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Understanding Barriers to Continuous Ambulatory Peritoneal Dialysis: A Qualitative Study from Health Professionals' Perspectives

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ABSTRACT

The declining number of end-stage renal disease (ESRD) patients who opt for Continuous Ambulatory Peritoneal Dialysis (CAPD) as a renal replacement therapy is influenced by several factors, including high infection rates, limited patient and family knowledge, and restricted access to CAPD services. However, research exploring the perspectives of healthcare professionals, such as dialysis nurses and nephrologists, on this phenomenon remains limited. This study aimed to explore the perspectives of dialysis nurses and nephrologists regarding barriers to CAPD utilization. A qualitative descriptive design was employed, using semi-structured interviews with 12 participants, including 10 dialysis nurses and 2 nephrologists at a tertiary hospital in West Sumatra, Indonesia. Data were analyzed using Colaizzi's seven-step method. Five major themes emerged: (1) Weak coordination, unsupportive policies, and limited expertise; (2) Infection risk as the primary challenge in CAPD; (3) Ineffective patient and family education in CAPD care; (4) Psychological barriers to accepting CAPD therapy; and (5) Determinants of patient decision-making in choosing CAPD, and 15 Sub-themes. This study highlights the barriers that patients face when choosing CAPD as a renal replacement therapy. Unsupportive policies, increased infection risks, and inadequate educational systems were identified as key challenges that require urgent evaluation and improvement. Strengthening these aspects is crucial to ensure optimal care for patients who opt for CAPD.

Keyword: Indonesia, Nephrologist, Nurse Perspective, Peritoneal Dialysis, Qualitative Study

1. Introduction

Chronic Kidney Disease (CKD) is a rapidly increasing global health and healthcare burden. Although Indonesia had the lowest prevalence, with 117–540 per million population (pmp) according to worldwide statistics (Thurlow et al., 2021), the number of patients undergoing hemodialysis in Indonesia increased every year, reaching 132,142 patients in 2018, and the number continues to increase. West Sumatra is recorded as the fifth province with the most chronic kidney disease patients, with around 1,344 patients undergoing hemodialysis (Indonesian Renal Registry, 2018). Currently, three modalities of renal replacement therapy are available for patients with end-stage renal disease, namely hemodialysis (HD), peritoneal dialysis (PD), and kidney transplantation (Pernefri, 2013). Hemodialysis is the most widely used modality; however, its

availability remains limited, particularly in remote areas. Meanwhile, the limited number of kidney donors poses another challenge.

Peritoneal dialysis (PD) is a renal replacement therapy that infuses a sterile solution into the peritoneal cavity via a catheter, allowing the removal of water and solutes by utilizing the peritoneal membrane as an exchange surface (Tang & Lai, 2020). The utilization of PD can serve as a solution to improve the equity of kidney care services in Indonesia. Patients undergoing PD can perform dialysis independently without having to visit the hospital. Additionally, PD patients tend to have better preservation of residual kidney function and a higher quality of life compared to those undergoing hemodialysis (Bikbov et al., 2017). Previous studies have also demonstrated that the use of peritoneal dialysis (PD) is more cost-effective than hemodialysis (HD) (Wu et al., 2020).

The two types of peritoneal dialysis (PD) available are continuous ambulatory peritoneal dialysis (CAPD) and automated peritoneal dialysis; only CAPD is currently available in Indonesia. Since its introduction in 1985, the use of CAPD in Indonesia has not gained widespread popularity. Nearly all patients undergo hemodialysis (HD), while only about 2% utilize CAPD. Financial constraints, limited facilities capable of providing CAPD, and a shortage of healthcare professionals skilled in CAPD are among the key reasons why this modality has not developed optimally in Indonesia (Lydia, 2020). Clinicians play a pivotal role in promoting the use of CAPD and ensuring equitable access to kidney replacement therapy services in Indonesia. This situation presents a significant challenge to achieving equity in renal replacement therapy nationwide.

Current literature describing the need for kidney supportive care has primarily focused on data from patients undergoing hemodialysis (HD). However, there is a lack of specific guidance for patients receiving peritoneal dialysis (PD) (Lu & Chai, 2022). Although the use of peritoneal dialysis (PD) in Indonesia has been growing by about 20% annually, its overall prevalence remains very low at only 1–2%, far below the targeted 30% by 2019. Expanding the use of continuous ambulatory PD (CAPD), where no contraindications exist, could be a cost-effective strategy to address the financial burden of end-stage kidney disease (ESKD) treatment. However, several barriers hinder CAPD implementation, including high treatment costs, Indonesia's archipelagic geography, limited healthcare facilities and trained personnel in remote areas, inadequate reimbursement and incentive structures, frequent discontinuation of PD, and insufficient awareness among both the public and healthcare providers. To enhance the utilization of PD, reforms in reimbursement policies and the national health insurance system are necessary. In addition, nationwide initiatives focusing on CKD prevention, dialysis modality education, and the establishment of structured PD training programs for health professionals are essential (Jonny et al., 2022).

