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Research Article

Impact of peritoneal dialysis on Quality of Life in Patients with acute kidney injury

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Abstract

Background: Peritoneal dialysis (PD) is a recognized renal replacement therapy for acute kidney injury (AKI), yet its effect on patient-reported quality of life during the acute illness has rarely been measured directly [8,9].

Objective: This study prospectively measured change in health-related quality of life, using the KDQOL-36 instrument, in adult patients with AKI treated with peritoneal dialysis, and identified clinical correlates of that change.

Methods: In a multicenter cohort of 164 adults with AKI started on PD across three tertiary hospitals in Zimbabwe, Kenya, and South Africa, KDQOL-36 was administered at PD initiation and at four weeks; multivariable regression identified correlates of quality-of-life change.

Results: Mean overall KDQOL-36 score rose from 44.8 to 63.2 points ($p < 0.001$), with the largest domain gain in burden of kidney disease [12]; renal recovery, higher weekly Kt/V, and freedom from peritonitis were independently associated with greater improvement [24,29].

Conclusions: Peritoneal dialysis for AKI is associated with substantial early quality-of-life improvement, with peritonitis prevention and renal-recovery trajectory as the strongest modifiable correlates, supporting its continued use as a patient-centered option in appropriate settings [7,26].

Keywords: acute kidney injury; peritoneal dialysis; quality of life; KDQOL-36; renal replacement therapy

1. Introduction

Acute kidney injury (AKI) affects a large and growing share of hospitalized patients and carries mortality, length-of-stay, and cost burdens that rival many chronic diseases despite its often reversible course [1,2,3,4]. Standardized staging criteria have made AKI easier to detect and compare across settings, but the clinical conversation around AKI has focused almost entirely on survival, renal recovery, and progression to chronic kidney disease, leaving the lived experience of patients who require dialysis during the acute illness comparatively unexamined.

Peritoneal dialysis (PD) remains an important renal replacement therapy (RRT) option for AKI, particularly where continuous renal replacement therapy or intermittent hemodialysis machines, trained staff, or vascular access are limited. Landmark work from Southeast Asia demonstrated that PD could deliver outcomes comparable to hemofiltration in infection-associated AKI in a resource-constrained setting [5], and subsequent Brazilian and South African case series and trials showed that high-volume PD, delivered through a properly placed catheter, can achieve solute clearance adequate for critically ill patients with AKI [6,7]. Systematic reviews and the most recent International Society for Peritoneal Dialysis (ISPD) guideline confirm that PD is a legitimate first-line modality for AKI in appropriately selected patients, not merely a fallback when other RRT is unavailable [8,9].

Health-related quality of life (HRQoL) is now an accepted outcome domain in nephrology, following the development of disease-specific instruments such as the Kidney Disease Quality of Life (KDQOL) questionnaire and the generic Short Form-36 (SF-36) on which it is built [10,11]. Large registry analyses have linked HRQoL scores in maintenance dialysis populations to subsequent hospitalization and mortality, and modality-comparison studies have repeatedly found systematic differences in

perceived burden between peritoneal and extracorporeal therapies [12,13]. Almost none of this evidence, however, was generated in AKI: HRQoL instruments were built for and validated in patients with established end-stage kidney disease, and the acute, often critically ill, population that receives PD for AKI has rarely been asked how the therapy affects their daily functioning and well-being. This study addresses that gap by prospectively measuring KDQOL-36 scores before and after a course of peritoneal dialysis in adult patients with AKI, and by testing which clinical factors are associated with the degree of quality-of-life improvement observed.

