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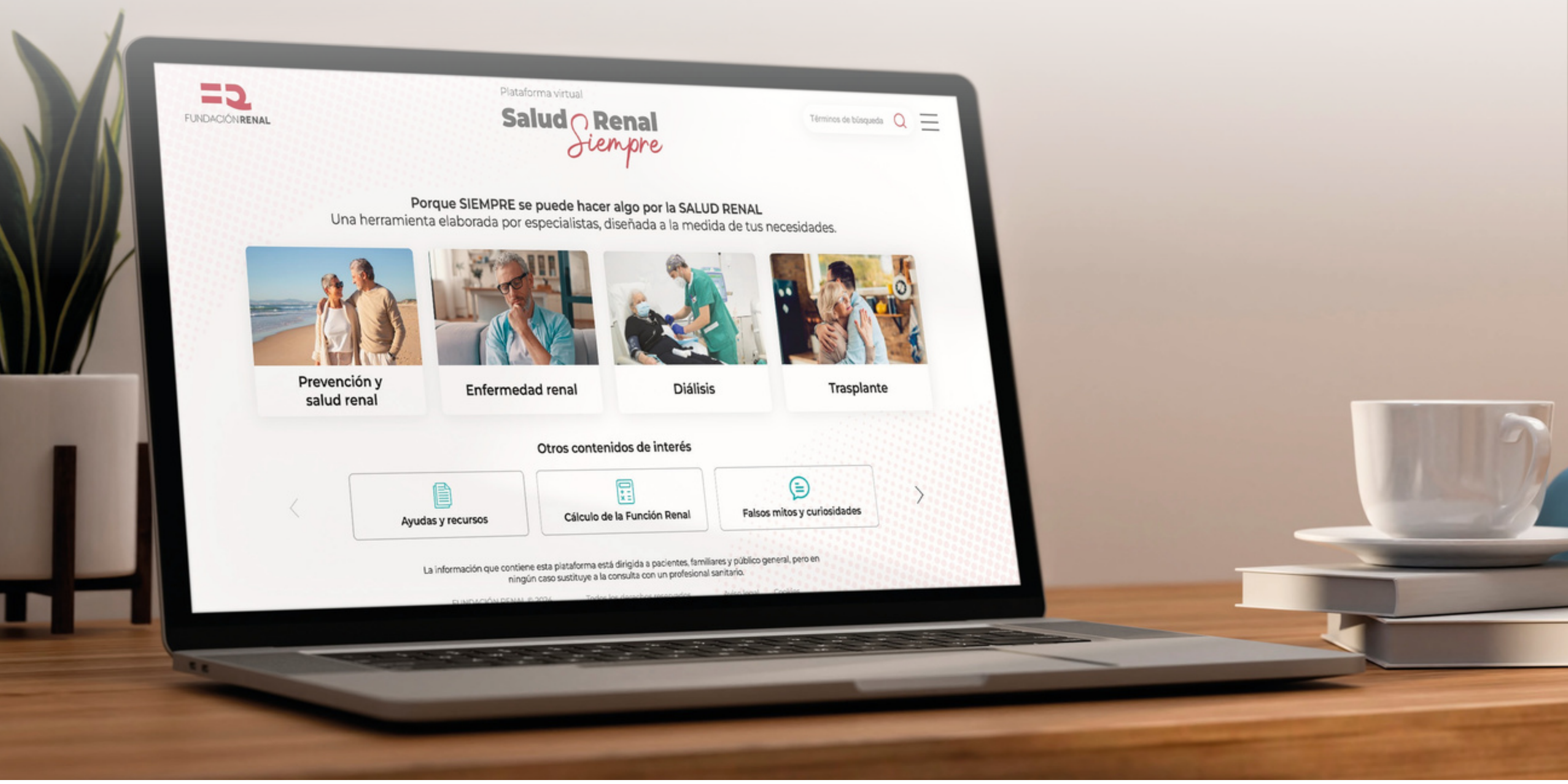

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Towards a sustainable and effective model for the prevention of chronic kidney disease: the strategic role of nephrology nursing

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Chronic kidney disease (CKD) is now one of the greatest health challenges in Europe and worldwide. Its rising incidence, late diagnosis, and the substantial clinical, social, and environmental costs associated with advanced stages require a profound transformation of health-care systems. The response cannot be limited to hospital-based care; it must be structured around primary care, prevention, and a comprehensive approach led by multidisciplinary teams. Within this context, the vision and role of nephrology nursing—and the support of patient organizations such as the Spanish Association for the Fight Against Kidney Disease (ALCER)—are essential to achieving systemic, effective, and sustainable change.

The Global Response: The World Health Organization (WHO) Resolution on Kidney Health

In May 2025, the World Health Assembly adopted Resolution EB156/CONF./6, which for the first time places CKD at the center of the global public-health agenda. This resolution, promoted by Guatemala and supported by organizations including the International Society of Nephrology (ISN) and the European Kidney Patients' Federation (EKPF), establishes a roadmap to address CKD through:

- Integration of kidney health into national non-communicable disease plans.
- Improvements in data collection and epidemiological surveillance.
- Promotion of primary prevention and early detection strategies.
- Strengthening of human resources, including training of health personnel in kidney health.
- Development of resilient health systems that prioritize equity and access to essential CKD treatments.

These international guidelines legitimize and reinforce many practices already under development across the European nephrology community, as documented in the report *Overview of primary prevention and screening best practices* from the PreventCKD project, in which the patient organization EKPF analyzes best practices in early CKD detection

.

The Chronic Care Model as a Strategic Framework and the Role of Nephrology Nursing

Llewellyn's 2019 article on the application of the Chronic Care Model (CCM) to CKD management in primary care provides a robust framework for rethinking CKD care. The CCM, developed by the MacColl Center for Health Care Innovation, is organized around six key components:

- Self-management support
- Delivery system design
- Decision-support strategies
- Clinical information systems
- Health-system organization
- Community engagement

Studies reviewed indicate that interventions integrating multiple CCM components are more effective in improving clinical and operational outcomes. A particularly relevant finding is that nurses—especially those with nephrology training—are *"key facilitators"* of successful CCM implementation, contributing directly to screening, education, treatment follow-up, and shared patient management.

The PreventCKD best-practice report and Llewellyn's work both highlight the positive impact of specialized nursing on CKD prevention and early management. Nephrology nurses not only possess the clinical expertise required for interpreting tests, educating patients, and coordinating care, but they also play a decisive role in promoting self-care, treatment adherence, and shared decision-making.

Examples such as the SureNet model in the United States, community programs in New Zealand, and nurse-led clinics in Australia and the United Kingdom illustrate how nursing leadership in rural, urban, and multicultural settings increases access, reduces unnecessary referrals, and improves the quality of life of individuals with CKD.

Beyond Clinical Care: Campaigns, Community, and Empowerment

Awareness campaigns are also a high-value strategic tool. The WHO resolution underscores the importance of engaging communities and patient organizations in CKD prevention. Initiatives such as *Actúa por tus riñones* and *Renalert* by the Spanish National Federation of ALCER Associations, or *End Dialysis by 2050* by Kidney Health Australia, translate this vision into concrete actions that promote healthy habits, improve health literacy, and encourage early diagnosis.

Nephrology nursing can strengthen these campaigns through holistic, culturally adapted strategies, including school-based activities, outreach to high-risk groups, and digital health campaigns. Nurses possess a unique ability to translate science into accessible language and empower at-risk individuals to make informed decisions about kidney health.

Despite progress, the PreventCKD report highlights several gaps:

- Low risk perception in vulnerable groups.
- Limited evidence on awareness-campaign outcomes.
- Insufficient epidemiological data in early CKD stages.
- Limited systematization of the impact of educational and community interventions.

In this regard, the WHO resolution's aim to improve data collection, invest in workforce training, and strengthen links between primary and specialized care finds in nephrology nursing a strategic ally for practical implementation. Nurses can serve as a bridge between public policy, scientific evidence, and social realities.

Conclusion: A Global Opportunity Requiring Local Leadership

CKD demands integrated, sustainable, person-centered responses. The WHO resolution has opened an unprecedented window of opportunity for governments, professionals, and communities to act in a coordinated manner.

Spain has already begun this work. For months, a task force convened by the Directorate-General for Public Health of the Ministry of Health has been working on a national strategy for early CKD detection within the chronic-care framework. Nephrology nursing, represented by the Spanish Society of Nephrology Nursing, is part of this group, collaborating with medical societies and the National Federation of ALCER Associations toward a strategy that includes key indicators for future evaluation and improvement.

Implementing the CCM from a nursing perspective—as suggested by Llewellyn and by PreventCKD—brings this vision into the everyday reality of health-care centers, hospitals, and rural areas. Nephrology nurses are prepared to lead this transformation, not as peripheral support, but as central agents in redesigning kidney care.

Now is the time to act—not only for clinical or economic reasons, but as a matter of health justice, equity, and sustainability. As the WHO states, "kidney health is a global priority," and nephrology nursing is a key defender of that priority.

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Kidney transplantation in older patients: survival and quality of life. A systematic review

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ABSTRACT

Kidney transplantation in older patients: survival and quality of life. A systematic review

Introduction: Kidney transplantation offers improved survival and quality of life vs dialysis in patients with advanced chronic kidney disease. However, its use in older adults remains controversial due to factors such as comorbidity and reduced life expectancy.

Objectives: To identify and synthesise the available scientific evidence regarding outcomes of kidney transplantation in older patients with end-stage renal disease.

Methodology: We conducted a systematic review across searches in PubMed, Scopus, and Google Scholar. The following MeSH terms were used: kidney transplant, older adults, quality of life, survival. Articles published between 2014 and 2024 in English or Spanish were included.

Results: A total of 16 studies were selected, including 6 systematic reviews and 10 observational studies. Analysis showed that kidney transplantation in older adults is generally associated with greater survival and improved quality of life vs remaining on dialysis. However, outcomes vary depending on donor type, comorbidities, and pretransplant functional status.

Conclusions: Kidney transplantation is a valid therapeutic option for selected elderly patients, improving both survival and quality of life, and should not be excluded solely on the basis of age. Comprehensive and individualised assessment is essential to optimise outcomes in this population.

Keywords: kidney transplantation; older adults; survival; quality of life.

RESUMEN

Trasplante renal en pacientes de edad avanzada: supervivencia y calidad de vida. Una revisión sistemática

Introducción: El trasplante renal es una opción terapéutica que ofrece una mejora en la supervivencia y en la calidad de vida en comparación con la diálisis, en personas con insuficiencia renal crónica avanzada. Sin embargo, su uso en adultos mayores sigue siendo motivo de controversia debido a factores como la comorbilidad asociada y una menor esperanza de vida.

Objetivos: Conocer y sintetizar la evidencia científica existente sobre los resultados del trasplante renal en pacientes con insuficiencia renal terminal de edad avanzada.

Metodología: Se ha realizado una revisión sistemática a través de una búsqueda llevada a cabo en las bases de datos PubMed, Scopus y Google académico. Se utilizaron los términos MeSH: trasplante renal ("kidney transplant"), adultos mayores ("older adults"), calidad de vida ("quality of life"), supervivencia ("survival"). Se incluyeron artículos cuya publicación estuviese comprendida entre 2014 y 2024 en inglés y español.

Resultados: Se seleccionaron 16 artículos, entre ellos 6 revisiones sistemáticas y 10 estudios observacionales. El análisis de estos trabajos evidenció que el trasplante renal en adultos mayores se asocia, en general, con una mayor supervivencia y una mejor calidad de vida en comparación con la permanencia en diálisis. No obstante, los resultados varían en función del tipo de donante, las comorbilidades y el estado funcional previo al trasplante.

Conclusiones: El trasplante renal es una alternativa válida en pacientes ancianos seleccionados, mejorando su supervivencia y calidad de vida, y no debe descartarse únicamente por la edad. Es fundamental realizar una valoración integral e individualizada para optimizar los resultados en esta población.

Palabra clave: trasplante renal; edad avanzada; supervivencia; calidad de vida.

INTRODUCTION

Chronic kidney disease represents a major public health challenge due to its high prevalence, treatment cost, and impact on quality of life. In advanced stages, patients require renal replacement therapy (RRT), with kidney transplantation (KT) being the preferred option over dialysis[1,2]. KT offers better outcomes, even in individuals older than 65 years of age, with survival rates of 90% at 1 year and 70% at 5 years[3,4].

Access to transplantation, however, remains limited by the shortage of organs, worsened by a decline in young donors due to demographic changes and decreased mortality from accidents. Despite Spain's leadership in donation, the waiting list continues to grow, reinforcing the need for innovative strategies[5,6].

In 2023, mortality rates among patients on hemodialysis and peritoneal dialysis were 13.3% and 8.6%, respectively, compared with 2.6% among patients with a functioning KT. Although 65% of patients on hemodialysis are over 65 years old, only 38% of these access KT[7].. This has prompted reconsideration of selection criteria, allowing the inclusion of older patients with good clinical status as transplant candidates[8].

The increasing number of transplants in this population raises questions about clinical outcomes. Although limiting factors such as comorbidities or postoperative complications exist[9], one-year patient survival in individuals over 60 years ranges from 89.7% to 91%, and graft survival adjusted for mortality reaches 96.4%[10]—figures comparable to those of younger recipients.

Given these results, strategies such as allocating older donors to older recipients and accepting living donors with expanded criteria have been implemented, improving outcomes and access to transplantation[11]. However, these decisions must be made cautiously, considering the clinical complexity of elderly patients, including diabetes, cardiovascular disease, or infections.

In this context, frailty—associated with poorer postoperative outcomes and higher mortality risk in dialysis—has become a key factor when evaluating KT candidacy[12]. To address these challenges, improvements are being developed in immunosuppressive protocols, perioperative management, and donation promotion[13,14].

Beyond survival, quality of life has gained particular importance and is now considered a fundamental aspect. Although data remain limited, KT has been shown to improve functional and social quality compared with dialysis, as well as reduce the burden of dietary restrictions[15,16].

For these reasons, it is necessary to adopt a broader perspective that considers not only survival rates but also complications, perceived quality of life, and comparisons with elderly patients undergoing dialysis[17]. In a context where the mean age of patients receiving RRT is increasing, this review is especially relevant.

Accordingly, our primary endpoint was to identify and synthesize the scientific evidence regarding survival and quality of life in older adults who undergo kidney transplantation, and our secondary endpoints were:

- To compare survival between older adults with KT and those receiving dialysis.
- To assess the influence of KT on quality of life in elderly patients with end-stage renal disease.

METHODOLOGY

Design

We conducted a systematic review of studies from health science databases according to the PRISMA statement (Preferred Reporting Items for Systematic Reviews and Meta-Analyses)[18].

Additionally, following the PICO model, we defined the following research question: "Do elderly kidney transplant recipients have better survival and quality of life compared with patients of the same age on dialysis?"

According to this model:

- **P (Population):** elderly KT recipients.
- **I (Intervention):** not applicable.
- **C (Comparison):** elderly dialysis patients.
- **O (Outcomes):** comparison of results between both RRT modalities.

Search strategy

The databases used were PubMed, Google Scholar, and Scopus. Data collection occurred from November 2024 to March 2025.

The search strategy consisted of using descriptors or keywords according to MeSH terminology: *kidney transplant*, *older adults*, *quality of life*, *survival*. These terms were combined using Boolean operators AND and/or OR as appropriate.

Eligibility criteria

– Inclusion criteria

- Original articles or systematic reviews addressing the study objectives.
- Studies analyzing KT survival outcomes in elderly populations.
- Original articles comparing mortality in elderly KT recipients versus elderly dialysis patients.
- Studies analyzing quality of life in elderly kidney transplant recipients.
- Original articles comparing quality of life in elderly KT recipients vs. elderly dialysis patients.
- Studies conducted in Europe.

– Exclusion criteria

- Studies analyzing these variables in populations younger than 60 years.
- Articles without full-text availability.

Quality assessment

To assess the quality of the included studies, the STROBE checklist[19] was used for observational and cross-sectional studies. The CASPE checklist[20] was used for systematic reviews.

Data extraction

The following variables were extracted from the selected articles: author, country, year, methodological design, sample, sample age, main results, and quality of the evidence.

Synthesis of results

A qualitative synthesis was performed to organize and interpret the information clearly and systematically. A thematic-categorical approach was adopted due to the heterogeneity of outcomes and variables among the studies reviewed.

RESULTS AND DISCUSSION

Search results

Once the search strategy had been established, the search process was conducted. The first search was performed without considering any inclusion or exclusion criteria, with the aim of identifying the volume of existing publications on the topic.

Using the combination of the previously mentioned MeSH terms, a total of 6,045 articles were obtained. Of these, 250 were preselected after applying the exclusion criteria, from which 26 were discarded due to duplication across databases.

After reviewing the titles and abstracts, 161 articles were excluded because they were not aligned with the topic addressed in this review. Two additional articles were excluded because no abstract was available.

Next, full-text access was obtained for the remaining 63 articles, and a screening process was conducted. A detailed reading was carried out to determine their suitability, resulting in 47 being excluded due to lack of conclusive data.

Ultimately, 16 articles were selected. This process is shown in the flowchart following PRISMA recommendations[18] **(figure 1)**.

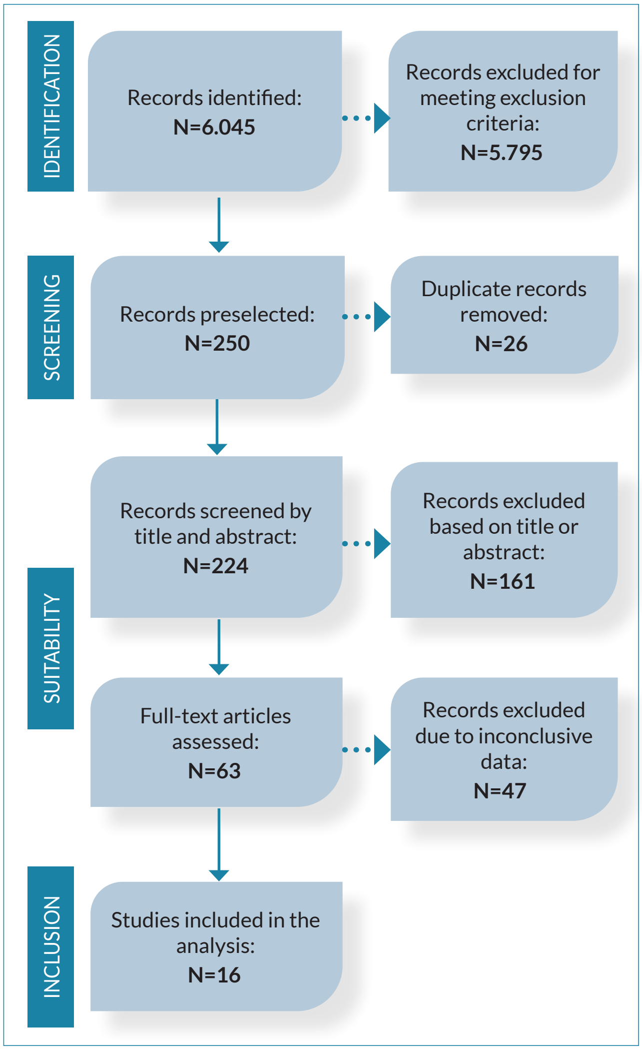

Figure 1. Flow diagram of the article search process.

The total number of articles obtained at each stage was as follows:

- **PubMed:** 21 articles were retrieved, of which 13 were removed after applying exclusion criteria. Among the remaining 8, three were eliminated due to duplication. Ultimately, 2 articles were included after screening titles, abstracts, and full texts.

- **Scopus:** 3,142 articles were identified; 3,002 were excluded after applying criteria. From the 140 preselected articles, 10 were removed because they were duplicates, and 72 were excluded after reviewing titles, abstracts, and full texts. A total of 3 articles were retained.
- **Google Scholar:** 2,882 articles were found; 2,780 were excluded after applying criteria. Of the remaining 102, 13 duplicates were removed. After screening titles, abstracts, and full texts, 11 articles were included.

Characteristics of the results

Most of the studies included in this review were observational designs.

The main characteristics and relevant data of the selected articles are presented in **table 1** (author, country and year of publication, study design, sample size and age, main results, and quality assessment).

Description of variables

– Donor and recipient age

Most of the reviewed studies analyzed the relationship between donor and recipient age[21,22,24,26,33,36]. Artiles et al.[21], in a sample of 293,501 patients, reported that the mean donor age for recipients >70 years was higher compared with recipients <70 years, demonstrating a tendency to allocate older donors to older recipients. Similarly, in a cohort study with 138 transplant recipients with a median age at transplant of 77.5 years, donor median age was also high, at 77 years, and 22.5% of donors were 80 years or older[22].

Lloveras et al.[24] analyzed 5,230 deceased-donor kidney transplants and found that 80.1% of kidneys from donors ≥65 years were transplanted into recipients ≥60 years, confirming the donor–recipient age correlation. Cuadrado-Payán et al.[26] compared recipients aged 60–65 years with those ≥75 years and found that donors for the ≥75 group were significantly older. Another study examining deceased-donor kidney recipients reported that recipients who received kidneys from donors ≥75 years had a mean age of 68.9 years, with most of these kidneys (93.6%) allocated to recipients ≥60 years[33].

Table 1. Characteristics of the studies included in the review.

Citation	Author (year), Country	Type of Study	Sample Size	Sample Age	Results	Quality Criterion
21	Artiles et al. (2023), Europe	Systematic review and meta-analysis	9 articles	≥70 years	The meta-analysis highlights that KT is an important treatment for end-stage renal disease in the elderly. However, the decision between dialysis and transplantation is complex, and improved recipient selection through geriatric assessments is recommended.	CASPE 9/11
22	Cabrera et al. (2020), Spain	Retrospective observational cohort study	138 patients	≥75 years	Outcomes of KT in patients aged >75 years who received kidneys from deceased donors of similar age were analyzed. Findings suggest that pre-transplant evaluation based on clinical and macroscopic characteristics is effective in ensuring good outcomes.	STROBE 18/22
23	Arcos et al. (2019), Spain	Retrospective observational cohort study	2,585 patients	≥75 years	Kidney transplants from donors >80 years were analyzed to determine the benefit threshold of transplantation in recipients >60 years. The study explores the feasibility of using elderly donors and outcomes in elderly recipients.	STROBE 20/22
24	Lloveras et al. (2015), Spain	Retrospective matched analysis study	915 patients	-	Transplanted patients were compared with dialysis patients, analyzing survival and other transplant-associated variables. The analysis provides a deeper understanding of factors influencing the success of KT.	STROBE 18/22

Citation	Author (year), Country	Type of Study	Sample Size	Sample Age	Results	Quality Criterion
25	Hernández et al. Spain (2018)	Systematic review	*11 artícles	≥65 years	This study examines mortality in elderly patients on the kidney transplant (KT) waiting list and compares it with mortality among transplant recipients. KT offers better survival than dialysis in older adults, but careful candidate selection is required. Risk factors for death on the waiting list are identified, and perioperative and post-transplant mortality are evaluated.	CASPE 10/11
26	Cuadrado Payán et al. Spain (2022)	Single-center, longitudinal, retrospective study	164 patients: • 106 (60–65 years) • 57 (≥75 years)	≥65 years	This study analyzes outcomes of KT in older recipients who received kidneys from older donors. Outcomes of recipients ≥75 years were compared with those aged 60–65 years, adjusting for donor and recipient covariates. The results provide valuable information regarding the viability of KT in elderly patients, increasingly relevant given population aging.	STROBE 17/22
27	Morales et al. Spain (2015)	Prospective, longitudinal observational study	52 patients	Mean age 74.3 years	The study investigates pre-dialysis KT in elderly recipients using kidneys discarded from very elderly donors. It is proposed as an alternative for older patients, offering an option for pre-dialysis KT.	STROBE 20/22
28	Mesnard et al. Spain (2023)	Systematic review	*27 artícles	≥70 years	This review analyzes KT from donors older than 70 years. Evidence on the outcomes of these transplants is limited. The systematic review examines available data to improve understanding of KT results with elderly donors.	CASPE 9/11
29	MacKinnon et al. United Kingdom (2018)	Systematic review	*29 artícles	≥65 years	This study examines the relationship between physical function and physical activity with clinical outcomes in patients with CKD not on dialysis and KT recipients. It reviews evidence on reduced physical function and activity in CKD and evaluates associations with mortality and other adverse outcomes.	CASPE 8/11
30	Barbachowska et al. Poland (2024)	Systematic review	*17 artícles	≥60 years	This review focuses on surgical and clinical complications of KT in elderly recipients. It aims to provide a detailed understanding of the challenges and risks associated with kidney transplantation in this population.	CASPE 10/11
31	Schoot et al. Netherlands (2022)	Systematic review	*16 artícles	≥60 years	This review compares dialysis and KT in older adults. It summarizes functional, psychological, and quality-of-life outcomes associated with each treatment. The choice between transplant and dialysis in the elderly is complex due to the high prevalence of comorbidities.	CASPE 10/11

Citation	Author (year), Country	Type of Study	Sample Size	Sample Age	Results	Quality Criterion
32	Heldal et al. Norway (2019)	Observational, longitudinal, retrospective study with a cost-utility analysis	289 patients	≥65 years	This study analysed the health and economic impact of kidney transplantation (KT) in individuals older than 65 years. One year after transplantation (performed in 71% of the 289 patients, with a mean wait time of 14.6 months and 24 months on dialysis), there was a significant improvement in quality of life and QALYs. However, the cost per QALY was higher in the first post-transplant year (€88,100 vs. €76,495 on the waiting list), with a high ICER (€419,792/QALY). Although the initial cost is higher, transplantation may be cost-effective in the long term, and longer follow-up is recommended.	STROBE 18/22
33	Pérez-Sáez et al. Spain (2019)	Retrospective observational cohort study	5.886 patients	Stratified into 3 groups: <65 years, 65–69 years, ≥70 years	This study examined the survival benefit of KT using kidneys from deceased donors older than 75 years. Survival of patients who received kidneys from donors ≥75 years was compared with that of dialysis patients who were transplant candidates. The findings contribute to understanding the benefits of KT in recipients receiving organs from elderly donors.	STROBE 20/22
34	Zompolas et al. Germany (2021)	Retrospective clinical study	85 patients	≥65 years	This study analysed the outcomes of deceased-donor KT in the Eurotransplant Programme, with a specific focus on recipients aged 75 years or older. Trends and outcomes were evaluated, including patient and graft survival. The study provides valuable information on the effectiveness and challenges of KT in elderly recipients within the Eurotransplant framework.	STROBE 18/22
35	Tsarpali et al. Norway (2021)	Prospective cohort study	192 patients	Mean age 72.1 years	This study investigated how comorbidity and physical status before transplantation influence survival in elderly KT recipients. Higher comorbidity and lower physical function were significantly associated with poorer post-transplant survival.	STROBE 19/22
36	Lønning et al. Norway (2015)	Single-centre retrospective study	47 patients	>80 years	The study included transplant recipients between 1983 and 2015. Patients transplanted before 2000 showed lower survival, with a median of 2.5 years, compared with those transplanted after 2000, whose mean survival was 5.0 years. Death-censored graft survival at five years was similar between the ≥79 and 70–79 age groups (89% in both). Analyses also showed that donor age and timing of KT were significant factors influencing survival outcomes.	STROBE 17/22

***:** number of articles. **KT:** Kidney transplantation. **QALY:** Quality-Adjusted Life Years**. ICER:** Incremental Cost-Effectiveness Ratio.

Similarly, Lønning et al.[36] analyzed transplants in patients older than 79 years and found that donor median age increased significantly in transplants performed after the year 2000 compared with earlier transplants.

These findings reflect a common practice in elderly kidney transplantation, where donor age tends to be higher and, in most cases, expanded-criteria donors are used for older recipients.

Survival

Recipient survival

Advanced recipient age is generally associated with lower survival after kidney transplant. A systematic review found that in the short term (1–3 years), survival rates are similar between younger and older patients, but at 5 years, differences widen: among recipients >70 years, survival ranges between 51.0% and 93.1%, compared with 68.0% to 94.0% in younger recipients[21].

In one study with patients of mean age 77 years, survival was 82.1% at 1 year and 60.1% at 5 years, with cumulative mortality of 45.6% at 3 years[22]. Similarly, a cohort of recipients of donors >65 years reported survival rates at 1, 5, 10, and 15 years of 91.8%, 74.9%, 54.3%, and 37.6%, respectively—lower than those receiving kidneys from younger donors (96.4%, 89.7%, 77.1%, and 64.8%)[24]. Comparable results were found in recipients ≥75 years, with 1- and 5-year survival rates of 91% and 74%, whereas the 60–65 group reached 95–97% and 82–85%, respectively[26]. However, Lønning et al.[36] found no direct association between advanced age and higher mortality when comparing recipients >79 years with those aged 70–79 years.

Another study observed greater survival among patients who received preemptive kidney transplant (before starting dialysis), with survival rates of 92% at 1 year and 78% at 3 and 5 years, compared with 83% at the same intervals among those who began dialysis prior to transplant[27].

A systematic review reported survival rates for recipients of donors >70 years of 90.88% at 1 year and 71.29% at 5 years, consistent with recent series[28]. Another study noted that transplantation from donors ≥75 years resulted in survival rates of 90% at 1 year, 70% at 5 years, 50% at 10 years, and 26% at 15 years, lower than those receiving kidneys from donors <75 years[34]. In another study involving adults >60 years, higher early infection rates negatively affected survival[30].

From a survival perspective, these findings reinforce the feasibility of kidney transplantation in older adults, with results comparable to recent cohorts of recipients from octogenarian donors, in whom improved survival was noted beginning at 12 months post-transplant[37].

Graft survival

In older patients, renal graft survival is generally comparable to, or even more favorable than, that of younger recipients. According to a systematic review, graft loss is similar between recipients older and younger than 70 years, and was even lower in older adults. No relevant differences were found regarding delayed graft function, estimated glomerular filtration rate, or final creatinine levels[12]. Another study reported graft-survival rates of 95.6% at one year and 93.1% at five years, excluding deaths[22], while another cohort of recipients of donors older than 65 years showed graft-survival rates at 1, 5, 10, and 15 years of 84.4%, 61.0%, 40.1%, and 27.4%, respectively—lower than those observed with younger donors (90.1%, 77.6%, 58.9%, 42.7%)[23]. Survival improves when donors are between 60 and 79 years (93% at one year; 83% at five years) compared with very elderly donors, where survival drops to 86% and 64% at the same time points[23]. In another study, although graft survival in recipients ≥75 years reached 96% at one year and 83% at five years, compared with 99% and 89% in the 60–65-year group, no statistically significant differences were found[26]. In transplants performed before the initiation of dialysis, graft survival reached 96% at one, three, and five years; meanwhile, in those who began dialysis before transplant, survival decreased to 76%–68%–68%, respectively, with significant differences[27]. There was also a higher prevalence of delayed graft function among those who had initiated dialysis before surgery (34.6%) compared with those transplanted pre-emptively (3.8%). Immediate graft function was also more common in the pre-emptive group (92% vs. 53%)[27].

Other national registries in recipients of donors >70 years reported graft-survival rates of 92% at one year and 81.5% at five years, similar to other international series. No relevant differences were observed in glomerular filtration rate, creatinine, or the rate of acute rejection (16%)[28].

Graft survival from donors >75 years is 78% at one year, 55% at five years, 38% at ten years, and 15% at fifteen years, lower than survival from donors <75 years (90%, 75%, 56%, 40% at the same time points). However, in grafts from donors >75 years, survival excluding recipient death can reach 68% at 10 years. Other factors shown to negatively affect survival include viral infections, diabetes, early graft dysfunction, and female recipient sex[33].

Quality of Life

Quality of life (QoL) is a key indicator of the success of kidney transplantation (KT) in elderly patients. A systematic review shows a significant improvement in overall QoL as early as two months after transplantation, which is maintained or even increases up to one year, with general-health scores rising from 56 to 67 at two months and to 70 at six months. Validated tools such as the SF-36 and the EuroQol-5D support this positive trend at one year post-transplant[31].

In contrast, older patients starting dialysis do not show a clear improvement in QoL. Some studies report no significant changes at six months, and others show only partial improvements after one year, though with methodological limitations and a lack of robust statistical analysis. A single-center study suggested a slight improvement in cognitive function after starting dialysis, although with a small sample and no statistical testing[31].

