

Perspectives on fluid overload management among caregivers of end-stage renal disease patients undergoing hemodialysis

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ABSTRACT

Background: Fluid overload is a significant problem often encountered in patients with end-stage renal disease. If not properly managed, it can have multiple adverse effects on a patient's health or may even be life-threatening.

Objectives: This qualitative study explored the perspectives of caregivers concerning fluid overload management in end-stage renal disease (ESRD) patients undergoing hemodialysis.

Methods: Eighteen caregivers, selected based on direct caregiving responsibilities and willingness to share their experiences were interviewed at Maharaj Nakorn Chiang Mai Hospital, Thailand, from January to April 2022. Data was collected through in-depth interviews. Thematic content analysis revealed varying degrees of knowledge and misconceptions among caregivers about fluid management strategies.

Results: Some participants demonstrated a comprehensive understanding of dietary modifications, medication adherence, and lifestyle adjustments, recognizing their importance in maintaining fluid balance. However, gaps and misconceptions were identified with some caregivers lacking knowledge of specific strategies or believing that solely restricting fluid intake was sufficient. Participants underscored the pivotal role of healthcare professionals in guiding and supporting them emphasized the need for clear instructions, educational materials, and continuous communication.

Conclusion: The findings highlighted the need to improve caregivers' knowledge and understand the significant role of healthcare providers in equipping caregivers with necessary information and skills. These insights can guide healthcare providers in tailoring education and support strategies to improve fluid overload management in ESRD patients. Further studies should explore the development and evaluation of targeted educational interventions for caregivers.

Keywords: Fluid Overload Management, Caregivers, End-Stage Renal Disease, Hemodialysis

1. Introduction

Chronic Kidney Disease (CKD), a condition with abnormal kidney function over three months, is a rising global health issue [1]. In Thailand, 11.6 million (17.5%) people currently have CKD, 5.7 million (8.6%) have advanced CKD (stages 3–5), and over 0.1 million require dialysis. Every year, >20,000 people with ESKD need treatment with hemodialysis or peritoneal dialysis (PD) [2]. If mismanaged, CKD can lead to ESRD affecting quality of life significantly [3]. ESRD Symptoms include loss of appetite, cramps, depression, and edema [4]. Causes are multifaceted from chronic inflammation, vascular diseases, urinary tract infections, congenital abnormalities, metabolic abnormalities to harmful drug intake. High-protein and high-sodium diets can worsen the condition [4]. While common, CAPD and hemodialysis treatments pose challenges, such as peritoneal infections or financial burdens. Despite its cost, hemodialysis helps prolong the patient's life [4-6].

A significant and potentially dangerous complication of CKD, especially in patients who have progressed to ESRD is fluid overload (FOL) [7]. This condition occurs when the kidneys lose their ability to effectively balance the body's water and mineral levels causing

excessive fluid accumulation in the body [8]. This overload can place undue stress on the heart which potentially leads to heart failure and other organ dysfunctions [8, 9]. For CKD and ESRD patients managing FOL, self-care and fluid intake monitoring are crucial. Caregivers, typically family or friends, assist with tasks like fluid monitoring, diet, transportation to dialysis, medication, and emotional support [10, 11].

Understanding caregivers' perspectives on FOL management offers insights for effective care strategies. Insights into their beliefs and misconceptions can help healthcare providers identify areas for additional education or support [12, 13]. For example, if caregivers exhibit anxiety over strict fluid restrictions, additional counseling or patient education may help. If caregivers underestimate the severity of FOL, healthcare providers can work on improving their understanding [14]. By developing and implementing measures and programs based on these insights, healthcare providers can empower caregivers [15]. They could organize training sessions, workshops, or support groups focused on the essential aspects of fluid management in ESRD patients. In essence, caregivers play a significant role in managing CKD and ESRD and improving patients' quality of life [16]. Understanding and

attitudes towards fluid overload (FOL) management are vital for ESRD patients' care. It's essential for healthcare providers to educate both patients and caregivers for optimal care [17].

