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Martínez-Cadenas R. https://doi.org/10.37551/S2254-28842025010

Managing of acid waste in haemodialysis: an opportunity to reduce environmental impact

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The treatment of chronic kidney disease through haemodialysis is an undeniable therapeutic advance that has improved the survival of millions of patients worldwide[1]. However, like any healthcare activity, its environmental cost is a reality the sector can no longer ignore. The production, distribution, and disposal of materials used in each haemodialysis session generate a considerable carbon footprint, in addition to other negative environmental effects, such as water eutrophication and non-renewable energy consumption[2].

One of the less explored factors, yet with a significant environmental impact, is the type of container used to transport dialysis acid. Recent results from a multicentre study conducted in 15 haemodialysis centres of *Fundación Renal Española* have provided clear data on the environmental footprint of different container formats: 3.9 L plastic jerrycans, 4.2 L bags, and 300 and 600 L tanks[3]. The data show that jerrycans have the highest carbon footprint, followed by bags, while tanks offer the best performance in terms of environmental sustainability.

The life cycle analysis (LCA) performed in this study revealed that the primary contributing factor to the carbon footprint is the production and disposal of the containers. Jerrycans, for example, require five times more plastic than bags and, at the end of their useful life, generate more waste that needs to be treated, thus increasing greenhouse gas emissions. Conversely, tanks, by allowing for more efficient resource use and generating less waste per treatment, represent a more sustainable alternative, according to the study's findings.

These results highlight a real opportunity to improve the sustainability of haemodialysis through strategic decisions in material procurement and use. Adopting centralised systems (tanks) would not only reduce the environmental footprint but could also simplify logistics and lessen the workload for healthcare staff. However, implementing these solutions entails an initial infrastructure investment that must be weighed against the long-term environmental and operational benefits.

Green nephrology isn't merely a trend, but a necessity to ensure that therapeutic advancements in treating chronic kidney failure are compatible with environmental preservation[4]. Scientific evidence indicates that choosing more sustainable containers is a decisive step in this direction. Now, the responsibility falls on institutions and professionals to translate these findings into concrete decisions that contribute to a more planet-friendly haemodialysis. Nevertheless, while environmental impact should be considered a key factor when selecting an option, it's crucial to maintain a realistic approach and seek the right balance, prioritising solutions that, in addition to being sustainable, are also economically viable.

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- The award will be presented at the opening ceremony of the 50th SEDEN Congress 2025.
- The winning work will be made available to the journal Enfermería Nefrológica for publication if the editorial committee deems it appropriate. Authors must acknowledge the origin of the work as the SEDEN Award.
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Influence of sex on vascular access outcomes for haemodialysis: a systematic review

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ABSTRACT

Introduction: Arteriovenous fistula remains the most effective access for haemodialysis, but women are less likely to receive it than men. The reasons are not entirely clear. Likewise, women have a higher risk of mortality associated with greater use of central venous catheters, leading to gender inequalities in outcomes.

Objectives: To understand and synthesise existing scientific evidence on the influence of sex on vascular access outcomes for haemodialysis.

Methodology: A systematic review was conducted following the PRISMA statement, with articles extracted from the PubMed and Scopus databases (2019–2024). The search terms used were: "female", "gender", "sex", "haemodialysis", and "vascular access".

Results: A total of 14 articles were included, 13 of which correspond to observational studies, whilst 1 is a bioinformatic study. The synthesis of the reviewed literature reveals physiological (immunological, genetic, venous diameter, pregnancy) and external factors (pre- and post-dialysis care).

Conclusions: The difficulties women face in achieving successful vascular access through an arteriovenous fistula are not only due to physiological factors but also to an interaction between internal and external factors, such as clinical practices. Immunological, hormonal, and genetic mechanisms that can hinder fistula maturation have been identified. Furthermore, inequalities in medical care, such as greater dependence on catheters and less effective pre-dialysis care, contribute to worse outcomes for women.

