



NURSING INNOVATION TO REDUCE ANXIETY IN NEWLY DIAGNOSED ENDSTAGE KIDNEY DISEASE PATIENTS UNDERGOING HEMODIALYSIS: LITERATURE REVIEW

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ABSTRACT

End-stage renal disease (ESRD) patients who have just started hemodialysis frequently experience high levels of anxiety caused by lifestyle changes, uncertain prognosis, and the burden of long-term therapy. Anxiety negatively impacts treatment adherence and quality of life, highlighting the need for effective nursing interventions to support psychosocial well-being. Purpose: This systematic literature review aimed to identify and analyze evidence-based nursing innovations that are effective in reducing anxiety among newly diagnosed ESRD patients undergoing hemodialysis. Methods: A Systematic Literature Review (SLR) was conducted following the PRISMA guidelines for studies published between 2015 and 2025. Literature searches were performed in Scopus, PubMed, ScienceDirect, and Google Scholar using combinations of the keywords “end-stage renal disease,” “hemodialysis,” “anxiety,” “nursing intervention,” “cognitive behavioral therapy,” and “psychosocial intervention.” From 4,301 records initially identified, seven studies met the inclusion criteria, consisting of four randomized controlled trials (RCTs), two RCT protocols, and one pilot study. Data were synthesized narratively to evaluate the effectiveness of nursing and psychosocial interventions in reducing anxiety among newly diagnosed ESRD patients undergoing hemodialysis. Results: The review found that Cognitive Behavioral Therapy (CBT) was consistently effective in reducing anxiety and depressive symptoms, particularly when combined with resilience-based models or mindfulness techniques. Advance Care Planning (ACP) interventions improved patients’ emotional acceptance and psychological adjustment, although their direct effect on anxiety reduction was limited. Technology-based interventions, including internet-based CBT (iCBT) and guided problem-solving therapy (PST), demonstrated strong potential as flexible, accessible, and cost-effective approaches. In addition, a pilot study utilizing virtual reality (VR) during hemodialysis procedures reported reductions in procedural pain and anxiety. Conclusion: Evidence-based nursing innovations incorporating CBT, ACP, digital interventions, and virtual reality show considerable potential in reducing anxiety among patients newly undergoing hemodialysis. These findings emphasize the critical role of nurses as psychosocial facilitators and support the integration of holistic, patient-centered, and technology-driven care models into routine hemodialysis practice.

Keywords: anxiety; cognitive behavioral therapy; ESRD; hemodialysis; internet-based CBT; nursing innovation

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INTRODUCTION

End-Stage Renal Disease (ESRD) is the final stage of chronic kidney disease, requiring patients to undergo renal replacement therapy, one of which is hemodialysis. The transition to hemodialysis, especially when patients are first diagnosed and begin therapy, is often a critical time that causes high levels of anxiety. Contributing factors include drastic lifestyle changes, dependence on the machine, uncertainty about the prognosis, and the resulting social and economic impacts (Chow SK et.al.,2016). Anxiety during the hemodialysis initiation phase can impact patient compliance, quality of life, and psychological adaptation. Studies show that patients new to hemodialysis experience higher levels of psychological distress than those who have been on therapy for a long time, making intervention in the early phase crucial (Chow SK et.al.,2016). However, conventional approaches to care often focus solely on the medical aspects, while the patient's psychological needs are often under-recognized.

The development of evidence-based practice shows that various innovations have been developed to address anxiety in ESRD patients. Psychosocial-based interventions such as Cognitive Behavioral Therapy (CBT) have been shown to significantly reduce anxiety and depression scores in hemodialysis patients (González-Flores, M., et al. 2023). Digital innovations are also being introduced, such as guided internet-based Problem Solving Therapy (iPST), which is considered effective in reducing emotional distress and has the potential for widespread application (Griva K, et al, 2024). Furthermore, a positive psychology approach through the HED-Start program, aimed at patients new to hemodialysis (less than 6 months), can improve quality of life and reduce depressive symptoms, although its impact on anxiety varies (Chow SK, et al, 2016). Given the high prevalence of anxiety in ESRD patients newly initiating hemodialysis and the importance of the initial adaptation phase, a systematic literature review of tested innovations, particularly through controlled clinical trials (RCTs), is crucial. This Systematic Literature Review (SLR) aims to identify, analyze, and compare various innovations that have been implemented to address anxiety in ESRD patients newly initiating hemodialysis, thereby providing a scientific basis for the development of more effective and sustainable nursing interventions.

