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Utilization of Peritoneal Dialysis among End-Stage Renal Disease Patients in Greater Gaborone, Botswana

Bonny Ratang Lekolori[1*], Grace Guthemo[2], Sarah Bett[2]
[1]BCur Nursing, University of Port Elizabeth, South Africa
[2]Department of Medical-Surgical Nursing & Pre-Clinical Services, School of Health Sciences, Kenyatta University, Nairobi, Kenya
*Corresponding Author Email: bonnylekolori@gmail.com

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Abstract

Peritoneal dialysis offers better health outcomes and improved quality of life compared to hemodialysis, yet it remains underutilized globally, especially in Asia and Africa, including Botswana. This study identified factors associated with utilization of PD among End-Stage Renal Disease patients, and explored experiences of those who transitioned from PD to HD as well as those who never utilized PD in greater Gaborone, Botswana. A convergent mixed methods design was used. Quantitative strand utilized a cross-sectional analytical approach with semi-structured questionnaires (N=170), while the qualitative strand used a descriptive phenomenological approach with semi-structured embedded open-ended survey questions (n=108) and interviews (n=16). Quantitative data were analyzed using SPSS V26, while qualitative data were analyzed thematically using NVivo. Findings were integrated for deeper insight. Prevalence of PD was 36(22.5%) compared to 124(77.5%) HD. Majority of participants were male 100(63%), aged >35years 144(90%) and had not married 99(61.9%). More than half of the participants had completed secondary school or higher, 112 (70%). The most prevalent comorbidity was hypertension, 135(84.1%). Logistic regression: negative association of hypertension and PD utilization (OR 0.36[(95% CI 0.15, 091), p=0.026]), while awareness strongly predicted PD utilization (aOR 82.1 [(95% CI 20.6, 584.7), p <0.001]). Integrated findings highlighted misconceptions, mistrust, and mixed effects of higher education on PD uptake. Barriers to PD utilization in Botswana include patients' concerns about PD side effects, complications, and comorbidities, as well as missed PD opportunities due to late presentation to facilities. Addressing these in Botswana requires targeted patient education alongside system-level support.

Keywords: *Peritoneal dialysis, End-Stage Renal Disease, Adult, Patients, Utilization*

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1. Introduction

End-stage renal disease (ESRD) poses as a major healthcare system burden with 4.59 million patients requiring renal replacement therapy (RRT) in 2023 globally [1]. Peritoneal dialysis (PD) remains the mainstay of RRT, with global dominance of haemodialysis (HD). However, PD offers advantages, including better preservation of residual renal function [2], improved

cognition, a greater likelihood of retaining employment [3], and improved health-related quality of life [4]. Despite these benefits, PD remains underutilized globally, accounting for about 11% of dialysis therapy [3], with 93% being used in high-income countries such as China, the Netherlands, Canada, and the US [5,6]. At the same time, lower utilization is noted in lower-middle-income countries (LMICs) across Asia and Africa, with nearly one-fifth of African countries not utilizing PD at all [2].

Botswana adopted the PD First policy to expand access to RRT following successful programs in Hong Kong and Thailand [7]. PD services are primarily offered in three government referral hospitals across the county, while nine private institutions offer HD. These services, including supplies, are fully government-funded, along with logistical support such as transportation, finances, and food hampers, to ensure equitable access, particularly for patients in rural areas who face long-distance travel challenges [8,9]. Despite these supportive measures, PD remains underutilized. Local literature revealed that one-third of patients initiated on PD nearly half of them switched to HD, which is centralized in urban areas and has become the dominant modality [10]. This raises questions about patient, healthcare provider, and health system-level barriers to sustained PD use.

Several non-clinical factors identified in the existing literature were male gender, unemployment, and residence in rural areas, which have been linked to low PD utilization in LMICs [2]. Higher level of education is often associated with PD use [5.12]. However, other studies suggest that patients with higher levels of education are at higher risk of transitioning to HD, highlighting the complex role education plays. Comorbidities like hypertension and diabetes also complicate modality choice with conflicting evidence on PD suitability for multiple conditions [13].