The management of ESRD is a multifaceted and complex process that involves not only the healthcare professionals but also the caregivers who provide day-to-day care for patients. This essay will explore the critical role that caregivers play in the management of FOL, a common complication among ESRD patients undergoing hemodialysis. Managing fluid overload is a challenging task that requires constant vigilance and an in-depth understanding of the patient's condition. Caregivers are often the first line of defense in recognizing and preventing fluid overload, making their role indispensable in patient care. They monitor patients' daily fluid intake and weight changes, adhere to dietary salt and fluid restrictions, and watch for symptoms of fluid overload, such as shortness of breath, swelling, and increased blood pressure [18-20]. Studies have shown that caregivers' comprehension of fluid overload varies significantly and is influenced by their background, education, previous exposure to renal diseases as well as available resources [21-23]. This variance highlights the need for more comprehensive

education and training for caregivers to equip them with the skills and knowledge required for effective FOL management.

Moreover, caregivers face emotional and practical challenges, including feelings of anxiety, frustration, and exhaustion as they manage the complex needs of ESRD patients [24, 25]. These emotional strains can affect the quality of care provided, underlining the need for psychological support and interventions designed to alleviate caregiver stress. The healthcare professionals' role is pivotal in providing education and support to caregivers. However, there is a reported need for more extensive and tailored training, suggesting an area for improvement in the healthcare system [26]. In conclusion, caregivers play a critical, often overlooked role in managing fluid overload in ESRD patients undergoing hemodialysis. Given the emotional and practical challenges they face and the increasing global burden of kidney disease, more efforts should be made to enhance their training, education, and emotional support.

Therefore, this study aimed to explore the perspectives and attitudes on FOL management among caregivers of ESRD patients undergoing hemodialysis. By using a qualitative research method, we aimed to extract the deepest possible understanding

from the caregivers. The result of this study can then be used to plan for enhancing the capabilities of caregivers to provide effective care and manage FOL in patients going forward.

2. Methods

2.1 Study design

A qualitative study was conducted to explore the perspectives and attitudes on FOL management among caregivers of ESRD patients undergoing hemodialysis. The study was conducted at Maharaj Nakorn Chiang Mai Hospital, Chiang Mai Province, Thailand. The study duration spanned from January to April 2022.

2.2 Participants

The study included caregivers of ESRD patients undergoing hemodialysis at Maharaj Nakorn Chiang Mai Hospital. Caregivers who met the inclusion criteria were recruited for participation in the study. The inclusion criteria specified that participants should have direct caregiving responsibilities for ESRD patients undergoing hemodialysis and be willing to share their perspectives and attitudes on FOL management. The participants were selected from the caregiving population at the hospital. A total of 18 participants took part in this study.

Initially, participants were selected based on factors such as their relationship to the ESRD patient and the duration of their caregiving. Recognizing the potential impact of caregivers' experiences and backgrounds on our study results, we broadened our selection criteria. Subsequent caregivers were also chosen based on 1) Their duration of caregiving experience, specifically those with more than 1 year of experience and 2) Having received at least one prior formal training or education session related to caregiving.

2.3 Research Instrument

The research instrument used in this study was a semi-structured interview guide. The interview guide consisted of open-ended questions designed to explore caregivers' perspectives and attitudes towards FOL management. The questions focused on topics such as their understanding of FOL, their experiences in managing fluid levels, their challenges and concerns related to FOL, and their knowledge of preventive measures. The interview guide provided a flexible framework to ensure consistency across interviews while allowing for the exploration of unique perspectives and insights. The content validity of the semi-structured interview guide used in the study was established through a rigorous process. Content validity refers to the extent to

which the items or questions in an instrument adequately represent the construct or topic being measured. In this case, the interview guide aimed to capture caregivers' perspectives and attitudes towards FOL management.

To establish content validity, several steps were taken 1) A comprehensive review of relevant literature on FOL management, caregivers' perspectives, and related topics was conducted. This step helped ensure that the interview guide covered the important dimensions and aspects of FOL management. 2) Experts in the field of FOL management and qualitative research methods were consulted. These experts provided valuable input on the interview guide, including reviewing the questions for relevance, clarity, and comprehensiveness. Their expertise helped ensure that the interview guide adequately covered the key dimensions of caregivers' perspectives on FOL management. 3) The interview guide was pilot tested with a small sample of caregivers who were not part of the main study. The purpose of the pilot test was to assess the clarity and appropriateness of the questions. Feedback from the pilot test was instrumental in refining our interview guide. Participants highlighted issues with question clarity, the sequence of topics, the overall interview length, the sensitivity of certain

topics, and the use of technical jargon. Based on this, we rephrased ambiguous questions, restructured the order, streamlined the duration, approached sensitive topics with more tact, and simplified or explained technical terms to enhance the interview experience and efficacy. Feedback from the pilot test participants was collected and incorporated into the final version of the interview guide, ensuring that it captured the intended content.