However, although various studies have evaluated the effectiveness of psychosocial interventions such as Cognitive Behavioral Therapy (CBT), mindfulness, Advance Care Planning (ACP), and digital technology in reducing anxiety in hemodialysis patients, several research gaps remain. The majority of existing studies focus on the general hemodialysis patient population without differentiating between therapy phases, whereas evidence indicates that the initial phase of hemodialysis initiation represents the most critical period with the highest levels of anxiety. In addition, most studies involve small sample sizes, are conducted in single-center settings, and rarely prioritize innovative nursing-based interventions integrated into routine clinical practice. Several recent publications are still limited to research protocols without reported outcomes, preventing firm conclusions regarding the effectiveness of emerging interventions. Therefore, the aim of this systematic literature review is to identify, analyze, and compare evidence-based nursing innovations that have been clinically tested to reduce anxiety among patients with ESRD who are newly initiating hemodialysis.

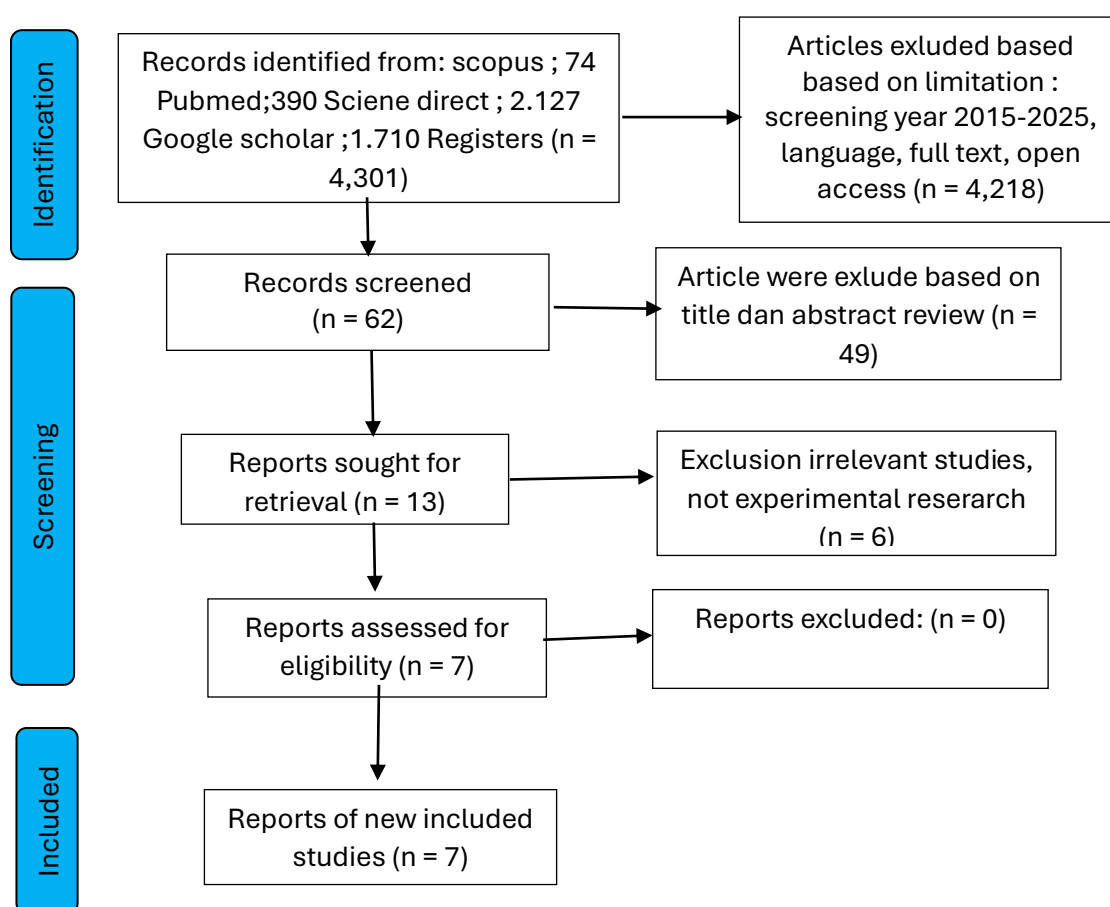
METHOD

However, although various studies have evaluated the effectiveness of psychosocial interventions such as Cognitive Behavioral Therapy (CBT), mindfulness, Advance Care Planning (ACP), and digital technology in reducing anxiety in hemodialysis patients, several research gaps remain. The majority of existing studies focus on the general hemodialysis patient population without differentiating between therapy phases, whereas evidence indicates that the initial phase of hemodialysis initiation represents the most critical period with the highest levels of anxiety. In addition, most studies involve small sample sizes, are conducted in single-center settings, and rarely prioritize innovative nursing-based approaches integrated into routine clinical practice. Several recent publications are still limited to research protocols without reported outcomes, preventing firm conclusions regarding the effectiveness of emerging interventions. Therefore, a systematic review was conducted using search keywords including “end-stage renal disease,” “hemodialysis,” “anxiety,” “nursing intervention,” “cognitive behavioral therapy,” “mindfulness,” “advance care planning,” and “digital psychosocial intervention” to identify and compare evidence-based nursing innovations that have been clinically tested to reduce anxiety among ESRD patients initiating hemodialysis..