More recent studies, such as Humar et al.[38] indicate a QoL comparable to that of the general population of the same age group. These findings reinforce that elderly recipients obtain substantial benefits from KT, even when the organ comes from donors of a similar age. In this regard, our findings align with those of Alegre et al.[37], who reported that one-third of older patients experienced a considerable improvement in their health compared with the year prior to transplantation.

Other studies, such as the one conducted by Cornella et al.[40] noted certain limitations in specific QoL domains, suggesting that improvements may not be uniform. However, the overall impact on daily functioning and subjective well-being remains positive. In this study, everyday activities such as walking, dressing, and personal hygiene scored high after transplantation—findings consistent with those of Alegre et al.[37]. Moreover, the incorporation of adapted physical-exercise programs, such as hydrotherapy described by Pechter et al.[41], may play an important role in prolonging survival and improving functional status.

Comparison of Quality of Life and Survival Between Dialysis and Kidney Transplantation

According to Schoot et al.[31], older transplant recipients show better health-related QoL than those remaining on dialysis. Dialysis patients have poorer physical function and a higher incidence of serious falls. Additionally, mortality in dialysis is 10 to 20 times higher than in the general population, whereas after transplantation this rate decreases, although the risk remains elevated due to the burden of advanced kidney disease.

To evaluate the survival benefit of KT using very elderly deceased donors, Arcos et al.[23] studied a cohort of patients ≥60 years who initiated renal replacement therapy. Their analysis showed that transplantation with donors aged 60–79 yearsprovided a survival advantage beginning at 12 months post-transplant in all patient subgroups, regardless of age or comorbidities. When analyzing donors ≥80 years, the overall reduction in mortality reached 85%.

Barbachowska et al.[30] reviewed studies in recipients>70 years and highlighted that although mortality may be higher immediately after transplantation vs dialysis, survival markedly improves after the first year: 80% at 5 years vs. 53% in dialysis, and 53% at 10 years vs. 17% in dialysis. Similarly, a cohort study showed that recipients of kidneys from donors ≥75 years had lower mortality risk than those who remained on the dialysis waiting list, with a survival benefit evident from the first month post-transplant[33].

Therefore, our findings align with studies summarized in a systematic review of 110 works[42] and the UNOS (United Network for Organ Sharing) registry[43], which conclude that KT is associated with lower mortality, fewer cardiovascular events, and better health-related QoL vs dialysis.

Immunosuppression

Several studies have analyzed immunosuppression in kidney transplant (KT) recipients from elderly donors. In the study by Pérez-Sáez et al.[23], recipients of donors ≥80 years received tacrolimus more frequently (82.0%) and thymoglobulin (34.4%) compared with donors aged 60–79 years (tacrolimus 60.1%, thymoglobulin 25.1%), while cyclosporine was used less often in donors ≥80 years. The use of mycophenolate and steroids was high and similar in both groups. Primary use of tacrolimus during the first 6 weeks was associated with improved graft survival and a higher proportion of functioning grafts, thanks to tacrolimus- and basiliximab-based protocols. Another study including 5,886 deceased-donor KT recipients showed that tacrolimus use increased with donor age, reaching 64.8% in recipients of donors ≥75 years. In multivariable analysis, its use was associated with lower risk of death, lower risk of graft loss, and lower risk of death-censored graft loss[33].

According to Lønning et al.[36], the introduction of mycophenolate mofetil and basiliximab improved post-transplant outcomes. It has been suggested that recipients >80 years may tolerate lower trough levels of calcineurin inhibitors.

Regarding biopsy-proven acute rejection, results are mixed: some studies report lower rejection rates in older patients, whereas others find no meaningful differences. In a study comparing recipients aged 60–65 and ≥75 years, the rate of biopsy-proven acute rejection at one year was similar (16% in both groups), although there was a tendency toward T-cell–mediated rejection in younger recipients and antibody-mediated rejection in older ones[30].

Immunosuppression remains an area of uncertainty in this population. Although there is a growing trend toward using tacrolimus, anti-IL2R agents, or thymoglobulin, no specific recommendations exist for older adults. The findings suggest the need for individualized protocols, as proposed by the British Transplant Society[44], considering the risk of adverse effects, the limited likelihood of re-transplantation, and the risk of allosensitization in case of graft failure.

Post-transplant complications and mortality

A meta-analysis of 19 studies found that the risk of early complications (delayed graft function, graft loss, or acute rejection) was similar between recipients ≥70 years and <70 years: the incidence of delayed graft function was 26.4% in older recipients vs. 23.5% in younger ones[21]. In another study of 138 older recipients, early complications included primary graft failure (6.5%), delayed graft function (53.6%), surgical complications (37%), acute rejection (15.2%), and infections (70.3%). Mortality reached 45.6% during follow-up, with infections and cardiovascular events as the main causes[22].

In transplants from donors ≥80 years, there was a higher risk of graft loss and lower graft survival at 1 and 5 years, as well as higher early post-transplant mortality, especially among recipients with diabetic nephropathy; mortality risk increased with age[23]. Delayed graft function was also associated with higher mortality and reduced survival in large studies[24].

According to Mesnard et al.[28], the incidence of delayed graft function was 41.8% and primary graft failure 4.7% in recipients of elderly-donor kidneys, with major postoperative complications in 48% and vascular complications in 9%.

Infectious complications—especially urinary tract infections—were the most frequent and severe among older recipients[29]. In another study comparing patients aged 60–65 and ≥75 years, infection was the leading cause of death in both groups, but markedly more common in those ≥75.26 Additionally, higher age, delayed graft function, and longer dialysis duration were associated with increased risk of postoperative complications[34,35].

Regarding complications overall, the data highlight a high frequency of infections and cardiovascular events as the main causes of mortality, consistent with other studies such as Orlandi et al.[45]. Although some research reports similar acute rejection rates across age groups, others—such as Doucet et al.[46]—show a lower incidence of acute rejection in older living-donor recipients. In this review, the rate of acute rejection was similar across age groups, but differences in rejection type were noted: more cellular rejection in younger patients and more antibody-mediated rejection in older ones, as also described by Cuadrado-Payán et al.[26].

Costs

Heldal et al.[32] analyzed the costs associated with KT. The estimated cost of the first year post-transplant was €62,551 compared with €52,476 for patients on the waiting list. The study also evaluated Quality-Adjusted Life Years (QALYs): 0.710 in transplant recipients vs. 0.686 in waiting-list patients during the first year. The cost per QALY was €88,100 in transplant recipients and €76,495 in waiting-list patients, with an Incremental Cost-Effectiveness Ratio (ICER) of €419,792/QALY during the first year.

Costs associated with KT also support its use in older patients. As mentioned in this review and aligned with data from the Spanish National Transplant Organization[44], KT involves a similar initial investment to dialysis but yields a marked cost reduction in subsequent years. These findings support its long-term economic advantage, also noted by Jarl et al.[44], with annual savings of up to €41,000 after the second post-transplant year.

Function and physical activity

A recent systematic review[29] showed that poorer physical function and lower physical activity are associated with higher mortality in patients with CKD. Worse performance on objective tests such as the Short Physical Performance Battery, the timed-up-and-go test (TUG), the 6-minute walk test (6MWT), and gait speed were independently associated with higher mortality risk. Each additional second on the TUG increased mortality risk by 8%, and a decrease of 0.1 m/s in gait speed increased risk by 26%. Better performance on the 2-minute step test and in the number of chair rises within 29 seconds was linked to lower cardiovascular risk, hospitalization, and need for dialysis[29].

Regarding physical activity, accelerometry and questionnaires showed that longer and more intense walking was associated with better health. Merely meeting recommendations (>150 min/week of moderate-to-vigorous activity) reduced mortality risk. Replacing sedentary time with light activity lowered mortality risk, whereas increasing to moderate/vigorous levels did not add extra benefit. Increasing physical activity by 60 min/week reduced risk of end-stage renal disease, with the greatest reduction seen beyond 150 min/week. Falling below these levels increased mortality[29].

Finally, Tsarpali et al.[35] found that higher pre-transplant physical function (PF) scores were associated with greater survival: at 5 years, survival was 77% with PF >60 vs. 55% with PF ≤60. A PF ≤60 doubled mortality risk.

Study limitations

This systematic review has several limitations that must be considered. First, the heterogeneity in study methodologies, inclusion criteria, and analyzed variables (survival, quality of life, donor type, graft function) complicates direct comparison. Additionally, some studies had short follow-up periods or small sample sizes, which may limit the robustness of long-term survival data.

Furthermore, not all studies used standardized tools to assess quality of life, limiting rigorous qualitative synthesis. Restricting the review to studies published in English and Spanish introduces the possibility of publication bias by excluding relevant literature in other languages.

Practical considerations

Advanced age should not be an exclusion criterion for KT. Individualized patient assessment is essential, considering functional status, comorbidities, social support, and life expectancy. Donor selection should focus on risk–benefit analysis aimed at optimizing waiting time and graft quality.

From a nursing perspective, it is important to foster hope regarding KT among older patients during their long periods on dialysis, and to support this strategy because—based on these results—transitioning to transplantation, when possible, provides not only better survival and quality of life but also liberation from the burden of dialysis therapy, whether center-based or at home.

Based on these findings, kidney transplantation in individuals >65 years is consolidating as an effective therapeutic option compared with dialysis, offering advantages in both survival and quality of life. Thanks to advances in surgical techniques, immunosuppressive management, and careful candidate selection, clinical outcomes in this age group are comparable—and in some cases superior—to those of younger patients.

Compared with older adults on dialysis, KT clearly offers better survival from the first year onward. This difference becomes increasingly pronounced with time, reflecting not only greater longevity but also superior quality of life, including improved autonomy, emotional well-being, reduced physical limitations, and enhanced social integration.

Despite age-related considerations such as frailty or comorbidities, the benefits of KT outweigh the risks in appropriately selected patients. Moreover, KT represents a more cost-effective long-term strategy than chronic dialysis, with meaningful implications for healthcare systems.

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Renal Foundation

Award for Excellence in Communication

Award Rules

PURPOSE

The Renal Foundation is a non-profit organization dedicated to the comprehensive care of individuals with kidney disease, as well as raising awareness and promoting prevention of this condition. As part of its ongoing commitment to quality and excellence, the Renal Foundation has created this award within the framework of the annual congress of the Spanish Society of Nephrology Nursing (SEDEN). The award was established on the occasion of the Foundation's 40th anniversary, with the aim of taking a further step in promoting research in nephrology nursing, and recognizing excellence in the communication of presented work, rewarding both the content of the presentation and the quality of its oral delivery during the congress. The first edition took place at the XXXXVIII SEDEN National Congress held in Salamanca (Spain).

CANDIDATES

Eligible candidates are nursing professionals or teams whose oral presentations have been accepted for in-person delivery at that year's congress. The 5 highest-scoring oral presentations, as quantitatively evaluated by the SEDEN review panel, will automatically be considered. No work involving members of the Renal Foundation or conducted in any of its centers or dialysis units may participate.

EVALUATION CRITERIA

Various aspects of the presentation will be assessed, including:

1. Quality: presentation, structure, and relevance of the content.

2. Clarity: ease of understanding of the delivery.

3. Innovation: originality of format and use of new technologies.

4. Dynamism of the presenter.

5. Impact and connection with the audience.

6. Direct impact on the care of individuals with kidney disease.

FINANCIAL ENDOWMENT

This award includes a prize of €1,000 (one thousand euros).

DISSEMINATION

The winning work will be made available to the journal Enfermería Nefrológica for possible publication, subject to the editorial committee's decision. The Renal Foundation may also disseminate the winning work, without this implying the transfer or limitation of ownership rights over the awarded works, including intellectual or industrial property rights. Whenever authors use the work and/or its data, they must state that it originated as a Renal Foundation Award.

JURY

The jury will consist of an odd number of members designated by the SEDEN Board of Directors and the Renal Foundation, with the latter entitled to appoint an additional member to avoid tie votes in the final decision. The award may be declared void.

AWARD GRANTING AND PRESENTATION

To receive the award, the work must be presented at the SEDEN National Congress by one of the signing authors. Presentations by individuals who are not listed as authors will not be accepted.

ACCEPTANCE OF TERMS

Participation in this call implies acceptance of these terms.

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Applications of Artificial Intelligence in nephrology nursing: an integrative review of predictive and clinical management tools

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ABSTRACT

Introduction: The introduction of artificial intelligence (AI) into the field of nephrology offers a new perspective for analysing technology-mediated real-time data.

Objectives: To determine the applications of artificial intelligence in nephrology nursing practice and to characterise predictive, diagnostic, and clinical management tools aimed at patients with kidney disease.

Methodology: We conducted an integrative literature review in accordance with the PRISMA statement. Original articles with no time restriction were searched in MEDLINE, EBSCO, Cochrane, and LILACS using combinations of terms related to artificial intelligence, nursing, and nephrology. Observational studies, experimental studies, and clinical trials in adult populations published in English, Spanish, or Portuguese were included. Excluded were robotic developments, gynaecological–obstetric patients, and previous reviews. Two reviewers independently extracted data on study design, sample, interventions, comparators, and main outcomes, applying CASPe guidelines to assess methodological quality.

Results: From 279 initial records, 30 studies met the inclusion criteria. They were grouped into 2 categories: 16 studies on predictive and diagnostic tools, and 14 on improved care and clinical management (patient classification systems, early warning systems, dialysis optimisation, and readmission prevention). Most demonstrated the superiority of machine learning and deep learning models compared with traditional approaches.

Conclusions: AI applied to nephrology nursing shows promising performance in prediction and diagnosis, as well as in the optimisation of care processes. Clinical implementation studies and cost-effectiveness evaluations are needed to consolidate its integration into daily practice and maximise its benefits.

Keywords: artificial intelligence; machine learning; kidney diseases; nephrology nursing; computerised clinical decision support systems; literature review.

RESUMEN

Aplicaciones de la inteligencia artificial en la enfermería nefrológica: revisión integrativa de las herramientas predictivas y de gestión clínica

Introducción: La introducción de la inteligencia artificial, en el área de la nefrología, proporciona una nueva perspectiva para analizar datos en tiempo real mediados por tecnología.

Objetivos: Determinar las aplicaciones de la inteligencia artificial en la práctica de la enfermería nefrológica y caracterizar herramientas predictivas, diagnósticas y de gestión clínica dirigidas a pacientes con enfermedad renal.

Metodología: Se realizó una revisión integrativa de literatura siguiendo la declaración PRISMA. Se buscaron artículos originales sin límite temporal en MEDLINE, EBSCO, Cochrane y LILACS, usando combinaciones de términos relacionados con inteligencia artificial, enfermería y nefrología. Se incluyeron estudios observacionales, experimentales y ensayos clínicos en población adulta, publicados en inglés, español o portugués. Se excluyeron desarrollos robóticos, pacientes gineco-obstétricas y revisiones previas. Dos revisores extrajeron de forma independiente datos sobre diseño, muestra, intervenciones, comparadores y resultados principales, aplicando guías CASPe para evaluar la calidad metodológica.

Resultados: De 279 registros iniciales, 30 estudios cumplieron los criterios de inclusión. Se agruparon en dos categorías: 16 trabajos en herramientas predictivas y diagnósticas, y 14 en mejora de atención y gestión clínica (sistemas de clasificación de pacientes, alertas tempranas, optimización de diálisis y prevención de readmisiones). La mayoría mostró superioridad de modelos de aprendizaje automático y deep learning frente a enfoques tradicionales.

Conclusiones: La inteligencia artificial aplicada en enfermería nefrológica demuestra un rendimiento prometedor en predicción y diagnóstico, así como en la optimización de procesos asistenciales. Se requieren estudios de implementación clínica y evaluaciones costo-efectivas para consolidar su integración en la práctica diaria y maximizar sus beneficios.

Palabras clave: inteligencia artificial; aprendizaje automático; enfermedades renales; enfermería nefrológica; sistemas de apoyo a la decisión clínica computarizados; revisión de literatura.

INTRODUCTION

Artificial intelligence (AI) refers to the capacity of algorithms encoded in technological media to learn in order to perform automated tasks that do not require human interaction at each stage of the process[1]. AI is a branch of engineering and computer science dedicated to the design and programming of tools that imitate neuronal synapses using a binary command code to approach human abilities such as learning, reasoning, and self-correction[2].

Currently, the search for tools and processes that facilitate and improve quality of life has permeated all fields, including health sciences, which continue to undergo transformation[3]. Among the advantages offered by the application of AI are its ability to enhance the competencies of healthcare providers by supporting diagnosis, optimizing treatment plans through personalized approaches, and assisting financial processes within health systems. This contributes to improving services offered to the population[1,2].

Chronic kidney disease (CKD) is the 6th leading cause of death worldwide. It affects approximately 10% of the population—an estimated 850 million people globally—and is responsible for at least 2.4 million deaths per year, while acute kidney injury, a precursor of CKD, affects more than 13 million individuals worldwide[4]. In Latin America, the average incidence is 162 patients per million inhabitants[5]. Latin America has the highest global mortality rate from CKD and is the second leading cause of years of life lost[4]. CKD represents a substantial burden for the affected individual, their family, society, and the healthcare system[4].

In nephrology, the application of AI-based tools is still emerging but has already achieved impact across the entire continuum of care (prevention, diagnosis, treatment, and follow-up) for individuals with kidney disease. This review identified the applications of AI in the field of nephrology nursing. The importance of AI lies in its ability to analyze large quantities of data and extract useful information that can help healthcare professionals make more precise and informed decisions[2].

For the discipline of Nephrology Nursing (NN), understanding AI applications will allow more optimal planning of effective and individualized care plans by identifying risks and needs, and by freeing time from administrative tasks that can instead be invested in direct nursing care[6].

This study aimed to determine the applications of AI in NN practice and to characterize predictive, diagnostic, and clinical-management tools directed toward the care of people with kidney disease. Accordingly, the following review question was posed: What are the applications of AI for NN practice, and what AI-based tools have been developed for the care of people with kidney disease?

METHODOLOGY

Design

We conducted an integrative literature review was conducted to guide the search for the most up-to-date publications and research, based on the PRISMA 2020 guidelines[7].

Eligibility Criteria

Studies addressing the application of AI in the health sciences, with observational or experimental designs in adult populations and including aspects of nursing care, were selected. No time restriction was applied. Publications in English, Spanish, or Portuguese were included. Studies focused on robotics or mechatronics, research conducted on gynecologic–obstetric patients, and previous literature reviews were excluded.

Information Sources

A bibliographic search of original articles indexed in EBSCO, MEDLINE, the Cochrane Library, and LILACS was carried out in February 2024.

Search Strategy

The research question was developed using the PICO strategy, which supported the construction of the following search equations: English: "Artificial Intelligence" AND "Nursing Care", "Artificial Intelligence" AND "Kidney Disease", "Artificial Intelligence" AND "Nephrology"; Spanish: "Inteligencia artificial" AND "Cuidado de Enfermería", "Inteligencia artificial" AND "Enfermedad Renal", "Inteligencia artificial" AND "Nefrología". Search equations included DeCS/MeSH terms: ("Artificial Intelligence"[Mesh]) AND "Nursing Care"[Mesh], ("Artificial Intelligence") AND "Nursing Care", "artificial intelligence" AND "nursing", ("Artificial Intelligence") AND "kidney", "artificial intelligence" AND "kidney disease", ("Kidney Diseases"[Mesh]) AND "Artificial Intelligence"[Mesh]. Filters applied: human studies and original research. Preprints were excluded. No date limits were applied.

Quality Assessment

Articles were independently evaluated by the authors using the appropriate methodological appraisal tools according to study design, specifically the Critical Appraisal Skills Programme Español (CASPe). Articles achieving less than 50% compliance with CASPe criteria were excluded. Discrepancies were resolved through discussion until unanimous consensus was reached.

Data Extraction

Data were extracted systematically and structured into two thematic groups: 1) AI applications as predictive and diagnostic tools in nephrology. 2) AI applications in patient-care optimization and clinical management For each article, the title, authors, methodological design, sample characteristics, main objective, and a summary of key findings were recorded. A narrative synthesis was then performed to integrate and contrast findings across both categories.

RESULTS

Study Selection

Electronic searches yielded a total of 279 titles. Three records were removed for being duplicates. After screening titles and abstracts, 236 records were excluded for not meeting the established criteria. Forty publications were read in full. Ten articles were excluded after being evaluated with the CASPe tool because they did not meet the methodological validity criteria. Finally, 30 records were included in the review (**figure 1**).

Characteristics of the Studies

Of the 30 selected articles, 12 were from Asia (40%), 8 from North America (27%), 9 from Europe (30%), and 1 from Africa (3%). The study designs included 9 observational studies (30%), 7 randomized clinical trials (23%), 6 multicenter studies (20%), 4 comparative studies (13%), 3 quasi-experimental studies (10%), and 1 multicohort observational study (3%).

Results of Individual Studies

Table 1 illustrates the characteristics of the 16 studies included under the category of AI applications as a predictive and diagnostic tool in nephrology. The characteristics of the 14 articles included in the category of AI applications for improving patient care and clinical management are shown in **table 2.**

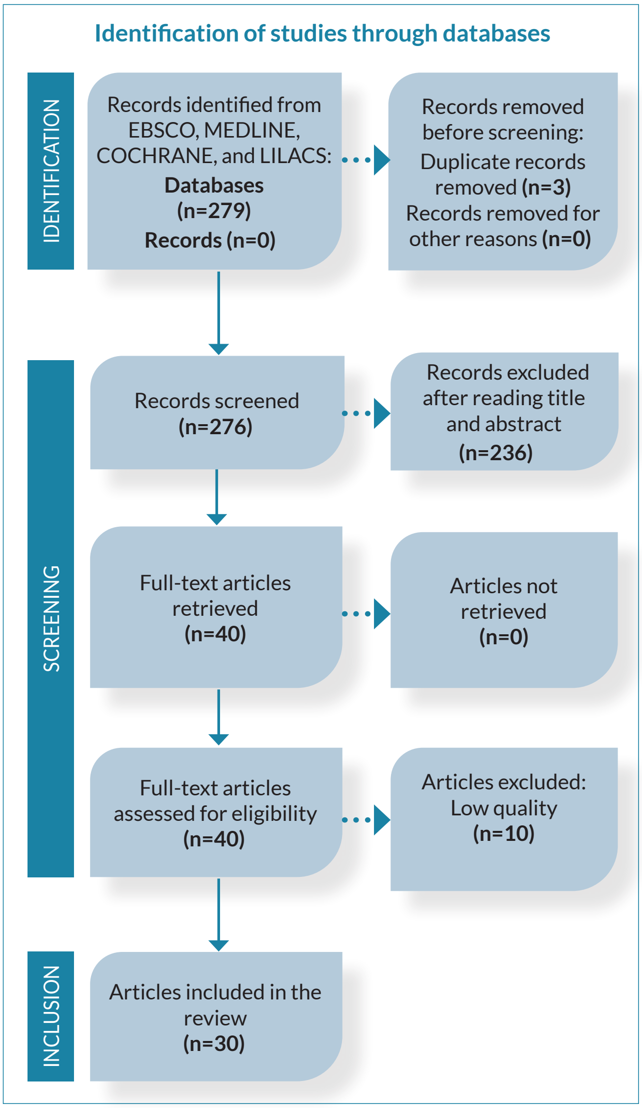

Figure 1. Flow diagram of article search based on PRISMA statement recommendations.

Synthesis Results

Application of AI as a Predictive and Diagnostic Tool in Nephrology

In this category, 16 studies were identified investigating the potential of AI-based technologies for both prediction and early diagnosis of kidney diseases. Flechet et al.[8]. evaluated a predictive model for acute kidney injury (AKI) in the intensive care unit (ICU), comparing the predictive capability of expert physicians with an AI algorithm (AKIpredictor). At ICU admission, both AI and experts showed similar performance, with an area under the receiver operating characteristic curve (AUROC) of 0.80 *vs* 0.75, respectively[8]. However, on the first morning, AKIpredictor outperformed experts with an AUROC of 0.94 *vs* 0.89, and during the first 24 hours exceeded physicians with an AUROC of 0.95 *vs* 0.89, achieving a net benefit of 67% *vs* 50%[8]. Martínez et al.[9] analyzed emergency department data and developed a predictive model capable of early identification of individuals at high risk for AKI, demonstrating strong predictive performance up to 72 hours before traditional diagnostic criteria were met[9]. These findings align with those described by Ozrazgat-Baslanti et al.[10], who noted that deep learning (DL) tools can generate continuous, accurate, and early predictive data.

According to Chaudhuri et al.[11], AI is capable of processing and analyzing large volumes of data that enable prediction of future events related to kidney disease and support clinical decision-making regarding therapeutic measures[11]. Wu et al.[12] compared a machine learning (ML)-based approach with traditional models (Framingham risk scale) for cardiovascular risk stratification in young adults with hypertension,

Table 1. Characteristics and qualitative analysis of the articles included regarding the application of artificial intelligence as a predictive and diagnostic tool in nephrology.

Author (Year)	Country	Study Type	Participants	Intervention	Comparison	Main Outcome	CASPe
Wu X. et al.[12] (2020)	China	Observational study.	508 young adults with hypertension.	Evaluate cardiovascular risk in young hypertensive patients using two new ML methods (RFE and XGBoost).	Performance compared with a traditional statistical model (Cox regression) and the available clinical Framingham Risk Score (FRS).	ML identified 11 valuable variables for predicting clinical outcomes. ML model C-statistic: 0.757, outperforming Cox regression (0.723) and recalibrated FRS (0.529) in identifying composite endpoints.	100%
Roth J. et al.[13] (2021)	Switzerland	Multicenter study.	12,761 people with HIV in the Swiss HIV Cohort Study.	Evaluate various ML algorithms and modeling strategies for individualized CKD prediction in a high-dimensional cohort.	Logistic regression ("short models") using well-established predictors.	64 static variables+502 time-varying variables used. ML models outperformed expert-based models with AUC 0.926–0.996 and precision-recall 0.631–0.956, demonstrating state-of-the-art predictive performance.	100%
Martínez D. et al.[9] (2020)	USA	Multicenter study.	59.792 patiens.	Early identification of high-risk acute kidney injury (AKI) patients using an ML-based prediction model in the emergency department.	N/A	AKI incidence at 72 hours: 7.9% for stage≥1 and 1.0% for stage≥2. Predictive performance AUC=0.74–0.81. Median time from ED arrival to prediction: 1.7 hours.	100%
De Gonzalo- Calvo D. et al.[30] (2020)	USA	Clinical trial.	810 patients with end-stage renal disease receiving hemodialysis (AURORA trial).	Evaluate whether plasma miRNAs improve cardiovascular-risk prediction in ESRD patients on HD	Predictive models without miRNAs.	Adding miRNAs improved discrimination accuracy at baseline (integrated AUC = 0.71) compared with models lacking miRNAs.	90%
Raynaud M. et al.[19] (2021)	France, United Kingdom, Italy, Belgium, Canada, South America	Multicohort observational study.	13,608 adult kidney transplant recipients from 18 academic centers	Develop a dynamic artificial-intelligence approach for continuously refined survival predictions using updated clinical data	N/A	Bayesian joint models identified independent predictors of graft survival (recipient immunologic profile, interstitial fibrosis, tubular atrophy, graft inflammation, repeated eGFR and proteinuria). The final model showed high accuracy and predictive ability in the development cohort and was validated in Europe, the U.S., South America, and RCT cohorts.	100%

Author (Year)	Country	Study Type	Participants	Intervention	Comparison	Main Outcome	CASPe
Churpek M. et al.[34] (2020)	USA	Multicenter study.	495,971 hospitalized patients (2008–2016).	Internal and external validation of a machine-learning risk score to detect AKI in hospitalized patients.	N/A	Variable AKI rates observed; predictive capabilities assessed via AUC. A probability threshold of 0.057 anticipated stage-2 AKI before increases in serum creatinine across cohorts.	100%
Chan L. et al.[29] (2021)	USA	Observational study.	1,146 patients with type 2 diabetes and CKD.	Develop/validate KidneyIntelX combining EHR data and biomarkers.	N/A	High accuracy with AUC 0.77 in both cohorts, outperforming the clinical model (AUC 0.62). In the high-risk group, PPV was 61% (*vs* KDIGO 40%); low-risk identification showed NPV 90%.	90%
Roblot V. et al.[35] (2022)	France	Observational study.	124 patients with metastatic renal cell carcinoma (2007–2019).	Validate a deep-learning algorithm for skeletal muscle index (SMI) measurement and survival prediction.	N/A	Both methods classified 56% as sarcopenic. Sarcopenic groups showed significantly lower survival: 6.0 *vs* 12.5 months (manual), 6.0 *vs* 13.9 months (DL). In an independent population, DL-defined sarcopenia predicted poorer survival (10.7 *vs* 17.3 months).	75%
Xiao J. et al.[36] (2019)	China	Comparative study.	551 CKD patients.	Rapid prediction of CKD severity using demographic and biochemical blood features, comparing statistical, ML, and neural network models.	N/A	Logistic regression performed best (AUC 0.873, sensitivity 0.83, specificity 0.82). Albumin, serum creatinine, TG, LDL, and GFR were significant predictors.	80%
Azar AT. et al.[28] (2011)	Egypt	Egypt Comparative study.	156 hemodialysis patients.	Evaluate artificial neural networks to predict urea rebound and identify optimal input parameter combinations.	Compared with Smye and Daugirdas models.	ANN obtained correlation 0.97 ($p<0.0001$). Smye and Daugirdas methods had R=0.81 and 0.93. Smye method showed larger errors and substantial bias; predictive accuracy for eqKt/V was similar between ANN and Daugirdas.	75%
Xi IL. et al.[15] (2020)	China	Multicenter study.	1,162 renal lesions diagnosed by pathology or imaging.	Develop a deep-learning model (ResNet) to distinguish benign renal tumors from RCC on routine MRI.	N/A	DL model achieved higher test accuracy vs. baseline (0.70 *vs* 0.56), and comparable to experts (0.70 *vs* 0.60). Sensitivity (0.92 *vs* 0.80) and specificity (0.41 *vs* 0.35) also outperformed experts.	50%
Liu Y. et al.[37] (2022)	China	Randomized clinical trial.	120 patients with renal dysplasia.	Assess EM-based low-dose CT imaging for detection and diagnosis of renal dysplasia.	N/A	EM algorithm improved PSNR, reduced processing time, and enhanced diagnostic accuracy across dysplasia subtypes, suggesting clinical usefulness.	60%
Byun S. et al.[16] (2021)	Korea	Clinical trial.	2,139 patients with non-metastatic clear-cell RCC.	Evaluate prognosis of nm-ccRCC using DeepSurv model, compared with Cox and RSF.	RSF and CPH models	DeepSurv showed superior prediction of RFS and CSS compared to CPH and RSF. Deep learning appears useful for survival prediction in RCC.	50%

Author (Year)	Country	Study Type	Participants	Intervention	Comparison	Main Outcome	CASPe
Purkayastha S. et al.[17] (2020)	USA	Multicenter study.	82 RCC lesions confirmed pathologically.	Differentiate low-grade (Fuhrman I–II) from high-grade (III–IV) RCC using MRI radiomic features.	N/A	Automated TPOT pipeline achieved ROC AUC 0.60 with 81% accuracy. Manual pipeline AUC 0.59 with 77% accuracy. Automated pipelines may be equally or more effective for non-invasive Fuhrman grade prediction.	60%
Jacob A. et al.[14] (2010)	USA	Comparative study.	1,126,495 USRDS dialysis records.	Build predictive survival models for ESRD patients using USRDS data.	Compared with Cox proportional hazards model.	Predictive models showed C-statistics ~0.78–0.80. Cox model performed better at some time points, but USRDS-based models enabled accurate long-term survival prediction after dialysis initiation.	63%
Toda N. et al.[18] (2022)	Japan	Multicenter study.	585 contrast-enhanced CT images from patients with histologically confirmed RCC.	Develop a deep-learning algorithm for fully automated detection of small renal tumors (≤4 cm).	N/A	High performance: accuracy 88.3%/87.5%, sensitivity 84.3%/84.8%, specificity 92.3%/90.2% (datasets A/B). AUC 0.930 and 0.933 (internal/external validation). Useful for early detection of small RCC.	50%

Table 2. Characteristics and Qualitative Analysis of Included Articles on the Application of Artificial Intelligence to Improve Patient Care and Clinical Management.