Previous studies have provided important insights into the experiences of nurses in teaching patients to perform CAPD. Shubayra (2015) highlighted several barriers, including language challenges, and emphasized the need for retraining and the establishment of a specialized team to conduct pre-assessments and home visits. Peritonitis remains the primary cause of treatment failure among patients with end-stage kidney disease (ESKD) undergoing CAPD (Lu & Chai, 2022; Yip, 2021). Patients on peritoneal dialysis (PD) often face high mortality rates, substantial symptom burdens, and reduced quality of life. Kidney supportive care offers a person-centered approach by integrating patients' goals, values, and preferences into treatment decisions at all stages of kidney disease. Tools such as *the My Kidney Care Roadmap facilitate shared decision-making between patients and clinicians, enabling discussions about prognosis, treatment options (including* dialysis, transplant, or conservative management), and evolving patient priorities (Lu & Chai, 2022).

Given the complex and context-specific nature of these experiences, a descriptive qualitative design was deemed appropriate for this study. This approach enables researchers to gain an in-depth understanding of participants' perceptions, attitudes, and experiences in their natural settings without imposing theoretical assumptions. The use of a descriptive qualitative design is particularly suitable for studies seeking to uncover participants' perspectives on complex or underexplored phenomena, as it emphasizes exploration rather than measurement (Bradshaw et al., 2017). This study enabled the capture of nuanced insights from dialysis nurses and nephrologists involved in CAPD care within the Indonesian context.

A review by Jonny et al. (2022) on the status of PD in Indonesia indicated that, despite its cost-effectiveness and suitability for patients in rural areas with limited resources, the utilization of CAPD remains very low. In this context, exploring healthcare professionals' perspectives on the barriers to CAPD adoption in Indonesia is essential. Therefore, this study aimed to explore the perspectives of dialysis nurses and nephrologists regarding barriers to CAPD utilization.

2. Methods

2.1 *Study Design*

This study employed a qualitative descriptive design, incorporating semi-structured interviews with 12 participants. The approach aims to explore individuals' experiences in their entirety, describe their structure, and uncover the central themes and meanings they attach to those experiences, thereby providing rich and comprehensive insights into the phenomenon (Creswell & Poth, 2016).

2.2 *Setting and Participants*

A total of 12 participants, including 10 dialysis nurses and 2 nephrologists from the hemodialysis unit of a tertiary government hospital in Indonesia, were recruited through purposive sampling. The sample size was determined based on the total number of available staff in the unit hemodialysis, which consisted of 18 dialysis nurses and 3 nephrologists. The participants were selected purposively to ensure representation from both professional groups that are directly involved in CAPD management. The inclusion criteria were: (1) dialysis nurses with a minimum of one year of work experience, (2) prior experience in caring for CAPD patients, and (3) willingness to participate in the study and share their experiences.

2.3 *Measurement and Data Collection*

The interviews focused on the central question: *"In your opinion, what barriers do patients who choose CAPD therapy face?"* To gain deeper insights, the interviewer followed up with probing prompts such as *"What do you mean?", "Could you clarify?",* and *"Can you be more specific?"*. All interviews were conducted by the first author (FM), a lecturer at the Faculty of Nursing, Universitas Andalas. Her research expertise lies in qualitative inquiry, with a particular focus on understanding the challenges faced by nurses in specialized clinical settings and in providing care for patients with chronic kidney disease. Having a background in nephrology nursing, she was familiar with the context of dialysis care, which facilitated rapport building with participants and enhanced the depth of data obtained. The interviews were conducted in accordance with ethical principles of personal protection, ensuring participants' privacy and comfort. With participants' consent, all sessions were audio-recorded. Each participant was interviewed once, with sessions lasting between 30 and 60 minutes. Data collection was continued until data saturation was achieved, which occurred after interviews with 10 dialysis nurses and 2 nephrologists. At this point, no new themes or insights emerged, and the information obtained became repetitive across participants. Therefore, the sample size was deemed adequate to capture a comprehensive understanding of the barriers and challenges in CAPD adoption from both nursing and medical perspectives.