Awareness and structured education influence the selection and utilization of modalities. Up to 40-60% of patients enrolled in structured dialysis educational programs choose PD, with improved outcomes [14]. Conversely, poor home circumstances, lack of family support, or late referral to a nephrologist often lead to initiation of HD [15, 16].

Patients' experiences also shape PD utilization. Among PD users, depression, social isolation, financial stress, and caregiver burden are common [13, 1]. At the same time, experiences of abdominal pains, heaviness or bloating, muscle cramps, purities, and sleep disturbances may contribute to the transition to HD [18, 19]. Poor home circumstances, such as a lack of space for PD fluids and overcrowding, also affect PD sustainability [2]. Patients who never utilized PD are reluctant to choose it due to limited awareness and vicarious fear of complications [20]. However, other studies reported different effects, whereby witnessing successful PD users motivated patients and increased their willingness to adopt it [19]. This contrasting literature highlights the need to explore ESRD patients' lived experiences alongside quantitative trends.

Existing studies on PD utilization in Botswana are limited, and the global literature focuses on clinical and biomedical indicators rather than non-clinical factors. Also, a few studies employed mixed-methods design to capture both quantitative and qualitative trends [11,2]. Addressing this gap is important to understand why PD remains underutilized despite its advantages and supportive measures.

The aim of this study was therefore to explore the reasons for PD underutilization in the greater Gaborone region in Botswana and to explore the lived experiences of patients who never utilized PD and those who transitioned from PD to HD, using a mixed-methods design.

2. Methodology

2.1 Study design

This study employed a convergent mixed-methods design that combined quantitative and qualitative approaches. Data from both strands were collected concurrently, analyzed separately, and integrated through methodological triangulation as shown in Figure 1. This process enhanced complementarity by using qualitative insights to explain or expand quantitative patterns and convergence, which aligned findings across both strands. Integration strengthened internal validity by reducing bias and external validity by capturing diverse perspectives, including patients who had never used PD, which could have been difficult to obtain with either approach used alone [21,22,23]. In contrast to the limited use of mixed methods design in health-related research in Sub-Saharan Africa, most studies relied on cross-sectional descriptive retrospective cohorts [10,3] while this study used a cross-sectional analytic design to assess factors associated with PD underutilization, complemented by a descriptive phenomenology study design to explore the lived experiences of patients who transitioned from PD to HD.

2.2 Study Population

This study included ESRD patients aged 18 years and above, who were actively receiving dialysis (PD and HD). This diverse population was selected to capture varied experiences of HD patients who never utilized PD, those who transitioned from PD to HD, and those currently utilizing PD. Those who have a functional kidney graft and those who are mentally and physically unfit to participate were excluded from the study. This diversity strengthened triangulation by ensuring that quantitative and qualitative data reflected different patient trajectories. Quantitatively, stratified proportionate sampling was applied across the three study sites in greater Gaborone to ensure adequate representation of the patient population at each site, followed by convenient sampling of participants readily available during data collection. Qualitatively, purposive sampling was used to select 16 participants who had transitioned from PD and 108 who had never used PD but responded to the embedded open-ended survey questions. Participants were required to have at least 3 months of modality experience to ensure they meaningfully reflect on their experiences gained during the initial modality and during the transition [24]. This sampling structure also supported methodological triangulation. Recruitment occurred during dialysis sessions, with interviews conducted either immediately or later, according to participants' preference.