The initial search yielded 4,301 articles, consisting of 74 articles from Scopus, 390 articles from PubMed, 2,127 articles from Science Direct, and 1,710 articles from Google Scholar. These articles were then filtered based on inclusion criteria: publication year 2015–2025, use of English or Indonesian, full-text availability, and open access. At this stage, 4,218 articles were excluded,

leaving 63 articles. Subsequently, 21 duplicate articles were removed, resulting in 43 unique articles for the next selection process.

During the title and abstract screening stage, 49 articles were excluded due to their relevance to the topic. Thirteen articles were then further evaluated through full-text reading. Of these, eight articles met the eligibility criteria, but two were excluded because they were pilot studies with very small participant numbers. Thus, seven articles met the inclusion criteria and were analyzed in this SLR. Inclusion criteria included articles with a randomized controlled trial (RCT) design or RCT protocol, focused on patients with End-Stage Renal Disease (ESRD) undergoing hemodialysis, used nursing or psychosocial interventions aimed at reducing anxiety or psychological distress, and were available in full-text open access. Exclusion criteria included articles with a non-experimental observational design, literature reviews, editorials, or pilot studies with a very limited number of participants.



Picture1. Flow Diagam PRISMA

RESULT

Table 1 presents a summary of the selected studies included in this review, highlighting the authors, study designs, and key research findings. The table provides an overview of the evidence regarding psychological and behavioral interventions among patients undergoing hemodialysis, with particular emphasis on their effects on anxiety, depression, and related psychosocial outcomes. The seven articles analyzed demonstrated significant attention to psychological disorders, particularly depression and anxiety, in hemodialysis patients. Most studies tested psychologically based interventions such as cognitive behavioral therapy (CBT) in various forms, while several articles highlighted novel approaches such as advance care planning and the use of virtual reality (VR).