2.4 *Data analysis*

Data were analyzed using Colaizzi's (1978) method, a rigorous and systematic approach that enhances the credibility and reliability of the findings. This method enables researchers to identify emerging themes, explore their interrelationships, and uncover the underlying structure of the experiences being studied. Following each interview, the first and second researchers (FM and EH) independently transcribed the audio recordings into text. The coding process was carried out manually, with the assistance of Microsoft Excel, which was used to systematically arrange excerpts, codes, and emerging themes. Although specialized qualitative data analysis software was available, manual coding allowed for closer engagement with the data. A color-coded system was applied to highlight key statements during the initial analysis. These statements were subsequently organized into meaningful units, clustered into sub-themes, and further developed into themes that provided an in-depth description of the phenomenon of challenges experienced. After extracting the themes, all research authors participated in a discussion to reach a consensus. Data analysis was conducted concurrently with data collection. To validate the findings, the themes were presented to five participants, who confirmed that the results accurately reflected their own experiences.

2.5 *Rigour and Trustworthiness*

Trustworthiness was established using the criteria of credibility, transferability (or fittingness), and dependability (Lincoln & Guba, 1985). To ensure the accuracy of the data collected, interview transcripts were emailed to participants for review. Member checking, considered the most important technique for establishing credibility, was conducted to allow participants to validate the findings and reflect on their experiences (Mays & Pope, 2020). Data triangulation was also employed by comparing perspectives from different professional groups, dialysis nurses and nephrologists, to enhance the depth and credibility of the findings. Dependability was supported by engaging a qualitative research expert to audit and evaluate the research process. Confirmability was achieved through debriefing sessions with the research team, ensuring that the analysis and theme development were unbiased, with all researchers reaching consensus on the findings. Finally, transferability was addressed by summarizing the results and presenting a detailed narrative of the interview findings, enabling readers to clearly understand and potentially apply the study's outcomes in other contexts.

2.6 *Ethical Considerations*

Prior to commencing the study, ethical approval was obtained from the Research Ethics Committee of Dr. M. Djamil Hospital, Padang (No. DP.04.03/D.XVI.10.1/244/2025). The researcher then introduced themselves to the participants, explained the purpose and procedures of the study, obtained written informed consent, and assured participants that their personal information would remain confidential.

3. Result

3.1 *Characteristics of Participants*

As presented in Table 1, the study included 10 nurses and 2 nephrologists working in the hemodialysis unit. The majority of participants were female, aged over 35 years, and possessed more than four years of professional experience."

Table 1 Characteristics of participants

Participant Code	Age (years)	Gender	Profession	Education	Work Duration (years)
Participant 1	48	Female	Nurse	Bachelor of Nursing	19
Participant 2	35	Female	Nurse	Bachelor of Nursing	6
Participant 3	52	Female	Nurse	Bachelor of Nursing	24
Participant 4	56	Female	Nurse	Bachelor of Nursing	18
Participant 5	37	Female	Nurse	Bachelor of Nursing	12
Participant 6	35	Male	Nurse	Bachelor of Nursing	4.5
Participant 7	58	Female	Nurse	Bachelor of Nursing	18
Participant 8	40	Female	Nurse	Bachelor of Nursing	8
Participant 9	49	Female	Nurse	Bachelor of Nursing	16
Participant 10	43	Female	Nurse	Bachelor of Nursing	9
Participant 11	57	Male	Nephrologist	Specialist/ Doctorate	26
Participant 12	46	Female	Nephrologist	Specialist	10

3.2 *Themes and Sub-themes*

After analyzing the data using the Colaizzi method, 5 themes and 15 sub-themes were identified, as shown in Table 2

Table 2 Main summary themes and sub-themes

Themes	Sub-Themes
Weak Coordination, Unsupportive Policies, and Limited Expertise	- Lack of coordination between hospital units and insufficient system evaluation. - Absence of a dedicated CAPD outpatient clinic and structured home-visit program. - Misalignment between national CAPD policies and actual clinical implementation. - Limited number of nurses with specialized CAPD expertise. - Financial constraints, reimbursement, and incentive issues.
Infection threat is the main challenge in CAPD.	- A drastic rise in infection rates has led to a decrease in CAPD patient numbers. - Poor patient personal hygiene and environmental conditions. - Nutritional and dietary management issues increase infection risk. - Experiences of CAPD failure due to infection among peers discourage patients from choosing CAPD
Ineffective Patient and Family Education System in CAPD Care	- CAPD education methods and media are not yet optimal. - CAPD education is not consistently supported by all healthcare professionals.
Psychological barriers to accepting CAPD therapy	- Patients' lack of self-confidence - Patients do not want the hassle, so they avoid CAPD
Determinants of Patient Decision-Making in Choosing CAPD	- Clinical conditions, educational background, and family support influence choice. - Geographic location and service accessibility affect CAPD adoption.