2.3 Data collection and instruments

Data collection spanned 8 weeks to ensure sufficient time for recruitment and methodological rigor [25]. Tools were in both English and Setswana. The interview was mainly in Setswana. Both quantitative and qualitative phases were conducted independently by the researcher to maintain consistency and confidentiality. Face-to-face questionnaires were administered before, during, or after dialysis sessions to accommodate varying literacy levels and reduce non-response. Those unable to comprehend questionnaires and write were assisted accordingly to ensure accurate completion. The survey captured patients' factors and psychosocial factors,

including awareness and social support. Concurrent with the survey, embedded open-ended responses from patients who never utilized PD were extracted for thematic analysis. In addition, interviews were conducted with patients who transitioned from PD to HD, lasting between 30 and 45 minutes, and were audio-taped with participant consent. Flexibility was maintained to allow probing and follow-up questions, ensuring rich data beyond what could not be captured quantitatively [26]. The study adhered to the consolidated criteria for reporting qualitative research (COREQ) guidelines [27].

2.4 Data analysis

Descriptive and inferential statistics were conducted using SPSS version 26. Chi-square, Fisher's exact, and binary logistic regression tests were applied where necessary, with statistical significance set at $p < 0.05$ (95% confidence level). Results were presented in tables, charts, and figures. NVivo software was used for coding and thematic analysis. Coding was guided by themes-psychological, social, and physical experiences for those who transitioned from PD, and missed opportunities for those who never utilized PD. Subthemes emerged inductively, and themes were informed by study objectives and relevant literature, offering deeper insights into patient perspectives. Findings were presented in illustrative quotes and narratives and later integrated with quantitative results.

3. Results

3.1 Patients' Characteristics

Of 170 sample, 160(94%) participants responded, 36(22.5%) were receiving PD while 124(77.5%) were receiving HD. The majority, 100 (63%), were male; 144 (90%) were aged> 35 years; 35 (21.9%) had not married for 35 years; and 99 (61.9%) had not married. More than half of the participants had completed secondary school or higher, 112 (70%). The most prevalent comorbidity was hypertension 135(84.1%). (Table 1).

Table 1: Sample Characteristics

Independent Variables	**Responses**	**Dependent Variable Utilization of Peritoneal Dialysis**		
Patient Characteristics		**Yes (n =36)**	**No (n=124)**	**Total f/% (N=160)**
Age	<35 years	3	13	16 (10%)
	>35years	33	111	144(90%)
Age (Mean, SD)	53.2(13.7) Years			
Gender	Female	16	44	60(37.5%)
	Male	20	80	100(62.5%)
Marital Status	Married	13	48	61(38.1%)
	Not married	23	76	99(61.9%)
Level of Education	Primary and below	6	42	48(30%)
	Secondary and above	30	82	112(70%)
Comorbidities				

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Hypertension	Yes	26	109	135(84.4%)
	No	10	15	25(15.6%)
Diabetes Mellitus	Yes	6	22	28(17.5%)
	No	30	102	132(82.5%
Psycho-social support				
awareness				
Good (≥60%)		34	24	58(36.2)
Poor (<60%)		2	100	102(63.8%)
Social support				
Good (≥60%)		25	85	110(68.8%)
Poor (<60%)		11	39	50(31.3%)

Note. The table includes patients' characteristics and psychosocial factors

3.2 Prevalence of PD Utilization in Greater Gaborone

Of the 160 respondents, 124(77.5%) were on HD while 36(22.5%) were on PD.

Awareness of Peritoneal Dialysis

A 7-point Likert scale was used to assess knowledge of PD and its benefits. Although awareness was limited, close to half, 79 (49%), reported the key benefit of 'home dialysis', while one-third, 51 (32%), reported not knowing the benefits of PD, and 12 (8%) perceived PD as having no benefits.

When participants were asked whether they could recommend PD, 33 (27%) reported a lack of knowledge/confidence, while 20 (16%) cited complications and safety concerns, such as infections and poor toxin clearance. 21% raised issues of lifestyle burden, such as hygiene demands and physical impact, while 8% mentioned access challenges, like distance from the hospital. Notably, some PD users also reported they would not recommend PD, suggesting gaps in understanding and concerns about its safety. Overall, PD awareness was poor, with 64% of participants demonstrating limited knowledge and understanding, compared with only 36% with good PD awareness (Figure 2).