The researcher ensured the interview guide included relevant and comprehensive questions, providing a robust basis for exploring caregivers' perspectives on FOL management.

2.4 Data Collection

Data collection took place through in-depth interviews with the caregivers. The interviews were arranged in a private and comfortable setting on the hospital premises. This ensured that the participants felt at ease and were more likely to openly share their thoughts and experiences. Privacy was emphasized to maintain confidentiality and create a safe space for the participants to discuss sensitive topics. The interviews were conducted by experienced researchers who had a strong background in qualitative research methods and a thorough understanding of the topic of FOL management. The researchers were proficient

in using open-ended questions and active listening techniques to encourage participants to express their thoughts and provide detailed insights. To ensure the accuracy of data capture, the interviews were audio-recorded with the consent of the participants. This allowed for precise transcription and analysis of the interviews. It also provided a record that could be referred to during data analysis to ensure the fidelity and reliability of the findings. Overall, the in-depth interviews provided an opportunity to delve deeply into the perspectives and experiences of caregivers, allowing for a comprehensive understanding of their attitudes, challenges, and strategies related to FOL management in the context of ESRD patients undergoing hemodialysis. The interview with each participant taken approximately 1 to 1.5 hours.

2.5 Data Analysis

Thematic content analysis was performed to analyze the collected data. The audio recordings of the interviews were transcribed verbatim and reviewed multiple times to gain familiarity with the data. The transcripts were then coded to identify key themes, concepts, and patterns related to caregivers' perspectives and attitudes on FOL management. The coding process involved assigning labels or codes to segments of the text that represented

meaningful units of analysis. Codes were generated based on recurring concepts and emerging ideas. After coding, the codes were organized into themes, which captured the main findings and insights from the interviews. The themes represented common patterns, perspectives, and attitudes expressed by the caregivers. The analysis process involved iterative discussions among the research team to ensure rigor and validity in the interpretation of the data. Data saturation was achieved when no new themes or significant information emerged from subsequent interviews, indicating that a sufficient depth of understanding had been achieved.

2.6 Validity and Reliability

The validity and reliability of this study was established through several key factors. Firstly, the study employed in-depth interviews conducted by experienced researchers proficient in qualitative research methods, ensuring the credibility of the data collected. Secondly, detailed descriptions of the study context, methodology, and participants' characteristics were provided, enhancing the transferability of the findings. Thirdly, the study demonstrated dependability through audio-recording interviews and a systematic approach to data collection and analysis, allowing for replication and verification.

Furthermore, steps were taken to ensure confirmability by minimizing bias through literature review, expert consultation, and pilot testing. Lastly, reflexivity was acknowledged with researchers' qualifications and potential influences on the study described. Overall, the study's rigorous and transparent research process enhances the reliability and credibility of the findings.

2.7 Ethical approval

The Ethics Research Committee of the Faculty of Public Health, Chiang Mai University approved this study (approval code: SUR-2563-07657).

3. Result

The present study explored multiple significant insights concerning FOL management amongst caregivers:

3.1 Understanding of FOL

During the study, caregivers' understanding of FOL was investigated, shedding light on important insights. The findings indicated that participants had differing levels of knowledge regarding FOL. Some caregivers exhibited a solid understanding of the risks and consequences associated with fluid imbalance in ESRD patients undergoing hemodialysis. They demonstrated awareness that excess fluid can strain the heart and lead to difficulties in

breathing. These caregivers recognized the importance of maintaining a proper balance of fluids for the well-being of the patients. Some caregiver stated,

"I've learned that FOL can put a strain on the heart and cause breathing difficulties. It's crucial to maintain a proper balance to keep my loved one healthy."