Keywords: vascular access; haemodialysis; sex; gender; arteriovenous fistula.

RESUMEN

Influencia del sexo en los resultados del acceso vascular para hemodiálisis. Una revisión sietemática

Introducción: La fístula arteriovenosa sigue siendo el acceso más eficaz para la hemodiálisis, pero las mujeres tienen menos probabilidades de recibirla que los hombres. Las razones no están completamente claras. Asimismo, las mujeres presentan un mayor riesgo de mortalidad asociada al mayor uso del catéter venoso central, determinando desigualdades de género en los resultados.

Objetivos: Conocer y sintetizar la evidencia científica existente sobre la influencia del sexo en los resultados del acceso vascular para hemodiálisis.

Metodología: se realizó una revisión sistemática siguiendo la declaración PRISMA, con artículos extraídos de las bases de datos PubMed y Scopus (2019–2024). Para llevar a cabo la búsqueda se utilizaron los términos: "female", "gender" "sex", "hemodialysis" y "vascular access".

Resultados: se han incluido 14 artículos, 13 de los mismos corresponden a estudios observacionales, mientras que 1 es un estudio bioinformático. De la síntesis de la literatura revisada aparecen factores fisiológicos (inmunológicos, genéticos, diámetro venoso, embarazo) y factores externos (atención prediálisis y postdiálisis).

Conclusiones: las dificultades que encuentran las mujeres para lograr un acceso vascular exitoso mediante una fístula arteriovenosa no solo se deben a factores fisiológicos, sino a una interacción entre y factores externos, como las prácticas clínicas. Se han identificado mecanismos inmunológicos, hormonales y genéticos que pueden dificultar la maduración de la fístula. Además, las desigualdades en la atención médica, como la mayor dependencia de catéteres y la menor eficacia de la atención prediálisis, contribuyen a peores resultados para las mujeres.

Palabras clave: acceso vascular; hemodiálisis; sexo; género; fístula arteriovenosa.

INTRODUCTION

Chronic Kidney Disease (CKD) represents one of the main emerging threats to global public health, due to its progressive nature, asymptomatic presentation in early stages, and high socio-health care burden. This pathology has been recognised as a "silent epidemic" due to its increasing prevalence and the low perception of risk by both patients and non-specialist health care professionals[1].

In recent decades, the incidence of CKD has steadily increased in numerous countries, including Spain. According to data from the Spanish Registry of Kidney Patients (ONT/SEN), the rate of patients with CKD undergoing renal replacement therapy (RRT) rose from 121.1 people per million population (pmp) in 2010 to 141.4 pmp in 2020, representing an 11.6% increase[2].

In the terminal phase of CKD, RRT becomes essential for patient survival, with haemodialysis (HD) being the most frequently used therapeutic modality, ahead of peritoneal dialysis and kidney transplantation[3]. In Spain, 39.4% of patients on RRT receive HD as their primary treatment[4]. This procedure requires effective and safe vascular access, usually via a native arteriovenous fistula (NAVF), prosthetic arteriovenous fistula (PAVF), or central venous catheter (CVC)[5,6].

The NAVF is considered the vascular access of choice due to its lower rate of infectious complications, greater durability, and better overall clinical outcomes[7]. Nevertheless, the use of CVC persists as a frequent option, especially in patients with comorbidities, lack of nephrological preparation, or in urgent clinical situations, despite being associated with lower survival, less dialytic efficacy, and a higher risk of bloodstream infections[8].

Various studies have shown that the presence of a functional NAVF is directly related to greater survival for HD patients. Vs CVCs, AVFs confer a 52% reduction in the risk of mortality during the first year of HD, as well as a significant decrease in bacteraemia rates, which are up to 20 times higher with CVCs vs NAVF[8,9]. Furthermore, the initial use of CVC has been identified as an independent risk factor for mortality in HD patients[10].

The maturation and functionality of the NAVF are determined by multiple factors, both clinical, anatomical, and technical. Among the most relevant are advanced age, obesity, female sex, diabetes mellitus, cardiovascular diseases, blood vessel diameter, and surgical expertise in fistula creation[7,11].