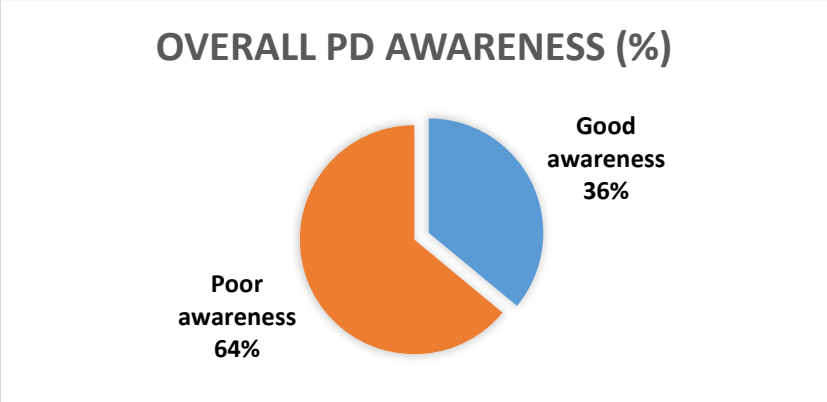

Figure 2: Overall Awareness of PD among Patients with ESRD

Social Support

Participants' perceptions were generally positive, with the highest proportions of responses ranging from 41.3% to 47.5%, indicating strong spouse/intimate support compared to low

levels of friends' support. Overall, social support was good, with 68% participants experiencing strong support compared to only 32% who expressed poor social support (Figure 3).

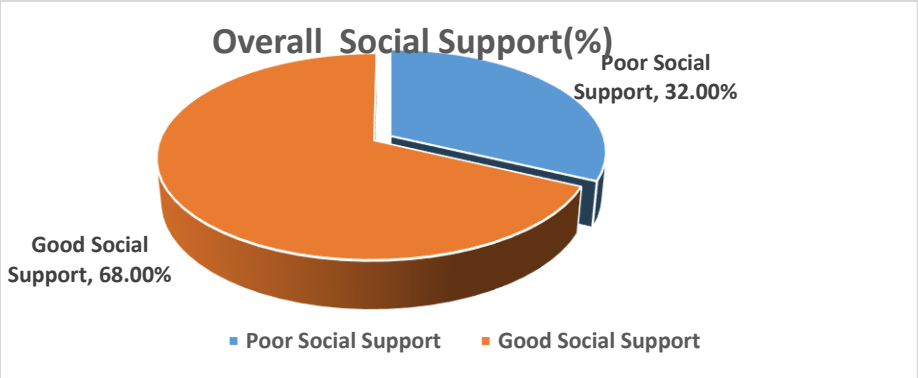

Figure 3: Overall Score for Social Support (%)

3.3 Multivariate Binary Logistic Regression Analysis

Two variables revealed statistically significant associations; one under patients' characteristics (hypertension) and one under psychosocial factors (awareness). Patients with hypertension were revealed to be 78% less likely to utilize PD compared to those without hypertension, aOR= 0.22, 95% CI [0.04, 0.88], *p*=.044. Regarding awareness, those with good awareness scores were over 82 times more likely to use PD than those with poor awareness (aOR = 82.1, 95% CI [20.6, 584.7], p < .001), as shown in Table 2.

Table 2: Multivariate Models for Association between Predictor Variables and PD Utilization

Factors	Utilization of peritoneal dialysis			
	Yes = 36	No = 124	Adjusted OR	P-value
Hypertension				
Yes	26	109	0.22 (0.04, 0.88)	**0.044***
No	10	15	***Reference***	
Awareness				
Good (≥60%)	34	24	82.1 (20.6, 584.7)	**<0.001***
Poor (<60%)	2	100	***Reference***	

Note. Confidence level (* *p*<0.05)

3.4 Qualitative Analysis

Participants' lived experiences were explored in two subgroups: those who had never used PD (n=108) via embedded open-ended survey questions, and those who transitioned from PD to HD (n=16) via audio-recorded interviews. For survey responses, only those that met the inclusion criteria of relevance and clarity were analyzed. Thematic data saturation was reached with the 9th respondent and the 7th interview, providing sufficient depth and meaning to support the phenomenological aims and align with study objectives and the Health Belief Model.