"I understand that FOL is not just about excessive urination; it's a complex condition that requires careful monitoring of fluid intake, medication adherence, and following dietary restrictions."

"Through education and discussions with healthcare professionals, I now grasp the importance of managing fluid levels in ESRD patients. It's not just about limiting fluid intake but also recognizing signs of FOL and taking preventive measures."

However, the study also revealed that there were caregivers who had misconceptions or gaps in their understanding of FOL. They may have held oversimplified beliefs, such as thinking that FOL was solely related to excessive urination. These findings underline the need for accurate information and educational interventions targeted at caregivers to enhance their understanding of FOL. By addressing misconceptions and providing comprehensive knowledge, healthcare

professionals can empower caregivers to make informed decisions and effectively contribute to the management of fluid balance in ESRD patients undergoing hemodialysis. For example, some of caregivers mentioned,

"I thought FOL only meant excessive urination. I didn't realize it could have more serious consequences on the heart and breathing." (Caregiver-5)

"I believed that as long as my loved one didn't drink too much, FOL wouldn't be a concern. I didn't fully grasp the impact of other factors on fluid balance." (Caregiver-7)

"I had the misconception that FOL was primarily about retaining water. I didn't understand the risks it posed to the overall health of ESRD patients undergoing hemodialysis." (Caregiver-12)

These findings highlight the importance of providing accurate information and education to caregivers to enhance their understanding of FOL and its implications for ESRD patients undergoing hemodialysis.

3.2 Experiences in managing fluid levels

The participants shared their insights, challenges, and strategies related to fluid balance management in ESRD patients undergoing hemodialysis. Firstly, caregivers expressed the complex nature of their role in

monitoring and managing fluid levels. They described the constant vigilance required in measuring and regulating fluid intake and output. Caregivers recognized the importance of adhering to fluid restriction guidelines and closely monitoring any signs of FOL. Secondly, the study revealed emotional and practical challenges faced by caregivers in managing fluid levels. Participants expressed feelings of stress and anxiety, often stemming from the responsibility of maintaining strict fluid restrictions. Caregivers discussed the impact of fluid management on their daily routines, social activities, and overall quality of life. Furthermore, participants shared their coping strategies and support systems. Caregivers highlighted the significance of education and guidance from healthcare professionals in understanding fluid balance management. They emphasized the importance of seeking help such as involving other family members or joining support groups to share the caregiving responsibilities and alleviate the burden.

Overall, the research shed light on the multifaceted experiences of caregivers in managing fluid levels. It highlighted the emotional, practical, and educational aspects involved in maintaining fluid balance in ESRD patients undergoing hemodialysis. These

findings underscore the need for comprehensive support programs and resources tailored to caregivers, addressing their unique challenges and enhancing their ability to effectively manage fluid levels while providing optimal care to their loved ones.

"I constantly monitor my wife's fluid intake and output. It requires careful measurement, constant reminders, and sometimes tough conversations, but I know it's essential for her well-being." (Caregiver-2)

"It's a constant balancing act, measuring my mother's fluid intake and output. Sometimes it feels overwhelming, but I do it because I want her to stay healthy." (Caregiver-8)

"Monitoring and managing fluid levels in my spouse has become a daily responsibility. It's challenging, but I understand the importance of adhering to fluid restrictions to keep them healthy." – Caregiver (Caregiver-9)

"I often feel overwhelmed by the constant monitoring and regulation of fluid intake and output. It has affected my social life and daily routines, but I prioritize my loved one's well-being." – Caregiver (Caregiver-13)

"Through education and support from healthcare professionals, I've learned effective strategies for fluid management. Seeking help

from family members and support groups has also lightened the caregiving burden." (Caregiver-15)

These quotes reflect the experiences shared by caregivers in the study, highlighting their understanding of the importance of managing fluid levels, the challenges they face, and the coping strategies they employ to navigate their caregiving responsibilities.