Author (Year)	Country	Study Type	Participants	Intervention	Comparison	Main Outcome	CASPe
Hong L. et al.[21] (2021)	China	Randomized clinical trial.	447 people with COPD.	Identify how AI-based technology improves quality of life in COPD patients seen in Emergency Services.	Medical intervention without AI tools.	Improved quality of life at 12 months; reduced hospitalization rate and length of stay for COPD. Preliminary results confirm effectiveness of the AI-based treatment.	90%
Brom H. et al.[26] (2020)	USA	Observational study.	2,165 EHR records.	Identify patients at risk of readmission using machine-learning CART applied to hospital EHRs.	N/A	30-day readmission rate was 11.2%. CART showed highest risk among ER visitors, ≥9 comorbidities, Medicaid insurance, and age ≥65. Findings support improved nursing care for high-risk patients.	
Barbieri C. et al.[38] (2015)	Germany, Spain, France, Portugal, Czech Republic	Observational study.	752 hemodialysis patients from 3 NephroCare clinics.	Assess impact of Anemia Control Model (ACM) decision-support system in routine anemia management.	Standard anemia management (expert nephrologists following best practice).	Darbepoetin dose decreased (0.63→ 0.46 mg/kg/month). Hb in target range rose from 70.6%→76.6%→83.2% with ACM. Hb variability decreased (SD 0.95→0.83 g/dL).	81%
Zhao C. et al.[22] (2022)	China	Randomized clinical trial.	44 people with diabetic kidney disease.	Evaluate ultrasound imaging and comprehensive nursing scheme based on AI algorithms.	N/A	Group B showed improved resistance index, fewer complications, and better quality of life. Intelligent ultrasound monitoring provides clinically relevant renal function tracking.	82%

Author (Year)	Country	Study Type	Participants	Intervention	Comparison	Main Outcome	CASPe
Yin P. et al.[33] (2022)	China	Randomized clinical trial.	60 postpartum women with mild–moderate pelvic organ prolapse.	Apply AI-based ultrasound technology and rehabilitation training for postpartum recovery.	N/A	Experimental group showed greater levator ani thickness, reduced perineal diameter, and stronger pelvic floor muscle strength vs. control. AI algorithm outperformed traditional imaging in Dice coefficient, PPV, sensitivity, and Hausdorff distance.	75%
Chen X. et al.[32] (2022)	China	Randomized clinical trial.	120 CKD patients (stages 3–5).	Evaluate "Internet + Hospital-to-Home (H2H)" nutritional care model using improved wavelet transform algorithm for CT imaging.	N/A	Improved arm muscle circumference, triceps skinfold, biochemical markers, nutritional screening scores, and patient satisfaction. Enhanced renal blood flow and vascular efficiency. AI-enhanced CT imaging performed better, supporting clinical use.	75%
Bagnasco A. et al.[27] (2015)	Italy	Observational study.	840 nurses.	Apply artificial neural networks to predict communication failures in emergency departments.	N/A	Variables such as terminology, listening, attention, and clarity predicted communication failure. Multilayer perceptron model correctly predicted >80% of failures based on personnel characteristics.	80%
Barrera A. et al.[23] (2020)	United Kingdom	Randomized clinical trial.	41 psychiatric inpatients (755 nights) and 18 nurses.	Apply AI-assisted digital nursing observations to minimize sleep disruption while maintaining safety.	Comparison with usual observations without AI.	AI-assisted observations matched manual ones; no adverse events in >755 nights. Qualitative data show improved patient and night-staff experience.	80%
Smith BP. et al.[39] (1998)	USA	Clinical trial.	Heparin dosing and coagulation data from 89 patients.	Evaluate ability of population statistics vs. ANN (MLP) to predict heparin pharmacodynamics during hemodialysis.	Two models: traditional NONMEM *vs* neural network.	Neural network showed greater accuracy and fewer outliers. Distribution volume and clearance increased after dialysis started; baseline coagulation time influenced results. ANN suitable as alternative for dosing predictions.	90%
An R. et al.[24] (2021)	China	Observational study.	300 ICU patients.	Develop classification system stratifying ICU patients by severity and care needs.	N/A	Three clinical subgroups identified with different trajectories and nursing workloads. Regression model predicted classes with good fit and satisfactory performance after 200 permutations.	80%
Du Q. et al.[25] (2022)	China	Randomized clinical trial.	64 patients with diabetic nephropathy.	Develop unsupervised-learning patient classification system; evaluate improved FCM algorithm with PDCA home nursing.	N/A	Experimental group had higher satisfaction and nursing service quality. Improved FCM algorithm aided diagnosis. PDCA home-nursing improved quality of life in diabetic nephropathy.	75%
Flechet M. et al.[18] (2019)	Italy	Observational study.	252 critically ill patients without end-stage renal disease or AKI at ICU admission.	Evaluate the AKIpredictor model to predict AKI-23 within the first week of ICU stay; prospective evaluation.	Compared with ICU physicians' predictions.	At admission, AKIpredictor and physicians showed similar performance (AUROC 0.80 *vs* 0.75). After 24 h, AKIpredictor outperformed clinicians (AUROC 0.95 *vs* 0.89). Net benefit favored AKIpredictor across broader threshold ranges.	80%

Author (Year)	Country	Study Type	Participants	Intervention	Comparison	Main Outcome	CASPe
Tangri N. et al.[20] (2011)	United Kingdom	Comparative study.	3,269 adults initiating peritoneal dialysis (PD) between 1999–2004.	Compare predictive factors for PD technique survival using ANN vs. logistic regression vs. Cox regression.	N/A	PD center had a major impact on technique survival. Other predictors showed marginal/variable effects. Comorbid conditions and high BMI were not consistently associated with increased technique failure.	90%
Barbieri C. et al.[31] (2016)	Portugal, Italy, Spain (Fresenius Medical Care clinics).	Observational study.	4,135 hemodialysis patients.	Develop an ML model to predict anemia-treatment response in ESRD patients on dialysis.	Compared with linear model and MLP; in Italy & Spain also compared with a previously published MLP.	Proposed model outperformed linear and previous MLP models. Success rates for Hb prediction error <1 g/dl: 93% (Portugal), 91% (Italy), 90% (Spain). Low error rates indicate no systematic Hb-estimation bias. MLP showed strong performance and validation in training, validation, and external test sets.	90%

demonstrating that the ML model surpassed the predictive capacity of traditional models[12]. Roth et al.[13] demonstrated the utility of AI in predicting the incidence of chronic kidney disease (CKD) in persons living with HIV. Their evaluation of multiple ML algorithms and modeling strategies showed that ML models outperformed expert-based models, with AUROC values ranging from 0.926 to 0.996 and PR values from 0.631 to 0.956, demonstrating state-of-the-art predictive performance[13]. Jacob et al.[14] developed models based on United States Renal Data System (USRDS) data to accurately predict survival in individuals with end-stage renal disease receiving kidney replacement therapy, showing strong model performance and supporting their usefulness in long-term survival assessment[14].

Five articles highlighted that advances in AI have improved image-analysis capabilities, increasing diagnostic precision in nephrology[18-21]. Toda et al.[18] developed an ML algorithm to detect renal tumors in contrast-enhanced CT images using a multicenter database. The algorithm achieved 84.3% sensitivity and 92.3% specificity, demonstrating utility for early detection of small renal tumors[18]. Other authors have tested the efficiency of AI-based predictive models compared with conventional statistical models. Byun et al.[16] evaluated the survival-predictive capacity of a DL model and concluded it outperformed linear regression models due to its ability to process large heterogeneous datasets (CT images, genetic data, histology), offering the potential to identify new biomarkers and generate hypotheses from large data volumes[16].

In the area of kidney transplantation, one study identified that the application of AI improved risk stratification for kidney transplant recipients. Raynaud et al.[19] used an AI-based tool to predict outcomes following kidney transplantation. The model incorporated histological, immunological, and functional characteristics of the grafts, which were combined with repeated measurements of proteinuria and glomerular filtration rate. This resulted in a global dynamic AUC of 0.857 (95% CI: 0.847–0.866), which improved with successive repeated measurements, increasing from 0.780 (0.768–0.794) to 0.926 (0.917–0.932), demonstrating its high predictive performance ($p<0.0001$)[19].

Application of AI in improving patient care and clinical management

AI has had a significant impact on improving patient care and clinical management. Tangri et al.20 compared predictors of peritoneal dialysis (PD) technique survival using an artificial neural network (ANN) vs Cox regression. Both analyses identified technique failure—defined as switching modality to hemodialysis for more than 30 days—with similar outcomes[20].

Six studies were identified that, while not strictly nephrology-nursing–specific, provided relevant insights from a broader care-delivery perspective.

Hong et al.[21] described that AI-based technology improves the quality of life of patients diagnosed with chronic obstructive pulmonary disease (COPD). A significant improvement in quality of life was demonstrated over a 12-month period, accompanied by a reduction in hospitalization rates and length of hospital stay due to COPD, when nursing interventions were guided by AI. However, in the single-factor analysis, the AI-supported medical intervention did not show significant changes, and the experimental results preliminarily confirmed the effectiveness of AI-assisted medical treatment. In contrast, Zhao et al.[22] explored the effect of AI-based ultrasound image evaluation in patients with diabetic kidney disease, determining that nursing interventions can help control renal function and that intelligent ultrasound imaging systems can monitor these changes[22].

Some AI-based tools focus on early-warning systems. Barrera et al.[23] suggest that digitally assisted nursing observations could maintain patient safety and improve the experience of both patients and staff during night shifts, aiming to minimize sleep disruption—thus proposing new utilities for AI-enabled technology[23].

In efforts to improve clinical care, An R et al.[24] developed a patient-classification system that stratifies individuals upon ICU admission according to severity and care needs, reducing workload burden in nursing teams and demonstrating strong predictive efficiency[24]. Du et al.[25] also developed a self-learning–based patient-classification system to identify subgroups of critically ill patients and build classifiers capable of predicting patient categories, thereby benefiting diagnosis and patient quality of life[25]. Brom et al.[26] identified patients at risk of readmission using a machine-learning technique—classification and regression trees (CART). The findings generated by this algorithm can be used to improve the quality of nursing care delivery for patients with a higher likelihood of readmission.

Regarding nursing care and the risk of communication-related errors, Bagnasco et al.[27] developed artificial neural networks to predict the risk of communication failures. They achieved successful prediction of more than 80% of communication errors based on the characteristics of the receiving operator. The aim is to prevent such failures and ultimately avoid errors in patient care.

Regarding dialysis adequacy parameters, Azar et al.[28] found that the use of AI improves efficiency and reduces complication risk[28]. Their study evaluated the use of artificial neural networks to predict urea rebound and examined different combinations of input parameters to determine the most predictive set, thereby improving the quality of dialysis treatment.

DISCUSSION

Based on the findings of this integrative review, the transformative potential of AI-based tools in the clinical approach and care practices for people with kidney disease—both in hospital and outpatient settings—is evident. The results show that AI enables the prediction of adverse events[27], the early diagnosis of kidney diseases[15,17,18], risk stratification[14,19,29,30], and the optimization of clinical interventions[20,21,23,26,28,30-33], all through the analysis of large volumes of data. These capabilities demonstrate AI's usefulness not only for diagnostic precision and clinical decision-making support, but also as a tool to promote more timely and personalized care. For example, the review highlights how, in critical scenarios, the complementarity between clinical judgment and AI enhances the ability to identify subtle patterns within large datasets, reducing human error and improving diagnostic accuracy[8]. It was also observed that multimodal clinical data analysis has the potential for clinical implementation to optimize risk-prevention strategies and early therapeutic management for individuals at risk of developing kidney diseases[10], through AI-based predictive models[11-13,35].

The advantages offered by AI-based technologies benefit not only patients but also clinical staff. Various interventions demonstrated that AI can personalize treatments, automate repetitive tasks, and prioritize interventions[23,24], with the goal of improving healthcare team efficiency and, most importantly, increasing human interaction time. Likewise, AI has proven useful in out-of-hospital environments: through remote patient monitoring it is possible to identify those at risk of hospital readmission, enabling personalized planning, improved care quality, and reduced financial burden for the health system[26].

AI-driven imaging analysis has also improved diagnostic precision in nephrology, opening new possibilities for clinical outcomes in individuals with kidney disease through more accurate and timely diagnoses[18]. Its application extends to clinical management as a tool for monitoring, treatment planning, and follow-up[19], supporting decision-making and the design of individualized interventions based on predictive risk.

It is clear that AI has an impact not only as a tool for prevention, prediction, and diagnosis in nephrology, but also as a valuable resource to improve patient care and clinical management. Studies validated in various clinical contexts highlight AI's ability to identify complex data patterns invisible to traditional statistical models[20-22]. By recognizing risk patterns early, clinical teams can plan timely interventions to prevent complications associated with renal replacement therapy[28] or kidney-related diseases[21,22].

The benefits of AI-based technologies extend beyond patient well-being and support clinical teams. As demonstrated, AI can personalize care, automate routine activities, and help prioritize nursing interventions[23,24]. Its usefulness has also been shown in outpatient follow-up contexts, identifying patients at risk of rehospitalization and allowing better planning, improved care quality, and lowered care costs[26].

In nephrology nursing practice specifically, AI has the potential to significantly improve care for individuals with kidney disease. Automation of certain clinical tasks allows more time for direct patient care, positively impacting the overall quality of nursing care.

In research, AI can help identify patterns and correlations among risk factors, symptoms, and outcomes, contributing to a deeper understanding of kidney diseases and the development of new therapies. AI should be regarded as a complementary tool to clinical care, supporting but never replacing professional clinical judgment or the empathy that characterizes human-centered care.

Comparatively, the findings of this review align with those reported by authors such as Bagnasco et al.[27] and Zhao et al.[22], who demonstrated AI's impact on clinical settings and nursing practice, including improvements in patient safety, reductions in adverse events, and optimization of nurse-patient care time. However, specific scientific evidence focused on nephrology nursing remains limited. This review helps fill that gap by offering a broad perspective on how integrating these technologies into routine nursing practice can enhance clinical decision-making in kidney health care. For nephrology nursing, AI implementation represents a path toward the future of care through strengthened clinical vigilance, individualized care planning, and continuous quality improvement—supported by predictive models that anticipate health deterioration and guide early therapeutic interventions.

Despite the promising findings, several limitations were identified. Sample sizes varied greatly across studies, demonstrating substantial heterogeneity in population characteristics, AI algorithms used (from logistic regression to artificial neural networks), and clinical environments. These discrepancies hinder direct comparisons and reduce the generalizability of findings. Additionally, many models were validated only on local datasets with no external testing, limiting their broader applicability and potentially introducing bias when used with populations of different clinical or sociodemographic characteristics. Furthermore, several included studies were not exclusively focused on nephrology nursing, a limitation often encountered due to limited scientific literature in the field. Nevertheless, including broader interdisciplinary studies enriched the review by offering complementary perspectives relevant to nursing practice.

Challenges and opportunities for AI implementation were also identified. There is a need for multicenter validation studies to ensure reliability across diverse clinical settings. Intervention strategies are required to progressively integrate AI into kidney care processes and rigorously evaluate model performance in real-world environments. Future research should explore cost-effectiveness, usability among nursing staff, and the impact of AI on clinically meaningful outcomes for people with kidney disease. Ethical and legal considerations are also crucial, including data privacy, transparency of AI tools, equity and nondiscrimination, and equitable access to such technologies.

In conclusion, the synthesis of findings supports AI as a complementary tool in the care of individuals with kidney disease—particularly for prediction, risk stratification, and clinical decision-making support. Although several well-designed studies demonstrate clinically relevant outcomes, caution is advised when generalizing the findings due to limited external validation and study heterogeneity. The integration of AI into renal care must rely on solid evidence while respecting the clinical judgment and human-centered approach fundamental to nursing practice.

Authors' contributions

All authors participated in literature search, review protocol development, data collection, analysis, interpretation, and writing.

Conflicts of interest

The authors declare no financial, personal, or institutional conflicts of interest that could have influenced the development of this research.

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"JANDRY LORENZO" GRANT 2025

The SPANISH SOCIETY OF NEPHROLOGY NURSING (SEDEN) sponsors this grant to promote research aimed at expanding knowledge in the field of nephrology nursing. The deadline to apply is June 30th, 2025, under the following:

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1.- Projects may be submitted by nurses who are full members of **SEDEN** and up to date with their membership fees. Other professionals may be included as co-authors to promote interdisciplinary collaboration.

2.- Submit an anonymous, detailed project (no length limit) including: Introduction (background and current state of the topic), **Objectives** (and hypothesis if applicable), **Methodology** (setting, design, population and sample, measurement tools, data collection, and statistical analysis), **References, Project timeline, and Estimated budget**. Send via email to: seden@seden.org

3.- The **SEDEN** Board will appoint an Evaluation Committee to act as jury. The decision will be communicated by September 13th, 2025.
Award Details:
The grant includes a diploma presented at the opening session of the 50th SEDEN Congress (2025) and a monetary award of **€1,800***.
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4.- Awardees agree to submit the final research project to **SEDEN** by September 12th, 2026. Extensions of up to 6 months may be requested. If not submitted, the remaining 50% will not be paid. The final report must include: introduction, methods, results, discussion, and bibliography. It must be presented at the LI **SEDEN** Congress, with one of the authors as presenter. Submissions by non-authors will not be accepted.

5.- The final project must adhere to ***Enfermería Nefrológica's* publication guidelines** and will undergo peer review. If rejected, it will be published on the **SEDEN** website.

6.- The project may not be published or presented elsewhere until conditions 5 and 6 are fulfilled. The award must be acknowledged as Jandry Lorenzo Grant 2025 in all uses.

7.- Applying implies acceptance of these rules and the jury's decision, which is final.

8.- The grant may be declared void.

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Impact of post-dialysis fatigue and recovery time in chronic haemodialysis patients: an exploratory observational study

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ABSTRACT

Introduction: Haemodialysis is the most widely used renal replacement therapy in advanced stages of kidney disease, although it entails adverse effects that directly impact quality of life. Among these, post-dialysis fatigue stands out as a persistent sensation of exhaustion that may last for hours or even days, and whose impact has been scarcely documented.

Objectives: To estimate the frequency of post-dialysis fatigue and recovery time in patients undergoing chronic haemodialysis, analysing associated clinical, functional, and subjective variables.

Material and Method: We conducted a cross-sectional study from January through April 2023 in a Spanish public hospital. Patients with more than 3 months on treatment were included. Demographic, clinical, functional, technical, and self-reported health perception data were collected. Fatigue was defined by self-report. Descriptive and bivariate analyses were performed.

Results: A total of 43 patients were included, with a mean age of 67.4 years; 28% were women. Post-dialysis fatigue was reported by 53.5% of patients, with no significant differences by age or sex. Patients who experienced post-dialysis fatigue had a longer mean recovery time (467.9±194.4 *vs* 66.3±137.0 minutes; $p<0.001$), lower total protein levels (6.1 *vs* 6.5 g/L; $p=0.022$), and worse self-perceived health ($p=0.026$). No associations were found with other clinical or technical variables.

Conclusions: Post-dialysis fatigue is a frequent event and is associated with longer recovery time and both clinical and subjective markers of poorer general health. Its systematic evaluation could improve the comprehensive management of patients on haemodialysis.

Keywords: haemodialysis; post-dialysis fatigue; recovery time; quality of life.

RESUMEN

Impacto de la fatiga postdiálisis y el tiempo de recuperación en el paciente crónico en tratamiento de hemodiálisis: estudio observacional exploratorio

Introducción: La hemodiálisis es el tratamiento sustitutivo más empleado en fases avanzadas de enfermedad renal, aunque conlleva efectos adversos que afectan directamente la calidad de vida. Entre ellos destaca la fatiga postdiálisis, una sensación persistente de agotamiento que puede prolongarse durante horas o días, y cuyo impacto ha sido escasamente documentado.

Objetivos: Estimar la frecuencia de fatiga postdiálisis y el tiempo de recuperación en pacientes en hemodiálisis crónica, analizando variables clínicas, funcionales y subjetivas asociadas.

Material y Método: Estudio transversal realizado entre enero y abril de 2023 en un hospital público español. Se incluyeron pacientes con más de tres meses en tratamiento. Se recogieron datos demográficos, clínicos, funcionales, técnicos y percepciones de salud. La fatiga se definió por autorreporte. Se aplicaron análisis descriptivos y bivariantes.

Resultados: Se incluyeron 43 pacientes, con una edad media de 67,4 años, siendo .el 28% mujeres. El 53,5% reportaron fatiga postdiálisis, sin encontrar diferencias significativas por edad o sexo. Los pacientes que presentaron fatiga postdiálisis presentaron un mayor tiempo medio de recuperación (467,9±194,4 frente a 66,3±137,0 minutos; p<0,001), niveles más bajos de proteínas totales (6,1 frente a 6,5 g/L; p=0,022) y peor autopercepción de salud (p=0,026). No se hallaron asociaciones con otras variables clínicas ni técnicas.

Conclusiones: La fatiga postdiálisis es un evento frecuente y se asocia a mayor tiempo de recuperación y a marcadores clínicos y subjetivos de peor estado general. Su evaluación sistemática podría mejorar el abordaje integral del paciente en hemodiálisis.

Palabras clave: hemodiálisis; fatiga postdiálisis; tiempo de recuperación; calidad de vida.

INTRODUCTION

Currently, 700 million people worldwide suffer from chronic kidney disease (CKD), of whom approximately three million are on renal replacement therapy, with a prevalence between 7–12% depending on the world region[1-3]. Moreover, these numbers are expected to double by 2030[4], with hemodialysis being the most widely used life-support treatment[5-6]. However, chronic hemodialysis has a substantial impact on patient health[7]. Among the most frequent complications is symptomatic hypotension, which occurs in up to 30% of patients during hemodialysis and may even lead to premature termination of the dialysis session due to intradialytic symptoms[8]. In this regard, patients experiencing complications often report post-dialysis fatigue (PDF), with a prolonged post-dialysis recovery time (DRT)[9]. Recovery may occur within the first 30 minutes among incident dialysis patients with good tolerance[10], but may extend up to 12 hours after treatment in complex chronic patients with frailty symptoms[11]. Thus, DRT may be defined as the amount of time a patient needs to recover physically and psychologically after a hemodialysis session, allowing them to perform basic activities of daily living without limitations[12].

There is limited evidence on how DRT affects quality of life or how hemodialysis could be adapted to improve this indicator[13]. Several factors may influence recovery time in hemodialysis patients, including intradialytic complications, treatment type and dose, and patient comorbidities[7,10,14,15]. Although hemodialysis is a life-sustaining therapy, its adverse effects increase patient burden and may significantly reduce quality of life both during and after treatment. Understanding the extent to which PDF symptoms prolong DRT could clarify the magnitude of the problem and guide improvement strategies, serving as an innovative and clinically relevant indicator for the management and effectiveness of hemodialysis[7,15].

Quality of care for patients on dialysis is largely defined by quantifiable laboratory outcomes, including urea kinetics, anemia, and bone-mineral metabolism. A prolonged recovery time negatively affects clinical indicators, perceived fatigue and pain, sleep, and cognitive function[16], and is associated with higher hospitalization and mortality rates[13,17]. Moreover, PDF may severely limit a patient's ability to perform daily activities, directly affecting quality of life, employment capacity, and social relationships. Despite its prevalence and impact on perceived health among renal patients, these symptoms have not been systematically documented in the scientific literature[18] and the use of PROMs in clinical care remains very limited[19]. Therefore, the aim of this study was to estimate the prevalence of PDF and DRT in patients undergoing chronic hemodialysis, exploring associated clinical and functional variables related to both the patient and renal therapy.

MATERIAL AND METHOD

Study design and setting

We conducted an analytical, prospective observational study in September 2023, recruiting all participants from the Hemodialysis Unit of *Hospital de Manacor*, a secondary-level hospital integrated into the Health Service of the Balearic Islands (Spain) (IB-Salut). The hospital serves approximately 150,000 inhabitants, mainly from the Llevant region and part of the Pla de Mallorca. It provides specialized care in internal medicine, general surgery, pediatrics, gynecology and obstetrics, anesthesiology, intensive care, emergency medicine, and various other medical and surgical specialties.

Participants

A non-random intentional sampling strategy was used. The purpose and details of the study were communicated to all unit staff through email and an in-person presentation to ensure adherence during data collection. All patients undergoing chronic hemodialysis for more than 3 months at the time of the study and receiving treatment at *Hospital de Manacor* were recruited. Exclusion criteria included patients unaware of their illness or unable to clearly report their perceptions, and patients who did not provide informed consent.

Procedures / Data collection

Data collection occurred during September 2023. Patients were initially contacted and provided with study information and informed consent forms. Subsequently, all sociodemographic variables, validated questionnaires (KDQOL-36 by Hays et al.[20]), Barthel Index, laboratory tests, and hemodialysis session variables were recorded. The new indicators included were PDF and DRT.

Variables

The primary variables were the presence of PDF and the time to recovery after dialysis (DRT). These variables were collected individually, documenting the presence of fatigue at the end of the dialysis session and the patient's perception of the time required to regain full function and the ability to perform basic activities of daily living since the previous dialysis session. Both PDF and DRT were recorded using a self-administered questionnaire completed by the nurse during each shift and entered into the REDCap platform during the hemodialysis session. Fatigue was assessed through a binary question (yes/no), and recovery time after the previous session was measured in hours.

The secondary variables were distributed into several categories:

- **Patient sociodemographic variables:** age, sex, BMI, duration of chronic treatment, presence of diabetes, modified Charlson comorbidity index, Barthel Index, and hospitalization within the previous month.
- **Dialysis-related variables:** dialysis shift and modality, type of vascular access, hemodialysis dose, ultrafiltration rate, total ultrafiltration volume, blood flow and dialysate flow, conductivity, patient temperature, Kt/V, Kt, and whether the patient slept during the session.
- **Analytical follow-up variables:** hemoglobin, 24-hour creatinine clearance (mL/min) and 24-hour urine output, total protein (g/L), and albumin (g/L).
- **Quality-of-life questionnaire variables:** KDQOL-36. The KDQOL-36 questionnaire is a health-related quality-of-life assessment instrument specifically designed for individuals with chronic kidney disease. It includes eight dimensions: (1) symptoms and problems of kidney disease; (2) effects of treatment; (3) burden of kidney disease; (4) physical function; (5) social function; (6) emotional function; (7) general health status; and (8) health-related quality of life.

Statistical analysis

A statistical analysis was performed using the variables exported from NefroLink, which were stored in an anonymous database created in an Excel spreadsheet (Microsoft Office 365). The dataset was subsequently cleaned and analyzed using IBM SPSS Statistics version 25.

Categorical data were summarized as proportions; continuous variables as mean, median, SD, and interquartile range. Quantitative methods were applied for primary and secondary outcomes. Bivariate analyses used parametric or non-parametric tests depending on distribution (correlation, ANOVA, chi-square). Missing primary outcome data (DRT) were not imputed. Statistical significance was set at *$p<0.05$*.

Ethical considerations

The study was approved by the Ethics and Research Committee of *Hospital de Manacor* and the Ethics Committee of the Balearic Islands. Written informed consent was obtained from each participant. Reference number CEI-IB 5170/23 PI.

RESULTS

General characteristics of the sample

A total of 43 patients were included; 27.9% (n=12) were women. Mean age was 67.4 years (SD, 12.8). Mean time on chronic hemodialysis was 38.3 months (SD, 37.4). Patients had a mean BMI of 47.2 kg/m² (SD, 10.6) and a modified Charlson comorbidity index of 5.3 (SD, 2.6). Most were functionally independent (Barthel score mean 88.4, SD, 17.8); 58.1% (n=25) had diabetes. Only 9.3% (n=4) had been hospitalized in the previous month.

Prevalence of PDF and Recovery Time

A total of 55.8% of patients (n=24) reported PDF. The mean DRT for the entire sample was 290.5 minutes (SD, 263.5). The frequency distribution showed that 41.9% recovered in <1 hour, 13.9% between 1 and 5 hours, and 44.2% between 5 and 10 hours.

Dialysis and Laboratory Characteristics

Regarding dialysis characteristics, most patients (74.4%) received online hemodiafiltration (OL-HDF) with a mean weekly dialysis duration of 11.6 hours (SD, 1.4). Native arteriovenous fistula was the most common vascular access (62.8%). For the technical parameters of dialysis, the mean blood flow rate was 329.7 mL/min (SD, 39.7) and the mean dialysate flow rate was 547.7 mL/min (SD, 71.5), with a mean conductivity of 14.0 mS/cm (SD, 0.1). Dialysate temperature remained constant at 36.5 °C (SD, 0.1). Additionally, most patients (65.1%) reported routinely sleeping during the session. Laboratory parameters showed a mean hemoglobin level of 11.3 g/dL (SD, 1.4) and mean albumin level of 3.8 g/dL (SD, 0.4). The remaining variables are shown in **table 1**.

KDQOL-36 Questionnaire

Analysis of the KDQOL-36 results showed a mean score of 50.5 (SD, 15.4) for the SF-12 physical and mental component. The perceived burden of kidney disease had a mean score of 53.7 (SD, 26.9). The symptom/problem dimension of CKD scored 80.4 (SD, 12.1), and the effects of CKD on daily life scored 68.0 (SD, 22.2).

Comparative Analysis in Relation to PDF

In the bivariate analysis, patients reporting PDF had a significantly longer recovery time than those without PDF (467.9 min [SD, 194.4] vs 66.3 min [SD, 137.0]; $p<0.001$). Regarding biochemical parameters, patients with PDF had significantly lower total protein levels (6.1 g/L vs 6.5 g/L; $p=0.022$), suggesting a possible association with nutritional status. Although albumin levels were also lower in the

Table 1. Sociodemographic characteristics of the sample.

Variable	Total/Value
Total number of patients	43 (100)
Age, mean (SD)	67.4 (12.8)
Sex, n (%)	
Female	12 (27.9)
Male	31 (72.1)
BMI, mean (SD)	47.2 (10.6)
Time on dialysis in months, mean (SD)	38.3 (37.4)
Charlson Index, mean (SD)	5.3 (2,6)
Barthel Index, mean (SD)	88.4 (17.8)
Diabetes, n (%)	
No	18 (41.9)
Yes	25 (58.1)
Hospitalization in the past month, n (%)	
No	39 (90.7)
Yes	4 (9.3)
Primary Outcomes	
Post-dialysis fatigue, n (%)	
No	19 (44.2)
Yes	24 (55.8)
Recovery time, mean (SD)	290.5 (263.5)
Recovery time categories, n (%)	
0–1 hour (0–60 min)	18 (41.9)
1–5 hours (61–300 min)	6 (13.9)
5-10 hours (301-600 min)	19 (44.2)
Dialysis Characteristics	
Vascular access type, n (%)	
Low-flux HD	4 (9.3)
High-flux HD	7 (16.3)
Online hemodiafiltration (HDF-OL)	32 (74.4)
Weekly dialysis dose (hours), mean (SD)	11.6 (1.4)
Tipo acceso vascular, n (%)	
CVC	16 (37.2)
Native AV fistula (FAVi)	27 (62.8)
Prosthetic AV fistula (pFAV)	0
Dialysis shift, n (%)	
Morning	25 (58.1)
Afternoon	18 (41.9)
Ultrafiltration rate per session (kg), mean (SD)	0.6 (0.4)
Total ultrafiltration (kg), mean (SD)	1.8 (1.0)
KT, mean (SD)	47.4 (12.5)
Kt/V, mean (SD)	1.3 (0.3)
Blood flow (mL/min), mean (SD)	329.7 (39.7)
Dialysate flow (mL/min), mean (SD)	547.7 (71.5)
Conductivity (mS/cm), mean (SD)	14.0 (0.1)
Temperature (°C), mean (SD)	36.5 (0.1)
Sleeps during dialysis, n (%)	
No	15 (34.9)
Yes	28 (65.1)
Analytical Characteristics	
Hemoglobin, mean (SD)	11.3 (1.4)
24h urine creatinine clearance (mL/min), mean (SD)	2.7 (4.0)
24h urine output, mean (SD)	302.9 (454.1)
Total proteins (g/L), mean (SD)	6.3 (0.6)
Albumin (g/L), mean (SD)	3.8 (0.4)
KDQOL-36	
SF-12 Physical & Mental Component, mean (SD)	50.5 (15.4)
Burden of kidney disease, mean (SD)	53.7 (26.9)
Symptoms / problems of CKD, mean (SD)	80.4 (12.1)
Effects of CKD on daily life, mean (SD)	68.0 (22.2)

PDF group (3.7 g/L vs 3.9 g/L), the difference did not reach statistical significance (*p*=0.064). KDQOL-36 analysis showed significantly lower scores in the PDF group in both the SF-12 physical and mental component (43.9 *vs* 58.8; *p*=0.001) and the perceived burden of kidney disease (44.9 *vs* 64.8; *p*=0.014). No statistically significant differences were observed between groups in the remaining sociodemographic, clinical, dialysis-related variables, or other KDQOL-36 domains. All findings are presented in **table 2**.