In this context, notable sex differences have been identified in the vascular access used. Women are less likely to receive an NAVF and have a higher prevalence of CVC as primary access. In Spain, 20.8% of women on HD use CVC vs 10.8% of men, which highlights a significant care gap[12].

Although this difference has traditionally been attributed to the supposedly lower quality of venous capital in women, ultrasound studies have not demonstrated significant anatomical differences between sexes. However, some research has described poorer maturation and patency rates in female AVFs, which could influence clinical decision-making and favour the preferential use of CVC in this population[13].

On the other hand, analyses adjusted for mortality also reflect a higher rate of adverse events associated with CVC use in women vs men, highlighting an inequity in vascular access management that could contribute to poorer health outcomes in the female population[14].

Within this framework, the main objective of the present work has been to identify and synthesise the existing scientific evidence on the influence of sex on vascular access outcomes for haemodialysis. Secondary objectives included:

- Identifying the physiological factors linked to AVF failure in women.
- Exploring structural inequalities in access to vascular surgery and analysing the clinical implications of prolonged CVC exposure in this population.

METHODOLOGY

Design

We conducted a systematic review based on scientific evidence from previous studies, following the guidelines established by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement[15].

Furthermore, following the PICO model, we established the following question: "Does sex influence the use of vascular access in patients undergoing HD?" According to this model, we established:

- **P (Population):** Women on HD.
- **I (Intervention):** Existing differences between sexes.
- **C (Comparison):** Men on HD.
- **O (Outcomes):** Comparison between vascular access outcomes.
- **S (Studies):** Observational.

Search Strategy

The bibliographic search was conducted across the Pubmed and Scopus databases to select the most up-to-date information available. Data collection took place from September through December 2024.

The search method consisted of using keywords according to MeSH terminology: "female", "gender", and "sex", terms linked by "OR"; together with the terms "haemodialysis", "vascular access"; linked by the Boolean term "AND".

Eligibility Criteria

Inclusion Criteria

- Articles in English and Spanish.
- Full-text articles.
- Articles published between 2019 and 2024.
- Original articles addressing sex differences in HD vascular access.

Exclusion Criteria

- Literature reviews.
- Studies not including women.

Article Quality Assessment

The quality of the selected articles was assessed according to the checklists defined by STROBE (Strengthening the Reporting of Observational Studies in Epidemiology)[16], intended for observational studies.

Data Extraction

The information collected includes authors, year and country of publication, study design, sample used, summary of key results obtained, and quality of evidence of the selected articles. A thematic-categorical approach was used due to the disparity of variables and methodologies evaluated in the selected studies.

Synthesis of Results

For the synthesis of information, a qualitative analysis was employed, which allowed for the clear and structured organisation and interpretation of data, thus responding to the objectives proposed in this study.

RESULTS

Search Results

The search strategy identified a total of 2103 publications. After removing duplicates and applying the inclusion criteria, 618 were evaluated by title and abstract, and 42 proceeded to full-text reading. Finally, 14 publications were included in the review. This process is represented in **figure 1**, following PRISMA recommendations[15].

Characteristics of Results

Of the 14 articles chosen for this review, 13 correspond to observational studies, while 1 is a bioinformatics study. **table 1** presents the selected articles along with their most relevant data.

