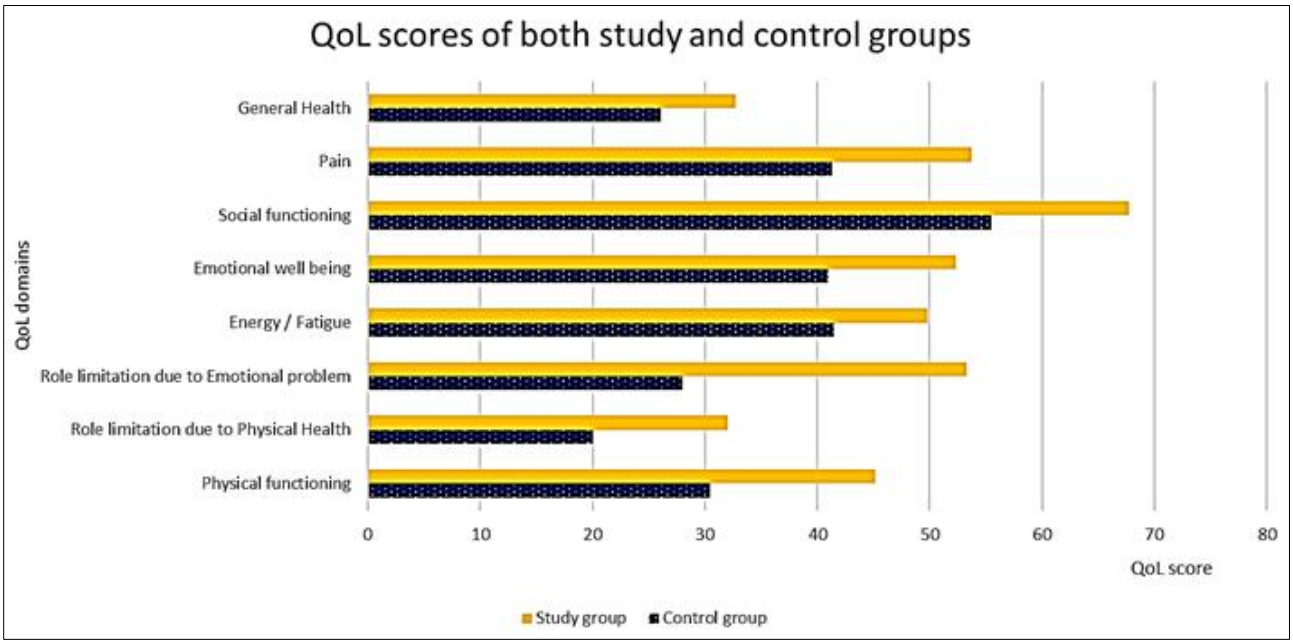

Fig 4: Bar chart graph of main QoL scores of both study and control groups.

Conclusion

In conclusion, End-Stage Renal Disease and hemodialysis present significant challenges impacting patient quality of life. The results of this study demonstrate that a well-designed health education program significantly improves clinical outcomes, particularly in the control of anemia and mineral and bone disorders (calcium and phosphorus), and markedly increases quality of life scores across most domains in hemodialysis patients. Patient education is a crucial component in optimizing care and mitigating the burden of ESRD.

Recommendations

Based on the findings of this study and supporting literature, the following recommendations are made:

- Hemodialysis care should be delivered by a multidisciplinary team including nephrologists, HD nurses, dieticians, health educators, pharmacists, physical therapists, occupational therapists, social workers, and volunteers.
- Adherence to updated evidence-based medical practice and guidelines is essential for effective management and prevention of complications.
- Healthcare staff should periodically assess patients' clinical status and QoL to identify needs and tailor interventions.
- Further studies are recommended, utilizing mixed qualitative and quantitative methods for QoL assessment to gain richer information.
- This study should serve as a pilot for larger, prospective randomized multicenter trials to overcome current limitations and provide more definitive outcomes.

References

1. Umeukeje EM, Mixon AS, Cavanaugh KL. Phosphate-control adherence in hemodialysis patients: current perspectives. Patient Preference and Adherence.