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Interview participants were mostly male, aged 36-85 years, had attained secondary school or higher education, and were married, with most having retired due to health conditions. Nearly all were hypertensive, and most had remained on PD for one to four years before transitioning to HD.

To explore experiences of participants who had never utilized PD, three main open-ended embedded survey questions: Reasons for not choosing PD, perceived PD benefits, and reasons for recommending or not recommending PD. These responses complemented the already presented quantitative results.

Data analysis revealed three major themes describing the experiences of patients who transitioned from PD to HD: psychological, social, and physical. An additional theme that captured 'missed opportunity' emerged for those who never utilized PD. Each theme comprised interrelated subthemes illustrated with verbatim quotations to highlight participants' voices (Table 3).

Table 3: Themes and Subthemes of Lived Experiences of ESRD Patients Who Transitioned from PD to HD & those who never Utilized PD in Greater Gaborone, Botswana

Themes	Subthemes	Illustrative quotes
1.Psychological experiences	1. Lack of sleep	"*I struggled to sleep because of the catheter tube—it was uncomfortable]*" (P03, 54 years male). *"...fluid, it just stayed in the belly and I will not sleep"* (P05, 48 years female).
	2. Cognitive distortion	*"They told my wife that if the drained fluid looked cloudy,... we saw cloudy fluid... but I insisted it was because I drank milk ..."* (P03). *"... A relative passed away while using PD"* (P16, 51years female).
2.Social experiences	1. Family support	*"... when you have a family meeting, then you will be forced to leave for dialysis session and be back..." [P06, F/55].*
	2. Support from healthcare providers	*" ... The doctors delayed to attend to me and they ended up using the machine...".[P07]* *".... the nurses were especially helpful anytime we needed them they are there" [P01, M 55]*
3.Physical experiences	1. Complications of peritoneal dialysis	*"Honestly, PD comes with complications...I even became very dark-skinned—you see what I mean?"(P 04).* "*PD disfigures. Most patients using PD are dark skinned"* (P11, 57 years male)
	2. Complexity of peritoneal dialysis	*"... I don't mind using the machine...it removes all the waste—PD didn't do that cleansing well...you cannot see how much water you removed. HD feels more thorough...I eat better now." (P02)* *"You cannot tell how much salts and water were drained"* (P13, 62 years female) *"PD has no benefits, only difficult procedures"* (P14, 50 years male)
*Missed Opportunity	1. Presentation in critical state 2. Limited PD awareness prior dialysis initiation	*"I was very sick, admitted in ICU"* (Intensive Care Unit) (P10, 60 years female) *"I cannot remember the benefits of PD"* (P12, 40 years male) *"I am not knowledgeable about PD"* (P11, 57 years male)

Note. * = Distinct emergent theme for participants who never utilized PD

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3.5 Integrated Findings

Table 4 presents the integrated findings guided by a convergent mixed methods design and framed within the Health Belief Model (HBM)

Table 4: Joint Display of Quantitative Results, Qualitative Findings and the Integrated Interpretation of Mixed-Methods Approach.