DISCUSSION

This study shows that more than half of the patients reported symptoms consistent with PDF, with 44% stating that they required more than five hours to recover physically, mentally, and socially after their dialysis session. It is estimated that between 43–81% of patients experience this symptomatology recurrently, consistent with findings in the scientific literature[21,22]. In our study, we observed a significantly longer DRT among patients presenting PDF vs those who did not. This finding not only validates DRT as a clinical marker but also reinforces the need for its systematic assessment in clinical practice. Therefore, both the detection of PDF and DRT could be proposed as indirect clinical outcomes of dialysis treatment tolerance, given that prolonged DRT—particularly beyond four hours—has been associated with poorer adherence to nutritional guidelines, worse attendance to dialysis sessions, and higher hospitalization rates[7,23,24]. The relevance of this finding extends beyond symptom severity, directly affecting quality of life, functional autonomy, and the potential for social and occupational reintegration. It also influences the patient's ability to plan basic daily activities[16], contributing to a vicious cycle of progressive deterioration[25,26].

Another relevant finding was the association between PDF and significantly lower total protein concentrations compared with patients without PDF (6.1 g/L *vs* 6.5 g/L; *p*=0.022). This is consistent with multiple investigations identifying nutritional status as a key determinant of vitality in hemodialysis patients[26]. Protein–energy wasting is highly prevalent in this population due to protein losses inherent to dialysis, chronic low-grade inflammation, and decreased caloric intake. This condition has been consistently linked to lower functional capacity, greater frailty, and poorer overall prognosis[11,13]. In this context, PDF may represent an early clinical manifestation of nutritional deterioration, anticipating more severe stages such as the protein–energy wasting syndrome. These biochemical markers should be interpreted not only as indicators of nutritional status but also as a reflection of systemic functional reserve.

Table 2. Comparative analysis of characteristics by post-dialysis fatigue.

Comparative Analysis	No post-HD fatigue n (%) 19 (44.2)	Post-HD fatigue n (%) 24 (55.8)	*p*-valor
Main variable			
Recovery time, mean (SD)	66.3 (137.0)	467.9 (194.4)	<0.001
Sociodemographic characteristics			
Age, mean (SD)	65.3 (15.3)	69.0 (10.6)	0.383
Sex, n (%)			0.373
Female	4 (21.1)	8 (33.3)	
Male	15 (78.9)	16 (66.7)	
BMI, mean (SD)	48,7 (12.0)	46.0 (9.4)	0.414
Time on dialysis in months mean (SD)	44.2 (32.4)	33.7 (41.0)	0.367
Charlson Index, mean (SD)	5.7 (2.7)	4.9 (2.4)	0.277
Barthel Index, mean (SD)	90.8 (19.7)	86.5 (16.3)	0.434
Diabetes, n (%)			0.977
No	8 (42.1)	10 (41.7)	
Yes	11 (57.9)	14 (58.3)	
Hospitalization in the last month, n (%)			0.062
No	19 (100)	20 (83.3)	
Yes	0	4 (16.7)	
Dialysis characteristics			
Dialysis type, n (%)			0.657
Low-flux HD	2 (10.5)	2 (8.3)	
High-flux HD	2 (10.5)	5 (20.8)	
HDF-OL	15 (78.9)	17 (70.8)	
Weekly dialysis dose (hours), mean (SD)	11.3 (2.0)	11.8 (0.5)	0.212
Dialysis shift, n (%)			0.224
Morning	13 (68.4)	12 (50.0)	
Afternoon	6 (31.6)	12 (50.0)	
Vascular access type, n (%)			0,189
CVC	5 (26.3)	11 (45.8)	
Native AVF (FAVi)	14 (73.7)	13 (54.2)	
Prosthetic AVF (pFAV)	0	0	
Mean UF rate per session (kg), mean (SD)	0.6 (0.4)	0.6 (0.4)	0.848
Total ultrafiltration (kg), mean (SD)	1.8 (1.1)	1.8 (0.9)	0.970
KT, mean (SD)	46.7 (11.0)	47.9 (13.9)	0.763
Kt/V, mean (SD)	1.3 (0.3)	1.4 (0.3)	0.430
Blood flow (mL/min), mean (SD)	330.8 (36.9)	328.7 (42.6)	0.870

Regarding quality-of-life analysis, significant inter-group differences were observed: patients with PDF displayed lower scores on the physical and mental components of the SF-12, as well as a greater perceived burden of chronic kidney disease. These findings are consistent with the literature describing PDF as one of the dimensions with the greatest impact on quality of life among renal patients[13,14]. Several studies have validated that the physical and emotional domains of the KDQOL-36, including the SF-12, are sensitive to variations in symptoms such as fatigue, pain, and sleep disturbances[26]. In this regard, our findings reinforce that fatigue should not only be evaluated in terms of intensity or duration but also considered a cross-sectional component affecting overall well-being and daily functioning. These data open a promising avenue for developing combined assessment tools that incorporate both biomarkers and symptom indicators, acting as central modulators between clinical status and the subjective experience of illness. This perspective provides a strong argument for including systematic fatigue assessment as part of quality-of-life indicators in hemodialysis programs, on the same level as physiological variables such as Kt/V or hemoglobin. Incorporating such an indicator would enable a more holistic evaluation of patient status and the early identification of at-risk subgroups who could benefit from individualized intervention strategies, potentially reducing the human, social, and economic burden of this underestimated event in renal replacement therapy.

Our study presents methodological limitations that should be considered when interpreting the results. As this phenomenon is understudied and underestimated, preliminary data were not available in our context; therefore, a first exploratory approach was conducted in a controlled local setting using a cross-sectional observational design. This allowed us to determine the prevalence of PDF and DRT after each dialysis session. Future studies should propose an internationally agreed definition measurable through a specific and sensitive instrument capable of analyzing the relationship between PDF, DRT, patient characteristics, and quality of life, with the aim of identifying risk factors and establishing implementation strategies for patient-centered, adapted interventions.

Análisis comparativo	No post-HD fatigue n (%) 19 (44.2)	Post-HD fatigue n (%) 24 (55.8)	*p*-valor
Dialysate flow, mean (SD)	555.4 (72.3)	541.7 (71,7)	0.537
Conductivity, mean (SD)	14.0 (0.2)	14.0 (0.1)	0.959
Temperature, mean (SD)	36.4 (0.1)	36.5 (0.1)	0.123
Sleeps during dialysis, n (%)			0.377
No	8 (42.1)	7 (29.2)	
Yes	11 (57.9)	17 (70.8)	
Analytical Characteristics			
Hemoglobin, mean (SD)	11.7 (1.4)	11.0 (1.4)	0.125
24h urine creatinine clearance (mL/min), mean (SD)	3.4 (4.6)	2.1 (3.5)	0.296
24h urine output, mean (SD)	357.9 (434.4)	259.4 (473.7)	0.486
Total proteins (g/L), mean (SD)	6.5 (0.6)	6.1 (0.6)	0.022
Albumin (g/L), mean (SD)	3.9 (0.3)	3.7 (0.4)	0.064
KDQOL-36 Questionnaire			
SF-12 Physical & Mental Component, mean (SD)	58.8 (14.7)	43.9 (12.8)	0.001
Burden of kidney disease, mean (SD)	64.8 (26.2)	44.9 (24.5)	0.014
Symptoms / problems of CKD, mean (SD)	82.5 (12.6)	78.8 (11.7)	0.330
Effects of CKD on daily life, mean (SD)	73.5 (23.7)	63.6 (20.3)	0.149

Based on our findings, we conclude that PDF is a highly prevalent phenomenon in the chronic hemodialysis population, with more than half of the evaluated patients reporting its presence and a significant proportion requiring more than five hours to recover after treatment. These data support the consideration of PDF as a relevant clinical outcome whose monitoring could provide valuable information regarding treatment tolerance and risk of functional decline. PDF may serve as an early marker of malnutrition and frailty, given its association with lower total protein levels. Its relationship with poorer physical and mental quality of life and greater perceived disease burden further highlights the need for systematic assessment alongside other key dialysis indicators. Incorporating this event as a clinical indicator could facilitate early detection of vulnerable patients and contribute to the development of more personalized therapeutic strategies, with the potential to improve not only clinical outcomes but also the overall patient experience and well-being in hemodialysis.

Conflicts of interest

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Factors associated with low health literacy in haemodialysis patients: an observational study

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ABSTRACT

Introduction: Haemodialysis requires adaptations in patients' lives due to imposed restrictions, directly impacting their quality of life. Health literacy is fundamental for understanding and applying information related to therapy, influencing adherence and clinical outcomes. The contribution of health literacy to dialysis patients in developing countries still requires further investigation.

Objectives: To determine the prevalence of low health literacy among haemodialysis patients and its associated factors.

Material and Method: We conducted a cross-sectional and prospective study conducted in a dialysis unit in southeastern Brazil between September 2023 and April 2024. Sociodemographic, clinical, and dialysis data were collected through interviews and review of health records. Health literacy was assessed using the HLS-EU-Q6 instrument, categorising participants as having problematic, inadequate, or sufficient literacy.

Results: Of the 218 patients on haemodialysis, 112 were included; 61.8% (n=68) were male, with a mean age of 50.11±23.47 years and a mean of 7.44±3.61 years of schooling. Low literacy was observed in 60.72% (n=68). Years of schooling were associated with literacy levels.

Conclusion: Low health literacy was found in more than half of the participants, associated with educational attainment and interdialytic weight gain. It is suggested that health information should be adapted to patients' literacy levels, using visual resources to facilitate understanding, promote self-care, and improve clinical outcomes. However, interventional studies are needed to evaluate the effectiveness of these strategies.

Keywords: health literacy; chronic kidney failure; renal dialysis; education; nursing.

RESUMO

Fatores associados ao baixo letramento em saúde em paciente hemodialíticos: estudo observacional

Introdução: A Hemodiálise exige adaptações na vida do paciente devido às restrições impostas, refletindo diretamente na sua qualidade de vida. O Letramento em Saúde é fundamental para compreender e aplicar informações relacionadas à terapia, influenciando a adesão e os resultados clínicos. Destaca-se que ainda precisa ser melhor investigado as contribuições do Letramento em Saúde nos pacientes dialíticos em países em desenvolvimento.

Objetivos: Determinar a prevalência do baixo letramento em Saúde em pacientes em hemodiálise e seus fatores associados.

Material e Método: Estudo transversal e prospectivo realizado em uma Unidade de diálise no Sudeste do

Brasil, entre setembro de 2023 e abril de 2024. Dados sociodemográficos, clínicos e dialíticos foram coletados por meio de entrevista e consulta ao prontuário. O letramento foi avaliado pelo instrumento HLS-EU-Q6, categorizando os participantes em letramento problemático, inadequado ou suficiente.

Resultados: Dos 218 pacientes em terapia, 112 foram incluídos, 61,8% (n=68) eram do sexo masculino, com idade média de 50,11±23,47 anos e escolaridade de 7,44±3,61 anos. O baixo letramento foi de 60,72% (n=68), com influência dos anos de escolaridade.

Conclusão: O baixo LS foi encontrado em mais da metade dos participantes, com associações ao nível de escolaridade e ganho de peso interdialítico. Sugere-se que as informações em saúde sejam adaptadas aos níveis de letramento dos pacientes, utilizando recursos visuais para facilitar a compreensão, promover o autocuidado e melhorar os desfechos clínicos. No entanto, são necessários estudos intervencionistas para avaliar a eficácia dessas estratégias.

Palavras-chave: letramento em saúde; insuficiência renal crônica; diálise renal; escolaridade; enfermagem.

RESUMEN

Factores asociados con el bajo nivel de alfabetización en salud en pacientes en hemodiálisis: un estudio observacional

Introducción: La hemodiálisis requiere adaptaciones en la vida del paciente debido a las restricciones impuestas, reflejándose directamente en su calidad de vida. La Alfabetización en Salud es fundamental para comprender y aplicar la información relacionada con la terapia, influyendo en la adherencia y en los resultados clínicos. Las contribuciones de la alfabetización a los pacientes en diálisis en los países en desarrollo aún necesitan ser mejor investigadas.

Objetivos: Determinar la prevalencia del bajo nivel de alfabetización en salud en pacientes en hemodiálisis y sus factores asociados.

Material y Método: Estudio transversal y prospectivo realizado en una unidad de diálisis del sudeste de Brasil entre septiembre de 2023 y abril de 2024. Se recogieron datos sociodemográficos, clínicos y de diálisis mediante entrevista y consulta de historias clínicas. La alfabetización se evaluó mediante el instrumento HLS-EU-Q6, categorizando a los participantes en alfabetización problemática, inadecuada o suficiente.

Resultados: De los 218 pacientes en hemodiálisis, se incluyeron 112, el 61,8% (n=68) eran varones, con una edad media de 50,11±23,47 años y una escolaridad de 7,44±3,61 años. La alfabetización baja fue del 60,72% (n=68). Los años de escolarización influyeron en los niveles de alfabetización.

Conclusión: El bajo nivel de alfabetización en salud se encontró en más de la mitad de los participantes, con asociaciones con el nivel educativo y el aumento de peso interdialítico. Se sugiere adaptar la información sanitaria a los niveles de alfabetización de los pacientes, utilizando recursos visuales para facilitar la comprensión, promover el autocuidado y mejorar los resultados clínicos. Sin embargo, se necesitan estudios de intervención para evaluar la eficacia de estas estrategias.

Palabras clave: alfabetización en salud; insuficiencia renal crónica; diálisis renal; escolaridad; enfermería.

INTRODUCTION

Hemodialysis (HD) is the most widely used renal replacement therapy for patients with chronic kidney disease (CKD), a modality that requires significant lifestyle adjustments due to imposed restrictions, which directly affect quality of life[1,2].

According to the Brazilian Nephrology Census, the estimated number of patients on dialysis in 2022 was 153,831.3 Among prevalent patients, 95.3% were on HD (4.6% of these on hemodiafiltration) and 4.7% on peritoneal dialysis (PD). Together, systemic arterial hypertension (33%) and diabetes mellitus (32%) accounted for two-thirds of the underlying diseases leading to kidney failure[3].

Patients with CKD on HD face daily decisions related to self-management of the disease. To minimize risks, the adoption of healthy lifestyle behaviors is recommended, including regular physical activity, dietary and fluid restrictions, and adherence to complex therapeutic regimens at all stages of the disease[3].

Given the importance and complexity of correctly adhering to therapeutic regimens, the relevance of health literacy (HL) among patients becomes evident, as it may contribute to understanding and using health information, thereby improving the effectiveness of renal replacement therapy (RRT) and overall quality of life[4]. In addition to being a determinant of self-care and therapeutic effectiveness, HL allows identification of patients who require greater instructional support[4].

HL is a multidimensional concept that encompasses cognitive, affective, social, and personal skills that determine an individual's motivation and ability to access, understand, and use health information[5]. It is not limited to the ability to read and comprehend exchanged information, but also includes the ability to actively manage one's own health, locate and evaluate information, and seek resources for better health maintenance[5].

HL may help patients understand and adhere to restrictive diets and complex medication regimens, as well as adhere rigorously to medical appointments and dialysis sessions for those in CKD stage 5D[6].

Research indicates that HL remains understudied in developing countries, including Latin America. A 2017 systematic review of studies conducted in developed countries found that 25% of participants had low HL.7 In contrast, a systematic review in Latin America and the Caribbean identified 84 studies conducted across 15 countries[8-11], reporting a prevalence of low HL of 86.49%[12].

There is a scarcity of high-quality studies examining how low HL negatively impacts health outcomes, highlighting the need for large-scale research and interventions to improve outcomes for patients with CKD and low HL[13]. Given these considerations, the contributions of HL among dialysis patients in developing countries require further investigation.

The objective of this study was to determine the prevalence of low HL among patients undergoing HD and its associated factors.

MATERIAL AND METHOD

Study Design, Setting, and Period

We conducted an observational, cross-sectional study in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines[14]. The study was carried out at the Dialysis Unit of the Hospital das Clínicas, School of Medicine of Botucatu, São Paulo State, Brazil, from September 2023 to April 2024.

Population and Sample

All adult patients enrolled in the chronic HD program were considered eligible, according to the following criteria:

Inclusion criteria: Individuals aged ≥18 years; enrolled in a chronic HD program for at least 3 months; receiving dialysis treatment 3 times per week.

Exclusion criteria: Individuals with CKD not enrolled in the local chronic HD program (transplant recipients, hospitalized dialysis patients); illiterate individuals and/or those with cognitive impairment according to the Mini-Mental State Examination (MMSE).

Variables

Variables were collected through participant interviews and electronic medical record review (sociodemographic, clinical, and dialysis-related data). During the interview, participants completed three questionnaires (MMSE, HLS-EU-Q6, and lifestyle habits), administered once during an HD session.

Mini-Mental State Examination (MMSE)

The MMSE was first administered to assess global cognitive function, including temporal and spatial orientation, registration, attention and calculation, recall, language, executive function, visuospatial skills, and abstraction. The total score ranges from 0 to 30 points, corresponding to the following categories: cognitive decline: <2 4 points; mild decline: 23–21 points; moderate decline: 20–11 points; severe decline: <10 points[15]. If the participant remained eligible, the remaining questionnaires were administered.

HLS-EU-Q6

HL was assessed using the HLS-EU-Q6 (Health Literacy Survey Questionnaire). Derived from the multidimensional HLS-EU-Q47 developed by the European Research Consortium[16], the instrument aims to evaluate the ability to understand, assess, and perform tasks related to health. The Brazilian Portuguese translation and validation demonstrated a unidimensional structure, adequate factorial indices, and high reliability[16]. The questionnaire includes 6 Likert-scale questions assessing the patient's ability to locate, understand, and apply health information. The final score is calculated as the mean of all items answered and classified into 3 HL levels: inadequate (≤2); problematic (>2 and ≤3); and sufficient (>3)[16].

Ad hoc Questionnaire

An ad hoc questionnaire was developed for this study to identify self-care practices related to diet and medication therapy. It consisted of 5 questions: ***1)*** *Do you come to hemodialysis alone?* (Yes / I come with a family member or caregiver); ***2)*** *Do you attend your medical appointments alone?* (Yes / I come with a family member or caregiver); ***3)*** *At home, do you take your medications by yourself?* (Yes / I receive help for this); ***4)*** *Do you prepare your own meals?* (Yes / Someone else prepares them); ***5)*** *At home, do you consume processed foods (boxed juices, soft drinks, cookies, instant noodles)?* (Yes / No).

Electronic Health Record Data

With participant consent, sociodemographic data were collected, including age (years), sex (female or male), nationality (Brazilian or other), place of birth (city of origin), educational level (years of schooling), and occupation. Occupations were categorized according to occupational risk type: physical risk: machine operator, security guard, butcher, locksmith; chemical risk: farm worker, rural producer; biological risk: waste collector; ergonomic risk: real estate agent, saleswoman, driver, general services assistant, shopkeeper, homemaker, domestic worker, waiter, salesperson, caretaker, administrative assistant, business owner, seamstress, student; mechanical risk: auto mechanic.

Clinical Variables

Clinical variables included underlying diseases, time on RRT, creatinine, and urea. Dialysis-related data included dry weight, therapy duration, and type of vascular access. Ultrafiltration rate, initial and final weight, and mean arterial pressure (MAP) at the start and end of the last 12 sessions were collected. For analysis of systemic blood pressure, pre- and post-dialysis systolic and diastolic pressures from all HD sessions were reviewed. Interdialytic weight gain (IDWG) was defined as the postdialysis weight of one session and the predialysis weight of the following session.

Data Analysis

For data analysis, participants were categorized into 2 groups (sufficient HL and problematic/inadequate HL). Descriptive statistics were performed using means, standard deviations, minimum and maximum values, and medians for quantitative variables, and frequencies and percentages for categorical variables. Mean IDWG was calculated as: predialysis weight (current session)–postdialysis weight (previous session)÷number of sessions. Relative IDWG was calculated as: mean IDWG÷dry weight×100.

Comparisons of means for quantitative variables according to HL level were performed using the Student t test for normally distributed data and a gamma distribution adjustment for skewed data. For bivariate analyses, associations between HL groups and categorical variables were assessed using the chi-square test.

A significance level of 5% (*p*<0.05) was adopted for all tests. For multivariate correlation, logistic regression using the Wald test was performed, with HL as the outcome. Results were presented as odds ratios with corresponding 95% confidence intervals; intervals not including 1 were considered statistically significant. All analyses were performed using SAS for Windows, version 9.4.

Ethical Procedures

In accordance with Resolution 510/2016, the study was approved by the Institutional Research Ethics Committee (CAAE 73273823.0.0000.5411/Approval No. 6.589.572), and all participants provided written informed consent.

RESULTS

Of the 218 patients enrolled in the HD program, 5.9% (n=13) were illiterate and 15.5% (n=34) presented cognitive impairment, thus being excluded. Additionally, 27.9% (n=61) did not provide consent. A total of 112 participants were included in the study. Among them, 61.8% (n=68) were male, with a mean age of 50.11±23.47 years and mean schooling of 7.44±3.61 years. The prevalence of low HL was 60.72% (n=68). The most prevalent comorbidities were systemic arterial hypertension (40%) and diabetes mellitus (29.1%). Participant data are shown in **table 1.**

When evaluating results according to HL level (**table 2**), statistically significant differences were found for educational level, occupation, and vascular access. Regarding education, having 6 to 8 years of schooling was more frequent in the inadequate/problematic HL group (n=34; 50%; *p*=0.0013). Conversely, having 9 to 13 years of schooling predominated in the sufficient HL group (n=23; 52.3%; *p*=0.0002).

For occupation, there was a significant difference between HL groups (*p*=0.0112), with ergonomic-risk occupations being significantly more common in the sufficient HL group (68.2%; *p*=0.0143).

Vascular access was associated with HL (p=0.0307), with central venous catheters (CVC) more prevalent in both HL groups vs arteriovenous fistula (AVF). Inadequate/problematic HL was predominant among men (61.8%; n=42), with a mean age of 51.82±23.21 years.

Table 1. Sociodemographic, clinical, and dialysis characteristics of participants.

Variables	N = 112	%
Male sex	68	61.8
Age (years)*	50.11 ± 23.47	–
Education (years)*	7.44 ± 3.61	–
Occupation: Occupational Risk	–	–
Ergonomic	59	52.67
Physical	29	25.89
Mechanical	12	10.71
Biological	1	0.89
Chemical	7	6.25
Health literacy	–	–
Inadequate/Problematic	68	60.72
Sufficient	44	39.28
Underlying disease	–	–
Systemic arterial hypertension	44	39.28
Diabetes mellitus	32	28.57
Glomerulopathies	10	8.92
Others	39	34.82
Dialysis data	–	–
Mean IDWG (%)*	2.85 ± 1.34	–
Time on dialysis therapy (months)*	44.8 ± 73.76	–
Treatment duration (hours)*	3.98 ± 0.36	–
Entry MAP*	94.3 ± 6.16	–
Exit MAP*	87.7 ± 5.15	–
Vascular access	–	–
Arteriovenous fistula	39	34.82
Central venous catheter	73	65.17

*Mean ± standard deviation; **MAP:** Mean arterial pressure; **IDWG:** Interdialytic weight gain.

In the multivariate analysis, no significant association was found between vascular access (CVC vs AVF) and HL (OR, 2.247; 95% CI, 0.897–5.626; *p*=0.084). However, educational level remained significant, especially for Group G2 (9–13 years of schooling) (OR, 7.661; 95% CI, 2.676–21.935; *p*=0.0014). For Group G1 (6–8 years), lower educational level was associated with a higher risk of low HL (OR, 2.862; 95% CI, 1.054–7.777; *p*=0.006) **(table 3)**.

When stratifying participants by interdialytic weight gain (IDWG)—G1 (IDWG<2%), G2 (IDWG 2–4%), and G3 (IDWG>4%)—and comparing them according to HL level, a significant association was found (*p*=0.0474). In 79.4% (n=23) of participants with inadequate/problematic HL, IDWG was <2% **(table 4).**

Table 2. Comparison between HL groups regarding dialysis and sociodemographic variables.

Variables	Adequate HL N(%)	Inadequate/ Problematic HL N(%)	*p*-valor
Number of sessions evaluated*	10.39 ± 1.83	10.22 ± 2.18	0.6767
Participants*	44 (39.2)	68 (60.7)	-
Age*	47.5±4.17	51.82±23.21	0.5129
Male sex	28 (63.6)	42 (61.8)	0.8416
Occupation	-	-	0.0112
Ergonomic risk	30 (68.2)	29 (42.6)	-
Physical risk	11 (25.0)	18 (26.5)	-
Others	3 (4.6)	21 (30.9)	-
Education level	-	-	0.0002
1 to 5 years	13 (29.5)	22 (32.4)	0.9168
6 to 8 years	8 (18.2)	34 (50.0)	0.0013
9 to 13 years	23 (52.3)	12 (17.6)	0.0002
Dialysis data	–	–	–
Mean IDWG (%)*	3.39 ± 2.72	3.07 ± 2.59	0.529
Time on dialysis (months)*	44.8 ± 73.76	33 ± 41.14	0.1259
UF (mL)*	19.02 ± 13.35	17.32 ± 12.07	0.5815
Creatinine*	8.1 ± 4.63	8.61 ± 4.15	0.5422
Pre-urea*	109 ± 61.71	97.24 ± 48.56	0.266
Dry weight*	73.93 ± 24.14	74.33 ± 19.58	0.9237
Urea Reduction Rate*	0.67 ± 0.16	0.70 ± 0.12	0.3098
Vascular access	–	–	**0.0307**
CVC	34 (77.3)	39 (57.4)	–
AVF	10 (22.7)	29 (42.6)	–
Lifestyle habits	–	–	–
Do you prepare your own meals? (Yes)	21 (47.7)	27 (39.7)	0.4022
Do you come alone to hemodialysis? (Yes)	24 (54.5)	39 (57.4)	0.7699
Do you go alone to medical appointments? (Yes)	20 (45.5)	28 (41.2)	0.6550
At home, do you take your medications alone? (Yes)	24 (54.5)	39 (57.4)	0.4390
At home, do you consume processed foods? (Yes)	30 (68.2)	42 (61.8)	0.4888

HL: Health literacy; **N(%);** Mean ± standard deviation; **IDWG:** Interdialytic Weight Gain; **UF:** Ultrafiltration; **AVF:** Arteriovenous Fistula; **CVC:** Central Venous Catheter

Table 3. Multivariate logistic regression analysis.

Variable	Coefficient (OR)	95%CI	p-value
Vascular access:			
CVC vs AVF	2.247	0.897- 5.626	0.084
Education G1 (6–8 years)	2.862	1.054-7.777	0.006
Education G2 (9–13 years)	7.661	2.676-21.935	0.0014

CVC: central venous catheter; **AVF:** arteriovenous fistula; **OR:** odds ratio; **CI:** confidence interval; **Education G1** = 6–8 years of schooling; **Education G2** = 9–13 years of schooling.

Table 4. Interdialytic weight gain and health literacy.

Variable	G1	%	G2	%	G3	%	p-value
Sufficient HL	6	20.6	27	48.2	11	40.7	0.0474
Inadequate/ Problematic HL	23	79.4	29	51.8	16	59.3	–
Total	**29**	–	**56**	–	**27**	–	**112**

HL: Health literacy; **IDWG:** Interdialytic weight gain; **G1:** IDWG<2%; **G2:** IDWG 2–4%; **G3:** IDWG>4%.

DISCUSSION

Low HL was predominant, affecting more than half (60.7%) of participants. Significant associations were observed when comparing participants across HL levels: the fewer years of schooling, the greater the likelihood of inadequate/problematic HL. Among dialysis-related variables, an IDWG <2% was significantly associated with inadequate/problematic HL. No additional associations with HL were identified.

Low HL among patients with kidney disease has been reported in other recent studies with similar prevalence. A study including 336 participants across five dialysis centers in Turkey found that 62.5% had inadequate or limited HL. In Portugal, an evaluation of HL levels among 268 HD patients across seven clinics showed a prevalence of low HL of 74%[17,18].

Additionally, we observed that 17.6% (n=12) of participants with low HL had more than eight years of schooling. Furthermore, 5.9% (n=13) of otherwise eligible patients were excluded due to illiteracy. Low educational attainment is frequently associated with low HL, as it plays a central role in this context.

Lower educational level and the need for assistance with reading and writing have been shown to be statistically significant predictors of HL scores in other studies[17,18]. Individuals with limited education face challenges in understanding health information and, consequently, in effectively managing their chronic disease[19]. As a result, they often have limited knowledge about health-related issues, making tailored interventions essential to adequately support this group[20].

The association between low HL and low educational level underscores the need to reconsider how health professionals deliver health education to patients. It is necessary to develop interventions specifically directed at this population, as individuals with low HL have greater difficulty understanding health materials—whether printed or digital—and communicating with health professionals[20]. In a 2023 randomized clinical trial with 112 HD patients in China, multimodal health education was vs standard counseling. Three months after the intervention, significant differences were observed between the control and intervention groups in quality of life, HL, and self-care behaviors[21].

Nurses, due to their daily contact with patients, play a central role in health education, contributing to better treatment adherence and, consequently, improved quality of life[22]. A 2025 systematic review examined interventions used by nurses to promote HL in chronic non-communicable diseases[23]. Among the 25 included studies, 15 addressed CKD or its risk factors, such as diabetes and cardiovascular disease, including hypertension. Nurses were found to use simple language, avoid medical jargon, and simplify complex concepts to make information more accessible[23]. For patients with low HL, visual resources such as images or videos were used to enhance understanding, and patients were encouraged to ask questions to clarify doubts and participate actively in their care[23].

Participants with low HL had an IDWG <2%, when stratified by dry weight, a variable that was associated with HL. The literature shows that managing IDWG is a necessary component of self-care. In 2020, AlAwwa et al. found an independent correlation between low IDWG and atrial fibrillation in a cohort of 231 HD patients in Jordan[24]. Additionally, a study[25] including dialysis patients who were hypertensive due to hypervolemia found lower IDWG, similar to our findings, which also showed higher blood pressure levels in the low-HL group. A cross-sectional study conducted in four hospitals in China with 433 HD patients demonstrated that better HL levels were associated with better management of fluid restrictions and IDWG. Other factors may also influence IDWG management, such as family support and adherence to instructions from health professionals[26].

Lastly, no other clinical or sociodemographic associations with low HL were identified. This included vascular access type, although CVC use was more common than AVF among participants. A 2024 Brazilian study involving 167 patients receiving conservative treatment also found no significant association between HL levels and clinical or dialysis-related variables[27]. This absence of association suggests that clinical factors alone do not directly influence patients' HL skills. Socioeconomic conditions and access to technology appear to be more relevant, highlighting the need for educational interventions that account for patients' social and digital contexts[27]. In this sense, understanding how HL levels shape these choices and their impact on clinical outcomes is essential.

This study has some limitations. Data collection in the HD unit may have influenced responses and contributed to the number of participants who declined to participate, as HD machines and chairs are positioned close to one another, potentially causing discomfort when answering questionnaires. It is recommended that future studies avoid conducting data collection during dialysis sessions.

Based on the findings, we conclude that low HL was present in more than half of participants, influenced by educational level and associated with low IDWG. It is suggested that health information be tailored to patients' HL levels. Additionally, the use of visual resources to facilitate understanding may improve health education, support active participation in self-care, and consequently enhance clinical outcomes. However, interventional studies are needed for further evaluation.