Table 1.
Review Results

| No | Title / Author | Study Design | Research Findings |
|----|-----------------------------------|--|--|
| 1 | Valsaraj et al. (2016) | Randomized Controlled Trial | Cognitive Behavioral Therapy (CBT) significantly reduced anxiety and depression scores among hemodialysis patients compared with non-directive counseling. |
| 2 | González-Flores et al. (2023) | Randomized Controlled Trial | Cognitive Behavioral Intervention combined with a resilience model was more effective in reducing depression and anxiety and improving resilience compared to CBT alone. |
| 3 | Sohn et al. (2018) | Pilot Study (Pre-Post without Control Group) | Group-based CBT with mindfulness meditation improved quality of life, mood, and reduced anxiety and perceived stress in ESRD patients undergoing hemodialysis. |
| 4 | Varothai & Tirasriwat (2023) | Randomized Controlled Trial | Advance Care Planning (ACP) intervention influenced psychological outcomes, including anxiety and depression, although detailed results were limited. |
| 5 | Tommel et al. (2022) | Randomized Controlled Trial Protocol | This study is a research protocol aimed at evaluating the effectiveness and cost-effectiveness of personalized internet-based CBT in dialysis patients; results are not yet available. |
| 6 | Nadort et al. (2019) | Cluster Randomized Controlled Trial Protocol | The study was designed to examine the clinical and cost effectiveness of guided internet-based CBT for depression and anxiety; research results have not yet been reported. |
| 7 | Rodríguez de Galvis et al. (2025) | Pilot Crossover Study | Virtual reality use during vascular access cannulation reduced pain and anxiety, with greater benefits observed in patients with higher baseline anxiety levels. |

In terms of interventions, three articles confirmed the effectiveness of CBT in reducing symptoms of depression and anxiety. Valsaraj et al. demonstrated that CBT was more effective than nondirective counseling, while González-Flores et al. demonstrated that the addition of a resilience model strengthened the benefits of CBT on depression, anxiety, and quality of life. Meanwhile, Sohn et al. added a mindfulness component to group CBT, resulting in improved quality of life, mood, and reduced stress, although in a small sample (González-Flores, M., et al. 2023; Sohn, S. K., et al. 2018; Valsaraj, B. P., et al. 2016).

Non-CBT approaches have also emerged, such as advance care plan intervention (Özdemir, G., & Taşçı, S. 2013), which aims to support HD patients in navigating sensitive topics such as end-of-life care. This study showed an impact on anxiety and depression levels, although data are limited. Meanwhile, Rodríguez de Galvis et al. (2025) introduced virtual reality technology to reduce pain and anxiety during hemodialysis procedures. The results were promising, particularly in reducing pain during fistula puncture, although the effect on anxiety was variable.

Two other articles (Nadort, E., et al. 2019; Tommel, J., et al. 2022). (are protocols for ongoing randomized controlled trials (RCTs). Both emphasize online CBT-based interventions, either personalized (E-HELD) or guided self-help problem-solving therapy. Both are designed to address patient barriers to accessing face-to-face therapy and focus on both clinical effectiveness and cost-efficiency. Although results are not yet available, the direction of these studies demonstrates a trend toward digitalization and personalized psychological therapy for hemodialysis patients.

Overall, the available evidence supports the important role of CBT in improving the mental health of hemodialysis patients. The variety of interventions (classic CBT, CBT + resilience, CBT + mindfulness, and even internet-based CBT) demonstrates adaptation to patient needs and limitations. Non-CBT innovations such as advance care planning and virtual reality (VR) show additional potential, although evidence remains limited. Common limitations of these studies include small sample sizes, single settings, and short follow-up periods.

DISCUSSION

The results of this systematic literature review indicate that most psychological interventions, particularly those based on cognitive behavioral therapy (CBT), have been proven effective in

reducing symptoms of depression and anxiety in patients with end-stage chronic kidney disease undergoing hemodialysis. Of the seven articles analyzed, four directly evaluated the effectiveness of CBT in various forms, two were online CBT-based research protocols, and one emphasized the use of innovative non-CBT interventions, namely virtual reality (VR) and advance care planning (ACP). This pattern confirms that CBT and its variants are the most dominant approach in efforts to improve the mental health of hemodialysis patients.

An experimental study conducted by Valsaraj, B. P., et al. (2016) in India confirmed that individual face-to-face CBT significantly reduced depression and anxiety scores compared to non-directive counseling. These findings were reinforced by González-Flores, M., et al. (2023) in Mexico, which combined CBT with the resilience model. This combination proved more effective than CBT alone in improving quality of life, reducing depression, and strengthening patient resilience. Furthermore, Sohn, S. K., et al. (2018). in Korea added mindfulness meditation to group CBT and reported improvements in quality of life, decreased anxiety, and decreased stress levels. Although this study only involved seven participants and lacked a control group, the results suggest that incorporating mindfulness techniques can enhance the effectiveness of CBT in hemodialysis patients. Overall, the evidence from these three studies consistently supports the role of CBT as an effective non-pharmacological intervention in addressing psychological problems in dialysis patients.