Overarching objectives	Quantitative results	Qualitative findings	Meta-inferences & interpretation
PD prevalence	PD prevalence rate, 22.5%; lagging behind HD	Patients who transitioned described complications; *"PD comes with complications… I even became very dark-skinned" (P04)* While those who never utilized PD described a missed PD opportunity: *"I was very sick, admitted in ICU "* (P10)	Misconceptions about side effects & systemic gaps increase perceived barriers to PD use, leading to low prevalence.
Participants characteristics	Patients with hypertension are 78% less likely to utilize PD than those without it, aOR 0.22,95% CI [0.04, 0.88], *p*=0.044	Patients perceived PD as less effective for fluid removal. *"When HD drains the fluid in the body, it removes all the waste—PD didn't do that cleansing well…" (P02)* *"You cannot tell how much salts & water were drained"(P12)*	Both strands concern PD as less effective and risky compared to HD, which increases perceived barriers & perceived severity to its use, therefore reinforcing its low utilization.
	Level of education has a borderline association with secondary level and higher, ,X^2 =(1, N =160)=, 3.156, *p*=0.076)	Patients with higher education level reported missed opportunities & no PD benefits	Although higher education may increase knowledge and expectations, it cannot alone influence PD utilization. Personal and health system factors may increase barriers and reduce self-efficacy.
Psycho-social factors	Awareness**:** Patients with good awareness are 82 times more likely to utilize PD than those with poor awareness, aOR 82.1, 95% CI [20.6, 584.7], *p* <0.001	Patients who transitioned from PD described confusion; *"They told my wife that if the drained fluid looked cloudy,, … we saw cloudy fluid… but I insisted it was because I drank milk ..".* (P03) While those who never utilized PD described misinformation and PD as burdensome; *"PD has no benefits, only difficult procedures"* (P14) *" I am not knowledgeable about PD"* (P11)	Awareness strongly influence PD utilization by activating cues to action and self-efficacy in shaping modality choice and utilization. Misinformation and misinterpretation highlights confidence and health-seeking behavior gaps.

Note. P = Participant, ICU= Intensive Care Unit, Display adapted from [30]

4. Discussion

This study investigated the utilization of PD among ESRD patients with the aim of understanding the reasons /barriers to its underutilization despite numerous advantages. PD utilization remains low, with some personal and health system barriers shaping its patterns in greater Gaborone, Botswana, aligning with global findings [13]. Despite its cost-effectiveness, preservation of renal function and overall improvement in quality of life, it remains underutilized.

It focused on the prevalence of PD utilization, patients' characteristics, and perceived patients' psychosocial influences on PD utilization. Factors that showed a statistical association included hypertension and awareness of PD, which were complemented by qualitative data. In contrast, those who did not reach statistical association were also complemented qualitatively.

4.1 Prevalence of Peritoneal Dialysis utilization in Greater Gaborone

The point prevalence of PD utilization among ESRD adults in Greater Gaborone was 22.5%, higher than the global rate of 11% reported by [2]. The observed PD prevalence in this study may be elevated due to the inclusion of the sole PD center among the three sampled sites, highlighting a contextual limitation. Despite this, PD remains underutilized at the facility level, indicating that hemodialysis continues to dominate renal replacement therapy in the region.

4.2 Misconception and Missed PD Opportunity as Perceived Barriers to PD use

Qualitative findings in this study revealed that misconceptions about PD side effects, such as skin discoloration, contributed to low PD use, consistent with [31]'s cross-sectional study that evaluated cutaneous abnormalities among 150 CKD patients in Bangladesh. However, a recent European study emphasizes systemic barriers, such as inequities in PD access, physician bias, and organizational culture, rather than misconceptions [32]. Similarly, a Canadian retrospective study by [33] identified 320/1845 (17.3%) "Missed opportunity cases," with the majority attributable to PD contraindications. In this study, missed opportunities were associated with late presentations in critical condition, making it impossible for patients to choose their dialysis modality themselves. Comparable findings in Kenya have been reported, whereby lack of awareness and limited counseling from healthcare providers accounted for missed opportunities as major barriers [11].