Conflicts of interest

Non declared.

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Lola Andreu AWARD 2024-2025

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ORIGINAL

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Analysis of the relationship between body image and quality of life in patients with functioning renal transplants

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ABSTRACT

Introduction: Renal transplantation is the most favourable therapeutic option for patients with end-stage chronic kidney disease, being associated with lower mortality and greater survival vs other alternatives. However, recipients face difficulties in adapting to the donated organ, often perceiving it as a foreign body, which distorts their body image and promotes negative behaviours that affect quality of life.

Objectives: To determine the relationship between body image and quality of life in patients with functioning renal transplants.

Material and Method: We conducted a descriptive, cross-sectional observational study. A non-probabilistic, purposive sample of renal transplant recipients who consented and met the inclusion criteria was obtained. The Body Self Relations Questionnaire was used for the body image variable, and the SF-36 questionnaire was used for the quality-of-life variable.

Results: A total of 71 patients participated; 98.6% reported moderate dissatisfaction with body image. Regarding quality of life, the majority presented a very high level (57.7%), followed by a high level (38.1%). A significant association was found between less body image impairment and better quality of life (Spearman's Rho=−0.375; p<0.001).

Conclusions: Among patients with functioning renal transplants, at least in the sample studied, less body image impairment was associated with better quality of life.

Keywords: body image; quality of life; renal transplantation; chronic kidney disease.

RESUMEN

Análisis de la relación entre la imagen corporal y la calidad de vida en personas con trasplante renal funcionante

Introducción: El trasplante renal constituye la opción terapéutica más favorable para pacientes con enfermedad renal crónica terminal, se relaciona con menor mortalidad y mayor supervivencia comparado con otras opciones; sin embargo, los receptores enfrentan dificultades para adaptarse al órgano donado, percibiéndolo como un cuerpo extraño, lo que distorsiona su imagen corporal y propicia comportamientos negativos que afectan su calidad de vida.

Objetivos: Determinar la relación entre la imagen corporal y la calidad de vida en pacientes con trasplante renal funcionante.

Material y Método: Estudio observacional descriptivo de corte transversal. Se obtuvo una muestra no probabilística e intencional de receptores de trasplante renal que consintieron en participar en el estudio y cumplían los criterios de selección. Se utilizaron el cuestionario multidimensional Body Self Relations Questionnaire para la variable imagen corporal y el cuestionario SF-36 para la variable calidad de vida.

Resultados: Participaron 71 pacientes, el 98,6% refirió tener moderada insatisfacción respecto a su imagen corporal. Referente a la calidad de vida, la mayoría presenta nivel muy alto con 57,7% seguido de nivel alto con 38,1%. Se encontró una relación significativa entre menor afectación de la imagen corporal y mayor calidad de vida en los pacientes estudiados (Rho de Spearman =-0,375 y p-valor de <0,001).

Conclusiones: En los pacientes con trasplante renal funcionante, al menos en la muestra estudiada, una menor afectación de la imagen corporal está relacionada con mejor calidad de vida.

Palabras clave: imagen corporal; calidad de vida; trasplante renal; enfermedad renal crónica.

INTRODUCTION

Kidney transplantation (KT) is widely accepted as the first-line renal replacement therapy for patients with end-stage chronic kidney disease (CKD), as it is associated with lower morbidity and mortality and better quality of life compared with other renal replacement therapies[1-2]. Unlike other interventions, KT involves three key actors: the donor, the recipient, and the organ/tissue. Therefore, the procedure carries a wide range of representations and meanings for the patient, engaging biological, psychological, and social dimensions. However, the success of transplantation is often addressed primarily from a traditional biomedical perspective, focusing almost exclusively on graft assimilation while placing emotional, psychological, social, occupational, and family aspects in the background[3].

KT recipients demonstrate better survival rates than patients receiving dialysis-based renal replacement therapies[4]. Medical advances include the development of new methods and medications to improve these outcomes and enhance patients' quality of life. Nevertheless, holistic perspectives—such as patients' self-perception—have received limited attention. Studies in Latin America mainly compare the psychological symptoms of transplant recipients with those of the general population, without considering factors that may contribute to rejection episodes, such as the type of donated organ, the anonymity of the donor, or family support[5]. This population requires specific follow-up, where nursing professionals must address the factors influencing health-related quality of life (HRQoL). After nursing interventions based on health education and psychological counseling, several authors have reported improvements in patients' HRQoL, particularly in psychological domains[6-7].

Studies conducted in individuals undergoing surgical procedures have demonstrated that such interventions can significantly alter emotional, social, and physical aspects of life, leading to disturbances in body image[8-9]. Although most patients eventually adapt to these changes, they report feelings of mutilation, decreased self-esteem, altered sense of femininity, reduced sexual attractiveness, anxiety, sadness, humiliation, and fear of recurrence. In complex surgeries such as KT, body grief often occurs[10]. This phenomenon is characterized by disturbances in body image when there is a discrepancy between physical appearance and the mental representation the individual has of their body, significantly interfering with personal development and interpersonal relationships, with a negative impact on quality of life.

Rosen[11] defines body image as the way a person perceives, imagines, feels, and acts regarding their own body. This concept includes perceptual, subjective, and behavioral components. According to Botella García[12], the dimensions of body image in this study are 4: Subjective Importance of Corporality (ISC): concern for physical appearance, behaviors related to body shape, weight, dieting, and perceived physical attractiveness across body areas; Physical Fitness-Oriented Behaviors (COMF): regular physical activity—exercise, strength, and endurance—to maintain a healthy appearance; Self-Evaluated Physical Attractiveness (AFA): concern for maintaining an attractive body and the degree of satisfaction with one's appearance, including body image without clothing; and Physical Appearance Care (CAF): ongoing attention to bodily appearance, with emphasis on coordination and physical harmony.

Patients experiencing body image disturbances undergo changes at multiple response levels. Perceptually, these disturbances may focus on the affected area and produce distorted perceptions of defects and other changes. Cognitive disturbances—particularly those related to body image and interpersonal relationships—may trigger negative internal dialogue and dysfunctional personal values. Physiologically, patients experience changes in habits and must adapt to new and unfamiliar sensations. Emotionally, they face anxiety, dissatisfaction, aggression, and irritability, while behaviorally they may exhibit shame, fear of rejection, and social avoidance linked to their appearance[13].

Although there is extensive research on quality of life in patients with CKD undergoing hemodialysis and peritoneal dialysis, information on kidney transplantation in our region remains limited. Comparative studies show differences in quality of life according to the renal replacement therapy used; however, determining the superiority of one therapy over another remains challenging due to multiple variable factors[14]. Quality of life is a multidimensional concept shaped by multiple aspects of life, closely related to well-being, satisfaction of basic needs, and the means to achieve them[15]. Physical health integrates objective and subjective aspects influencing quality of life and personal, economic, and social development—key elements in the patient's life[16].

A KT recipient's ability to identify changes in body image and in quality of life related to such changes—as well as the interaction between these two factors—may constitute a valuable source of information for designing interventions aimed at improving not only graft survival but also the recipient's overall well-being. Such findings may also inform health policy development.

Therefore, the primary endpoint of this study was to determine the relationship between body image and quality of life, and to analyze the sociodemographic characteristics of KT patients at a public hospital.

MATERIAL AND METHOD

Study design, setting, and duration

We conducted a descriptive, observational, cross-sectional study in the outpatient nephrology clinic of the *Hospital Nacional Alberto Sabogal Sologuren*, an institution that provides healthcare services to individuals insured by the social security system in the Constitutional Province of Callao, Peru. The study period was from March 1st to July 30th, 2022.

Population and sample

The study population included all patients who received a deceased-donor KT at Hospital Nacional Alberto Sabogal Sologuren up to February 2022. A non-probability convenience sampling method was used. Inclusion criteria were more than three months post-transplant, active insurance coverage during the study period, and signed informed consent. Patients experiencing clinical complications during the study period were excluded.

Study variables and measurement instruments

The main variables analyzed were body image and HRQoL. Sociodemographic data were also collected, including sex, age, marital status, educational level, employment status, dialysis history, and time since transplantation.

Body image was measured using the short version of the Multidimensional Body Self Relations Questionnaire (MBSRQ), which includes 45 items structured into four dimensions and uses a Likert-type scale. This instrument evaluates overall body image perception and satisfaction with various body parts. Minor terminology adaptations were made to apply the tool to the Peruvian population; therefore, validity was reassessed by a panel of five experts (two specialists and three methodologists). The binomial test yielded statistical significance ($p=0.045139$, $p<0.05$), supporting the instrument's validity. A pilot test yielded a Cronbach's alpha of 0.792, indicating high reliability.

Quality of life was assessed using the SF-36 questionnaire, a widely validated tool measuring HRQoL through 36 items grouped into eight dimensions: physical functioning, physical role, bodily pain, general health, vitality, social functioning, emotional role, and mental health. In Latin America, the SF-36 has shown Cronbach's alpha values between 0.80 and 0.91 across its domains, indicating high internal consistency[17].

Each SF-36 item is scored from 0 to 100, with 0 representing the poorest quality of life and 100 the highest. For this study, the average across all dimensions yielded an overall quality-of-life score categorized into five levels: 0–19 very low; 20–39 low; 40–59 average; 60–79 high; 80–100 very high.

Data collection

Data collection occurred in three phases. First, authorization was obtained from the hospital ethics committee. Second, coordination was undertaken with the leadership of the Transplant Recipients Association of the National Hospital Alberto Sabogal Sologuren to establish objectives and procedures. Third, researchers contacted patients by phone to schedule their nephrology outpatient visits. After their medical appointments, patients were approached to complete the questionnaires following explanation and informed consent. Administration of the instruments required approximately 15–20 minutes per patient.

Statistical analysis

Data were entered into Microsoft Excel 2019 and analyzed using SPSS v25. Qualitative variables were described using frequency distributions, and numerical variables using mean ± standard deviation or median and interquartile range, depending on whether they followed a normal distribution. Inferential analysis employed Spearman's correlation coefficient (Spearman's rho) after verifying the normality of the variables, with statistical significance set at $p<0.05$ and a 95% confidence interval.

Ethical considerations

Informed consent was obtained from all participants, ensuring voluntary participation and confidentiality. The study complied with the Declaration of Helsinki and all relevant ethical and legal biomedical research regulations. Ethical approval was granted by the Hospital Ethics Committee. The study adhered to the guidelines of Peruvian regulations D.S. 011-2011-JUS and Law 29733 on personal data protection.

RESULTS

A total of 71 patients participated in the study. Their sociodemographic characteristics are shown in **table 1.**

Regarding body image **(figure 1)**, 98.6% (n=70) of participants reported moderate dissatisfaction with their body image, while only one patient displayed mild dissatisfaction. No cases of normal satisfaction or severe dissatisfaction were recorded. Overall, 100% of patients exhibited some degree of body image disturbance, primarily moderate or mild dissatisfaction.

Table 2 presents the dimensions of body image among transplant recipients. Findings included: 71.8% (n=51) had moderate dissatisfaction in the subjective importance of corporality dimension; 93% (n=66) had moderate dissatisfaction in physical fitness-oriented behaviors;

Table 1. Sociodemographic Characteristics.

Category	Subcategory	Frecuency	Percentage
		n=71	100.0
Age	25 to 29 years	4	5.6
	30 to 39 years	11	15.5
	40 to 59 years	40	56.3
	60 years and older	16	22.5
Gender	Male	36	50.7
	Female	35	49.3
Marital status	Single	24	33.8
	Married	40	56.3
	Cohabiting	5	7.0
	Divorced	2	2.8
Educational level	No formal education	1	1.4
	Primary	7	9.9
	Secondary	37	52.1
	Higher education	26	36.6
Employment status	Employed	14	19.7
	Unemployed	34	47.9
	Student	2	2.8
	Retired	21	29.6
Dialysis history	No dialysis	7	9.9
	Hemodialysis	56	78.9
	Peritoneal dialysis	8	11.3
Time as a transplant recipient	<1 year	3	4.2
	1 to 4 years	22	31.0
	5 years or more	46	64.8

67.6% (n=48) had moderate dissatisfaction in self-evaluated physical attractiveness; and 77.5% (n=55) had moderate dissatisfaction in physical appearance care.

Regarding quality of life, 57.7% (n=41) perceived very high quality of life, and 38.1% (n=27) reported high quality of life. Only a minimal percentage showed normal or low scores **(figure 2)**.

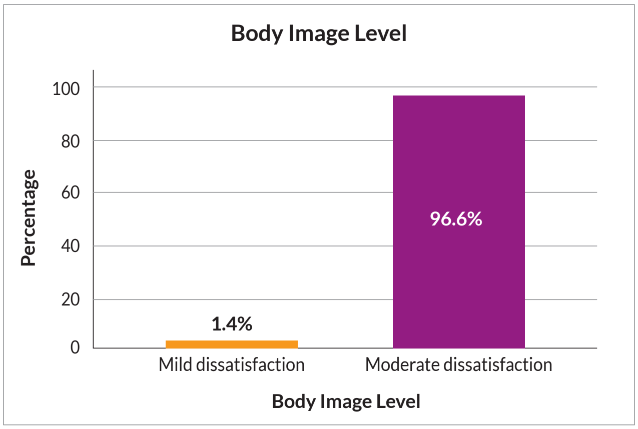

Figure 1. Level of body image satisfaction in kidney transplant recipients according to the Multidimensional Body Self-Relations Questionnaire (MBSRQ).

Among HRQoL dimensions: physical functioning: 95.8% (n=68) scored at a very high level; physical role: 60.6% (n=43) had high quality of life; bodily pain: 52.1% (n=37) reported very high quality of life; emotional role: 70.4% (n=50) had high quality of life; general health: 53.5% (n=38) scored at an average quality-of-life level; and physical role also included a very low level in 12.7% (n=9) **(table 3)**.

The correlation analysis between body image and quality of life in kidney transplant patients at the National Hospital Alberto

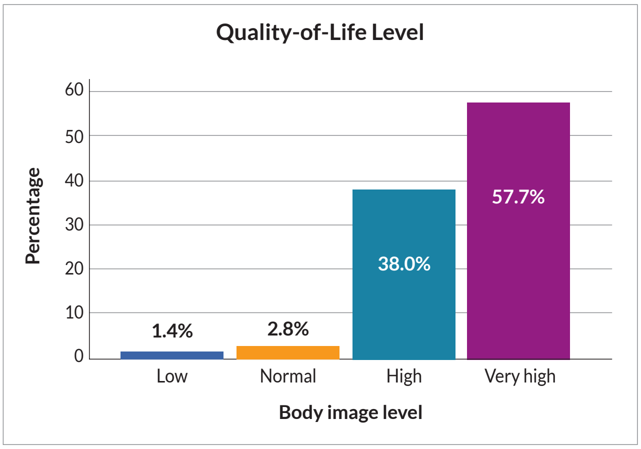

Figure 2. Percentage distribution of quality-of-life levels in kidney transplant recipients according to the SF-36 questionnaire.

Table 2. Dimensions of body image satisfaction.

	Normal		Mild dissatisfaction		Moderate dissatisfaction		Severe dissatisfaction		Total	
	f	%	f	%	f	%	f	%	f	%
Subjective importance of corporality	-	-	-	-	51	71,8	20	28,2	71	100,0
Behaviors aimed at maintaining physical fitness	-	-	3	4,2	66	93,0	2	2,8	71	100,0
Self-evaluated physical attractiveness	1	1,4	3	4,2	48	67,6	19	26,8	71	100,0
Care of physical appearance	-	-	5	7,0	55	77,5	11	15,5	71	100,0

Where: f= frequency; **%=** percentage.

Table 3. Percentage comparison of the dimensions of the quality-of-life variable in transplanted patients according to the SF-36 questionnaire.

Dimension	Very Low		Low		Average		High		Very high		Total	
	f	%	f	%	f	%	f	%	f	%	f	%
Physical Functioning	1	1.4	1	1.4	1	1.4	–	–	68	95.8	71	100.0
Role Physical	9	12.7	4	5.6	8	11.3	7	9.9	43	60.6	71	100.0
Bodily Pain	1	1.4	4	5.6	12	16.9	17	23.9	37	52.1	71	100.0
General Health	1	1.4	8	11.3	38	53.5	23	32.4	1	1.4	71	100.0
Vitality	1	1.4	2	2.8	26	36.6	37	52.1	5	7.0	71	100.0
Social Functioning	1	1.4	5	7.0	21	29.6	30	42.3	14	19.7	71	100.0
Emotional Role	11	15.5	6	8.5	4	5.6	50	70.4	–	–	71	100.0
Mental Health	–	–	2	2.8	19	26.8	31	43.7	19	26.8	71	100.0

Where: f= frequency; **%=** percentage.

Sabogal Sologuren showed a Spearman's rho of -0.375 with p=0.001 (<0.05), indicating a significant correlation between the two variables. At the dimensional level: Subjective importance of corporality (rho=0.363; p=0.002) and Self-evaluated physical attractiveness (rho=0.309; p=0.009) showed moderate correlations with quality of life. In contrast: Physical fitness-oriented behaviors (rho=0.085; p=0.479) and physical appearance care (rho=0.211; p=0.078) showed no correlation with quality of life **(table 4)**.

DISCUSSION

When analyzing the general data of the study, it was observed that the largest proportion of kidney transplant patients were between 40 and 59 years of age, with a predominance of males. This finding is consistent with the study by Nieto-Ríos[18], who reported that the average age of transplant recipients was 44 years, with a majority (60.7%) being male. However, these results differ from those obtained by Gómez-Sánchez et al.[19], who found that the mean age of transplant recipients ranged from 19 to 65 years, with a mean of 35±11.3 years, and with 65.9% being men. This discrepancy may be explained by differences in sample size and population context across studies.

Regarding other sociodemographic covariates—such as marital status, educational level, and employment status—the findings are in agreement with those of Cantillo-Medina[20], who reported that most transplant recipients were married, had completed secondary education, and that a significant proportion were unemployed, mainly engaging in household activities. In the present study, 47.9% of transplant recipients were not working at the time of the survey. This finding aligns with the results of Julián-Mauro et al[21], in Spain, who observed that only 27% of patients undergoing renal replacement therapies were employed, while 46.5% held a disability certificate. This is likely due to the functional limitations imposed by end-stage chronic kidney disease and renal replacement therapies, which affect patients' ability to re-enter the workforce[22-23].

Body image encompasses cognitive, emotional, and behavioral dimensions, including the individual's subjective perception of their body and its influence on socialization[24]. In this study, most transplant recipients reported moderate dissatisfaction with their body image. This suggests a direct relationship between body image and quality of life, as many patients experience difficulties accepting the transplanted organ, initially perceiving it as foreign to their bodies[25-26].

Table 4. Correlation between body image dimensions and quality of life (Spearman's Rho).

Dimension	Rho Coefficient	Sig. (two-tailed)	Interpretation	Significance
Subjective Importance of Corporality	0.363	0.002	Moderate positive correlation	Significant**
Behaviors Oriented Toward Maintaining Physical Fitness	0.085	0.479	No correlation	Not significant
Self-Evaluated Physical Attractiveness	0.309	0.009	Moderate positive correlation	Significant**
Care of Physical Appearance	0.211	0.078	Weak correlation	Not significant

****p<0.01; N**=71 in all cases.

Analysis of specific body image dimensions revealed that patients expressed concern regarding the maintenance of physical fitness and physical appearance, showing moderate dissatisfaction in both dimensions. These findings are consistent with those of Quezada Andrade et al[27]. in Mexico, who found that young patients with chronic kidney failure presented alterations in body image, personal care, weight loss, skin color changes, and other disease-related characteristics. Likewise, Ramírez et al[28]. in Chile highlighted that bodily changes in patients undergoing dialysis negatively affect self-esteem and self-image, leading many to modify their clothing in order to conceal visible signs of disease and its treatment.

When analyzing the role of corporeality in kidney transplantation, it is important to consider the evolutionary process experienced by the recipient in relation to the donor organ. To support this interpretation, we may refer to Hyman Muslin[29], who proposed one of the earliest theories describing the gradual psychological integration of the transplanted organ. This process is divided into three stages: in the first stage, the organ is perceived as a foreign body, separate from oneself; in the second stage, patients begin to experience the foreign organ increasingly as part of their own body; and in the third stage, the transplanted organ becomes integrated into the individual's body image and is perceived as part of the self. The findings of the present study support this conceptualization, as most transplant recipients reported moderate dissatisfaction with the subjective importance of corporality dimension (71.8%, n=51).

Overall, the study found that 57.7% of patients perceived a very high quality of life, while 38.1% considered it high. The physical functioning, physical role, bodily pain, and social functioning dimensions yielded the highest scores. These findings are consistent with those of Montoya-Hincapié[30] in Colombia, who identified physical role, social functioning, and emotional role as the most influential dimensions.

Furthermore, the relationship between body image and quality of life has been documented by Gargantini and Casari[31] in Argentina, who examined how body image perception affects multiple aspects of well-being. Their findings revealed that women undergoing complex surgeries exhibited dissatisfaction in dimensions such as physical attractiveness and sexuality, suggesting that bodily alterations can profoundly affect psychological and emotional well-being. In our study, correlation analysis of body image dimensions and HRQoL showed that cognitive and emotional perceptions—specifically subjective importance of corporality and self-evaluated attractiveness—had the greatest impact on HRQoL. In the present study, the physical role dimension had the highest proportion of patients with low quality of life (12.7%), a finding similar to that reported by Franco et al[32] in Colombia, where this dimension also received the lowest scores. This suggests that although transplant recipients experience overall improvements in quality of life, they continue to face limitations in daily and occupational activities. A study conducted in Peru by Lostaunau, Torrejón, and Cassaretto[33] likewise found low scores in the physical role dimension of the MOS-SF-36, likely due to side effects of treatment and the process of post-transplant adaptation.

This study faced theoretical and methodological limitations. First, the scarcity of previous research in this area limited comparisons with recent studies. Second, data collection was affected by restrictions during the COVID-19 pandemic, which limited access to patients and hindered in-person interviews.

In conclusion, the findings demonstrate a significant relationship between body image and quality of life in kidney transplant recipients at a public hospital in Peru. Specifically, a more preserved perception of body image was associated with better quality of life. Furthermore, the dimensions of subjective importance of corporality and self-evaluated physical attractiveness showed the strongest correlation with patients' perceived well-being.

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Conflicts of interest

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Evaluation of the humanisation programme *"ERCA Acompaña"*: patient safety and satisfaction during transition to haemodialysis

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ABSTRACT

Introduction: The initiation of haemodialysis is a vulnerable moment for patients with advanced chronic kidney disease. High-quality care that combines technical competence with a humanised approach is essential, as support and closeness influence adaptation to treatment. With this aim, *"ERCA Acompaña"* was created as a project seeking a safe and humanised transfer of patients to haemodialysis.

Objective: To evaluate indicators of satisfaction and perceived safety among patients included in *"ERCA Acompaña"* as a humanising and safety-enhancing tool at the start of haemodialysis.

Material and Method: We conducted a cross-sectional descriptive observational study in the Nephrology Department of Hospital Universitario Poniente from January 2021 through April 2025. A total of 32 patients who initiated haemodialysis from ERCA and completed a satisfaction questionnaire were included. The project implemented and evaluated a multidisciplinary accompaniment protocol for patients on their first day of haemodialysis, also analysing clinical safety indicators.

Results: A total of 32 patient questionnaires were analysed. The mean age was 64.37±11.88 years, with 65.6% men. Patients gave the highest scores to items related to trust, kindness, personalised care, warmth, guidance, reassurance, perceived safety, and family support. Overall satisfaction was rated at the maximum level, and no adverse effects associated with the programme were reported.

Conclusions: *"ERCA Acompaña"* improves the patient experience during the initiation of haemodialysis through strategies of humanisation and safety, achieving high satisfaction levels and an absence of complications in the care transition.

Keywords: accompaniment; renal disease; dialysis; humanisation of care; patient safety; ERCA.

RESUMEN

Evaluación del programa de humanización "ERCA Acompaña": seguridad y satisfacción del paciente durante la transferencia a hemodiálisis.

Introducción: El inicio de hemodiálisis es un momento vulnerable para pacientes con enfermedad renal crónica avanzada. Es fundamental una atención de calidad que combine competencia técnica y acompañamiento humanizado, ya que el apoyo y la cercanía influyen en la adaptación al tratamiento. Con este objetivo, se creó "ERCA Acompaña", un proyecto que busca una transferencia del paciente segura y humanizada.

Objetivo: Evaluar los indicadores de satisfacción y seguridad percibida por los pacientes incluidos en "ERCA Acompaña" como herramienta humanizadora y de seguridad en el inicio de hemodiálisis.

Material y Método: Se llevó a cabo un estudio observacional descriptivo transversal en el servicio de Nefrología del Hospital

Universitario Poniente entre enero de 2021 y abril de 2025. Se incluyeron 32 pacientes que iniciaron hemodiálisis desde ERCA y completaron un cuestionario de satisfacción. El proyecto implementó y evaluó un protocolo de acompañamiento multidisciplinar para pacientes en su primer día de hemodiálisis, analizando además indicadores de seguridad clínica.

Resultados: Se analizaron 32 cuestionarios de pacientes, con una edad media de 64,37±11,88 años, siendo el 65,6% hombres. Otorgaron la máxima puntuación a ítems relacionados con la confianza, amabilidad, trato personalizado, calidez, asesoramiento, tranquilidad, seguridad percibida y apoyo familiar. La satisfacción global media también fue máxima, y no se reportaron efectos adversos asociados al programa.

Conclusiones: "ERCA Acompaña" mejora la experiencia del paciente en el inicio de hemodiálisis a través de estrategias de humanización y seguridad, logrando altos niveles de satisfacción y ausencia de complicaciones en la transferencia asistencial.

Palabras clave: acompañamiento; enfermedad renal; diálisis; humanización de la atención; seguridad del paciente; ERCA.

INTRODUCTION

The Advanced Chronic Kidney Disease Unit (UERCA) is a multidisciplinary care unit focused on the comprehensive follow-up of patients with advanced chronic kidney disease (ACKD). Its objective is to provide personalized care to individuals at this stage of kidney disease, aiming to slow its progression, prevent and manage possible secondary complications, and prepare the patient for renal replacement therapy (RRT), ensuring a safe and individualized transition to the different therapeutic options available[1-2].

The transition from the ACKD stage to hemodialysis (HD) represents a critical moment in a patient's life, characterized by a high emotional burden and periods of uncertainty and vulnerability. In this context, the role of nephrology professionals becomes essential, not only in regard to technical aspects but also in providing emotional support to the patient[3].

Several authors have emphasized the importance of incorporating humanization strategies into the care of individuals with kidney disease. Humanization is understood as a person-centered approach that promotes empathy, effective communication, and respect for the individual. This approach enhances the patient's experience while improving professional satisfaction and overall quality of care[4,5].

In the current context—where HD units are increasingly characterized by high levels of technification, workload pressure, overcrowding, and limited time—there is an inherent risk of depersonalization and dehumanization of care. This trend may lead to patient objectification and emotional distancing, compromising effective communication and holistic care. Given the inherent vulnerability associated with illness, warm and humane care becomes essential, prioritizing respect for and dignity of the individual. Presence and human accompaniment, expressed through empathy, active listening, and sensitivity, are irreplaceable when faced with a patient's fear and suffering[6-9].

In accordance with the Andalusian Public Health System Humanization Plan[10] and within the framework of the Humanization Plan of *Hospital Universitario Poniente*[11], a support model during the first HD session was implemented in 2018 with the aim of minimizing the emotional impact of starting RRT and facilitating integration into the hospital environment. However, the progressive increase in healthcare demand and the limited number of available HD stations required the referral of patients directly from UERCA to the regional hospital or peripheral HD centers.

To address this situation, the *"ERCA Acompaña"* project was designed. This strategy allows patients to begin their first HD sessions in the hospital, facilitating an approach centered on clinical safety as well as quality and warmth of care. This intervention ensures support during the initiation of the technique, verification of vascular access function, assessment of HD tolerance, and confirmation of the patient's clinical stability prior to referral.

Therefore, the objective of this study was to analyze patient satisfaction indicators and perceived clinical safety among individuals included in the *"ERCA Acompaña"* project, as a humanizing and safety-enhancing tool during the initiation of HD therapy.

MATERIAL AND METHOD

Study design and setting

The study was conducted in the UERCA of the Nephrology Department at *Hospital Universitario Poniente* in El Ejido (Almería, Spain). A cross-sectional descriptive observational study was designed.

Population and sample

A non-probabilistic convenience sampling method was used. The sample consisted of 32 UERCA patients who began scheduled HD through the "ERCA Acompaña" program between January 2021 and April 2025. Patients who started dialysis in the hospital through this program and voluntarily agreed to complete the study questionnaire were included. Those with cognitive or language barriers preventing questionnaire completion were excluded.

Variables

The variables studied included age, sex, patient satisfaction level, and clinical safety indicators during the transfer process. Because no validated questionnaire was available to assess satisfaction, an ad-hoc self-administered questionnaire consisting of 13 items (all closed except the final open-ended question) was developed. The Delphi method was used to create this questionnaire with the participation of multidisciplinary experts from the hospital.

Data collection

The questionnaire was divided into 5 sections:

- **Section 1:** Informed consent for participation in the study.
- **Section 2:** Basic demographic data (age and gender).
- **Section 3:** Evaluation of the reception process in the Hemodialysis Unit (HD Unit) using 12 Yes/No questions.
- **Section 4:** One question regarding vascular access (VA), with two response options.
- **Section 5:** Assessment of the care received, consisting of 12 questions using a 5-point Likert scale (5 = highest level of agreement or satisfaction; 1 = lowest).
- **Open-ended question:** Allowed patients and relatives to express comments, suggestions, or concerns not captured by the closed items, providing valuable qualitative insights.

After the first HD session, eligible patients received the questionnaire link in digital format (email, WhatsApp) or a paper version, depending on their preference. Completion was voluntary and anonymous.

In parallel, indicators related to patient safety during the transfer from one unit to another were evaluated. A checklist completed by healthcare professionals (Yes/No items) was used, including indicators such as safety briefing, pre-dialysis VA assessment, clinical evaluation before, during, and after HD, and preparation of both the medical report and the nursing continuity of care report (ICCE) (see **table 1**).

Table 1. Safety indicator checklist.

	YES	NO
Safety briefing		
Pre-dialysis VA assessment		
Pre-HD clinical assessment		
Intra-HD clinical assessment		
Post-HD clinical assessment		
Preparation of medical report		
Preparation of Nursing Continuity of Care Report		
In-person patient handover nurse-to-nurse		
Adverse events related to patient transfer		

The "ERCA Acompaña" project was introduced in 2021 within the hospital's Humanization Plan, with the establishment of a working group responsible for designing and implementing a protocol for safe and humanized transfer of ACKD patients starting HD in the center. Defined interventions included:

- Informing the patient and family about the process once the decision to start HD and subsequent transfer was made.
- Participating in an HD Unit safety briefing the day before treatment initiation to ensure safe transfer of clinical and emotional information: patient data, clinical status, emotional status, VA condition, vaccination status, serology, session schedule, prescription, etc.
- Performing clinical and emotional assessment on the day of initiation and addressing any remaining questions.
- Accompanying the patient and family to the HD Unit, where the welcome protocol was carried out with the reference nurse and nursing assistant, including unit orientation, dressing room, rules, and introduction to the team and other patients.
- Assessing VA, venous development, and selecting the optimal puncture sites in cases of arteriovenous fistula (AVF).
- Clinical assessment after session initiation.
- Informing the family after connection to the machine and allowing entry to the unit when appropriate.
- Evaluating the intervention through the satisfaction survey.
- Managing transfer to the reference HD Unit, including preparation of the medical report and ICCE.
- Conducting awareness sessions for healthcare professionals.
- Evaluating the intervention using the satisfaction survey.

Data analysis

All data were recorded in an ad-hoc database. Statistical analysis was performed using SPSS for Windows (version 26.0, SPSS, Chicago, Illinois, USA). Quantitative variables were expressed as means with standard deviations or as medians with interquartile ranges, depending on their distribution. Qualitative variables were described using absolute and relative frequencies. The Kolmogorov–Smirnov test was used to assess the normality of variables.