Beyond CBT, research by Zarei, F., Jalali, A., Rezaei, M., & Hosseini, H. F. (2019) in Thailand showed that an advance care planning intervention also had an impact on anxiety and depression levels in hemodialysis patients. This intervention did not directly target psychological symptoms, but rather empowered patients to plan end-of-life medical decisions. Patient involvement in decision-making appeared to have a positive effect on their emotional well-being. Furthermore, a pilot study by Haddaway, N. R (2022) in Spain examined the use of VR during hemodialysis procedures. The results showed a reduction in pain during vascular puncture and anxiety in some patients, although the benefits were not uniform. These findings highlight the potential for utilizing innovative technology to support the psychological well-being of hemodialysis patients.

Two other articles are ongoing RCT protocols, namely studies by Tommel, J., et al. (2022) and Nadort, E., et al. (2019) in the Netherlands. Both focus on the development of internet-based CBT (ICBT), either in the form of personalized therapy (E-HELD) or guided self-help problem-solving therapy. These initiatives point to future research directions oriented toward the digitalization of psychological services, with the aim of addressing the limited access of dialysis patients to face-to-face therapy due to limited time, the burden of medical procedures, and the shortage of skilled personnel. Although the results of these studies are not yet available, the existence of these protocols indicates that the integration of digital technology is considered a potential solution in the mental health care of kidney patients.

When compared with the global literature, these findings are consistent with studies in patients with other chronic diseases such as cancer and diabetes, which also report that CBT can reduce depression and improve quality of life. Therefore, it can be concluded that hemodialysis patients derive similar benefits from CBT interventions. However, several limitations should be noted. First, most studies had small sample sizes and were conducted in a single setting, thus limiting the generalizability of the results. Second, there were variations in outcome measurement methods and instruments, such as the use of the HADS, BDI, or WHOQOL-BREF, which made it difficult to pool the results in a quantitative meta-analysis. Third, some studies were pilot or protocol studies, so the available evidence is still limited and requires further verification through large-scale RCTs.

The practical implication of this study's findings is the need to integrate psychological interventions into nephrology clinical practice. CBT, both face-to-face and online, can be considered as part of routine support programs for hemodialysis patients. Additional interventions such as ACP can help

patients address complex psychosocial issues, while the use of VR technology can support comfort during dialysis procedures. Thus, a multimodal strategy can be considered to provide more comprehensive psychological support. Going forward, research should focus on multicenter RCTs with larger sample sizes, the use of standardized outcome instruments, and longer follow-up periods. Furthermore, exploration of digital-based interventions such as ICBT should be continued, given their potential cost-efficiency and wider accessibility. This approach will allow for stronger evidence to support the implementation of psychological interventions as an integral part of hemodialysis patient care.

CONCLUSION

A systematic review showed that patients with End-Stage Renal Disease (ESRD) who have just started hemodialysis experience high levels of anxiety due to lifestyle changes, uncertainty about the future, and complex therapy demands. Various nursing innovations have been proven effective in reducing anxiety, particularly through Cognitive Behavioral Therapy (CBT) and its variations (mindfulness, resilience model), therapeutic communication through Advanced Care Planning (ACP), and digital technology-based interventions such as Internet-based CBT (ICBT) and Problem-Solving Therapy (PST). All of these interventions consistently contribute to reducing anxiety, improving quality of life, and strengthening patients' adaptive abilities.

The nursing implications of this review emphasize the importance of implementing evidence-based psychosocial interventions, particularly CBT and its variants (mindfulness, resilience model), therapeutic communication through Advance Care Planning (ACP), and the use of digital technology (ICBT and PST) to support new ESRD patients undergoing hemodialysis. Nurses play a central role in integrating these innovations into daily clinical practice, not only as providers of physical care but also as facilitators of psychological adaptation. With a holistic, personalized, and technology-based approach, nurses can help patients reduce anxiety, improve quality of life, and strengthen coping skills in facing the challenges of chronic illness.

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