The relationships among the identified themes reveal a chain of interconnected barriers influencing CAPD adoption. Weak coordination, unsupportive policies, and limited expertise serve as the systemic foundation,

resulting in poor infection control and inadequate patient education. These deficiencies increase patients' fear and uncertainty, forming psychological barriers to accepting CAPD therapy. Consequently, these interrelated factors shape patients' decision-making processes, often discouraging them from selecting CAPD as a treatment option. Together, these themes highlight how structural, educational, and psychological barriers form a reinforcing cycle that perpetuates the low adoption of CAPD in Indonesia.

Theme 1: Weak Coordination, Unsupportive Policies, and Limited Expertise

Sub-theme 1: Lack of coordination between hospital units and insufficient system evaluation

At present, dialysis nurses report that policy changes have excluded them from participating in peritoneal dialysis catheter insertion procedures in the operating room. This has led to deviations from established guidelines, particularly regarding flushing techniques and post-catheter insertion care. As expressed by one of the dialysis nurses:

> *"Previously, CAPD nurses from our unit assisted during catheter insertion in the operating room. Since the policy change, the procedure has been handled solely by operating room nurses, and we can no longer monitor it. As a result, CAPD infection rates have recently increased."(P1)*

The decline in the number of patients choosing CAPD has never been systematically evaluated, and the high infection rates have not been further investigated to identify their causes. To date, no policy has been implemented to address this evaluation.

> *"Currently, fewer than five patients are undergoing CAPD, showing a drastic decline. There has been no evaluation to determine whether this is due to rising infection rates, the complexity of the procedure, or a general lack of interest in CAPD among the community." (P3)*

Sub-theme 2: Absence of a dedicated CAPD outpatient clinic and structured home-visit program

Currently, there is no dedicated CAPD clinic, so all education and procedures required for CAPD patients are conducted in the hemodialysis unit. This situation poses a barrier for patients to explore and engage with this therapy fully.

> *"Since there is no special CAPD clinic here, everything is handled in the hemodialysis unit. As a result, CAPD patients are less familiar with the procedure. In Jakarta, however, a dedicated CAPD clinic is available, which provides patients with clear access to ask questions, address problems such as catheter blockage, or check their dialysis fluid. (P4)*

The CAPD mentoring program is conducted in hospitals, where nurses teach patients how to perform CAPD at home and provide written guidelines. Education covers all essential aspects, from proper handwashing to fluid exchange procedures, ensuring that patients and families can perform them correctly. However, there is no *home visit* program for CAPD patients, meaning there is no direct monitoring of whether procedures are correctly followed at home. If problems arise, patients usually return to the hemodialysis unit. A nurse explained:

> *"Nurses do not conduct home visits. If a CAPD access becomes blocked, patients come to the hemodialysis unit, and we assist in flushing it until it functions properly. Although communication is available through WhatsApp groups, I believe home visits are still necessary to assess the home environment and how patients actually perform CAPD."(P4).*

Sub-theme 3: Misalignment between national CAPD policies and actual clinical implementation

The Ministry of Health has recommended prioritizing CAPD as the preferred renal replacement therapy for patients with end-stage renal disease. However, hospital facilities and policies have not supported this initiative. A nurse explained:

> *"CAPD is actually a program from the Ministry of Health, which expects more patients to undergo CAPD. However, hospitals do not provide sufficient support, such as the absence of a dedicated CAPD clinic, a shortage of specialists, and an inadequate patient education system". (P7)*

Sub-theme 4: Limited number of nurses with specialized CAPD expertise

Currently, CAPD services are only available in type A hospitals, which limits the number of nurses specifically dedicated to CAPD care. Although hemodialysis training programs now include topics related to CAPD, the number of nurses with advanced expertise in CAPD care remains insufficient. A nurse stated:

> *"There are still very few nurses who are truly focused on CAPD care, and since CAPD is usually only provided in type A hospitals, this has become a significant challenge". (P8)*

Sub-Theme 5: Financial constraints, reimbursement, and incentive issues

In theory, the cost of CAPD is 10–20% lower than that of hemodialysis. However, changes in government policy have made CAPD financially burdensome for patients. Currently, patients are required to collect CAPD solutions from the hospital once a month in large quantities and purchase their own logistical supplies, such as gloves and masks, which are no longer covered by insurance. Although CAPD reduces transportation costs since the procedure can be performed at home, in practice, patients still face significant expenses for logistical needs and transportation to collect the solutions. A nephrologist explained:

> *"In the past, CAPD solutions were delivered to patients, but now they must either pick them up themselves or pay for delivery. This makes the costs much higher, sometimes even greater, because patients often need to rent a vehicle. The original purpose of CAPD was to support patients who had difficulty accessing hemodialysis units and to ease financial burdens. However, in reality, it now creates additional hardship, especially for patients who live far from the hospital and must cover extra logistical expenses" P12.*

Nurses reported that the payment and incentive system for those involved in CAPD care remains unclear. This situation affects their motivation to provide care, as described by one nurse:

> *"When CAPD patients experience problems, such as a blocked catheter, they usually contact me via WhatsApp. I advise them to come to the hemodialysis unit, where I assist in flushing the catheter until it functions properly. However, the payment system is not clearly defined". (P4)*

Theme 2: Infection threat as the main challenge in CAPD

Sub-theme 1: A drastic rise in infection rates has led to a decrease in CAPD patient numbers

The increasing rate of infections among CAPD patients has caused others to hesitate in choosing CAPD as their renal replacement therapy. As one nephrologist explained:

> *"In the past, many patients chose CAPD, with more than 30 participants. However, the number has drastically declined to about 15, and currently, only around five patients remain active. Many dropped out due to infections. When the infection is fungal, CAPD cannot be continued, and the catheter must be removed. If the infection is bacterial, the therapy can still be maintained". (P3)*

Sub-theme 2: Poor patient personal hygiene and environmental conditions

Many infection cases among CAPD patients are caused by poor personal hygiene. Patients often fail to wash their hands properly and do not maintain a clean environment for the procedure. As one nephrologist explained:

> *"In CAPD, if patients do not maintain proper hygiene, infection can easily occur. Good personal hygiene is essential, particularly in caring for the CAPD catheter, which carries a high risk of infection if not handled properly. Sometimes the catheter itself is fine, but inadequate care and an unhygienic home environment can still lead to infection". (P12)*

Sub-theme 3: Nutritional and dietary management issues increasing infection risk

CAPD patients require a high-protein diet and must maintain good nutritional intake, not only to prevent infection but also to meet the body's protein needs resulting from the dialysis process. However, many patients do not adhere to these recommendations. As one nurse explained:

> *"Since CAPD is performed four times a day, we recommend that patients regularly consume egg whites daily. However, they often feel bored with this diet, and many cannot afford to buy albumin supplements. This creates a dilemma, as managing patients' diets depends on many factors". (P7)*

Sub-theme 4: Experiences of CAPD failure due to infection among peers discourage patients from choosing CAPD

Patients with chronic kidney disease undergoing dialysis often form their own communities or groups, where they exchange information and share experiences. They tend to place greater trust in the experiences of fellow CKD patients rather than medical advice. Consequently, when one patient experiences an infection during CAPD and shares their story, it creates fear among other patients. As one nephrologist reported:

> *"Patients have their own communities. If a CAPD patient experiences a failure, such as an infection, negative information about CAPD quickly spreads, causing others to become afraid and unwilling to try it". (P6)*

Theme 3: Ineffective Patient and Family Education System in CAPD Care

Sub-theme 1: CAPD education methods and media are not yet optimal

A special CAPD room is available in the hemodialysis unit to provide education for patients and their families. However, the educational media is still limited to booklets and flipcharts. Ideally, CAPD education should be presented in a more engaging and easily understandable format, such as online videos that can be accessed by both patients and their families. A nurse said:

> *Currently, the educational media for CAPD is only in the form of flipcharts, and we explain it directly to patients and their families. If other media, such as videos, were available, it might be easier for patients and families to understand". (P3)*

Sub-theme 2: CAPD education is not consistently supported by all healthcare professionals

Not all parties involved in the management of chronic kidney disease provide adequate support and education about CAPD. In fact, some healthcare professionals do not recommend this therapy due to the high risk of infection. A nurse explained:

> *"Ideally, all parties, including doctors, should actively provide education about CAPD so that patients feel more motivated. However, in practice, even after we provide proper education, patients often hear statements such as 'you may get an infection,' which only increases their fear". (P4)*

Theme 4: Psychological barriers to accepting CAPD therapy

Sub-theme 1: Patients' lack of self-confidence

Patients often express a lack of confidence and feel incapable of performing CAPD procedures at home without the supervision of nurses. Despite receiving explanations on how to carry out the procedure, they remain afraid of making mistakes, which leads them to believe they cannot manage CAPD. As a nephrologist explained:

> *"The main issue I frequently encounter is that patients lack confidence because they are afraid of performing the procedure incorrectly, concerned about sterility, think they need a special room, and struggle with the requirement for independence". (P5)*

Sub-theme 2: Patients do not want the hassle, so they avoid CAPD

One of the reasons frequently expressed by patients is that they do not want to be burdened. CAPD is considered inconvenient because it must be performed independently at home. Some patients prefer hospital-based hemodialysis, as trained nurses perform it. As explained by a nephrologist:

> *"In CAPD, fluid exchange is performed four times a day, each lasting about two hours. In addition, patients are concerned about the storage of dialysis solutions, infection risks, and other related issues. This lack of practicality is the main reason why patients are reluctant to choose CAPD". (P11)*

Theme 5: Determinants of Patient Decision-Making in Choosing CAPD

Sub-theme 1: Clinical conditions, educational background, and family support influencing choice

When explaining renal replacement therapy to patients with chronic kidney disease, several considerations are taken into account to determine the most appropriate option. Clinical factors, including the patient's physical condition, overall health, age, level of activity, and comorbidities, serve as the basis for decision-making. As stated by one nephrologist:

> *"At the beginning, we explain the three available renal replacement therapies along with their respective advantages and disadvantages. The choice of therapy is then adjusted to the patient's characteristics. Patients we direct to CAPD are usually those who are younger, active, in good general condition, and without a medical history that could increase the risk of infection or complications". (P12)*

The decision regarding the choice of renal replacement therapy ultimately lies with the patient and their family. This decision is often influenced by the educational background of both the patient and their family. In some cases, we recommend CAPD, but patients and families refuse because they feel unconfident in performing it and fear that the procedure might worsen the patient's condition. As stated by a nephrologist:

> *"Patients are always educated about the advantages and disadvantages of the three types of therapy. We routinely provide education to patients and their families regarding the management methods for chronic kidney disease, including their benefits and limitations. Patients are then given the freedom to decide, and their personal background and cultural*

values usually influence their choices. Sometimes, patients choose CAPD, but their families do not support that decision". (P12).

Sub-theme 2: Geographic location and service accessibility affecting CAPD adoption

Geographical factors also influence patients' decisions to choose CAPD. Indonesia is a vast archipelagic country, and the distance between cities and rural areas is considerable, requiring significant time and high cost for transportation. Moreover, nephrologists and dialysis nurses are usually only available in major cities and in government hospitals located in urban areas.

"For patients who live far from the dialysis unit, I usually recommend CAPD because it is more economical, considering the high transportation costs to the hospital. Most of my patients come from rural areas and need more than three hours to reach the hospital. Indonesia is a vast country, and even within West Sumatra, the distance between regions is considerable."(P10)

4. Discussion

This study aims to explore the perspective of dialysis nurses and nephrologists regarding challenges in CAPD utilization. After interviewing 10 nurses and 2 nephrologists, we found five major themes emerged: (1) Weak coordination, unsupportive policies, and limited expertise; (2) Infection risk as the primary challenge in CAPD; (3) Ineffective patient and family education in CAPD care; (4) Psychological barriers to accepting CAPD therapy; and (5) Determinants of patient decision-making in choosing CAPD.

4.1 Weak coordination, unsupportive policies, and limited expertise

This study reported that the policy is not supportive of patients choosing CAPD as the primary modality of therapy for end-stage renal disease. There are many barriers, the primary ones being weak coordination, unsupportive policies, and limited expertise. The peritoneal dialysis (PD) -first policy has proven successful in countries such as Thailand and Hong Kong (Tungsanga et al., 2008; Choy & Li, 2015). In Indonesia, however, implementing this policy faces barriers, particularly in ensuring the distribution of PD supplies to remote areas. While installing hemodialysis (HD) machines in rural settings may involve lower initial costs, establishing HD centers in sparsely populated regions ultimately increases overall expenses. Given the high cost of HD, the Indonesian government has recommended prioritizing PD for eligible ESKD patients (Hyodo et al., 2019)

Moreover, in Indonesia, the ratio of nephrologists remains low, at 2.5 per 1,000 RRT patients (approximately 1 per million patients) (Tang et al., 2020). This shortage limits the time available for patient education and dialysis supervision, with some kidney units currently overseen by internists. Additionally, only 70% of the 7,410 HD nurses are reported to be certified (Pernefri, 2018). While data on the number of trained CAPD nurses are unavailable, the figure is likely much lower than that of HD nurses. The lack of adequately trained nephrologists and PD nurses may compromise the quality of dialysis services, leading to reduced PD sustainability and increased risk of complications.