Ethical considerations

This study was conducted in accordance with the ethical principles outlined in the most recent revision (Fortaleza, 2013) of the Declaration of Helsinki.

Data were processed in compliance with the Spanish Organic Law 3/2018 on Personal Data Protection and Digital Rights, the General Data Protection Regulation (Regulation 2016/679), and Law 41/2002 on patient autonomy and rights and obligations regarding clinical information and documentation.

All participants signed informed consent prior to inclusion in the study.

RESULTS

The sample consisted of 32 patients, with a mean age of 64.37±11.88 years. Of these, 65.6% were men (n=21).

In the section of the questionnaire related to patient reception, 81.2% (n=26) of the patients arrived at the hospital accompanied by their primary caregiver and/or a family member, while 18.8% (n=6) arrived alone. All patients (100%, n=32) were scheduled for an appointment at the ERCA nursing consultation and reported having received information about the process to follow that was clear and sufficient, having had their questions resolved, and perceiving a climate of trust from the team **(table 2)**.

Table 2 also includes the experiences during the welcome process in the HD Unit. All patients were accompanied by UERCA nursing staff, were introduced to the other patients and healthcare professionals, and were given the opportunity to say goodbye to their relatives before the session began.

In the next section of the questionnaire, related to connection to the HD monitor, 96.9% (n=31) of the patients had an autologous AVF, and 3.1% (n=1) had a central venous catheter. Among patients with an AVF, 100% (n=32) confirmed that a vascular access assessment was performed prior to cannulation and that the initial cannulation was performed by UERCA nursing staff. In all cases, regardless of the vascular access type, patients were connected to the HD monitor by UERCA nurses **(table 3)**.

Table 2. Summary of Responses. Patient Reception and Admission.

SURVEY ABOUT YOUR PERSONAL EXPERIENCE

On your first day of dialysis

	YES	NO	NOT APPLICABLE
Were you scheduled for an ERCA nursing consultation before starting treatment?	100% (n=32)	0%	
Did you receive information from ERCA staff about the process to follow?	100% (n=32)	0%	
Was the information you received clear and sufficient?	100% (n=32)	0%	
Were your questions answered?	100% (n=32)	0%	
Was the environment one of trust?	100% (n=32)	0%	
Did you arrive on your first day of hemodialysis accompanied by family and/or your primary caregiver?	81.25% (n=26)	18.75% (n=6)	
I was shown the dialysis unit facilities.	100% (n=32)	0%	
I was allowed to say goodbye to my relatives (mark “not applicable” if you were unaccompanied).	81.25% (n=26)	0%	18.75% (n=6)
I entered the dialysis room accompanied by the ERCA nurse.	100% (n=32)	0%	
I was introduced to all the healthcare professionals in the unit.	100% (n=32)	0%	
I was introduced to the other patients in the shift.	100% (n=32)	0%	

Table 2 presents the results of the questions asked after connection to the HD monitor. All patients (100%, n=32) reported that they received an explanation of possible symptoms and warning signs to monitor during the session. All patients who arrived accompanied confirmed that their relatives were informed by healthcare professionals after connection and that all were offered and allowed entry into the HD room to accompany them for a certain period of time.

The section of the questionnaire regarding the treatment received from health care professionals was evaluated using a Likert scale (1=very dissatisfied, 5=very satisfied). All patients gave the highest score for the items related to emotional support, closeness and understanding from the team, perception of safety, respectful and kind treatment, protection of privacy, comfort provided, and conveyed trust. All accompanied patients (100%, n=32) reported that their relatives received the necessary information and emotional support from the healthcare staff **(table 4)**.

In the final evaluation of the questionnaire, 100% (n=32) of the patients stated that the “ERCA Acompaña” project provided them with greater calm and confidence during their first day of HD.

When asked about their overall satisfaction level, also measured using a Likert scale from 1 to 5, all patients gave the maximum score, expressing very high satisfaction with the project.

Additionally, a qualitative analysis was performed on the responses to the open-ended question intended to gather suggestions, improvements, and patient and/or family experiences. This approach offered a deeper understanding of their experiences during the accompaniment process.

The testimonies collected revealed an overall positive evaluation of the intervention, highlighting the following aspects:

- Professionalism: Patients perceived a high level of competence and expertise among the staff who accompanied them.
- Human Treatment: Warmth, empathy, and individualized attention were emphasized as crucial elements that humanized the process.
- Perception of Safety: The accompaniment significantly contributed to creating a sense of safety during the transfer and initiation of treatment.

Likewise, both patients and family members emphasized the positive emotional impact of the accompaniment. The role of ERCA nursing staff was particularly noted as a key source of emotional support and guidance,

Table 3. Summary of Responses. Patient Connection.

SURVEY ABOUT YOUR PERSONAL EXPERIENCE			
On your first dialysis:			
	YES	NO	I DO NOT HAVE an AVF
If you have an AV fistula, was the arm with the fistula assessed before inserting the needles?	96.875% (n=31)	0%	3.125% (n=1)
	ERCA Nursing	HD Unit Nursing	I DO NOT HAVE an AVF
Who performed the first puncture of the fistula?	96.875% (n=31)	0%	3.125% (n=1)
Who connected you to the hemodialysis machine for the first time?	100% (n=32)	0%	
Once connected to the machine:			
	YES	NO	NOT APPLICABLE
Were you informed about possible symptoms and warning signs?	100%	0%	
If you were accompanied, did staff go out to the waiting room to inform your family?	81.25% (n=26)	0%	18.75% (n=6)
If you were accompanied, were your family members allowed to enter the dialysis room to stay with you for a while?	81.25% (n=26)	0%	18.75% (n=6)

Table 4. Summary of Responses. Care Provided by Professionals.

Care received from professionals:	1	2	3	4	5	NOT APPLICABLE
I felt supported by the professionals	0	0	0	0	100% (n=32)	–
I felt the professionals were close and present	0	0	0	0	100% (n=32)	–
I felt understood	0	0	0	0	100% (n=32)	–
I felt safe	0	0	0	0	100% (n=32)	–
The treatment was respectful	0	0	0	0	100% (n=32)	–
The treatment was kind	0	0	0	0	100% (n=32)	–
My privacy was protected	0	0	0	0	100% (n=32)	–
My comfort was promoted	0	0	0	0	100% (n=32)	–
I received emotional support	0	0	0	0	100% (n=32)	–
They conveyed confidence and safety	0	0	0	0	100% (n=32)	–
My family received the necessary information	0	0	0	0	81.25% (n=26)	18.75% (n=6)
My family received emotional support	0	0	0	0	81.25% (n=26)	18.75% (n=6)

facilitating adaptation and reducing anxiety associated with the start of HD.

Regarding clinical safety indicators, in 100% (n=32) of the cases, a safety briefing between the two units involved (ERCA–HD) was conducted, along with clinical assessment at the three care stages (pre-, intra-, and post-dialysis), adequate evaluation of the vascular access, and completion of both the medical report and the nursing continuity of care report (ICCE). Additionally, in all cases, the patient transfer between units was performed in person by healthcare professionals.

DISCUSSION

This study evaluated patient satisfaction and clinical safety indicators during the transition and initiation of HD within the context of the “ERCA Acompaña” project. The questionnaire results showed high acceptance of the program, with patients reporting that they felt accompanied, informed, and safe during their transition from the ERCA consultation to the HD Unit.

The initiation of renal replacement therapy in ACKD patients is associated with significant changes in quality of life, which may trigger anxiety–depressive disorders due to difficulties adapting to a stressful situation[12]. To mitigate this vulnerability, patients in this study were first scheduled for an ERCA consultation rather than directly admitted to the HD Unit on their first day of dialysis. This strategy—supported by existing evidence and previous clinical experience[13]—has been shown to enhance patients' perceived safety and calmness. Additionally, this encounter reinforced the information provided about the process and addressed any remaining questions.

Analysis of the patients' experiences during the HD Unit welcome process confirmed that the welcome protocol was systematically applied for all participants. This included familiarization with the facilities, introduction to healthcare staff and other patients, and explanation of unit rules.

Before entering the dialysis room, patients were given time for family farewell in a respectful environment. The scientific literature emphasizes the importance of familiarization with the environment and individualized attention when starting renal replacement therapy[13-17].

A highly valued component was the accompaniment by ERCA nursing staff upon entering the HD room, which provided a strong sense of security and reassurance.

Regarding connection to the dialysis monitor, UERCA nurses performed a thorough assessment of the AVF and carried out needle cannulation for all patients with an AVF.

Of note, 100% of patients were connected to the dialysis monitor by UERCA nursing staff. Although other nursing professionals are qualified to perform these tasks, clinical experience and literature indicate that patients often feel apprehension regarding vascular access cannulation[17]. For this reason, the presence of UERCA nursing staff was considered essential. Their familiarity with each patient's vascular access—based on long-term follow-up since AVF creation—contributed significantly to patient safety and confidence.

Once the HD session began, patient experience assessment showed full consistency (100%) in the explanation of potential symptoms and relevant warning signs.

Additionally, it was confirmed that relatives of accompanied patients received information from healthcare professionals after monitor connection. All relatives were offered and allowed entry to the HD room to accompany the patient for a period of time. This approach aligns with the literature on humanization in HD Units[6-18], which emphasizes that comprehensive information and staff closeness significantly increase patient satisfaction. It is essential to recognize that the primary caregiver and/or family are integral parts of the care process from the ACKD stage onward, and are considered essential components of care planning and delivery.

The results suggest that this practice fosters in patients a profound perception of understanding, safety, and appreciation from the care team. Beyond its direct benefit to patients, the "ERCA Acompaña" program may have a positive impact on healthcare professionals' well-being and professional fulfillment, reinforcing their satisfaction by enabling them to actively improve the patient experience.

Health care professionals must keep in mind that most patients and families will always remember who, how, where, and in what manner their first day of HD took place. The emotional and experiential impact generated will depend not only on the patient's coping capacity but also on the way they were treated.

This study is not free of limitations. Methodologically, the absence of a control group must be noted. This means that results obtained from patients participating in the "ERCA Acompaña" program could not be directly compared to those who did not receive the intervention.

The lack of a validated questionnaire to evaluate patient satisfaction may represent another limitation, although an ad-hoc questionnaire was developed using the Delphi method with multidisciplinary experts.

The fact that the study was conducted in a single hospital represents a limitation in terms of generalizability. The outcomes may be influenced by specific characteristics of the hospital, its organization, the patient population served, and the particularities of the team implementing the "ERCA Acompaña" program.

A potential social desirability bias may also be present in the satisfaction questionnaire responses. Participants may have tended to provide answers perceived as more socially acceptable or favorable to hospital staff, rather than expressing their true feelings or experiences—especially as they continued receiving care in the same center.

Based on the results, it can be observed that the implementation of the "ERCA Acompaña" program represents an innovative and humanized approach within UERCA to accompany patients on their first day of HD, differing from conventional practices in other hospitals. The uniqueness of this initiative lies in care continuity, in which the healthcare professionals who follow the patient in the ERCA consultation are the same ones who accompany them during their first HD session. This strategy seeks to transform the patient's experience during a moment of vulnerability, redefining care as a commitment deeply linked to individual dignity.

These results confirm a favorable reception of the "ERCA Acompaña" project among the study population, fostering a greater sense of safety, calmness, and confidence when facing the first HD session.

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We express our gratitude to our patients, as they are the ones who truly accompany us along the way, and to our colleagues in the ERCA Unit for trusting in our work, recognizing our role, and working together to offer the best to our patients.

Conflicts of interest

The authors declare that they have no personal or commercial relationships that could represent a conflict of interest in connection with the submitted article. (SEDEN declines any possible authorship conflicts in the works it publishes.)

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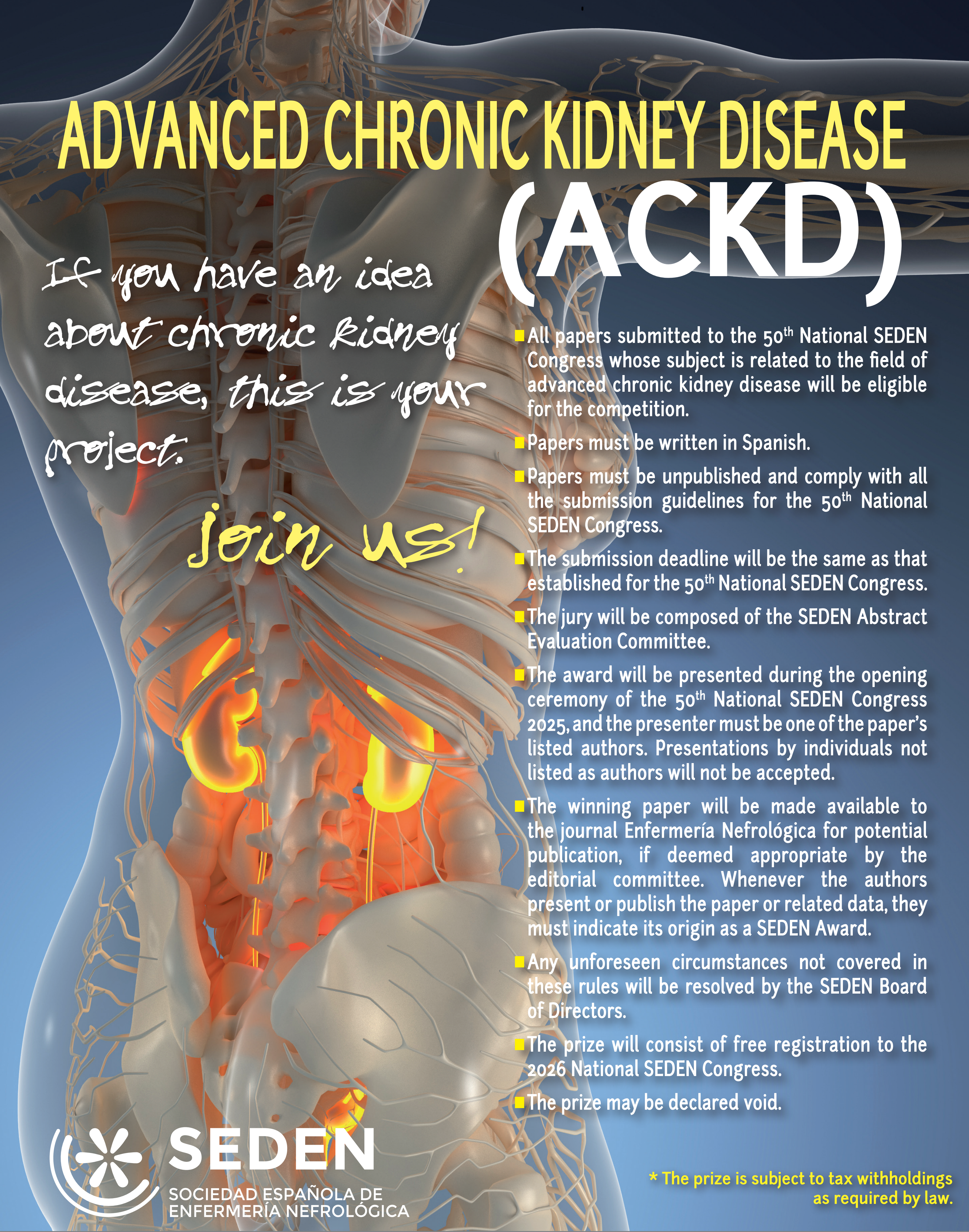

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Analysis of patients' experience regarding self-management capacity in dialysis treatment and the influence of the environment

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ABSTRACT

Introduction: In some cases, quality of life for dialysis patients leads to the search for home-based environments. In others, the home environment may represent a significant barrier. Analysing the environment in which dialysis treatment takes place is related to the patient's capacity for self-management of both treatment and disease. Nursing care plans should, from an early stage, assess whether an environment is appropriate and consider the patient's self-management style, encouraging an active role.

Objective: To explore the lived experience of dialysis patients in relation to personal self-management of treatment and the environment in which it occurs.

Material and Method: We conducted a descriptive phenomenological qualitative study through interviews with patients enrolled in different dialysis programmes. A non-probabilistic sampling method was used. Results were obtained through verbatim transcription, constant comparison, and field notes from the interviews. Discourse was analysed using triangulation and an iterative inductive thematic analysis.

Results: A total of 24 participants were interviewed. The categories and codes identified were: **a)** Hospital-based: a.a) Dialysis units: limited privacy, ineffective coping, social participation, passive role. **b)** Home-based: b.a) Home haemodialysis: active role, architectural barriers, family barriers. b.b) Peritoneal dialysis: daily exchanges, nocturnal cycler, space organisation, active role.

Conclusions: The environment in which dialysis treatment is carried out appears to be a key factor for patients and is linked to their capacity to enhance self-management. Nursing practice should involve early interventions aimed at understanding the impact of the environment..

Keywords: renal dialysis; haemodialysis, home; peritoneal dialysis; self-regulation; nursing; dialysis.

RESUMEN

Analisis de la experiencia de pacientes sobre la capacidad de autocontrol del tratamiento de diálisis y la influencia del entorno

Introducción: En algunos casos la calidad de vida para el paciente en diálisis conlleva a la búsqueda de entornos domiciliarios. En otros, el entorno domiciliario puede suponer una barrera importante. El análisis del entorno para el tratamiento de diálisis está relacionado con la capacidad de autocontrol personal de los tratamientos y la enfermedad. Los planes enfermeros deben tener en cuenta de forma temprana cuando un entorno es adecuado y también el estilo de autocontrol fomentando un rol activo.

Objetivo: Conocer la experiencia vivida por el paciente en diálisis en relación con el autocontrol personal del tratamiento y el entorno donde se produce.

Material y Método: Estudio cualitativo descriptivo fenomenológico mediante entrevista a pacientes en diferentes programas de diálisis. Muestreo no probabilístico. Los resultados se obtienen mediante trascripción textual, método de comparación constante y cuaderno de campo de las entrevistas. Se analiza el discurso mediante triangulación y análisis temático inductivo iterativo.

Resultados: Veinticuatro personas fueron entrevistadas. Las categorías y códigos resultantes son los siguientes: a) Hospitalaria; a.a) salas de diálisis: Escasa intimidad, afrontamiento ineficaz, participación social, rol pasivo. b) Domiciliaria; b.a) Hemodiálisis domiciliaria: rol activo, barreras arquitectónicas, barreras familiares, b.b) Diálisis Peritoneal: pases diarios, cicladora nocturna, organización de espacios, rol activo.

Conclusiones: Parece evidenciarse que el entorno donde se produce el tratamiento de diálisis es un elemento de relevancia para las personas en tratamiento y está relacionado con la capacidad para aumentar el autocontrol. La enfermería debería consensuar una intervención temprana dirigida a conocer el impacto del entorno.

Palabras clave: hemodiálisis; hemodiálisis domiciliaria; diálisis peritoneal; autorregulación; enfermería; diálisis.

INTRODUCTION

Chronic Kidney Disease (CKD) is a serious public health problem in which most deaths occur in older adults, and prevalence is higher in women; nevertheless, end-stage CKD and Renal Replacement Therapy (RRT) treatments occur more frequently in men[1]. Risk factors such as Diabetes Mellitus (DM), hypertension (HTN), or obesity[2] are those that produce the greatest comorbidity. Health-related quality of life is associated with survival and, in turn, with self-regulation of the disease, self-care, and personal responsibility for treatment-related care[3-5].

Symptoms vary depending on CKD progression or stage and RRT modality, ranging from perceived muscle weakness, lack of mobility, poor appetite, dry mouth, or low mood, with transplant recipients showing the lowest prevalence of symptoms[6]. Furthermore, increases or decreases in the prevalence of these symptoms depend on treatment planning and healthcare resources[7]. In this regard, home-based therapies offer an alternative context to traditional therapies in large dialysis units. Assessing the most appropriate setting facilitates better adherence to home hemodialysis (HHD) or peritoneal dialysis (PD), taking into consideration architectural barriers in the home or personal/family-related barriers[4,8].

The Temporal Self-Regulation Theory (TST) describes health behaviors and helps understand how these behaviors can be beneficial. However, they may carry high costs, sometimes even becoming demotivating; in contrast, behaviors that provide greater short-term satisfaction have a lower cost yet are more harmful[9,10]. TST considers that to promote behaviors that enhance treatment self-regulation, we must address motivational aspects (connectivity beliefs). Nurses can be strong allies in this process, fostering training in self-regulation, context assessment, and management of adverse situations[11]. Based on this, the guiding question for this study was: *What is the patient's experience according to the dialysis context, and how is it related to treatment self-management?* The objective was to understand the lived experience of hemodialysis or peritoneal dialysis patients in relation to personal self-management of dialysis treatment

MATERIAL AND METHOD

Design and Ethical Considerations

We conducted a descriptive phenomenological qualitative study through semi-structured interviews with hemodialysis (HD) and PD patients. The study was carried out from February to July 2023 with patients from *Fundació Puigvert* (Barcelona, Spain). The Drug Research Ethics Committee (CEIm) of *Fundació Puigvert* granted approval in December 2022 (reference number: C2022/39). Subsequently, the admissions unit provided the list of candidate participants for selection according to research criteria. The research process was communicated to the nursing management and the staff of the Dialysis Unit at the Foundation. To maintain participant privacy, identifying information was alphanumerically coded. All information was safeguarded and protected according to protocol. Efforts were made at all times to prevent any discomfort to interviewees.

Participants

Selection was carried out through convenience sampling, a non-probabilistic method, until data saturation was reached. Inclusion criteria were: patients aged 18 years or older, diagnosis of CKD for more than 3 months, and undergoing HD or PD treatment, who had signed informed consent. Exclusion criteria were: transplant recipients not undergoing HD or PD, individuals with cognitive impairment, or mental health issues.

The interview guide included the following topics: a) onset and progression of renal replacement therapy, b) treatment context, c) course of CKD, and d) difficulties and expectations. To ensure rigor, the interview guide was reviewed by two qualitative research experts (M.M.A. and R.B.S.). See **annex 1** for the interview guide.

Data collection and analysis

Initial contact with participants was made through the Unit's nursing staff. After accepting participation, the principal investigator (M.E.L.) provided all necessary information until full understanding was ensured. Participation was confirmed by signing the voluntary informed consent form.

Interviews were conducted outside the dialysis environment via videoconference, led by a nurse (I.M.C.) external to the patients' usual dialysis unit and accompanied by a participant observer (M.E.L.). Interviews lasted 30–45 minutes. Recruitment ended once data saturation was achieved.

Interviews were transcribed verbatim. Transcription analysis was conducted using iterative inductive thematic analysis with Atlas.ti V.24 (Atlas.ti Scientific Software Development GmbH, Berlin, Germany). Through thematic analysis, codes and code groups were generated. Throughout interviews and transcript analysis, the constant comparison method was systematically applied[12]. Categories, codes, and themes were developed through triangulation by three analysts (M.M.A., M.E.L., I.M.C.).

Quality and Rigor

This manuscript follows the COREQ (Consolidated Criteria for Reporting Qualitative Research) guidelines[13]. To avoid bias, all participants were interviewed outside the dialysis setting and by the same interviewer (I.M.C.).

The interviewer was selected for her experience in qualitative research and her lack of involvement with the patients' Dialysis Unit. Review and validation of the interview guide by the research team aimed to eliminate interpretative bias. The guide was adapted to open-ended questions to facilitate participants' responses.

To confirm reliability, a pilot interview was conducted prior to the study. After each interview, the constant comparison method was used to discuss key response patterns related to major themes, through consensus between I.M.C. and M.E.L. In parallel with the interviews, M.E.L. transcribed the recordings.

From September to October 2023, participants received a preliminary report summarizing key themes. Some participants confirmed the identification of themes, supporting the research team's interpretations.

RESULTS

A total of 28 HD patients and 11 PD patients were informed about the study, of whom 24 were ultimately interviewed: nine women (37.5%) and fifteen men (62.5%). Seventeen were undergoing HD (70.8%), including two receiving home hemodialysis. Additionally, seven individuals were receiving PD (29.2%). See **table 1.**

Table 1. Participant characteristics.

ID	SEX	AGE	MODALITY	TIME SINCE START OF LATEST TREATMENT (HD/PD DURATION)
01	M	50	HD	11 months
02	M	52	HD	2 years and 3 months
03	M	68	HD	6 months
04	F	63	HD	18 years and 11 months
05	M	63	HD	1 year and 2 months
07	M	41	HD	13 years and 2 months
08	M	56	HD	1 year and 8 months
09	M	47	HD	1 year and 4 months
10	M	35	HD	4 months
11	F	69	HD	4 years
12	F	46	HD	11 months
13	F	50	HHD	20 years and 3 months
14	M	65	HD	18 years and 7 months
15	M	66	DP	5 years and 2 months
16	F	35	DP	1 year and 2 months
17	M	18	DP	4 months
18	F	73	HD	1 year and 8 months
19	F	71	HD	1 year
20	M	59	HD	4 years
21	M	79	DP	7 months
22	M	75	DP	5 months
23	M	73	DP	1 year and 7 months
24	F	41	HHD	4 years
25	F	57	DP	1 year and 4 months

The resulting categories, themes, and codes are as follows: **1)** Hospital-based: *a) Dialysis units:* limited privacy, ineffective coping, social participation, and passive role. **2)** *Home-based:* a) Home hemodialysis: active role, architectural barriers, and family-related barriers. *b) Peritoneal dialysis:* daily exchanges, nocturnal cycler, space organization, and active role.

■ 1) Category 1. Hospital Context: Dialysis Units

Interviewees described how the environment may act as a barrier to health behaviors, or at times, as a facilitator. Hospital-based and satellite-clinic hemodialysis share common elements that define the clinical context and its influence on patients' health behaviors. Entering the dialysis unit for the first time is a key moment and is analyzed here as a central code within this category.

1.1. From a passive role to limited patient–healthcare staff connection

Participants described the hospital environment as lacking privacy, eliciting a sense of exposure, and characterized by very large shared spaces. From the moment they enter until the moment they leave the dialysis room, patients feel that their role is minimally active. The perception that they are not taken into account and do not participate in decision-making contributes to this passive role and intensifies their sense of illness.

> *"I'm fed up with hospitals and everything that comes with it. Every time you come to a hospital center it's hard to take it in. I'm like a horse (covers his eyes so as not to see sideways), and whatever is next to me, I don't want to see […] I have one person on the right and another on the left—don't ask me who they are, I don't even talk, I'm not interested."* ID03

Patients retain memories of sensory stimuli from their first entry into the dialysis room or unit. The emotion causing greatest distress is closely related to this first experience of dialysis, which is also when initial treatment guidelines are given, when they receive the most information and instructions, when they feel most overwhelmed by the impact, and when treatment acceptance is lowest.

> *"The smell is unlike anything else; later you get used to it, but there's a special smell in dialysis. […] And the doctor who treated me told me I'd be there for two hours; after a week he put me on two and a half, then three, and the next week four. I wanted to kill myself."* ID11

Participants reported difficulty maintaining contact with physicians in this context. Nursing assistants and nurses are the first resource for addressing health-related questions upon arrival. They perceive medical attention as infrequent and consider nursing support more accessible. In large dialysis halls, participants felt that the context makes immediate medical attention difficult, and many questions remain unresolved. Although nurses are closer, high staff turnover generates distrust toward newly assigned personnel.

> *"With the nurse I'm with, I'm there the whole four or five hours (dialysis unit). The doctor—you might see them every other day, for three minutes. […]. It's impossible for the doctor to treat you and know you as well as the nurse who's with you through the whole session when the interaction is two minutes."* ID07

> *"There are many of us, and they come in just to say hello. Dr. X used to say it: well, this is the visit—nothing, I've come to say hello. Because they don't have time for more. When they explain things, they explain them well, but rarely."* ID18

Interviewees described dialysis time as very long. The last hour is considered the worst due to the anxiety caused by remaining immobile for so many hours. In some cases, time spent being transported by ambulance adds to the burden. Overall, more than 18 hours per week may be spent solely on dialysis treatment.

> *"The last hour is very heavy, very hard. It's four hours, and after about the first three hours, well, they go by. I've tried picking up a book but honestly, I can't […], instead of relaxing me, it makes me nervous."* ID03

However, the dialysis context can also be a facilitator. Some participants expressed that dialysis units benefit social interaction, providing an environment for conversations among peers. Most patient-to-patient discussions about illness occur in informal spaces, such as waiting rooms or during ambulance transport. They perceive positively the ability to share experiences regarding illness and treatment in settings beyond the dialysis hall itself.

> *"I had never heard of peritoneal dialysis in my life, and when they offered it to me, I was a bit surprised […] I talked to a patient who showed me the catheter he had and explained how he lived. […] And I decided on peritoneal."* ID20

> *"In the ambulance: 'How are you?' – 'Oh, I'm not well.' […] You start letting things out with people while you're waiting (in the waiting room)."* ID12

■ 2) Category 2. Home Context: Peritoneal Dialysis and Home Hemodialysis

The home environment allows dialysis patients to integrate treatment into a familiar setting, away from large dialysis units and with greater comfort. Bringing treatment home is not easy; it requires effort both to increase motivation toward self-regulation and to acquire technical skills necessary for safe dialysis. In relation to TST, the healthcare professional acts as an ally, guiding self-management training and helping patients identify motivational "connectivity beliefs" that foster self-control.

2.1. When the clinic comes home

The complexity of taking treatment home entails changes in the home environment and family dynamics. Although participants valued greater autonomy and motivation in managing treatment, some felt that moving the illness home imposes unnecessary suffering on the family. They believed it is better to "leave the illness at the hospital" and reduce the emotional burden that bringing a clinical context into the household entails.

> *"In peritoneal dialysis, you bring the illness with you—you're living it day by day and several times a day, and you never leave it; you don't even have the break that hemodialysis gives you (refers to the time away from the dialysis room) to live without illness for two days, for example, on a weekend. […] Nobody gives you any clues about this kind of information so that you can make a proper judgment."* ID14

Interviewees emphasized that home therapies require an active self-management role: meticulous hygiene, strict adherence to aseptic protocols, and readiness to manage emergencies. Family members also need education and training. Homes must be reorganized to create clean, spacious areas for treatment and storage of supplies. These requirements can become barriers—architectural or family-related—for some patients.

> *"New routines have entered the house; we had to change our routines and even part of the furniture in a room because it takes up so much space. […] The reality is that a bunch of cardboard boxes arrive with all the supplies needed for dialysis […] We had to change half the room."* ID22

> *"I wash my hands eight times a day, for example, just for the catheter—eight times. Four masks per day, at minimum. And every time I shower, I have to do the dressing change… all the care you can imagine."* ID23

Bringing treatment home requires a degree of adaptation from cohabiting family members. Some participants reported sleeping in separate rooms from their partners due to nighttime disruptions. When young children are present, explanations are necessary to minimize the emotional impact of seeing the procedures, understanding illness, and coping with its consequences.

> *"As for my partner, we used to sleep in the same bed, and now she sleeps in another room. With dialysis, when I got up and started moving around, I kept her awake."* ID03

> *"This is not super easy. My son—I try to be completely transparent with him. I do dialysis in front of him. I explain that Mom doesn't have kidneys and that this is an external kidney. He worries because you're not well, you feel sick, but he's getting used to it. What I don't want is to lie to him!"* ID24

Participants performing PD or HHD can travel more easily, but require significant planning to ensure materials will be delivered to the destination, that hotels or apartments can store supplies, and that a safe, aseptic space will be available. At times, planning dialysis during travel leads participants to reject the idea altogether. Even with portable machines, the volume of supplies and physical strain of treatment may make short trips unfeasible.

> *"It's portable (the nocturnal cycler), like a slightly bigger computer. […] The bags of fluid, disinfectants… all of that takes up space. Every 15 days they send me 14 boxes of bags. It's a lot. […] And if I travel, they have to send it there."* ID21

DISCUSSION

This qualitative study aimed to understand the lived experience of hemodialysis and peritoneal dialysis patients regarding strategies needed to promote self-control behaviors and the relationship between these behaviors and the setting in which treatment occurs. The two principal categories obtained were: a) hospital-based (dialysis units), and b) home-based (home hemodialysis and peritoneal dialysis). The resulting themes were: **1)** *from a passive role to limited patient–healthcare staff connection*, with codes including limited privacy, ineffective coping, social participation, and passive role; and **2)** *when the clinic comes home*, with codes including active role, architectural and family barriers, daily exchanges, nocturnal cycler, and space organization.