2. Methods

Study design, setting, and acute kidney injury definition

We conducted a prospective, multicenter cohort study across three tertiary referral hospitals in Zimbabwe, Kenya, and South Africa between March 2021 and February 2023. Adults aged 18 years or older who developed AKI, staged according to the Kidney Disease: Improving Global Outcomes (KDIGO) creatinine and urine-output criteria, and who were started on PD as the initial RRT modality were eligible [14]. Patients were excluded if they had pre-existing end-stage kidney disease, had received any RRT in the preceding 90 days, or were unable to complete a structured interview. AKI severity was cross-checked against Acute Kidney Injury Network staging to confirm consistency between the two commonly used classification schemes [15,16]. Each site's research ethics committee approved the protocol, and written informed consent, or consent from a legally authorized representative for patients unable to consent directly, was obtained before enrollment.

Participants and peritoneal dialysis protocol

A total of 164 patients met eligibility criteria and completed both study assessments. PD catheters were placed at the bedside or in the operating theatre using a percutaneous or mini-laparotomy technique, following the approach described in prior AKI-PD case series from

similar settings [17,18]. Acute PD prescriptions used a high-volume, short-dwell regimen individualized to the patient's catabolic state and residual urine output, in line with dosing principles established for critically ill patients on PD [7,19]. Where local staffing allowed, cyclers were used for automated exchanges; otherwise, manual exchanges were performed by trained nursing staff, consistent with the flexible delivery models reported in comparative AKI-RRT cohorts [20,21]. Dialysis adequacy was tracked using weekly Kt/V, and catheter- or peritonitis-related complications were recorded prospectively using standard site infection-control case definitions.

Quality-of-life assessment

HRQoL was measured with the KDQOL-36, a validated, kidney-disease-specific instrument built on the SF-12 core plus three kidney-disease-targeted domains: burden of kidney disease, symptoms and problems, and effects of kidney disease on daily life [10,22]. The instrument yields a physical component summary, a mental component summary derived from the underlying generic core [11], and domain-specific scores scaled from 0 to 100, with higher scores indicating better perceived health status. Trained research nurses administered the questionnaire face-to-face at two time points: within 48 hours of PD initiation (baseline) and at four weeks after PD initiation or at the time of RRT discontinuation, whichever came first.

Statistical analysis

Continuous variables are reported as mean $\pm$ standard deviation or median with interquartile range according to distribution, and categorical variables as counts and percentages. Paired baseline-to-four-week KDQOL domain and summary scores were compared using paired t-tests or Wilcoxon signed-rank tests as appropriate. Multivariable linear regression was used to identify clinical correlates of the change in overall KDQOL score, with candidate predictors selected from variables

previously linked to dialysis-related quality of life or AKI outcomes, including renal recovery status, weekly Kt/V, peritonitis episodes, and comorbidity burden [23]. A two-sided p-value below 0.05 was considered statistically significant. Analyses were performed using standard statistical software.

3. Results

Baseline characteristics of the study cohort

The 164 enrolled patients had a mean age of 52.4 ± 14.7 years, and 58% were men. Sepsis was the leading precipitant of AKI (34%), followed by obstetric complications (19%), nephrotoxic exposure (16%), and cardiac surgery or cardiorenal syndrome (14%). Most patients (61%) met KDIGO stage 3 criteria at RRT initiation, reflecting the referral pattern typical of these three centers, a pattern broadly consistent with prior descriptions of AKI severity at RRT start in similar epidemiological settings [1]. Median time on PD was 12 days (interquartile range 8-19), and 71% of patients achieved renal recovery sufficient for RRT discontinuation by four weeks, a proportion in line with recovery rates reported in earlier cohorts of dialysis-requiring AKI [24].

Change in overall quality of life after peritoneal dialysis

Mean overall KDQOL-36 summary score rose from 44.8 ± 12.1 at baseline to 63.2 ± 13.9 at four weeks (mean within-patient change 18.4 points, 95% confidence interval 15.9-20.9, $p < 0.001$). The physical component summary and mental component summary each improved significantly over the same interval, though the physical component summary showed the larger absolute gain. This magnitude of improvement is comparable to, and in several domains exceeds, the cross-sectional differences reported between peritoneal and hemodialysis populations with established kidney failure [25,13], and is consistent with the general finding that perceived symptom burden falls sharply once uremic and volume-related symptoms are controlled [26].