4.2 Infection threat is the main challenge in CAPD

One of the most common obstacles is the high rate of infection in CAPD patients. A previous study in Semarang, Indonesia, showed that 42.3% of patients experienced peritonitis, 23.1% had catheter-related complications, and 15.4% had cardiovascular events (Adinugroho et al., 2024). The peritoneal catheter, a tube surgically inserted into the abdominal cavity to facilitate dialysis, is a significant risk factor for peritonitis. This infection of the peritoneum represents a serious complication in CAPD patients, as it can result in significant morbidity and mortality.

The catheter may serve as a potential entry point for bacteria into the peritoneal cavity. Even with meticulous catheter care and strict adherence to aseptic techniques, the risk of peritonitis cannot be eliminated. Furthermore, comorbidities such as diabetes, cardiovascular disease, and malnutrition further increase the susceptibility of CAPD patients to infection, as these conditions impair immune function and reduce the body's ability to combat invading pathogens (Adinugroho et al., 2024). Nurses reported that the patient experienced a reduced appetite, likely related to abdominal distension and a sense of epigastric fullness, occasionally accompanied by nausea. As a result, protein intake was infrequent, despite his awareness of the importance of consuming more protein to offset losses through the dialysate (Yip et al., 2021). This condition also increases the risk of infection in patients with CAPD, as managing diet and protein intake is crucial for these patients. Prompt referrals from dialysis nurses to dietitians can support the creation of individualized dietary plans that address the patient's complex nutritional requirements (Woodrow et al., 2017). Supporting patients in

maintaining physical activity, adhering to dietary recommendations, and following prescribed medications is essential to improving their overall energy and quality of life (Mailani et al., 2025).

Under certain conditions, it is necessary to switch from CAPD to HD. The factors leading to this change include inadequate CAPD, ultrafiltration failure, severe hypertriglyceridemia, recurrent peritonitis, and repeated technical or mechanical complications (Daudrigas & Blake, 2015). Peritonitis cases are preventable with appropriate nursing interventions that can lower the chance of treatment failure and long-term impact caused by an abrupt switch to hemodialysis. To successfully manage patients with continuous ambulatory peritoneal dialysis-associated peritonitis, dialysis nurses should appreciate the intricacies of the analyses underpinning their professional practices in promoting the patient's self-care techniques (Yip, 2021).

The dropout rate from dialysis, both HD and CAPD, remains relatively high. Among CAPD patients, the primary causes of dropout are death (86%) and transfer to HD (11%), with cardiovascular and cerebrovascular complications being major contributors (Pernefri, 2018). HD remains the more familiar and preferred modality for many patients. In contrast, CAPD is often perceived as burdensome due to the daily discipline required, leading to lower confidence in its adoption.

4.3 Ineffective patient and family education in CAPD care

The study findings reveal that not all health professionals fully support the use of CAPD, mainly due to concerns about high infection rates among patients and issues related to incentives. In addition, the education system within dialysis units remains inadequate. Strengthening patient and staff education, implementing quality improvement initiatives, and fostering continuous collaboration between newly developed and well-established PD programs are essential strategies to enhance the utilization of CAPD (Rope et al., 2018). CKD patients use diverse ways to seek health information and have specific learning needs that healthcare workers should address. They also explore treatments beyond dialysis, such as herbal or alternative therapies. Effective, practical education methods are needed to convey accurate information. Because patients' needs and preferences vary and are not always directly related to their health literacy levels, education should be tailored to individual needs (Mailani et al., 2024).

A previous study in Sri Lanka showed that the development of an educational curriculum can increase the CAPD patient census, which rose from 63 to 116 during the year. The peritonitis rate declined significantly, from 0.8 episodes per patient-year in the first 6 months to 0.3 episodes per patient-year in the latter 6 months. However, the most common root causes of peritonitis, related to contamination events and hygiene, persisted. The appropriate ascertainment of culture data and prescription of antibiotics also increased (Rope et al., 2018). Previous studies suggest that adult education theory alone is insufficient for creating new teaching strategies, developing learning materials, and reflecting on training situations for patients with chronic illnesses. Given the need for flexibility and collaboration in renal care, the advancement of both clinical and educational competencies should be emphasized in continuing nursing education (Bergjan & Schaepe, 2016).