Former studies on HD patient experiences confirm the broad view of barriers and facilitators inherent to the dialysis context[14-17]. Meeting the needs of dialysis patients is challenging given current conditions in hospital-based or satellite dialysis units. TST helps us understand the behaviors described by patients and to identify the codes within each category, as well as motivational reinforcers ("connectivity beliefs") that may enhance self-control[9-11].

CKD and RRT, with their temporal, dietary, social, and economic constraints, strain patients, and nurses play a key role as allies—supporting self-regulation skills, enhancing abilities, and teaching complication management[4,5]. Exploring alternatives that allow treatment flexibility seems to reduce the "cost" of health behaviors. Increased self-responsibility may help RRT patients better understand their limitations and the degree of flexibility possible in their treatment; this cannot occur in individuals who remain passive in their treatment and do not acquire self-regulation skills.

RRT patients tend to be middle-aged or older[1]. Developing individualized care plans values patients' abilities and reduces age-related bias. While some older adults experience the hemodialysis unit as a social environment with minimal time cost, middle-aged individuals may find the space less private and more disruptive to family and social activities[18]. According to our findings, the HD context may serve as either facilitator or barrier, requiring attention to human factors, unit characteristics, and available resources[19].

Recommendations highlighting the positive impact of home-based therapies and the need to increase PD availability[20,21] align with our findings. This shift requires significant changes in treatment models and substantial investment in the development of dedicated units and specialized training for nursing staff, nephrologists, and family caregivers[22]. Understanding the patient's home context also requires awareness of cultural factors that may act as barriers[14,15,21,23].

Communication styles influence the therapeutic relationship and the connection established with dialysis patients[24]. Patient information must be clear long before RRT initiation. Personalized information can better align expectations regarding RRT modalities, CKD management, or transplantation. Rapid access to unspecialized web-based information also shapes patient perspectives. Fostering appropriate use and oversight of online health information should be a topic for professional scientific forums[25].

This study presents methodological limitations. Participant heterogeneity must be considered when interpreting codes, and the number of home-based dialysis participants was limited. Generalizability may be restricted by the fact that all participants were treated at the same hospital. As for strengths, our phenomenological approach enabled us to capture lived experience and identify nuances unlikely to emerge from quantitative methodologies.

Based on our findings, the treatment setting appears highly relevant to patients and is linked to their capacity to enhance self-control. Nurses are well-positioned to coordinate early interventions aimed at understanding the motivational impact of the dialysis environment and supporting patients' ability to increase treatment self-regulation.

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Conflicts of interest

None declared.

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ANNEX 1. Semi-structured interview guide

Start, dialysis treatment (HD or PD), and expectations

– What has your experience with dialysis been like?

– How did you feel at the beginning of the treatment?

– What do you think about the information you have received throughout the treatment?

– Did you receive information about choosing between HD or PD?

– How do you feel during the session and after the session?

Care process, complications, and HD context

– How would you describe the care you receive at the hospital?

– What do you think about the nursing/medical staff who care for you?

– How do you perceive the information you receive?

– How do you feel during the session and after the session?

To conclude

– Is there any topic you would like to emphasize or any aspect you would like to comment on that we haven't discussed?

Supporting questions

– What do you perceive as support or a facilitator?

– What do you perceive as a barrier, something negative, or something that makes you uncomfortable?

– Could you give an example?

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CASE REPORT

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Butterfly-wing disease: is home haemodialysis possible?

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ABSTRACT

Case description: A 32-year-old woman with IgA nephropathy and "butterfly-wing disease" (dystrophic epidermolysis bullosa) required renal replacement therapy. Severe skin–mucosal fragility, even after minimal trauma, posed a major therapeutic challenge due to the difficulty of vascular access cannulation, wound care, and transfers for each haemodialysis session. Extreme care was required to prevent blistering and secondary scarring. For these reasons, a home haemodialysis technique was chosen.

Care plan description: The following nursing diagnoses were identified:

- Impaired skin integrity, manifested by bleeding and blisters, related to epidermolysis bullosa.
- Imbalanced nutrition: less than body requirements, manifested by body weight below the ideal range by age and sex and delayed wound healing, related to inadequate nutritional intake, injured oral cavity, and oesophageal stenosis.
- Chronic pain, related to cutaneous lesions caused by epidermolysis bullosa, manifested by reported fatigue and/or facial expressions of pain.
- Risk of infection.

Evaluation of the plan: Adequate training was achieved, enabling the patient to manage the technique and the identified problems, with positive changes across all outcomes established in the plan.

Conclusions: In our experience, home haemodialysis represents a viable therapeutic option in patients with dystrophic epidermolysis bullosa. It reduces hospital transfers, minimises the risk of trauma and infection, contributes to quality of life, and prolongs survival.

RESUMEN

Enfermedad en alas de mariposa: ¿es posible la hemodiálisis domiciliaria?

Descripción del caso: Mujer de 32 años, con nefropatía IgA y enfermedad de alas de mariposa (epidermólisis bullosa distrófica) que precisa terapia renal sustitutiva. La severa fragilidad cutáneo-mucosa ante mínimos traumatismos, supone un gran reto terapéutico por la dificultad de canalización de acceso vascular, las curas cutáneas y las transferencias a cada sesión de hemodiálisis. Son necesarios grandes cuidados para evitar la formación de ampollas y lesiones cicatriciales secundarias. Por todo ello, se optó por una técnica domiciliaria de hemodiálisis.

Descripción del plan de cuidados: Se identificaron los siguientes diagnósticos enfermeros:

- Deterioro de la integridad cutánea m/p sangrado y ampollas r/c epidermólisis bullosa.
- Desequilibrio nutricional: inferior a las necesidades corporales m/p peso corporal por debajo del rango ideal de peso según edad y sexo y retraso en la curación de las heridas r/c aporte nutricional inadecuado, cavidad bucal lesionada y estenosis esofágica.
- Dolor crónico r/c lesiones cutáneas causada por epidermólisis bullosa m/p expresa fatiga y/o expresión facial de dolor.
- Riesgo de infección.

Evaluación del plan: Se logró realizar un adecuado entrenamiento consiguiendo el manejo de la técnica y de los problemas detectados, con un cambio positivo en todos los NOC establecidos en el plan.

Conclusiones: En nuestra experiencia, la hemodiálisis domiciliaria supone una opción terapéutica viable en pacientes con epidermólisis bullosa distrófica. De esta manera, se disminuye el número de traslados al hospital, minimizando el riesgo de traumatismos e infecciones, contribuyendo a la calidad de vida del paciente y prolongando su supervivencia.

INTRODUCTION

Dystrophic epidermolysis bullosa (DEB), also known as "butterfly skin disease," is a rare genetic disorder caused by mutations in the COL7A1 gene, responsible for the synthesis of type VII collagen (C7), an essential protein for dermo-epidermal adhesion. Its recessive form (RDEB) is characterized by a marked reduction or absence of C7, leading to extreme fragility of the skin and mucous membranes, spontaneous blister formation or blistering after minimal trauma, and resulting in skin contractures, digital fusions, and severe gastrointestinal strictures[1]. As wounds heal, the skin loses elasticity and joint mobility becomes progressively limited, compromising patient autonomy.

The estimated prevalence is 2 cases per 100,000 people, according to the Dystrophic Epidermolysis Bullosa Research Association (DEBRA) (DEBRA Butterfly Skin Association, 2025). Despite its low frequency, DEB entails a high burden of morbidity and a reduced life expectancy, mainly conditioned by infectious complications, cutaneous neoplasms, and severe malnutrition.

The association between DEB and chronic kidney disease (CKD) has been scarcely documented in the literature. The first reported case of renal involvement dates back to 1973 and was attributed to secondary genitourinary complications[2]. Subsequently, isolated cases of glomerulopathies have been reported, including IgA nephropathy, amyloidosis, or glomerulonephritis, as in the case presented here[3].

The coexistence of DEB and advanced CKD constitutes an exceptional and highly complex clinical situation. Extreme cutaneous–mucosal fragility represents a significant barrier to conventional renal replacement therapy, complicating vascular access, routine wound care, and frequent hospital transfers. In addition, compromised nutritional status and a high risk of infection further worsen clinical outcomes.

In this context, home hemodialysis emerges as an optimal, safe, and personalized therapeutic alternative capable of minimizing risks associated with the hospital environment and improving patient quality of life. The present case report provides a relevant contribution to the scarce existing evidence and offers practical insight into the comprehensive management of patients with rare diseases and complex nephropathies from a multidisciplinary and individualized perspective.

CASE PRESENTATION

A 32-year-old woman with recessive dystrophic epidermolysis bullosa since birth. In this context, the patient presents episodic chronic dysphagia due to esophageal stenosis, requiring periodic dilations, and has had a permanent gastrostomy since age three. She required extraction of six teeth and two oral fibromas (dental prosthesis pending evaluation). She has syndactyly and multiple squamous cell carcinomas that required surgical excision. She has had numerous episodes of cutaneous and urinary tract infections.

From a renal perspective, she has advanced chronic kidney disease secondary to diffuse mesangial IgA nephropathy. Due to her unique clinical circumstances—living 80 km from the hospital, requiring multiple visits to her reference center and to other specialists—a home-based renal replacement therapy was selected. Because she has had a permanent gastrostomy since childhood, she had a relative contraindication for peritoneal dialysis, and home hemodialysis was chosen.

Upon initial evaluation, several active problems were identified, including protein–calorie malnutrition, with a body mass index of 16.52% (due to chewing difficulty, low intake, and a history of refeeding syndrome), as well as difficulty establishing vascular access, with absence of local anesthetic effect.

Hemodialysis initiation was scheduled, and a tunneled pediatric right internal jugular central venous catheter was placed. The modality was agreed upon with the patient and her family, prioritizing quality of life and minimizing hospital visits to allow continuation of her daily wound-care protocols (every 12 hours, lasting approximately 2 hours) and reduce infection risk.

Training took place in the hospital and included two family members in a semi-assisted educational phase (family/partner present and directed by the patient). Training lasted 21 days (150-minute sessions), three days per week, due to the patient's physical fatigue. In parallel with the medical team's training of the family, we also provided comprehensive education—with support from the DEBRA association—regarding the care required for the disease. Given the risk of injury in DEB, all routine clinical procedures were adapted to the patient's complexity: blood pressure was measured using devices without direct compression; soft silicone dressings were used to avoid damage during removal; bed sheets were kept wrinkle-free to reduce friction; identification was made with cards at the bedside or labels on clothing, avoiding wristbands. Monitoring used special soft-adhesion electrodes and sensors protected with non-adherent dressings to minimize any risk of skin injury.

During 2 years on the technique, monthly evaluations were scheduled, and the patient required multidisciplinary follow-up. She was hospitalized four times: once for heart failure, once for infectious diarrhea (Campylobacter), and twice for bacteremia. She required surgical removal of multiple cutaneous lesions (squamous cell carcinoma). Major complications included: absence of anesthetic effect for surgical procedures, catheter dysfunction, difficult pain management, limited vascular access, rapid loss of residual renal function, high nutritional requirements, anemia management, and anxiety–depression.

Her most recent hospital admission was due to septic shock secondary to *Staphylococcus aureus* bacteremia and COVID infection. Severe coughing episodes caused oral blisters and ulcers, making oral intake impossible. During the admission, transfers to the hemodialysis unit (skin friction) produced extensive lesions on the back with significant disruption of the skin barrier, blisters, and retractile scarring (over 80% body surface area).

Despite initially appearing impossible to perform hemodialysis in this patient, after more than a year and a half on renal replacement therapy, she remains stable on home hemodialysis.

COMPREHENSIVE NURSING ASSESSMENT ACCORDING TO THE MARJORY GORDON MODEL

To conduct the nursing evaluation, the "Assessment Guide for Patients with End-Stage Chronic Kidney Disease on Hemodialysis"[4] was used. This document incorporates tools such as NANDA taxonomy and the Nursing Outcomes Classification (NOC), and is based on Marjory Gordon's functional health patterns model[5]. Its purpose is to promote the use of a common nursing language and support comprehensive, standardized care.

Below is the assessment according to the 11 functional health patterns, including both altered and preserved aspects, consistent with the model's holistic approach.

Pattern 1 – Health perception and health management
The patient is knowledgeable about her condition, actively involved in her own care, adherent to treatment, and participates in decision-making.

Pattern 2 – Nutritional–metabolic
Protein–calorie malnutrition (Body Mass Index of 17) associated with epidermolysis bullosa, with oral blisters, missing teeth, esophageal stenosis, high insensible losses, and hydroelectrolytic imbalances (hypokalemia and hypophosphatemia). She maintains fluid restriction due to anuria.

Pattern 3 – Elimination
Persistent anuria due to chronic kidney disease. Altered bowel elimination: frequent diarrheal episodes related to recurrent digestive infections and chronic inflammatory status.

Pattern 4 – Activity and exercise
High dependency for basic activities of daily living. Very limited mobility due to joint contractures and skin lesions. The patient remains in a supine position most of the time and requires support devices and assisted mobilization. Reports habitual fatigue.

Pattern 5 – Sleep and rest
Fragmented, non-restorative sleep. Environmental and pharmacological interventions are required to improve rest.

Pattern 6 – Cognitive–perceptual
Alert and oriented in all three spheres. No cognitive impairment. Reports persistent, difficult-to-control chronic pain due to blistering lesions, with poor response to local anesthetic agents.

Pattern 7 – Self-Perception and self-concept
Presents altered body image, feelings of frustration, and dependency. Despite this, she maintains a cooperative attitude and active coping.

Pattern 8 – Role and relationships
Highly dependent on her environment. Primary caregivers are significantly involved in care. Family relationships are functional and provide strong emotional support.

Pattern 9 – Sexuality and reproduction
The patient has a stable partner. The sexual domain has not been explored in depth, as she did not express concerns regarding this pattern during the assessment. No current needs were identified.

Pattern 10 – Coping and stress tolerance
Demonstrates good adaptive capacity toward her chronic disease. Uses active coping strategies and benefits from effective emotional support from her family. Upon the need to initiate renal replacement therapy, she displayed signs of anxiety and emotional distress.

Pattern 11 – Values and beliefs
No ethical or spiritual conflicts identified. She respects therapeutic indications and actively participates in treatment-related decisions.

EVALUATION OF THE CARE PLAN

Nursing intervention outcomes were assessed using NOC indicators, with partially favorable clinical progress observed across several domains. Improvements were notable in nutritional status, pain control, and adherence to fluid management, although complications related to extreme cutaneous–mucosal fragility and chronic malnutrition persisted.

Nutritional management
Specific oral supplementation was initiated, along with parenteral nutrition during hemodialysis sessions. Nutritional

Description of the NANDA–NIC–NOC care plan.

Nursing Diagnosis (NANDA)	NOC (Outcome / Indicator)	NIC (Nursing Intervention)
(00002) Imbalanced nutrition: Less than body requirements, related to DEB-associated conditions.	(1004) Nutritional status.	(1100) Nutrition management.
	(100402) Food intake.	(1260) Weight management.
	(1260) Weight management.	(5614) Teaching: Prescribed diet.
		(1200) Parenteral Nutrition administration during hemodialysis.
(00195) Risk for electrolyte imbalance, related to renal dysfunction.	(0601) Fluid balance.	(4120) Fluid management.
	(1092) Risk control.	
	(060112) Absence of peripheral edema.	
	(190802) Acknowledges risk.	
	(190207) Uses risk-control strategies.	
(00095) Insomnia, related to inadequate sleep hygiene, manifested by non-restorative sleep.	(0004) Sleep.	(1850) Improve sleep.
	(000402) Hours of sleep.	
	(000404) Sleep quality.	
(00094) Risk for activity intolerance, related to imbalance between oxygen supply and demand.	(1804) Energy conservation.	(0180) Energy management.
	(180403) Appropriate activities.	
(00004) Risk for Infection, manifested by chronic DEB involvement and/or presence of central venous catheter, related to impaired skin integrity.	(1908) Risk detection.	(6540) Infection control.
	(190801) Recognizes signs and symptoms of risk.	(3590) Skin surveillance.
	(3102) Self-management: chronic disease.	(1800) Assistance with self-care.
(00002) Risk for falls, related to physiological factors.	(1828) Knowledge: fall prevention.	(6490) Fall prevention.
	(182801) Description of use of assistive devices.	(6486) Environmental management: safety.
	(182817) Description of How to Ambulate Safely.	
(00046) Impaired skin integrity, related to DEB and AVF, manifested by skin lesions.	(1102) Wound healing: primary intention.	(3590) Skin surveillance.
	(1105) Hemodialysis access integrity.	(3660) Wound care.
	(110303) Purulent drainage.	(3440) Incision Site care.
	(110322) Wound inflammation.	
	(110311) Skin blisters.	
(00045) Impaired oral mucous membrane, related to mechanical factors (pressure, friction, shear), manifested by lesions.	(1100) Oral hygiene.	(1730) Restoration of oral health.
	(110012) Oral mucous membrane integrity.	(3590) Skin surveillance.
(00133) Chronic pain, related to epidermolysis bullosa lesions, manifested by verbal reports of pain.	(1605) Pain control.	(1400) Pain management.
	(160511) Reports pain controlled.	(6040) Simple relaxation therapy.

DEB: Dystrophic epidermolysis bullosa.

Image 1. Severe skin involvement due to friction during an intrahospital transfer.

education was provided and nutritional status was monitored via bioimpedance. The patient initially had a BMI of 16.5, which increased slightly to 17.1 over three months. Estimated daily caloric intake increased from <1000 kcal to approximately 1050 kcal, representing a limited yet sustained improvement. Electrolyte disturbances associated with malnutrition, such as hypophosphatemia and hypokalemia, were corrected through oral and parenteral supplementation, with progressive laboratory normalization. Improved NOC indicators: *Nutritional Status* (1004) and *Food Intake* (100402).

Fluid management

Continuous monitoring of fluid balance was performed. Dry weight remained stable (36.2 kg to 36.0 kg). No signs of fluid overload, edema, or hypotensive episodes were observed. Adherence to fluid restriction recommendations was good, and electrolyte stability was maintained after correction of initial hypokalemia. NOC indicators: *Fluid Balance* (0601) and *Absence of Peripheral Edema* (060112).

Pain management

Chronic pain, initially rated 8/10 on a visual analog scale, decreased to 5/10 following optimization of pharmacological therapy and coordination with the pain unit. Relaxation techniques and non-pharmacological measures were added. Control was partial, with pain exacerbations during mobilization or infections. NOC indicators: *Pain Control* (1605) and *Reports Controlled Pain* (160511).

Trauma prevention

Caregivers were trained in safe mobilization techniques, and the home environment was adapted (special mattresses, wrinkle-free sheets, non-adherent dressings). No falls occurred at home within the first three months; however, during a subsequent hospital admission, an improper transfer resulted in extensive skin injury **(image 1)**. Thus, although traumatic episodes decreased at home, risk remains high in uncontrolled settings. Partial improvement was observed in: *Fall Prevention* (NOC 6490), and *Skin Surveillance* (NOC 3590)

DISCUSIÓN

The coexistence of recessive dystrophic epidermolysis bullosa (RDEB) and advanced CKD represents a significant clinical challenge due to its low prevalence, therapeutic complexity, and high morbidity burden. Although rarely described, renal involvement in patients with RDEB is not anecdotal. In a multicenter study conducted by the National Epidermolysis Bullosa Registry, up to 12.3% of patients with Hallopeau–Siemens–type RDEB died from renal causes before the age of 35, establishing renal failure as one of the main causes of death in this young population[6].

Renal complications described in this population include primarily IgA nephropathy, secondary amyloidosis, and post-infectious glomerulonephritis[7,8]. These conditions may progress silently; therefore, regular monitoring of renal function from early stages is recommended. This aspect is particularly relevant in patients with recurrent skin infections, chronic inflammatory states, and malnutrition—factors commonly present in the evolution of RDEB.

Interventions and NOC Indicators.

Intervention	NOC Indicator	Initial Value	Final Value	Estimated Improvement
Nutritional Management	BMI (kg/m^2)	16.5	17.1	+3.6%
	Daily caloric intake (100402)	<1000 kcal	~1050 kcal	+5–10%
	Phosphatemia, potassium levels	Altered	Normalized	100% resolved
Fluid Management	Peripheral edema (060112)	Present (mild)	Absent	100% resolved
	Fluid balance	Variable	Stable	100% controlled
Pain Management	VAS pain scale	8/10	5/10	–37.5%
Trauma Prevention	Friction injuries	Frequent	Sporadic	>50% reduction
	Falls (at home)	1 episode per month	0 (in 3 months)	100% in controlled environment

Renal replacement therapy in patients with DEB presents multiple challenges due to their particular cutaneous–mucosal fragility. Successful cases of hemodialysis, peritoneal dialysis, and even kidney transplantation have been reported, always with adaptations tailored to patient characteristics[9,10]. Peritoneal dialysis, despite its apparent lower aggressiveness, may be contraindicated in the presence of abdominal involvement, high risk of peritonitis, or prior gastrostomies. Consistent with published data, in our case this modality was ruled out due to the presence of a permanent gastrostomy and the associated technical risk[11]. Hospital-based hemodialysis carries risks related to frequent manipulation of vascular access, pressure from medical devices on the skin, and recurrent transfers[12,13]. In our experience, even minimal mobilizations triggered extensive lesions on the patient's back and oral mucosa, clearly illustrating the difficulty of maintaining this modality without worsening her overall condition. Similar complications have been reported by Małecki et al., who emphasized the need to rigorously adapt dialysis care to avoid skin injury in these patients[9].

Given these circumstances, home hemodialysis emerges as an optimal therapeutic alternative. By eliminating the need for transportation, allowing careful handling in a controlled home environment, and adapting techniques and devices to individual needs, this modality becomes a safe and effective option to preserve skin integrity and reduce complications[14]. In our case, the technique was successfully maintained for more than 18 months through a progressive training program, family involvement, and close clinical supervision.

Finally, although kidney transplantation remains a valid alternative, its application in patients with RDEB requires meticulous evaluation. Successful cases have been reported following specific surgical and anesthetic preparation, suggesting that with proper planning, transplantation may be considered in advanced stages, particularly in young patients with limited extra-renal comorbidity[11].

Overall, this clinical case adds valuable evidence regarding the feasibility of home hemodialysis in patients with RDEB and advanced CKD. Management requires a multidisciplinary approach, individualized protocols, and strong commitment from both the family environment and healthcare professionals. The accumulated experience, combined with existing literature, reinforces the need to disseminate such cases to guide future therapeutic decisions in rare diseases of high complexity.

CONCLUSIONS

This clinical case demonstrates that even in highly complex clinical scenarios—such as a patient with dystrophic epidermolysis bullosa and advanced chronic kidney disease—it is possible to successfully implement home hemodialysis when an individualized care plan, adequate training, and continuous support are provided. Over the course of follow-up, objective clinical improvements were observed in indicators such as nutritional status, pain control, and prevention of skin injuries, confirming that the goals established in the care plan were effectively achieved.

The patient's favorable evolution reinforces the idea that complex therapeutic options should not be dismissed solely due to their technical difficulty. This case highlights the importance of evaluating each situation comprehensively and with flexibility, tailoring available resources and strategies to the patient's specific characteristics, even when physical fragility and environmental conditions pose constant challenges. Nursing intervention—focused on accompaniment, environmental adaptation, and caregiver education—was key to ensuring treatment safety and continuity.

The strong involvement of all healthcare personnel, the support of the DEBRA Association in Spain, and the emotional and physical commitment of the patient's family were fundamental pillars in achieving effective coping during this new stage of life.

Our experience shows that home hemodialysis is not only feasible in patients with epidermolysis bullosa, but may also represent an alternative that improves quality of life, preserves autonomy, and dignifies the therapeutic process.

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Conflicts of interest

None declared.

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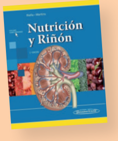

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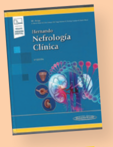

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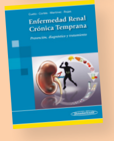

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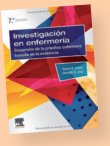

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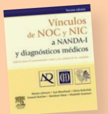

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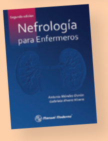

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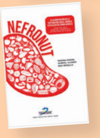

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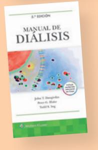

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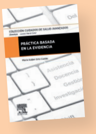

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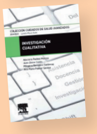

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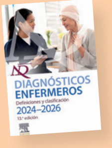

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- ☐ “Manual de diagnósticos enfermeros”. Gordin M.
- ☐ “Manual de diálisis”. Daurgidas J.
- ☐ “Procedimientos y Protocolos con Competencias Específicas para Enfermería Nefrológica”. Crespo, R. Casas, R. SEDEN (Sociedad Española de Enfermería Nefrológica)
- ☐ “Práctica basada en la evidencia”. Cortés O.
- ☐ “Investigación cualitativa”. Pedraz A.
- ☐ “Guía Práctica de Enfermería Médico-Quirúrgica”. Lewis S.L, Bucher L.
- ☐ “La Alimentación en la Enfermedad Renal Crónica. Recetario Práctico de Cocina para el Enfermo Renal y su Familia”. Fernández, S, Conde, N, Caverni, A, Ochando, A.
- ☐ “Manual de Tratamiento de la Enfermedad Renal Crónica”. Daugirdas, J.
- ☐ “Manual de Trasplante Renal”. Danovitch, G.
- ☐ “Investigación en metodología y lenguajes enfermeros”. Echevarría Pérez P.
- ☐ “Proceso de Cuidado Nutricional en la Enfermedad Renal Crónica. Manual para el Profesional de la Nutrición”. Osuna I.
- ☐ “Diagnósticos enfermeros. Definiciones y clasificación. 2021-2023”. T. Heather Herdman & NANDA International & Shigemi Kamitsuru.

Any book from Editorial Médica Panamericana, whether listed or not, will have a 10% discount off the base price for SEDEN members. Orders must be placed through www.panamericana.com, using the designated code for members at checkout. Books from Axón will also have a 10% discount, with free shipping, and must be ordered through www.axon.es, specifying the corresponding member code. Books published by Aula Médica will have a 30% discount and must be ordered via their website: https://www.clubaulamedica.com/ using the appropriate code. Books from Elsevier will have a 10% discount plus shipping costs and must be ordered through SEDEN.

The codes mentioned here can be found on the SEDEN website under the “Member Benefits” section. The discount percentage will be applied to the pre-VAT price.

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PUBLICATION GUIDELINES

Enfermería Nefrológica is the official journal of the Spanish Society of Nephrology Nursing (SEDEN). Although the preferred language for the journal is Spanish, it also accepts articles in Portuguese and English.

Enfermería Nefrológica regularly publishes four issues a year, on the 30th of March, June, September and December, and a shorter paper version. All of the contents are available to access free of charge on the website: **www.enfermerianefrologica.com.** The journal is financed by the Spanish Society of Nephrology Nursing and distributed under the Creative Commons Attribution-NonCommercial 4.0 International (CC BY-NC 4.0). This journal does not charge any article processing fees.

The journal is included in: CINAHL, IBECS, SciELO, CUIDEN, SIIC, Latindex, Capes DULCINEA, Dialnet, DOAJ, ENFISPO, Scopus, Sherpa Romeo, C17, RECOLECTA, ENFISPO, Redalyc, REBIUN, REDIB, MIAR, WordCat, Google Scholar Metric, Cuidatge, Cabells Scholarly Analytics, AURA, JournalTOCs and Proquest.

Enfermería Nefrológica publishes nursing research articles related to nephrology, high blood pressure and dialysis and transplants, which aim to increase scientific knowledge and ultimately lead to better renal patient care. It also accepts articles from other nursing fields or broader topics which result in greater professional knowledge of nephrological nursing.

In terms of publishing submissions, Enfermería Nefrológica follows the general guidelines described in the standard requirements for submissions presented for publication in biomedical journals, drafted by the International Committee of Medical Journal Editors (ICJME), available from **http://www.icmje.org**. The editorial committee will consider how well the submissions they receive follow this writing protocol.

JOURNAL SECTIONS

The journal essentially contains the following sections:

Editorial. Concise article which expresses an opinion or in which various facts or other opinions are stated. Short reviews by the editorial committee.

Long articles. These are articles in which the author(s) focus(es) on a health problem, which requires a specific nursing action performed with qualitative or quantitative methodologies, or both.

Long articles with qualitative or quantitative methodologies must contain: a structured summary (maximum 250 words in English and in the original language), introduction, objetive, method, results, discussion and conclusions (maximum length of 3,500 words for quantitative methodologies and 5,000 words for qualitative methodologies, a maximum of six tables and/or figures and a maximum of 35 bibliographic references).

Reviews. Bibliometric studies, narrative, integrative and systematic reviews, meta-analysis and meta-synthesis regarding current and relevant topics in nursing and nephrology, following the same structure and guidelines as the original qualitative work, but with a maximum of 80 bibliographic references.

Clinical case. Essentially descriptive reports of one or a few cases related to the clinical practice of nurses, in any of the various facets of their work. The report must be concise and will describe the methodology employed leading to resolution of the case from a nursing care perspective. It should include a 250-word summary in Spanish and English and cover: case description, care plan description, plan evaluation and conclusions. Maximum desired length is 2,500 words, with the following structure: introduction; presentation of case; complete nursing evaluation indicating model; description of care plan (containing the possible nursing diagnoses and problems regarding collaboration, aims and nursing interventions, wherever possible using the NANDA-NIC-NOC taxonomy); care plan evaluation and conclusions. A maximum of three tables/figures and 15 bibliographical references will be permitted.

Cover letter. These are short letters which agree or disagree with previously published articles. They can also be observations or experiences of a current topic of interest in nephrological nursing. They should be no longer than 1,500 words with up to five bibliographic references and one figure/table.

Brief articles. Research work in the same vein as the longer articles, but narrower in scope (series of cases, research on experiences with very specific aims and results), which can be communicated more concisely. These will follow the same structure: structured summary (250 words in English and Spanish), introduction, objetive, method, results, discussion and conclusion (2,500 words in length, maximum three tables and/or figures, maximum 15 bibliographical references).

Other sections. These will include various articles that may be of interest in the field of nephrological nursing.

Lengths indicated are for guidance purposes only. Submission length excludes: title, authors/affiliation, summary, tables and bibliographical purposes. The structure and length of each section of the journal are summarised in **table 1**.

FORMAL ASPECTS OF SUBMISSIONS

Authors grant the publisher the non-exclusive licence to publish the work and consent to its use and distribution under the **creative commons atribución - no comercial** 4.0 international (CC BY-NC 4.0) licence. Read the licensing information and **legal text** here. This must be expressly stated wherever necessary.

Previously published submissions or those sent simultaneously to other journals will not be accepted. Authors will inform the editorial committee of any submissions that are presented at scientific events (conferences or workshops). It would be advisable for all papers to have passed an ethics committee.

Submissions are to be uploaded to the digital platform found on the website: **http://www.enfermerianefrologica.com,** (Under the "Make a submission" section).

As part of the submission process, authors are obliged to check that their submission meets all of the requirements set out below. Any submissions that do not meet these guidelines will be declined for publication.

A letter of presentation addressed to the journal's Chief Editor must accompany the submission, in which the author(s) ask(s) for their work to be accepted for publication in a section of the journal. This will include completing the **publication agreement form**, vouching for the submission's originality and providing assurances that it has not been published elsewhere.

Submissions will be accepted in word format, one in which the author is identifiable, and the other which is anonymous for peer review. Pages must be DIN-A4 sized, double-spaced and with size-12 font, with 2.5-cm top, bottom and side margins. Pages will be numbered consecutively. Headings, footnotes and highlighting are not recommended, as they can cause problems with layout should the submission be published.

Enfermería Nefrológica's management tool will acknowledge the receipt of all submissions. Once receipt has been acknowledged, the editorial process starts, which can be followed by authors via the aforementioned platform.

Submissions must comprise three files to be uploaded onto the journal's OJS platform.