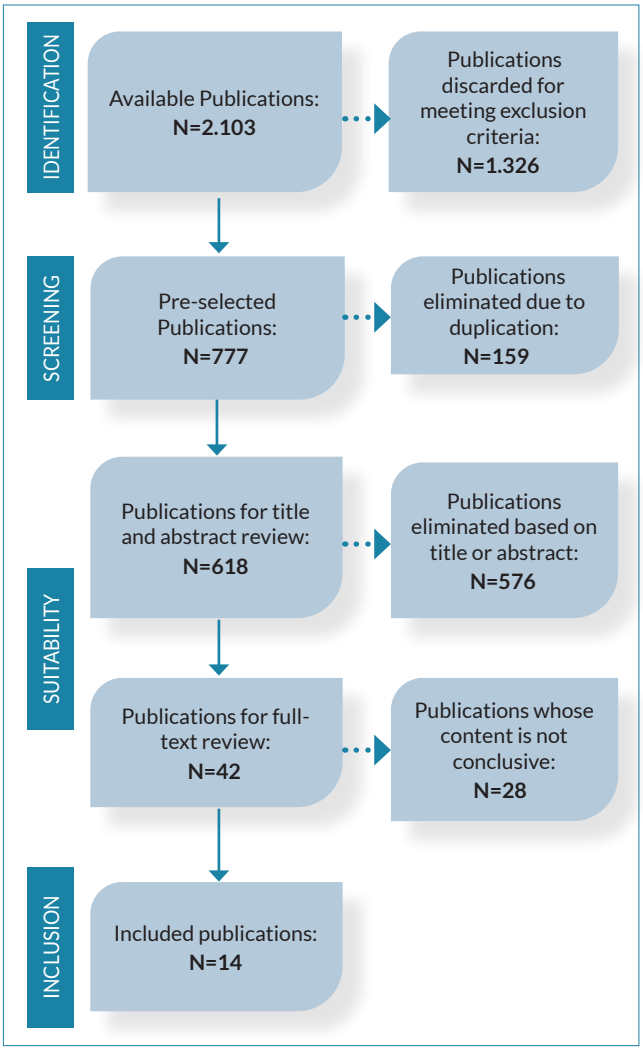

Figure 1. Flowchart of the search process.

DESCRIPTION OF RESULTS

Physiological Factors

Of the 14 articles analysed, 6 highlight the role of physiological factors as the main agents in NAVF failure among women.

Immunological Factors

On the one hand, one of the reviewed studies highlights a time difference in AVF maturation between sexes, being 82 days in men and 182 days in women. Additionally, a lower percentage of monocytes was observed in women, influencing vessel thickening and dilation during the initial fistula remodelling, with this scarcity being more pronounced in those whose fistulas failed. Among females, every 1% increase in monocytes is associated with a 1.7 increase in the odds of maturation. A possible intervention of macrophages in this process is also suspected; although no differences in total leucocytes, neutrophils, or lymphocytes

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

Authors and year	Study Type	Sample	Findings	Quality
Satam et al. Yale, EEUU, 2023 (17).	Retrospective observational cohort study.	56 patients - 28 women - 28 men	Women with brachiocephalic fistulas have a smaller brachial artery diameter both before and after surgery.	STROBE 18/22
Farrington et al. Alabama, EEUU, 2021 (18).	Retrospective observational cohort study.	132 patients - 66 women - 66 men	The association of elevated class II PRA antibodies with non-maturation of AVF suggests that the immune system may influence AVF maturation outcomes, especially among female patients.	STROBE 19/22
Mohazzab et al. Irán, 2022 (19).	Cross-sectional, longitudinal observational study.	466 patients - 322 women - 144 men	Female patients and hypertensive patients have a higher risk of catheter thrombosis, with diabetes being the most critical factor for infectious catheter-related dysfunction.	STROBE 17/22
Liu et al. China y Yale, EEUU, 2022 (20).	Bioinformatics study.	- 3 AVF databases.	In women with failed AVFs, key processes were identified, such as extracellular matrix organization, morphogenesis, cell proliferation, eGFR signaling regulation, and protein assembly.	Not applicable
Heindel et al. EEUU and Canadá, 2023 (21).	Retrospective longitudinal observational cohort study.	914 patients - 203 women - 711 men	Patients with radiocephalic AVFs often require intervention, on average, within the first year after creation, according to KDOQI guidelines.	STROBE 16/22
Jesudason et al. Australia, Reino Unido y Canadá, 2022 (22).	Retrospective observational cohort study.	23 women with advanced CKD during pregnancy	Catheter-related complications were minimal. With proper planning, it is possible to successfully create and use an AVF during pregnancy to minimize catheter use if preferred.	STROBE 18/22
Weigert et al. Portugal y Polonia, 2019 (23).	Retrospective observational cohort study.	1,247 patients	HD practices and treatment goals are similar for both women and men, including elderly patients.	STROBE 15/22
M. MacRae et al. Canadá, 2021 (24).	Retrospective observational cohort study.	2,375 patients - 929 women - 1,446 men	There are differences between women and men in the likelihood of receiving or successfully using an AVF. Regardless of sex, AVF use is associated with increased patient survival and fewer infections.	STROBE 18/22
Lee et al. Alabama, EEUU, 2020 (25).	Prospective observational cohort study.	9,458 patients - 4,531 women - 4,927 men	AVF may not be the best option for many older women starting HD with a CVC, and AVG should be considered as an alternative to avoid CVC dependence.	STROBE 17/22
Beaumier et al. Francia, 2022 (26).	Retrospective observational cohort study.	16,032 patients - 5,627 women - 10,405 men	The association between sex and CVC use seems to be mediated by indirect measures of the quality or timing of pre-dialysis care.	STROBE 16/22