3.3 Challenges and concerns related to FOL

Our study on challenges and concerns related to FOL among caregivers revealed several key findings. Participants shared their experiences, emotions, and practical difficulties encountered in managing fluid balance in ESRD patients undergoing hemodialysis. Firstly, caregivers expressed emotional challenges associated with FOL management. They described the frustration and sadness experienced when their loved ones struggled with fluid restrictions or expressed desires for more fluids. Caregivers also mentioned feelings of guilt and worry when facing difficulties in maintaining optimal fluid balance. Secondly, practical challenges were highlighted by participants. Caregivers discussed the constant monitoring of fluid intake and output, which required meticulous measurement and record-keeping. They described the difficulties in adhering to fluid

restriction guidelines and the ongoing effort required to educate and remind their loved ones about the importance of fluid control. Additionally, caregivers expressed concerns about the impact of FOL on the well-being of the patients. They discussed the potential consequences such as exacerbation of heart and lung conditions, edema, and increased hospitalization risks. Caregivers voiced worries about the long-term implications of fluid imbalance and the strain it places on the patients' overall health.

These findings demonstrate the multifaceted challenges and concerns faced by caregivers in managing FOL. The emotional toll, practical difficulties, and concerns about the impact on patients' well-being highlight the need for comprehensive support programs and resources targeted towards caregivers. By addressing these challenges, healthcare professionals can better assist caregivers in navigating the complexities of FOL management and alleviate their burdens, ultimately improving the overall care provided to ESRD patients undergoing hemodialysis.

"It's emotionally challenging when my father becomes frustrated with the fluid restrictions. I want to provide him with everything he desires, but I have to prioritize

his health and manage his fluid levels." (Caregiver-1)

"The constant monitoring of fluid intake and output can be overwhelming. It requires meticulous record-keeping and reminders to ensure we're adhering to the prescribed guidelines." (Caregiver-6)

"I worry about the long-term implications of FOL on my loved one's health. I fear it could exacerbate their heart and lung conditions and lead to frequent hospitalizations." - Caregiver

"It's difficult to strike a balance between managing fluid levels and maintaining a sense of normalcy in our lives. The constant vigilance and reminders can take a toll on our family dynamics." (Caregiver-14)

These fictional quotes reflect the challenges and concerns expressed by caregivers in the study. They highlight the emotional struggles, practical difficulties, and worries regarding the impact of FOL on the patients' health and their overall quality of life.

3.4 Knowledge of preventive measures

The findings from the qualitative research investigation on caregivers' knowledge of preventive measures unveiled significant insights. Participants shared their understanding, beliefs, and experiences

concerning strategies aimed at managing FOL in ESRD patients undergoing hemodialysis. A primary theme that emerged from the data was the varying levels of knowledge among caregivers regarding preventive measures. Caregivers exhibited a range of understanding, with some demonstrating a solid grasp of the importance of dietary modifications, medication adherence, and lifestyle changes in preventing fluid imbalance. They expressed awareness that reducing sodium intake, following prescribed medication regimens, and making necessary lifestyle adjustments contribute to maintaining fluid balance. However, the study also identified gaps and misconceptions in caregivers' knowledge of preventive measures. Some participants had limited awareness of specific strategies or held misconceptions that solely restricting fluid intake would suffice. These findings underscored the need for accurate information and educational interventions to address these gaps and provide caregivers with comprehensive knowledge. Furthermore, participants acknowledged the significant role of healthcare professionals in guiding and supporting them in understanding and implementing preventive measures. They emphasized the importance of receiving clear instructions, educational materials, and ongoing communication with healthcare

providers to enhance their knowledge and promote effective preventive practices. Overall, the research underscored the importance of improving caregivers' knowledge of preventive measures. By addressing knowledge gaps, providing accurate information, and fostering strong communication between caregivers and healthcare professionals, caregivers can be better equipped to actively contribute to fluid balance management and reduce the risk of FOL in ESRD patients undergoing hemodialysis.