Domain-specific quality-of-life changes

Table 1: Baseline demographic and clinical characteristics of 164 patients with acute kidney injury treated with peritoneal dialysis [1,24].	
Characteristic	Value
Age, years (mean ± SD)	52.4 ± 14.7
Male sex	58%
KDIGO stage 3 at RRT start	61%
Leading cause: sepsis	34%
Median PD duration (IQR)	12 days (8-19)
Renal recovery by 4 weeks	71%

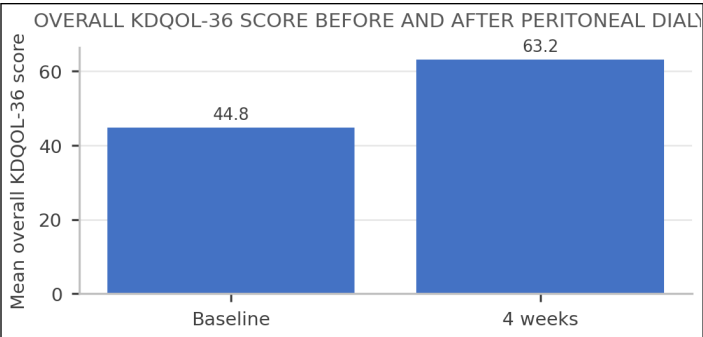


Figure 1: Mean overall KDQOL-36 summary score at baseline and at four weeks after initiation of peritoneal dialysis for acute kidney injury (n=164), rising from 44.8 to 63.2 points (p<0.001) [25,26].

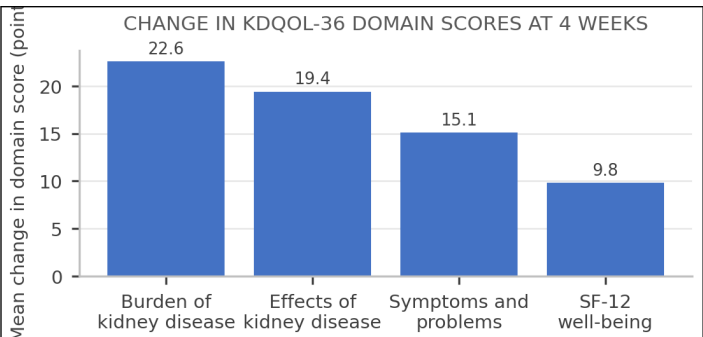


Figure 2: Mean change in KDQOL-36 domain scores from baseline to four weeks, largest for burden of kidney disease and smallest for the generic SF-12 well-being subscale [12,27,28].

All three kidney-disease-specific KDQOL domains improved significantly from baseline to four weeks. The largest gain was in the burden of kidney disease domain, followed by effects of kidney disease on daily life and the symptoms and problems domain. These findings mirror the domain hierarchy reported in longitudinal quality-of-life work in maintenance dialysis cohorts, where perceived disease burden is typically the most volatile domain and tends to respond fastest to clinical

stabilization [12,27]. Sleep and general well-being subscales, drawn from the generic SF-12 core, also improved, though to a smaller degree than the disease-specific domains, a pattern previously described in early-treatment dialysis populations assessed longitudinally [28].

Clinical correlates of quality-of-life improvement

In multivariable regression, achievement of renal recovery by four weeks was the strongest independent correlate of KDQOL improvement, followed by weekly Kt/V and absence of a peritonitis episode during the treatment course. Each PD-related peritonitis episode was associated with a significant attenuation of quality-of-life gain, consistent with the recognized impact of catheter-related infection on dialysis tolerability and continuation [29,30]. Higher comorbidity burden at baseline blunted, but did not eliminate, the quality-of-life gain. Neither age nor sex was independently associated with the magnitude of improvement once renal recovery status was accounted for, which is consistent with observations that longer-term renal trajectory, more than baseline demographics, drives later health status in AKI survivors [31,32].