File 1:

- Letter of presentation that accompanies the submission.
- Publication agreement form, content liability and assurance that it has not been published elsewhere.

File 2:

- Full submission (including tables and appendices) with name of author(s).

File 3:

- Full submission (including tables and appendices) with no identifying details of author(s).

The ethical responsibility section must be accepted before the files can be submitted.

The original submissions must adhere to the following presentation guidelines:

First page. This begins with the article title, authors' full names and surnames, work centres, countries or origin, email addresses and ORCID number (unique researcher ID). Indicate which author any correspondence is to be addressed to, as well as whether the surnames of the authors are to be joined by a hyphen or just one surname is to be used.

Summary. All articles must include a summary (in the original language and in English). This is to be a **maximum** length of **250 words.** The summary must contain sufficient information so that readers can gauge a clear idea of the article's content, without any reference to the text, bibliographical references or abbreviations and follow the same sections as the text: introduction, objetives, methodology, results and conclusion. The summary will not contain any new information not contained within the text itself.

Keywords. Some 3-6 keywords must be included at the end of the summary, which are directly related to the main study principles (advisable to use DeCS controlled vocabulary vocabulary https://decs.bvsalud.org/es/ and MeSH https://www.ncbi.nlm.nih.gov/mesh).

Text. In observational or experimental submissions, the text is usually divided into sections or the following: **Introduction,** which must provide the necessary items to understand the work and include its **objetives**.

Method employed in the research, including the centre where the research was conducted, its duration, characteristics of the series, sample selection criteria, techniques employed and statistical method. **Results,** which must provide data and not comment or discuss it. Results must exactly answer the objetives set out in the introduction. Tables and/or figures can be used to supplement information, although superfluous repetitions of results that are already included in the tables must be avoided, focusing instead on only the most relevant information. In the **Discussion** the authors must comment on and analyse the results, linking them to those obtained in other studies that are bibliographically referenced, as well as any conclusions they have reached with their work. The **Discussion** and **Conclusion** must stem directly from the results, with no statements made that are not validated by the results obtained in the study.

Acknowledgements. Should they wish to, authors may express their gratitude to anyone or any institution that has helped them to conduct their research. This section should also be used to acknowledge anyone who does not meet all of the criteria to be considered as an author, but who has helped with the submission, such as those who have helped with data collection, for example.

Statement on the use of generative Artificial Intelligence (AI) in scientific writing. AI and AI-assisted technologies should not be listed as author, co-author, or cited as author. Authorship implies responsibilities and tasks that can only be attributed to and performed by humans. If it has been used, authors should include a paragraph before the bibliography reporting the use of AI: "During the preparation of this paper, the authors used [NAME TOOL/SERVICE] for [REASON]. After using this tool/service, the authors reviewed and edited the content as necessary and take full responsibility for the publication's content". This statement does not apply to using essential tools to check grammar, spelling, bibliographic references, etc. If there is nothing to declare, there is no need to add this section.

References. References will follow the guidelines indicated in the ICJME with the guidance of the National Library of Medicine (NLM), available on: **https://www.nlm.nih.gov/bsd/uniform_requirements.html.**

Bibliographical references must be numbered consecutively according to the order of first appearance in the text, in superscript Arabic numerals, in the same font type and size as that used for the text. When they coincide with a punctuation mark, the reference will come before the mark. Journal titles must be abbreviated in accordance with the style used in Index Medicus; looking at the "List of Journals indexed" included every year in the January issue of Index Medicus. You can also consult the collective catalogue of periodic publications from the Spanish Health Sciences Libraries, or c17 **(http://www.c17.net/)**. Should a journal not appear in either Index Medicus or the c17, its name must be written out in full.

The bibliography of the articles should be updated to the last 7 years and it is recommended to cite an appropriate number of references.

Some examples of bibliographical references are given below.

Journal article

To be written as:

Zurera-Delgado I, Caballero-Villarraso MT, Ruíz-García M. Análisis de los factores que determinan la adherencia terapéutica del paciente hipertenso. Enferm Nefrol. 2014;17(4):251-60.

In the case of more than six authors, name the first six authors, followed by the expression *"et al"*:

Firanek CA, Garza S, Gellens ME, Lattrel K, Mancini A, Robar A *et al.* Contrasting Perceptions of Home Dialysis Therapies Among In-Center and Home Dialysis Staff. Nephrol Nurs J. 2016;43(3):195-205.

In the event that it is a supplement:

Grupo Español Multidisciplinar del Acceso Vascular (GEMAV). Guía Clínica Española del Acceso Vascular para Hemodiálisis. Enferm Nefrol. 2018;21(Supl 1):S6-198.

Online journal article:

Pérez-Pérez MJ. Cuidadores informales en un área de salud rural: perfil, calidad de vida y necesidades. Biblioteca Lascasas [Internet]. 2012 [cited 10 Mar 2015];8:[about 59 p.]. Available from: http://www.index-f.com/lascasas/documentos/lc0015.php

Article published electronically ahead of the print version:

Blanco-Mavillard I. ¿Están incluidos los cuidados paliativos en la atención al enfermo renal? Enferm Clin. Available from: 2017; http://dx.doi.org/10.1016/j.enfcli. 2017.04.005. Epub 2017 Jun 6.

Book chapter:

Pulido-Pulido JF, Crehuet-Rodríguez I, Méndez Briso-Montiano P. Punciones de accesos vasculares permanentes. En: Crespo-Montero R, Casas-Cuesta R, editores. Procedimientos y protocolos con competencias específicas para Enfermería Nefrológica. Madrid: Sociedad Española de Enfermería Nefrológica (SEDEN); 2013. p. 149-54.

Website

Sociedad Española de Enfermería Nefrológica. Madrid. [cited 5 Feb 2007]. Available from: https://www.seden.org.

Authors are advised to study the checklists on the website http://www.equator-network.org/reporting-guidelines/ for guidance on the study design of their submission.

- CONSORT for clinical trials.
- TREND for non-randomised experimental studies.
- STROBE for observational studies.
- PRISMA for systematic reviews.
- COREQ for qualitative methodology studies.

Tables and Figures. All will be referred to within the text (without abbreviations or hyphens), and consecutively numbered with Arabic numerals, without superscript, according the order mentioned within the text. They are to be presented at the end of the submission, on a separate page, with titles at the top.

Tables must be clear and simple, and any symbols or abbreviations must be accompanied by an explanatory note under the table. Images (photos or slides) must be of good quality. It is advisable to use the jpg. format.

ETHIC RESPONSIBILITY ACCEPTANCE

Enfermería Nefrológica adheres to the ethical guidelines established below for publication and research.

Authorship: Authors making a submission do so on the understanding that it has been read and approved by all of its authors and that all agree to submitting it to the journal. ALL of the listed authors must have contributed to the conception and design and/or analysis and interpretation of the data and/or the writing of the submission and the author information must include the contribution of each on the first page.

Enfermería Nefrológica adheres to the definition and authorship established by The International Committee of Medical Journal Edtiors (ICMJE). In accordance with the criteria established by the ICMJE, authorship must be based on 1) substantial contributions to the conception and design, acquisition, analysis and interpretation of data, 2) drafting of article or critical review of its significant intellectual content and 3) final approval of the published version. All conditions must be fulfilled.

Ethical approval: When a submission requires the collection of research data that involves human subjects, it must be accompanied by an express statement in the materials and method section, identifying how informed consent was obtained and a declaration, wherever necessary, stating that the study has been approved by an appropriate research ethics committee. Editors reserve the right to decline the article when questions remain as to whether appropriate processes have been followed.

Conflict of interests: Authors must disclose any potential conflict of interest when they make a submission. These may include financial conflicts of interest, patent ownership, shareholdings, employment in dialysis/pharmaceutical companies, consultancies or conference payments by pharmaceutical companies relating to the research topic or area of study. Authors must remember that reviewers have to notify the editor of any conflict of interest that may influence the authors' opinions.

Any conflict of interest (or information specifying the absence of any conflict of interest) must be included on the first page under the title "Conflict of interests." This information will be included in the published article. The following sentence must be included when authors have no conflict of interest: "Author(s) declare(s) no conflict of interest."

Sources of funding: Authors must specify the source of financing for their research when they make a submission. Providers of the assistance must be named and their location included (city, state/province, country).

PLAGIARISM DETECTION

Enfermería Nefrológica does not condone plagiarism and will not accept plagiarised material for publication under any circumstances.

Plagiarism includes, but is not limited to:

Directly copying text, ideas, images or data from other sources with the corresponding, clear and due acknowledgement.

Recycling text from the authors' own work without the corresponding referencing and approval by the editor (read more on recycling text in the policy on redundant publication, copying and recycling of text).

Using an idea from another source with modified language without the corresponding, clear and due acknowledgement.

The journal uses the **iThenticate-Similarity Check** service by Crossref to cross-match texts and detect plagiarism. All of the long articles submitted to Enfermería Nefrológica are processed by an anti-plagiarism system before being sent to peer review.

Enfermería Nefrológica follows the decision tree recommended by COPE in the event of suspecting a submission or an already-published article contains plagiarism (**http://publicationethics.org/files/Spanish%20%281%29.pdf**). Enfermería Nefrológica reserves the right to contact the institution to which the author(s) belong(s) in the event of confirming a case of plagiarism, both prior to and subsequent to publication.

Table 1. Summary table of the structure and length of each journal section.

Submission type	Summary (English and original article language)	Main text	Tables and figures	Authors	References
Editorial.	No.	Maximum length: 750 words, including references.	None.	Maximum recommended 2.	Maximum 4.
Long articles Quantitative Methodology.	250 words. Structure: introduction, objetive, method, results and conclusions.	Maximum length: 3,500 words. Structure: introduction, objetive, method, results, discussion and conclusions.	Maximum 6.	Maximum recommended 6.	Maximum 35.
Long articles Qualitative Methodology.	250 words. Structure: introduction, objetive, method, results and conclusions.	Maximum length: 5,000 words. Structure: introduction, objetive, method, results, discussion and conclusions.	Maximum 6.	Maximum recommended 6.	Maximum 35.
Brief articles.	250 words. Structure: introduction, objetive, method, results and conclusions.	Maximum length: 2,500 words. Structure: introduction, objetive, method, results, discussion and conclusions.	Maximum 3.	Maximum recommended 6.	Maximum 15.
Reviews.	250 words. Structure: introduction, objetive, methodology, results and conclusions.	Maximum length: 3,800 words. structure: introduction, objetive, methodology, results, discussion and conclusions.	Maximum 6.	Maximum recommended 6.	Maximum 80.
Clinical case.	250 words. Structure: case description, care plan description, plan evaluation, conclusions.	Maximum length: 2,500 words. Structure: introduction; presentation of case; (complete) nursing evaluation indicating model; description of care plan (containing the possible nursing diagnoses and problems regarding collaboration, objetive and nursing interventions), care plan evaluation and conclusions.	Maximum 3.	Maximum recommended 3.	Maximum 15.

NORMAS DE PUBLICACIÓN

La revista Enfermería Nefrológica es la publicación oficial de la Sociedad Española de Enfermería Nefrológica (SEDEN). Aunque el idioma preferente de la revista es el español, se admitirá también artículos en portugués e inglés.

Enfermería Nefrológica publica regularmente cuatro números al año, el día 30 del último mes de cada trimestre y dispone de una versión reducida en papel. Todos los contenidos íntegros están disponibles en la web de acceso libre y gratuito: **www.enfermerianefrologica.com.** La revista es financiada por la entidad que la pública y se distribuye bajo una licencia Creative Commons Atribución No Comercial 4.0 Internacional (CC BY-NC 4.0). Esta revista no aplica ningún cargo por publicación.

La revista está incluida en: CINAHL, IBECS, SciELO, CUIDEN, SIIC, Latindex, Capes, DULCINEA, Dialnet, DOAJ, ENFISPO, Scopus, Sherpa Romeo, C17, RECOLECTA, Redalyc, REBIUN, REDIB, MIAR, WordCat, Google Scholar Metric, Cuidatge, Cabells Scholarly Analytics, AURA, JournalTOCs y Proquest.

Enfermería Nefrológica publica artículos de investigación enfermera relacionados con la nefrología, hipertensión arterial, diálisis y trasplante, que tengan como objetivo contribuir a la difusión del conocimiento científico que redunde en el mejor cuidado del enfermo renal. Asimismo, se aceptarán artículos de otras áreas de conocimiento enfermero o de materias transversales que redunden en la mejora del conocimiento profesional de la enfermería nefrológica.

Para la publicación de los manuscritos, Enfermería Nefrológica sigue las directrices generales descritas en los requisitos de uniformidad para manuscritos presentados para publicación en revistas biomédicas, elaboradas por el comité internacional de editores de revistas biomédicas (ICJME). Disponible en **http://www.icmje.org.** En la valoración de los manuscritos recibidos, el comité editorial tendrá en cuenta el cumplimiento del siguiente protocolo de redacción.

SECCIONES DE LA REVISTA

La revista consta fundamentalmente de las siguientes secciones:

Editorial. Artículo breve en el que se expresa una opinión o se interpretan hechos u otras opiniones. Revisiones breves por encargo del comité editorial.

Originales. Son artículos en los que el autor o autores estudian un problema de salud, del que se deriva una actuación específica de enfermería realizada con metodología cuantitativa, cualitativa o ambas.

Los originales con metodología cuantitativa y cualitativa deberán contener: resumen estructurado (máximo de 250 palabras en inglés y en el idioma original), introducción, objetivos, material y método, resultados, discusión y conclusiones (extensión máxima de 3.500 palabras para los de metodología cuantitativa y 5.000 palabras para los de metodología cualitativa, máximo 6 tablas y/o figuras, máximo 35 referencias bibliográficas).

Revisiones. Estudios bibliométricos, revisiones narrativas, integrativas, sistemáticas, metaanálisis y metasíntesis sobre temas relevantes y de actualidad en enfermería o nefrología, siguiendo la misma estructura y normas que los trabajos originales cualitativos, pero con un máximo de 80 referencias bibliográficas.

Casos clínicos. Trabajo fundamentalmente descriptivo de uno o unos pocos casos relacionados con la práctica clínica de las enfermeras, en cualquiera de sus diferentes ámbitos de actuación. La extensión debe ser breve y se describirá la metodología de actuación encaminada a su resolución bajo el punto de vista de la atención de enfermería. Incluirá un resumen de 250 palabras en castellano e inglés estructurado en: descripción caso/os, descripción del plan de cuidados, evaluación del plan, conclusiones. La extensión máxima será de 2.500 palabras, con la siguiente estructura: introducción; presentación del caso; valoración enfermera completa indicando modelo; descripción del plan de cuidados (conteniendo los posibles diagnósticos enfermeros y los problemas de colaboración, objetivos e intervenciones enfermeras. Se aconseja utilizar taxonomía NANDA-NIC-NOC); evaluación del plan de cuidados y conclusiones. Se admitirá un máximo de 3 tablas/figuras y de 15 referencias bibliográficas.

Cartas al Editor Jefe. Consiste en una comunicación breve en la que se expresa acuerdo o desacuerdo con respecto a artículos publicados anteriormente. También puede constar de observaciones o experiencias sobre un tema de actualidad, de interés para la enfermería nefrológica. Tendrá una extensión máxima de 1.500 palabras, 5 referencias bibliográficas y una figura/tabla.

Original breve. Trabajos de investigación de las mismas características que los originales, pero de menor envergadura (series de casos, investigaciones sobre experiencias con objetivos y resultados muy concretos), que pueden comunicarse de forma más abreviada. Seguirán la siguiente estructura: resumen estructurado (250 palabras en inglés y castellano), introducción, objetivos, material y método, resultados, discusión y conclusiones (extensión 2.500 palabras, máximo 3 tablas y/o figuras, máximo 15 referencias bibliográficas).

Otras secciones. En ellas se incluirán artículos diversos que puedan ser de interés en el campo de la enfermería nefrológica.

Las extensiones indicadas son orientativas. La extensión de los manuscritos excluye: título, autores/filiación, resumen, tablas y referencias bibliográficas. La estructura y extensión de cada sección de la revista se resume en la **tabla 1.**

ASPECTOS FORMALES PARA LA PRESENTACIÓN DE LOS MANUSCRITOS

Los autores ceden de forma no exclusiva los derechos de explotación de los trabajos publicados y consiente en que su uso y distribución se realice con la licencia **creative commons atribución - no comercial** 4.0 internacional (CC BY-NC 4.0). Puede consultar desde aquí la versión informativa y el **texto legal** de la licencia. Esta circunstancia ha de hacerse constar expresamente de esta forma cuando sea necesario.

No se aceptarán manuscritos previamente publicados o que hayan sido enviados al mismo tiempo a otra revista. En el caso de que hubiera sido presentado a alguna actividad científica (Congreso, Jornadas) los autores lo pondrán en conocimiento del comité editorial. Sería recomendable que todos los trabajos hayan pasado un comité de ética.

Los manuscritos se remitirán por la plataforma digital de la revista que se encuentra en su página web, a la que se accede en la siguiente dirección: **http://www.enfermerianefrologica.com.** (Apartado "Enviar un artículo").

Como parte del proceso de envío, los autores/as están obligados a comprobar que su envío cumpla todos los elementos que se muestran a continuación. Se devolverán a los autores/as aquellos envíos que no cumplan estas directrices.

Junto al manuscrito deberá remitirse una carta de presentación al editor jefe de la revista, en la que se solicita la aceptación para su publicación en alguna de las secciones de la misma. En ella se incorporará el formulario de acuerdo de publicación, originalidad del trabajo, responsabilidad de contenido y no publicación en otro medio.

La presentación de los manuscritos se hará en dos archivos en formato word, uno identificado y otro anónimo para su revisión por pares. El tamaño de las páginas será DIN-A4, a doble espacio y un tamaño de letra de 12, dejando los márgenes laterales, superior e inferior de 2,5 cm. Las hojas irán numeradas correlativamente. Se recomienda no utilizar encabezados, pies de página, ni subrayados, que dificultan la maquetación en el caso de que los manuscritos sean publicados.

La herramienta de gestión de la revista Enfermería Nefrológica acusará recibo de todos los manuscritos. Una vez acusado recibo, se inicia el proceso editorial, que puede ser seguido por los autores en la plataforma mencionada anteriormente.

Los manuscritos se separarán en tres archivos, que se incluirán en la plataforma OJS de la revista:

Archivo 1:

- Carta de presentación del manuscrito.
- Formulario de acuerdo de publicación, responsabilidad de contenido y no publicación en otro medio.

Archivo 2:

- Trabajo identificado completo (incluidas tablas y anexos).

Archivo 3:

- Trabajo anónimo completo (incluidas tablas y anexos).

Antes del envío definitivo habrá que aceptar el apartado de responsabilidad ética.

Los manuscritos originales deberán respetar las siguientes condiciones de presentación:

Primera página. Se inicia con el título del artículo, nombre y apellidos completos de los autores, centros de trabajos, país de origen, correo electrónico y Orcid (identificador único de investigadores). Se indicará a qué autor debe ser enviada la correspondencia, así como si los apellidos de los autores irán unidos por un guión o sólo utilizarán un solo apellido.

Resumen. Todos los artículos deberán incluir un resumen (en el idioma de origen y en inglés). La **extensión máxima** será de **250 palabras.** El resumen ha de tener la información suficiente para que el lector se haga una idea clara del contenido del manuscrito, sin ninguna referencia al texto, citas bibliográficas ni abreviaturas y estará estructurado con los mismos apartados del trabajo (Introducción, Objetivos, Metodología, Resultados y Conclusiones). El resumen no contendrá información que no se encuentre en el texto.

Palabras clave. Al final del resumen deben incluirse 3-6 palabras clave, que estarán directamente relacionadas con las principales variables del estudio (se aconseja utilizar lenguaje controlado DeCS https://decs.bvsalud.org/es/ y MeSH https://www.ncbi.nlm.nih.gov/mesh).

Texto. En los manuscritos de observación y experimentales, el texto suele dividirse en apartados o secciones denominadas: **Introducción**, que debe proporcionar los elementos necesarios para la compresión del trabajo e incluir los **objetivos** del mismo. **Material y Método,** empleado en la investigación, que incluye el centro donde se ha realizado, el tiempo que ha durado, características de la serie, sistema de selección de la muestra, las técnicas utilizadas y los métodos estadísticos. **Resultados,** que deben ser una exposición de datos, no un comentario o discusión sobre alguno de ellos. Los resultados deben responder exactamente a los objetivos planteados en la introducción. Se pueden utilizar tablas y/o figuras para complementar la información, aunque deben evitarse repeticiones innecesarias de los resultados que ya figuren en las tablas y limitarse a resaltar los datos más relevantes. En la **Discusión** los autores comentan y analizan los resultados, relacionándolos con los obtenidos en otros estudios, con las correspondientes citas bibliográficas, así como las conclusiones a las que han llegado con su trabajo. La **Discusión** y las **Conclusiones** se deben derivar directamente de los resultados, evitando hacer afirmaciones que no estén refrendados por los resultados obtenidos en el estudio.

Agradecimientos. Cuando se considere necesario se expresa el agradecimiento de los autores a las diversas personas o instituciones que hayan contribuido al desarrollo del trabajo. Tendrán que aparecer en el mismo aquellas personas que no reúnen todos los requisitos de autoría, pero que han facilitado la realización del manuscrito, como por ejemplo las personas que hayan colaborado en la recogida de datos.

Declaración de uso de Inteligencia Artificial (IA) generativa en la redacción científica. La IA y las tecnologías asistidas por IA no deben figurar como autor o coautor, ni citarse como autor. La autoría implica responsabilidades y tareas que solo pueden ser atribuidas y realizadas por humanos. Si se ha utilizado la misma, los autores deben incluir un apartado antes de la bibliografía, informando sobre el uso de la IA: "Durante la preparación de este trabajo, los autores utilizaron [NOMBRE HERRAMIENTA / SERVICIO] para [MOTIVO]. Después de utilizar esta herramienta/servicio, los autores revisaron y editaron el contenido según sea necesario y asumen total responsabilidad por el contenido de la publicación". Esta declaración no se aplica al uso de herramientas básicas para verificar la gramática, la ortografía, las referencias bibliográficas, etc. Si no hay nada que declarar, no es necesario agregar este apartado.

Bibliografía. Se elaborará de acuerdo a lo que indica el ICJME con las normas de la National Library of Medicine (NLM), disponible en: **https://www.nlm.nih.gov/bsd/uniform_requirements.html.**

Las referencias bibliográficas deberán ir numeradas correlativamente según el orden de aparición en el texto por primera vez, en números arábigos en superíndice, con el mismo tipo y tamaño de letra que la fuente utilizada para el texto. Cuando coincidan con un signo de puntuación, la cita precederá a dicho signo. Los nombres de las revistas deberán abreviarse de acuerdo con el estilo usado en el Index Medicus; consultando la "List of Journals indexed" que se incluye todos los años en el número de enero del Index Medicus. Así mismo, se puede consultar el catálogo colectivo de publicaciones periódicas de las bibliotecas de ciencias de la salud españolas, denominado c17 (http://www.c17.net/). En caso de que una revista no esté incluida en el Index Medicus ni en el c17, se tendrá que escribir el nombre completo.

La Bibliografía de los artículos debe estar actualizada a los últimos 7 años y se recomienda citar un número apropiado de referencias

A continuación se dan algunos ejemplos de referencias bibliográficas.

Artículo de revista

Se indicará:

Zurera-Delgado I, Caballero-Villarraso MT, Ruíz-García M. Análisis de los factores que determinan la adherencia terapéutica del paciente hipertenso. Enferm Nefrol. 2014;17(4):251-60.

En caso de más de 6 autores, mencionar los seis primeros autores, seguidos de la expresión «et al»:

Firanek CA, Garza S, Gellens ME, Lattrel K, Mancini A, Robar A *et al*. Contrasting Perceptions of Home Dialysis Therapies Among In-Center and Home Dialysis Staff. Nephrol Nurs J. 2016;43(3):195-205.

En caso de ser un Suplemento:

Grupo Español Multidisciplinar del Acceso Vascular (GEMAV). Guía Clínica Española del Acceso Vascular para Hemodiálisis. Enferm Nefrol. 2018;21(Supl 1):S6-198.

Artículo de revista de Internet:

Pérez-Pérez MJ. Cuidadores informales en un área de salud rural: perfil, calidad de vida y necesidades. Biblioteca Lascasas [Internet]. 2012 [consultado 10 Mar 2015];8:[aprox. 59 p.]. Disponible en: http://www.index-f.com/lascasas/documentos/lc0015.php

Artículo publicado en formato electrónico antes que en versión impresa:

Blanco-Mavillard I. ¿Están incluidos los cuidados paliativos en la atención al enfermo renal? Enferm Clin. 2017; Disponible en: http://dx.doi.org/10.1016/j.enfcli.2017.04.005. Epub 6 Jun 2017.

Capítulo de un libro:

Pulido-Pulido JF, Crehuet-Rodríguez I, Méndez Briso-Montiano P. Punciones de accesos vasculares permanentes. En: Crespo-Montero R, Casas-Cuesta R, editores. Procedimientos y protocolos con competencias específicas para Enfermería Nefrológica. Madrid: Sociedad Española de Enfermería Nefrológica (SEDEN); 2013. p. 149-54.

Página Web

Sociedad Española de Enfermería Nefrológica. Madrid. [consultado 5 Feb 2007]. Disponible en: https://www.seden.org.

Se recomienda a los autores, que dependiendo del diseño del estudio que van a publicar, comprueben los siguientes checklists, consultables en la página web http://www.equator-network.org/reporting-guidelines/:

- Guía CONSORT para los ensayos clínicos.
- Guía TREND para los estudios experimentales no aleatorizados.
- Guía STROBE para los estudios observacionales.
- Guía PRISMA para las revisiones sistemáticas.
- Guía COREQ para los estudios de metodología cualitativa.

Tablas y Figuras. Todas se citarán en el texto (en negrita, sin abreviaturas ni guiones), y se numerarán con números arábigos, sin superíndices de manera consecutiva, según orden de citación en el texto. Se presentarán al final del manuscrito, cada una en una página diferente, con el título en la parte superior de las mismas.

Se procurará que las tablas sean claras y sencillas, y todas las siglas y abreviaturas deberán acompañarse de una nota explicativa al pie de la tabla. Las imágenes (fotografías o diapositivas) serán de buena calidad. Es recomendable utilizar el formato jpg.

ACEPTACIÓN DE RESPONSABILIDADES ÉTICAS

Enfermería Nefrológica se adhiere a las guías éticas establecidas abajo para su publicación e investigación.

Autoría: Los autores que envían un manuscrito lo hacen entendiendo que el manuscrito ha sido leído y aprobado por todos los autores y que todos los autores están de acuerdo con el envío del manuscrito a la revista. TODOS los autores listados deben haber contribuido a la concepción y diseño y/o análisis e interpretación de los datos y/o la escritura del manuscrito y la información de los autores deben incluir la contribución de cada uno en la página inicial del envío.

Enfermería Nefrológica se adhiere a la definición y autoría establecida por The International Committe of Medical Journal Edtiors (ICMJE). De acuerdo con los criterios establecidos por el ICMJE la autoría se debe basar en 1) contribuciones substanciales a la concepción y diseño, adquisición, análisis e interpretación de los datos, 2) escritura del artículo o revisión crítica del mismo por su contenido intelectual importante y 3) aprobación final de la versión publicada. Todas las condiciones han de ser cumplidas.

Aprobación ética: Cuando un envío requiere de la colección de datos de investigación en los que se involucra sujetos humanos, se debe acompañar de un estamento explícito en la sección de material y método, identificando cómo se obtuvo el consentimiento informado y la declaración, siempre que sea necesaria, de que el estudio ha sido aprobado por un comité de ética de la investigación apropiado. Los editores se reservan el derecho de rechazar el artículo cuando hay dudas de si se han usado los procesos adecuados.

Conflicto de intereses: Los autores deben revelar cualquier posible conflicto de intereses cuando envían un manuscrito. Estos pueden incluir conflictos de intereses financieros, es decir, propiedad de patentes, propiedad de acciones, empleo en compañías de diálisis/farmacéuticas, consultorías o pagos por conferencias de compañías farmacéuticas relacionadas con el tópico de investigación o área de estudio. Los autores deben tener en cuenta que los revisores deben asesorar al editor de cualquier conflicto de interese que pueda influir en el dictamen de los autores.

Todos los conflictos de intereses (o información especificando la ausencia de conflicto de intereses) se deben incluir en la página inicial bajo el título "Conflicto de intereses". Esta información será incluida en el artículo publicado. Si los autores no tienen ningún conflicto de intereses se deberá incluir la siguiente frase: "No se declaran conflictos de interés por el/los autor/es".

Fuentes de financiación: Los autores deben especificar la fuente de financiación para su investigación cuando envían un manuscrito. Los proveedores de la ayuda han de ser nombrados y su ubicación (ciudad, estado/provincia, país) ha de ser incluida.

DETECCIÓN DE PLAGIOS

La revista Enfermería Nefrológica lucha en contra del plagio y no acepta bajo ningún concepto la publicación materiales plagiados.

El plagio incluye, pero no se limita a:

La copia directa de texto, ideas, imágenes o datos de otras fuentes sin la correspondiente, clara y debida atribución.

El reciclado de texto de un artículo propio sin la correspondiente atribución y visto bueno del editor/a (leer más sobre reciclado de texto en la "Política de publicación redundante o duplicada y reciclado de texto".

Usar una idea de otra fuente usando un lenguaje modificado sin la correspondiente, clara y debida atribución.

Para la detección de plagios la revista utilizará el servicio **iThenticate-Similarity Check** de Crossref para la comprobación de similitud. Todos los originales remitidos a Enfermería Nefrológica son, previo a su envío a revisión por pares, evaluados por el sistema antiplagio.

Enfermería Nefrológica sigue el árbol de decisiones recomendado por la COPE en caso de sospecha de plagio de un manuscrito recibido o de un artículo ya publicado (**http://publicationethics.org/files/Spanish%20%281%29.pdf**). Enfermería Nefrológica se reserva el derecho de contactar con la institución de los/as autores/as en caso de confirmarse un caso de plagio, tanto antes como después de la publicación.

Tabla 1. Tabla resumen estructura y extensión de cada sección de la revista.

Tipo de manuscrito	Resumen (Inglés e idioma original del artículo)	Texto principal	Tablas y figuras	Autores	Referencias
Editorial.	No	Extensión máxima: 750 palabras, incluida bibliografía.	Ninguna.	Máximo recomendado 2.	Máximo 4.
Originales Metodología Cuantitativa.	250 palabras. Estructura: introducción, objetivos, material y método, resultados y conclusiones.	Extensión máxima: 3500 palabras. Estructura: introducción, objetivos, material y método, resultados, discusión y conclusiones.	Máximo 6.	Máximo recomendado 6.	Máximo 35.
Originales Metodología Cualitativa.	250 palabras. Estructura: introducción, objetivos, material y método, resultados y conclusiones.	Extensión máxima: 5000 palabras. Estructura: introducción, objetivos, material y método, resultados, discusión y conclusiones.	Máximo 6.	Máximo recomendado 6.	Máximo 35.
Originales Breves.	250 palabras. Estructura: introducción, objetivos, material y método, resultados y conclusiones.	Extensión máxima: 2500 palabras. Estructura: introducción, objetivos, material y método, resultados, discusión y conclusiones.	Máximo 3.	Máximo recomendado 6.	Máximo 15.
Revisiones.	250 palabras. Estructura: introducción, objetivos, metodología, resultados y conclusiones.	Extensión máxima: 3800 palabras. Estructura: introducción, objetivos, material y método, resultados, discusión y conclusiones.	Máximo 6.	Máximo recomendado 6.	Máximo 80.
Casos Clínicos.	250 palabras. Estructura: descripción caso, descripción del plan de cuidados, evaluación del plan, conclusiones.	Extensión máxima: 2500 palabras. Estructura: introducción; presentación del caso; valoración enfermera (completa); descripción del plan de cuidados (conteniendo los posibles diagnósticos enfermeros y los problemas de colaboración, objetivos e intervenciones enfermeras); evaluación del plan de cuidados y conclusiones.	Máximo 3.	Máximo recomendado 3.	Máximo 15.

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Pa-ERC: Prurito Asociado a la Enfermedad Renal Crónica.