Authors and year	Study Type	Sample	Findings	Quality
Arya et al. Atlanta, EEUU, 2020 (27).	Retrospective observational cohort study.	74,194 patients - 35,062 women - 39,132 men	Female patients spend more time with a CVC and are less likely to transition to permanent access. Minorities also spend more time with a CVC but are more likely to transition to permanent access.	STROBE 18/22
Arhuidese et al. San Diego, EEUU, 2020 (28).	Retrospective database-based observational study.	490,850 patients - 341,571 women - 456,693 men	Female gender is associated with a lower prevalence of preventive AVFs, higher use of catheters as a bridge to AVF, and lower patency *vs* men.	STROBE 18/22
Djukanović et al. Serbia, 2022 (29).	Longitudinal cohort study.	441 patients - 148 women - 293 men	Some significant gender differences were observed throughout the study, while others emerged during it, but none were due to gender disparities in the treatment applied.	STROBE 19/22
Piveteau et al. Francia, 2023 (30).	Retrospective observational cohort study.	8,856 patients - 3,188 women - 5,668 men	After adjusting for patient characteristics, women had more general practitioner visits and more frequent hospitalizations (longer than 24 hours) due to kidney conditions. In addition, hospital stays related to vascular access preparation and maintenance tended to be longer and more complex in women.	STROBE 16/22

HD; hemodialysis; **NAVF;** a native arteriovenous fistula; **PAVF;** a prosthetic arteriovenous fistula; **CVC;** a central venous catheter; **eGFR;** estimated glomerular filtration rate**; and KDOQI;** Kidney Disease Outcomes Quality Initiative.

were detected[17]. HLA antibodies, measured as PRA (Panel Reactive Antibody), can be activated after surgical vascular injury and promote immunological responses that favour hyperplasia, stenosis, or thrombosis, hindering NAVF maturation.

In cases of early NAVF failure, women present mean PRA class I and II levels 3 times higher than men. These levels are higher in patients with non-mature NAVF, highlighting a significant difference in PRA II. In particular, women with non-mature NAVF show values 6 times higher than men (18%±30% vs 3%±13%). According to Farrington C et al. (2021), PRA levels could have an indirect effect on AVF non-maturation through their pro-inflammatory action[18]. Conversely, Mohazzab A et al. (2022) suggest that both women, along with other groups such as hypertensive or obese patients, present a considerably higher risk of catheter thrombosis[19]. The difference in thrombosis rate could be affected by the duration of patient follow-up and the use of antithrombotic/thrombolytic protocols.