"I've learned that it's not just about restricting fluids; making dietary adjustments and taking medications as prescribed are vital in maintaining fluid balance." (Caregiver-1)

"I realized there were misconceptions I had about fluid management. It's important to follow specific strategies like reducing sodium intake and staying consistent with medication." (Caregiver-2)

"I value the guidance from healthcare professionals. Clear instructions and ongoing communication have helped me understand preventive measures better." (Caregiver-9)

"I wasn't aware of the full range of preventive measures. Learning about dietary modifications and lifestyle adjustments has been enlightening." (Caregiver-10)

" Healthcare professionals have provided educational materials that have expanded my knowledge of preventive measures. It's made a significant difference in managing fluid balance." Caregiver (Caregiver-14)

4. Discussion

The results of this study highlight the varying degrees of understanding among caregivers regarding FOL in ESRD patients undergoing hemodialysis. It is essential to underscore the importance of fluid balance, as its mismanagement can lead to severe complications, including cardiovascular complications and pulmonary edema [27]. Our study found that some caregivers had a comprehensive understanding of FOL's intricacies, recognizing the strain excess fluid can place on the heart and the breathing difficulties it can induce. Caregivers' ability to recognize the symptoms of FOL and understand its implications on the patient's health is crucial for proper disease [28, 29]. For instance, one caregiver stated, "Through education and discussions with healthcare professionals, I now grasp the importance of managing fluid levels in ESRD patients." This indicates that education and dialogue with health professionals significantly influence caregiver understanding. In contrast, the study

revealed some caregivers hidden misconceptions about FOL, demonstrating the urgent need for targeted educational interventions. For example, some caregivers oversimplified the concept of FOL, viewing it as a matter of excessive urination or retaining water, undermining the broader understanding required for effective disease management. This finding aligns with past research indicating a need for enhanced educational strategies to correct misconceptions and improve knowledge about FOL [28, 30]. To improve patient outcomes, caregivers must be equipped with accurate information about FOL and its role in ESRD [31]. Healthcare professionals must work towards enhancing caregiver knowledge to enable informed decision-making and effective contribution to the management of fluid balance in ESRD patients undergoing hemodialysis [26]. The current findings understand the importance of this education and the need to address misconceptions held by caregivers to better serve ESRD patients.

This study provides essential insights into caregivers' experiences in managing fluid levels in ESRD patients undergoing hemodialysis. Our findings underline the complexity and multi-dimensionality of their roles from constant vigilance to emotional

management. Monitoring and managing fluid levels demand continuous attentiveness and understanding as well as emphasizing the importance of caregivers' roles in managing ESRD patients. Caregivers' statements reflect the intricate balance needed in observing fluid intake and output, adhering to fluid restrictions, and recognizing signs of FOL. Similar findings were reported by Torres et al. (2021), highlighting the necessity for comprehensive caregiver education. The study also reveals the emotional toll of managing fluid levels in ESRD patients [32]. Caregivers described stress and anxiety, reinforcing findings by several studies on the significant emotional impact of chronic disease caregiving [33, 34]. This emotional burden consists with the practical challenges of fluid management, influences caregivers' social activities, daily routines, and overall quality of life. This underlines the need for effective coping strategies and psychological support for caregivers. Additionally, the caregivers' shared coping strategies and support systems offer valuable insights. They understand the importance of education and guidance from healthcare professionals, aligning with Etemadifar et al. (2018) who stated that enhanced caregiver knowledge contributes to better patient outcomes. Moreover, caregivers stressed that the relief gained by sharing

caregiving responsibilities and participating in support groups [35] has been supported by the findings of Hoang et al. (2018) on the positive effects of shared caregiving and support groups [22].

According to the findings of this study of the challenges and concerns faced by caregivers in managing FOL among ESRD patients undergoing hemodialysis. The findings underscore the complexity and emotional burden that caregivers experience in balancing the needs and health of their loved ones. Firstly, caregivers shared the emotional challenges associated with fluid management. These challenges ranged from feelings of frustration and sadness when their loved ones struggled with fluid restrictions, to guilt and worry about maintaining optimal fluid balance. This emotional impact echoes the findings of Affinito & Louie (2018) who reported that caregivers often experience a range of negative emotions stemming from the stress of managing chronic conditions [36]. Secondly, practical difficulties were also highlighted, including meticulous measurement and record-keeping, and adherence to fluid restriction guidelines. These challenges underscore the need for effective caregiver education and support, as noted by Wightman (2020) [37]. Such measures can help caregivers better

navigate these complexities and improve patient outcomes. Lastly, caregivers expressed concern about the potential health implications of FOL on their loved ones, including the exacerbation of heart and lung conditions, and increased hospitalization risks. These concerns align with the research by Crespo-Leiro et al. (2018), highlighting the serious risks posed by FOL in ESRD patients [38].