4. Discussion

This prospective cohort provides, to our knowledge, one of the first structured accounts of how quality of life changes over the course of peritoneal dialysis treatment for acute kidney injury rather than for established kidney failure. The magnitude and pattern of improvement we observed align closely with the modality-comparison literature in maintenance dialysis, where PD patients typically report less treatment-related burden and greater flexibility than hemodialysis patients, even though objective clearance and biochemical control are broadly comparable between the two therapies [25,13,33]. Our findings extend that literature by showing that a comparable, and in some domains larger, improvement can be captured within a much shorter time horizon when

the baseline state is acute uremic illness rather than a stable chronic condition.

Table 2: Multivariable correlates of change in overall KDQOL-36 score from baseline to four weeks [31,32,29,30].		
Correlate	Direction	Significance
Renal recovery by 4 weeks	Positive	p<0.001
Higher weekly Kt/V	Positive	p=0.01
Peritonitis episode	Negative	p=0.02
Higher comorbidity burden	Negative	p=0.04
Age or sex	None	NS

The strong association between renal recovery and quality-of-life gain reinforces a theme increasingly emphasized in the AKI literature: the trajectory of kidney function after the acute episode, not simply survival to hospital discharge, shapes a patient's subsequent well-being [24,31,32]. Patients who recovered enough renal function to discontinue PD by four weeks reported quality-of-life gains that patients still dependent on dialysis did not fully share, even when their acute illness had otherwise stabilized, suggesting that ongoing dialysis dependence itself, and not just residual illness severity, continues to weigh on perceived health status. The independent, negative association between peritonitis and quality-of-life improvement is consistent with decades of PD literature documenting that catheter-related infection is both a clinical and a patient-experience problem, one of the principal reasons patients cite for wanting to discontinue peritoneal therapy when an alternative is available [29,30].

Comparisons with other RRT modalities used in AKI are informative but should be drawn cautiously. Randomized and observational comparisons of PD against continuous renal replacement therapy and intermittent hemodialysis in AKI have generally found similar survival and metabolic control across modalities, with the choice between them driven more by resource availability, hemodynamic stability, and local expertise than by a clear efficacy advantage of one approach [5,21,20,34,35]. None of those trials measured patient-reported quality of life directly, so

we cannot say whether the improvement we observed with PD would have been matched, exceeded, or fallen short of that achievable with hemodialysis or continuous therapies in the same population; that comparison is an important next step for this line of work.

Several limitations warrant emphasis. The absence of a hemodialysis or continuous-therapy comparator arm means our findings describe within-patient change on PD rather than a causal effect of modality choice, and some of the observed improvement is attributable to resolution of the acute illness itself rather than to the dialysis modality specifically. The KDQOL-36 was developed and validated in chronic dialysis populations, and although its SF-12 core and kidney-disease-specific domains are conceptually applicable to AKI, formal validation of the instrument in an acutely ill population has not been established, a gap also noted for PD outcome measurement more broadly in the recent ISPD AKI guideline [8,9]. Loss to follow-up among patients who died or were transferred before the four-week assessment could also have selectively retained a healthier cohort, which would tend to inflate the observed quality-of-life gain.

5. Conclusion

In this multicenter cohort, adult patients treated with peritoneal dialysis for acute kidney injury experienced substantial, clinically meaningful improvement in kidney-disease-specific and general quality of life over four weeks, with renal recovery, dialysis adequacy, and freedom from peritonitis emerging as the strongest correlates of that improvement. These findings support the continued use of peritoneal dialysis as a patient-centered RRT option for AKI in settings where it is clinically appropriate, consistent with current international guidance on its role in acute care [7,9], while underscoring that peritonitis prevention and attention to renal-recovery trajectory, not the choice of modality alone, are likely to matter most for how patients

experience their recovery [26].