Genetic Factors

Another reviewed study suggests the possibility that differences between sexes lie in genetic factors. In their data analysis, 46 genes were found to show differences in their expression between failed and mature NAVF samples, regardless of sex. When performing a sex-based analysis, women with failed NAVF showed 428 genes expressed differently vs mature ones, while in men there were 174 genes. Biological processes related to gene expression and cellular macromolecule synthesis showed more activity in genes with higher expression in failed NAVF, regardless of sex[20].

In women with failed NAVF, processes related to the extracellular matrix, cell proliferation, and EGF signalling were activated, while key vascular functions were suppressed. In men, mechanisms of gene regulation, immune activation, and lipid translocation were activated, and responses to cellular stress, cytokines, and apoptosis were suppressed. Five key molecules that induce similar or opposite gene expression profiles between failed and mature AVFs were also identified, with sex-specific differences. In particular, anti-inflammatory compounds such as CGP-60474 and alvocidib reproduce patterns of expression associated with insufficiency in men, while in women they seem to counteract this insufficiency in failed AVFs. Finally, women present more unique microRNAs than men, suggesting a differential role of non-coding RNA in post-translational gene regulation in failed AVFs[20].

Venous Diameter

Regarding venous calibre, one study states that diameter does not necessarily influence NAVF maturation, although it can affect fistula velocity and flow after surgery, which impacts its maturation[17]. Similarly, neither arterial nor preoperative venous diameters show a significant relationship with non-maturation, although a 1 mm increase in venous diameter was related to a 39% reduction in the

probability of NAVF non-maturation. Average preoperative arterial diameters were similar in patients in their study whose AVF matured and those whose did not[18].

Heindel P et al. (2023) state that female patients, along with diabetics, and an intraoperative venous diameter <3.0 mm are associated with an increase in interventions, and an appropriate vessel diameter is one of the most important determinants of fistula success[21].

Pregnant Patients

The initiation of dialysis during pregnancy remains an unusual event. According to the reviewed study, 70% of evaluated women used a catheter at some point, and 70% of them had a CVC as initial vascular access. Few complications related to this were observed, with a single case of CVC infection, not requiring replacement during pregnancy. NAVF complications were mild and did not affect its use. Its presence facilitated catheter removal or avoided its use, with no differences according to access type. Most women who received an NAVF during pregnancy continued to use it postpartum[22]. Although concerns exist about aneurysms and other complications that might discourage NAVF creation during pregnancy, only one case of aneurysmal NAVF was reported, which was ligated without being used. Hormonal changes in pregnancy can induce vascular remodelling, favouring this risk. The decision must be personalised, considering the clinical context, local practices, and patient preferences. In women with advanced CKD, NAVF creation before conception or early in pregnancy can be successful, with low complication rates, and be used in later stages of pregnancy or after delivery[22].

External Factors

Of the 14 reviewed articles, 9 highlight the influence of external factors as the main causes of NAVF failure in women.

Pre-dialysis Care

Although NAVFs are considered the first-choice vascular access for HD patients, at the initiation of HD, catheter use is higher in women. According to MacRae J et al. (2021), fewer women undergo fistula creation attempts, despite receiving slightly more pre-dialysis care. This suggests that access to surgeons or willingness to perform fistula creation might vary by gender, reflecting a possible inequity in access to care. This decision by medical staff has also been recorded in other studies, attributing the cause to smaller vessel size in women[23].

After fistula creation, women often have prolonged catheter exposure and lower probabilities of successful use, possibly due to poorer maturation related to longer catheter duration and more insertion attempts. Patients with previous interventions have a higher risk of recurrence and require careful monitoring[21,24]. On the other hand, Lee T et al. (2020) report similar AVF outcomes between sexes, although women have a lower probability of creation, successful use, and unassisted maintenance, despite subsequent interventions being similar in both sexes[25]. Furthermore, Beaumier M et al. (2022) emphasised the importance of pre-dialysis care, and how its deficiency could partly explain CVC use in women. Their results demonstrate that females experience less effective prior care, presenting malnutrition and anaemia at dialysis initiation. Additionally, they suffer from late referral to nephrology and highlight the possibility that aesthetic considerations limit their options[26].