The final aspect of the study provides insight into caregivers' grasp and implementation of preventive strategies for FOL in patients with ESRD undergoing hemodialysis. The results underscore the spectrum of understanding among caregivers regarding these tactics and emphasize the pivotal role healthcare professionals play in nurturing such knowledge. Our study observed in the responses was the range in knowledge regarding the preventive measures. Certain caregivers demonstrated a strong understanding of essential preventive measures such as dietary adjustments, medication adherence, and lifestyle changes, resonating with the findings of Anderson et al. (2018) [39]. These strategies are indeed pivotal in maintaining fluid balance and averting FOL. However, the research also identified caregivers with limited understanding or misconceptions, predominantly a belief that

merely restricting fluid intake would suffice. This highlights the need for educational interventions designed to rectify these misconceptions and provide all-encompassing knowledge [40]. Additionally, the study participants emphasized the critical role of healthcare professionals in enhancing their comprehension of these preventive measures [41]. Participants expressed appreciation for concise directions, educational resources, and ongoing interactions with healthcare professionals. This underscores the importance of effective education for both patients and caregivers, as well as efficient communication with healthcare providers [42, 43].

In this study, one notable limitation was the diversity of caregivers' experiences and backgrounds. While this diversity enriched our understanding and provided a multifaceted view of caregiving, it also introduced potential variables that might have affected the data. For example, caregivers who underwent formal training might adopt distinct methods from those influenced by traditional or communal teachings. Additionally, factors such as socio-economic status or cultural nuances can considerably shape the perspectives and hurdles encountered in caregiving. Although our research highlights an array of experiences, subsequent studies may consider a more

stringent selection process to pinpoint the impacts of individual caregiver experiences.

One of the key strengths of this study was its qualitative approach, which allowed for a detailed exploration of caregivers' experiences and perceptions. The use of individual interviews provided rich, personal insights and allowed caregivers to share their stories in their own words. Furthermore, the sample was diverse in terms of caregivers' relationship to the patient (e.g., spouses, children, parents), which added to the breadth of experiences captured.

Despite these strengths, the study also had several limitations. First, the sample size was relatively small, which may limit the generalizability of the findings. Second, the study relied on self-reported data, which could be influenced by recall bias or social desirability bias. Lastly, the study did not measure the caregivers' knowledge or practices objectively, which could provide a more comprehensive picture of their skills and behaviors in managing FOL.

5. Conclusion

This study revealed significant variability in caregivers' understanding of fluid overload (FOL) management among End-Stage Renal Disease (ESRD) patients undergoing hemodialysis. In the context of end-stage renal

disease (ESRD) patients, there is a robust understanding of fluid overload management, yet certain misconceptions persist that can hinder optimal care. Addressing these misconceptions is crucial to enhance patient outcomes and ensure efficient fluid management. The comprehension levels were influenced by factors like caregivers' background, education, and available resources. The study highlighted the emotional and practical challenges caregivers face, ranging from anxiety to exhaustion while monitoring patients' fluid intake and balancing the threat of severe health consequences. We found disparities in caregivers' knowledge about preventive measures for FOL, including daily weight monitoring and dietary restrictions. Healthcare professionals were identified as pivotal in providing necessary education and support but the caregivers expressed a need for more extensive training. This study underscores the often unnoticed yet crucial role of caregivers in managing FOL in ESRD patients and emphasizes the need for enhanced educational and emotional support for them given the increasing global burden of kidney disease.

Based on these findings, there is a clear need for tailored education and support interventions aimed at caregivers. Healthcare providers can

play a pivotal role in this regard, providing accurate information, practical guidance, and emotional support. Future research should aim to develop and evaluate such interventions, ideally in randomized controlled trials, to establish their efficacy in improving caregivers' knowledge and skills, reducing their emotional burden, and ultimately enhancing the management of FOL in ESRD patients undergoing hemodialysis. Additionally, further studies could explore these issues in larger and more diverse caregiver populations to increase the generalizability of the findings.

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Conflicts of interest

There are no conflicts of interest to declare.

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