6. References

1. Hoste EAJ, Bagshaw SM, Bellomo R, et al. Epidemiology of acute kidney injury in critically ill patients: the multinational AKI-EPI study. *Intensive Care Med.* 2015;41(8):1411-1423.
2. Susantitaphong P, Cruz DN, Cerda J, et al. World incidence of AKI: a meta-analysis. *Clin J Am Soc Nephrol.* 2013;8(9):1482-1493.
3. Cerda J, Lameire N, Eggers P, et al. Epidemiology of acute kidney injury. *Clin J Am Soc Nephrol.* 2008;3(3):881-886.
4. Chertow GM, Burdick E, Honour M, Bonventre JV, Bates DW. Acute kidney injury, mortality, length of stay, and costs in hospitalized patients. *J Am Soc Nephrol.* 2005;16(11):3365-3370.
5. Phu NH, Hien TT, Mai NTH, et al. Hemofiltration and peritoneal dialysis in infection-associated acute renal failure in Vietnam. *N Engl J Med.* 2002;347(12):895-902.
6. Chitalia VC, Almeida AF, Rai H, et al. Is peritoneal dialysis adequate for hypercatabolic acute renal failure in developing countries? *Kidney Int.* 2002;61(2):747-757.
7. Gabriel DP, Caramori JT, Martin LC, Barretti P, Balbi AL. High volume peritoneal dialysis vs daily hemodialysis: a randomized, controlled trial in patients with acute kidney injury. *Kidney Int Suppl.* 2008;(108):S87-S93.
8. Chionh CY, Soni SS, Finkelstein FO, Ronco C, Cruz DN. Use of peritoneal dialysis in AKI: a systematic review. *Clin J Am Soc Nephrol.* 2013;8(10):1649-1660.
9. Cullis B, Al-Hwiesh A, Kilonzo K, et al. ISPD guidelines for peritoneal dialysis in acute kidney injury: 2020 update. *Perit Dial Int.* 2021;41(1):15-31.
10. Hays RD, Kallich JD, Mapes DL, Coons SJ, Carter WB. Development of the kidney disease quality of life (KDQOL) instrument. *Qual Life Res.* 1994;3(5):329-338.
11. Ware JE, Sherbourne CD. The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. *Med Care.* 1992;30(6):473-483.
12. Mapes DL, Lopes AA, Satayathum S, et al. Health-related quality of life as a predictor of mortality and hospitalization: the Dialysis Outcomes and Practice Patterns Study (DOPPS). *Kidney Int.* 2003;64(1):339-349.
13. Cameron JJ, Whiteside C, Katz J, Devins GM. Differences in quality of life across renal replacement therapies: a meta-analytic comparison. *Am J Kidney Dis.* 2000;35(4):629-637.
14. Kidney Disease: Improving Global Outcomes (KDIGO) Acute Kidney Injury Work Group. KDIGO Clinical Practice Guideline for Acute Kidney Injury. *Kidney Int Suppl.* 2012;2(1):1-138.
15. Mehta RL, Kellum JA, Shah SV, et al. Acute Kidney Injury Network: report of an initiative to improve outcomes in acute kidney injury. *Crit Care.* 2007;11(2):R31.
16. Bellomo R, Ronco C, Kellum JA, Mehta RL, Palevsky P; ADQI Workgroup. Acute renal failure - definition, outcome measures, animal models, fluid therapy and information technology needs: the Second International Consensus Conference of the Acute Dialysis Quality Initiative (ADQI) Group. *Crit Care.* 2004;8(4):R204-212.
17. Ponce D, Buffarah MB, Goes CR, Balbi AL. Peritoneal dialysis in acute kidney injury: Brazilian experience. *Perit Dial Int.* 2012;32(3):242-246.
18. Ponce D, Berbel MN, de Goes CR, Balbi AL. Peritoneal dialysis in acute kidney injury: trends in the outcome across time periods. *PLoS One.* 2015;10(5):e0126436.
19. Chionh CY, Ronco C. Acute peritoneal dialysis: what is the "adequate" dose for acute kidney injury? *Nephrol Dial Transplant.* 2010;25(10):3155-3160.
20. George J, Varma S, Kumar S, Thomas J, Gopi S, Pisharody R. Comparing continuous venovenous hemodiafiltration and