CAPD, as a renal replacement therapy, necessitates an integrated approach that is supported by comprehensive education and effective communication among healthcare professionals, patients, and their families. Optimal education is crucial for enhancing CAPD utilization among patients with end-stage renal disease. Ideally, education should begin early, at stage 4 chronic kidney disease, and be delivered by internists or nephrologists to allow adequate time for informed decision-making (Lydia, 2020). Previous studies have highlighted the importance of using assessment tools in educating patients undergoing peritoneal dialysis and the need for strategies that strengthen self-management. In particular, a stronger emphasis on affective learning objectives is necessary, and current teaching activities and materials should be adapted to reflect better patients' perspectives (Bergjan & Schaepe, 2016). Education should also extend to family members, as they play a pivotal role in supporting patients at home. Families are responsible for reporting the patient's condition while performing CAPD and ensuring adherence to prescribed procedures. Thus, family readiness is a crucial factor in the success of CAPD management.

4.4 Psychological barriers to accepting CAPD therapy

Patients often express a lack of confidence and feel incapable of performing CAPD procedures at home without the supervision of nurses. Despite receiving explanations on how to carry out the procedure, they remain afraid of making mistakes, which leads them to believe they cannot manage CAPD. One of the reasons frequently expressed by patients is that they do not want to be burdened. CAPD is considered inconvenient because it must be performed independently at home. Some patients prefer hospital-based hemodialysis, as nurses carry out the entire procedure.

Home-based dialysis also poses significant psychological challenges. Addressing these issues requires clinicians and healthcare providers to understand better and manage the psychological impact of home dialysis, in order to improve patient safety, quality of life, and long-term treatment outcomes (Walker et al., 2024). Previous research has demonstrated that strong clinician support plays a key role in effectively managing patient distress (Damery et al., 2019), while continuity of care and clear communication facilitate smoother transitions between healthcare providers. Similarly, providing regular psychosocial support has been shown to reduce caregiver burden and anxiety substantially (Pereira et al., 2017). These findings underscore the crucial role of clinician awareness and effective communication in promoting psychological well-being, a factor that is beneficial in advance care planning for kidney patients (Bristowe et al., 2014).

Additionally, limited patient education contributes to low health literacy, as some patients struggle to understand the necessity of multiple daily exchanges in CAPD compared to the less frequent hemodialysis sessions. For those unable to self-manage, the lack of adequate family or caregiver support further restricts CAPD adoption. Structural barriers, such as inadequate infrastructure and transportation challenges in rural areas, also hinder the distribution of CAPD supplies, thereby increasing costs and limiting access to these supplies.

4.5 Determinants of patient decision-making in choosing CAPD

Selecting the appropriate renal replacement therapy for chronic kidney disease requires consideration of several clinical factors, including physical status, comorbidities, age, and overall health. While patients and their families ultimately make the decision, their choices are often influenced by their educational background, confidence in self-management, and fear of potential complications. Geographic challenges in Indonesia, including extended distances, high transportation costs, and limited availability of nephrologists and dialysis nurses outside major cities, further influence the acceptance of CAPD (Jonny et al., 2022).

Providing optimal care for PD patients requires specialist nurses to conduct accurate, continuous, and systematic health assessments. Identified problems should be communicated to colleagues, patients, and their families, and integrated into individualized care plans designed to achieve specific nursing outcomes. To support patient rehabilitation, specialist nurses must also collaborate with other healthcare professionals and apply the latest research findings in their clinical practice (Yip, 2021).

Additionally, healthcare providers play a crucial role in promoting CAPD through targeted educational initiatives. Strategies such as distributing leaflets, leveraging social media platforms, and utilizing television campaigns can help increase awareness and acceptance (Wearne et al., 2017). With rapid technological progress, the nationwide adoption of telemedicine in dialysis units is recommended to strengthen patient education, monitor adherence, and provide remote management when home visits are not feasible (Jonny et al., 2022). However, current information on CAPD remains limited; thus, the development of a comprehensive kidney registry that captures indicators such as peritonitis and infection rates, treatment duration, and overall CAPD survival is essential for continuous quality improvement.

5. Conclusion

This study highlights significant barriers to the adoption of Continuous Ambulatory Peritoneal Dialysis (CAPD) in Indonesia. Despite national recommendations, uptake remains limited due to unsupportive policies, high infection risks, inadequate educational media, and the absence of structured follow-up, such as home visits. Policy changes that shift logistical and financial burdens to patients further reduce the affordability and accessibility of CAPD. Moreover, the lack of specialized clinics and limited expertise contributes to suboptimal patient support and confidence in this therapy. Strengthening institutional support, enhancing patient education, and realigning health policies are crucial to improving CAPD implementation and ensuring equitable access to renal replacement therapy. Addressing these barriers is critical not only to optimize patient outcomes but also to realize CAPD's potential as a sustainable and equitable modality of renal replacement therapy in Indonesia.

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