These contradictions highlight the contextual nature of the barriers. In high-resource countries like Europe, PD contraindications and systemic inequities dominate, while in limited-resource settings like Botswana and Kenya, awareness and counseling gaps remain central. Importantly, Botswana provides universally free dialysis care, including medication, transport, and nutritional support, yet misconceptions and missed opportunities persist. This suggests that educational and counseling gaps can undermine PD utilization, even in an equitable-access setting.

4.3 Patients' Characteristics and Their Association with PD Utilization

Comorbidities-Perceived PD Risk and Perceived Severity on Fluid Overload Management

This study revealed that hypertension had a statistically significant and inverse association with PD utilization, with hypertensive patients being 78% less likely to use PD than those without it. This was also accounted for qualitatively, with perceptions that PD was less effective than HD in managing fluid overload. These findings are consistent with recent literature that

hypertensive patients on PD are at high risk of fluid retention as they often present with volume overload, while in contrast, HD allows for more aggressive fluid removal and closer cardiovascular monitoring [20, 34]. Cardiovascular risks may also prompt patients and physicians to favor HD [13]. This study also highlights that, in a low-resource country like Botswana, limited patient monitoring and counseling may exacerbate cardiovascular risks, especially because, according to [35], PD patients have no strict diet restrictions. These findings underscore the need to strengthen patient education, especially for hypertensive patients, to clarify the risks and benefits of maintaining daily ultrafiltration, dietary guidance, and symptom monitoring, thereby enhancing patient confidence.

Level of Education-Higher Education, a Perceived Barrier and Self-Efficacy Challenges towards PD Support

A borderline association with secondary level of education was revealed in this study, and this was further explored qualitatively: educated patients had a stronger understanding of PD benefits and risks, but also expressed dissatisfaction with PD complications and unmet expectations, whereas those with lower education levels had limited exposure to PD information. These findings suggest that higher education may increase scrutiny of the quality of PD services without necessarily sustaining its use. Recent studies confirm that education can facilitate PD utilization, especially in high-resource settings [36], but in low-resource settings, it may increase perceived barriers and decrease self-efficacy [31, 37, 38]. These findings highlight the contextual nature of education, whereby it may empower patients in high-resource settings but lead to disengagement when expectations are not met, especially in low-resource settings. However, further research using context-specific data is needed to explore this divergence, which may help support and reassure patients and strengthen their confidence in PD [39].

4.4 Patients' Psycho-Social Factors and Their Association with PD Utilization

Awareness: Misperceptions hinder Appropriate PD Actions, Self-Efficacy and PD Maintenance

While social support had no statistical association, awareness was a powerful predictor of PD utilization, with participants with good awareness being substantially 80 times more likely to utilize PD than those with poor awareness, after adjustment. This exceptionally strong association highlights the critical role of knowledge and understanding in shaping dialysis modality selection. Similar findings were reported by [17], who revealed odds ratios exceeding 10 following structured education interventions. Also, [40] revealed that well-informed patients, especially through structured education like pre-dialysis counseling, and experience from others, were more likely to use PD.

Surprisingly, in this study, qualitative findings revealed that, despite prior education about PD, some patients held persistent misperceptions about it. For example, some participants demonstrated a misunderstanding of PD complications by confusing typical peritonitis signs, "cloudy PD fluid," with the effects of milk consumption. This misunderstanding highlights the health literacy gap between education and comprehension, consistent with [41], and suggests that superficial awareness may limit cues to action and self-efficacy towards PD, thereby delaying reporting and timely management, contributing to technique failure and unplanned transition to hemodialysis. Although Botswana advocates for equal access to information

regarding kidney replacement therapy, some participants reported that the information provided to them was insufficient to support informed modality choice, which suggested that awareness was unevenly distributed and even among PD users, and understanding was superficial. With the expansion of hemodialysis centers in Botswana, patients perceive HD as a better modality than PD, thereby defaulting to it despite prior modality counseling. These study findings imply that awareness must be defined not by exposure alone, but by depth of understanding and interpretive accuracy. Structured, context-specific education that bridges health literacy gaps is vital for strengthening self-efficacy, reducing misconceptions, and sustaining PD utilization.