2018;12:1175-1191. https://doi.org/10.2147/PPA.S145648
2. Shekelle P, Aronson MD, Melin JA. Overview of clinical practice guidelines. 2018. Available from: https://www.uptodate.com
3. Schub T, Engelke Z. Patient education: determining appropriate teaching methods. CINAHL Nursing Guide. Glendale, CA: CINAHL Information Systems; 2018.
4. St Clair Russell J, Boulware LE. End-stage renal disease treatment options education: what matters most to patients and families. Seminars in Dialysis. 2018;31(2):122-128. https://doi.org/10.1111/sdi.12665
5. Isakova T, *et al.* KDOQI US commentary on the 2017 KDIGO clinical practice guideline update for the diagnosis, evaluation, prevention, and treatment of chronic kidney disease-mineral and bone disorder (CKD-MBD). American Journal of Kidney Diseases. 2017;70(6):737-751. https://doi.org/10.1053/j.ajkd.2017.07.019
6. Steinberg DI. Principles of evidence-based medicine and quality of evidence. In: McKean SC, *et al.*, editors. Principles and Practice of Hospital Medicine. 2nd ed. New York, NY: McGraw-Hill Education; 2017.
7. Joint Commission International. Joint Commission International Accreditation Standards for Clinical Laboratories. 6th ed. USA: Joint Commission International; 2017. Available from: http://www.jcrinc.com
8. Cheung AK, Henrich WL. Secondary prevention of cardiovascular disease in end-stage renal disease (dialysis). 2017.
9. Kestenbaum B, Houillier P. Disorders of calcium, phosphate, and magnesium metabolism. In: Feehally J, Floege J, Tonelli M, Johnson RJ, editors. Comprehensive Clinical Nephrology. 6th ed. Elsevier Inc; 2019. p. 162.
10. Lunka S, Luukkanen H. Content of patient education for chronic renal failure patients undergoing dialysis treatments: a literature review. Helsinki: Metropolia University of Applied Sciences; 2017.
11. Marinho CLA, *et al.* Quality of life of chronic renal patients undergoing hemodialysis. Revista da Rede de Enfermagem do Nordeste. 2017;18(3):396. https://doi.org/10.15253/2175-6783.2017000300016
12. The Egyptian Society of Nephrology and Transplantation. Egyptian Renal Data System (ERDS) 1st Annual Report (2018). Cairo: ESNT; 2019. Available from: http://esnt-online.com
13. Ebrahimi H, *et al.* Influence of nutritional education on hemodialysis patients' knowledge and quality of life. Saudi Journal of Kidney Diseases and Transplantation. 2016;27(2):250-255. https://doi.org/10.4103/1319-2442.178253
14. Brück K, *et al.* CKD prevalence varies across the European general population. Journal of the American Society of Nephrology. 2016;27(7):2135-2147. https://doi.org/10.1681/asn.2015050542
15. Bahramnezhad F, *et al.* Family-centered education and its clinical outcomes in patients undergoing hemodialysis. Iranian Red Crescent Medical Journal. 2015;17(5):1-7. https://doi.org/10.5812/ircmj.17(5)2015.20705
16. AlSadhan A, Hejaili F, Salih S. Level of dietary awareness among Saudi dialysis patients and the influence of various factors. Saudi Journal of Kidney Diseases and Transplantation. 2015;26(3):544. https://doi.org/10.4103/1319-2442.157360
17. Tomlinson LA, Wheeler DC. Clinical evaluation and management of chronic kidney disease. In: Feehally J, Floege J, Johnson RJ, editors. Comprehensive Clinical Nephrology. 5th ed. Elsevier Inc; 2015. p. 942-948.
18. Sherman RA, *et al.* Clinical problem areas: complications during hemodialysis. In: Daugirdas JT, Blake PG, Ing TS, editors. Handbook of Dialysis. 5th ed. Philadelphia: Wolters Kluwer; 2015. p. 215-291.
19. Saran R, *et al.* US Renal Data System 2014 Annual Data Report: epidemiology of kidney disease in the United States. American Journal of Kidney Diseases. 2015;65(6 Suppl 1):A7. https://doi.org/10.1053/j.ajkd.2015.05.001
20. Sabanciogullari S, *et al.* Sexual function in patients with chronic renal failure on hemodialysis and its effects on patients' perception of health and life satisfaction. Sexuality and Disability. 2015;33(2):175-186. https://doi.org/10.1007/s11195-015-9398-9394

How to Cite This Article
Mohamed Okasha MS, Al Ahwal LMM, El Shall ND, Elmoniem Selim AA, Abou El Nasr MS. Effect of health education on quality of life and clinical outcomes in Hemodialysis patients. International Journal of Nephrology Research. 2025;7(2):05-10