- peritoneal dialysis in critically ill patients with acute kidney injury. *Perit Dial Int.* 2011;31(4):422-429.
21. Al-Hwiesh A, Abdul-Rahman I, Finkelstein F, et al. Acute kidney injury in critically ill patients: a prospective randomized study of tidal peritoneal dialysis versus continuous renal replacement therapy. *Ther Apher Dial.* 2018;22(4):371-379.
 22. Hays RD, Kallich JD, Mapes DL, et al. Kidney Disease Quality of Life Short Form (KDQOL-SF), Version 1.3: A Manual for Use and Scoring. RAND Corporation; 1997.
 23. Palevsky PM, Liu KD, Brophy PD, et al. KDOQI US commentary on the 2012 KDIGO clinical practice guideline for acute kidney injury. *Am J Kidney Dis.* 2013;61(5):649-672.
 24. Wald R, Quinn RR, Luo J, et al. Chronic dialysis and death among survivors of acute kidney injury requiring dialysis. *JAMA.* 2009;302(11):1179-1185.
 25. Juergensen E, Wuerth D, Finkelstein SH, Juergensen PH, Bekui A, Finkelstein FO. Hemodialysis and peritoneal dialysis: patients' assessment of their satisfaction with therapy and the impact of the therapy on their lives. *Clin J Am Soc Nephrol.* 2006;1(6):1191-1196.
 26. Kalantar-Zadeh K, Kopple JD, Block G, Humphreys MH. Association among SF36 quality of life measures and nutrition, hospitalization, and mortality in hemodialysis. *J Am Soc Nephrol.* 2001;12(12):2797-2806.
 27. Rocco MV, Gassman JJ, Wang SR, Kaplan RM. Cross-sectional study of quality of life and symptoms in chronic renal disease patients: the Modification of Diet in Renal Disease Study. *Am J Kidney Dis.* 1997;29(6):888-896.
 28. Merkus MP, Jager KJ, Dekker FW, Boeschoten EW, Stevens P, Krediet RT. Quality of life in patients on chronic dialysis: self assessment 3 months after the start of treatment. The Necosad Study Group. *Am J Kidney Dis.* 1997;29(4):584-592.
 29. Piraino B, Bernardini J, Sorkin M. Catheter infections as a factor in the transfer of continuous ambulatory peritoneal dialysis patients to hemodialysis. *Am J Kidney Dis.* 1989;13(5):365-369.
 30. Gokal R, Mallick NP. Peritoneal dialysis. *Lancet.* 1999;353(9155):823-828.
 31. Coca SG, Singanamala S, Parikh CR. Chronic kidney disease after acute kidney injury: a systematic review and meta-analysis. *Kidney Int.* 2012;81(5):442-448.
 32. Gammelager H, Christiansen CF, Johansen MB, Tonnesen E, Jespersen B, Sorensen HT. Five-year risk of end-stage renal disease among intensive care patients surviving dialysis-requiring acute kidney injury: a cohort study. *Crit Care.* 2013;17(4):R145.
 33. Finkelstein FO, Wuerth D, Finkelstein SH. Health related quality of life and the CKD patient: challenges for the nephrology community. *Kidney Int.* 2009;76(9):946-952.
 34. Ronco C, Bellomo R, Homel P, et al. Effects of different doses in continuous veno-venous haemofiltration on outcomes of acute renal failure: a prospective randomised trial. *Lancet.* 2000;356(9223):26-30.
 35. Bagshaw SM, Berthiaume LR, Delaney A, Bellomo R. Continuous versus intermittent renal replacement therapy for critically ill patients with acute kidney injury: a meta-analysis. *Crit Care Med.* 2008;36(2):610-617.