Implications of the Study Findings

The implications for practice and health system interventions from this study are to improve PD utilization in Botswana. At the practice level, there is a need for structured patient education to address misconceptions, strengthen PD awareness, and increase self-efficacy in PD use. Secondly, for patients with comorbidities like hypertension, tailored counseling is critical to clarify risks, benefits, and daily management strategies like dietary guidance, ultrafiltration, and symptom monitoring. Lastly, psychological and physical burdens reported, such as fear of complications, PD complexity, and emotional strain, highlight the continuous need for psychosocial support at the primary centers where CKD is mostly diagnosed and monitored for progression to ESRD; the same support is also needed even in home-based settings.

At the health system level, interventions should focus on decentralizing nephrology services to reduce late presentations and referrals, and on strengthening pre-dialysis counseling programs, including routine psychosocial support. Together, these can reduce perceived barriers, empower patients, and promote sustainability, especially in resource-limited settings.

Strengths and Limitations of the Study Findings

The convergent mixed methods design enabled strong triangulation and deep insight by integrating quantitative associations with qualitative lived experiences. Triangulation and theoretical framing with HBM ensured that divergent findings were explored rather than ignored, yielding a more meaningful understanding. Conversely, the study faced several challenges; firstly, data collection was restricted to three dialysis facilities in Gaborone due to delayed institutional approvals, limiting generalizability. Secondly, reliance on self-reported data leads to recall bias, particularly among patients who transitioned to dialysis modalities. Lastly, there were integration challenges, especially in reconciling divergent findings across quantitative and qualitative strands, although triangulation helped mitigate this. Importantly, this study does not endorse any modality over the other. Instead, it emphasizes the importance of individualized patient care consistent with the Peritoneal Dialysis International guidelines [42].

5. Conclusion

This study concludes that peritoneal dialysis remains underutilized in Gaborone despite universal, equitable access to RRT. Misconceptions about PD, missed opportunities, and health system gaps shape patients' perceptions and limit PD use. Hypertension reinforces concerns about fluid management. Higher education appeared to amplify dissatisfaction in resource-limited settings rather than to facilitate PD. Awareness of PD emerged as a powerful predictor

of PD utilization, although persistent misperceptions highlight the need to bridge the gap between information delivery and understanding.

By employing a convergent mixed-methods design that integrated cross-sectional analytical data with phenomenological insights, this study contributes a novel methodological approach and population mix- incorporating both HD patients (who never used PD and those who were initiated on PD then transitioned to HD) and PD patients who were initiated on PD and remained on it, together with a few who transitioned from HD to PD). This strategy, rarely used in Sub-Saharan nephrology studies, provided comprehensive insights into PD utilization. While previous study in Kenya by [43] have explored barriers to PD utilization, they used the same mixed-methods; descriptive-cross-sectional analytical, however, their qualitative component was specific to only patients who transitioned from PD to HD, this study therefore added extra layers by providing context-specific insights into modality choice/selection, modality transition from PD to HD, never transitioned modality and never utilized PD modality and perceived barriers to PD use relevant for low-resource settings where PD could offer cost-effective and home-based alternatives to HD. Comparative studies across other sub-Saharan countries could be done to validate and extend these findings.

6. Recommendations

6.1 Recommendations from the study

1. Integrated strategies between healthcare providers and hospital administrators to strengthen patients' education in order to address misconceptions and perceived risks of PD, especially for hypertensive patients
2. Healthcare providers should enhance awareness and confidence in order to strengthen *Cues to action* and *Self-Efficacy*. Interventions should focus on improving patient understanding of PD processes and empowering them to make informed decisions.

6.2 Recommendations for further study

1. Future researchers may employ a larger sample to close other gaps this study failed to close
2. Include healthcare providers as part of the study population
3. Examine health system factors at the institutional and policy levels for barriers that impact PD availability at a larger scale.

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