Although women receive the same number of fistula procedures as men, they are less prone to using it. While the maturation rate is similar, they have fewer creation attempts, more time with a catheter, and take longer for the fistula to mature. Men are almost three times more likely to use the fistula without a catheter, suggesting women's limited access to bailout therapies[21].

Preventive NAVF placement is less frequent in women, who also present greater use of catheters as bridging access. NAVF maturation and patency are lower in them, with no significant differences in infections justifying excisions. In a study conducted in the United States, women used CVCs for longer (245.8 vs. 200.8 days) and had longer transitions to HD, regardless of initial access. They also showed a lower probability of transitioning to NAVF and a higher probability of proximal AVF, with the latter increasing with age in both sexes. These factors, along with the delay between HD initiation with a catheter and permanent access placement, represent preventable exposure to risks, thus reducing catheter use and time is key to improving their outcomes[27,28].

According to the results of 2 of the studies, no inequalities were found between women and men regarding vascular access disparities, although there were differences in HD treatments. Similar percentages of men and women were referred late to a nephrologist, and these percentages are consistent with the proportion of patients dialysed by CVC in the first year[23,29].

NAVFs require interventions to maintain patency, while PAVFs need healing time before cannulation; if this is not achieved, CVC use is prolonged, increasing complications. The USRDS (2017) report indicates that less than 20% of patients use AVFs at dialysis initiation, with a 15% gender gap in favour of men after one year. Lee T et al. (2020) report higher AVF abandonment in women after successful use, suggesting lower effectiveness of interventions to maintain their patency. Furthermore, in women, PAVF outcomes were equal to or better than those of NAVF, with lower rates of failure and abandonment, indicating that grafts might be more beneficial in older women, reducing prolonged catheter use and its risks[25].

Post-dialysis Care

One study found few differences in post-dialysis care between sexes. Men have fewer long hospital stays and medical visits, possibly due to a higher prevalence of cardiovascular and respiratory diseases. In contrast, women present more

behavioural disorders, less autonomy, malnutrition, and inability to walk[30].

Arhuidese et al. (2020) suggest that the lower utilisation of AVF in women could explain the high rate of access-related hospitalisations, which negatively affect the patient, the system, and quality of life. More than 75% of preventive AVFs were used for HD, supporting their placement before treatment initiation. Additionally, a 36% increase in the use of catheters as a bridge to AVF was observed. On the other hand, Piveteau J et al. (2023) report longer and more complicated hospital stays for women to prepare or maintain vascular access, possibly due to smaller vascular calibre[28,30].

DISCUSSION

This review highlights the immunological factor as key in sex differences in AVF maturation. Women present fewer circulating monocytes, affecting initial vascular remodelling, while no differences were observed in leukocytes, neutrophils, or lymphocytes. Salmela B et al. (2013) link thrombophilia and female sex to a higher risk of vascular access failure due to thrombosis or stenosis[31]. Other factors such as hypertension, diabetes, age, and endothelial alterations also influence vascular response[32]. Studies identified T lymphocytes and macrophages as key regulators in maturation, with T lymphocytes modulating macrophages[33,34]. Given that women have greater innate and adaptive immune activation, this could explain the observed differences[35,36]. Furthermore, experimental studies in mice suggest that oestrogens increase immune cell recruitment, and their decrease after menopause could affect venous remodelling and NAVF patency[37-39].

HLA antibodies might be involved in AVF stenosis and thrombosis, as women exhibit higher levels of PRA I and II, suggesting a proinflammatory effect, although evidence is limited and primarily comes from transplant studies[40,41]. Furthermore, the TREM-1 receptor, present in immune cells, is associated with inflammation and could contribute to thrombosis [41].

In this review, more genes with differential expression were found in women than in men, highlighting processes such as extracellular matrix organisation and EGF signalling in failed AVFs. A 2020 study links greater venous fibrosis in women to increased TGF-ß1 and reduced BMP7, favouring smooth muscle cell and fibroblast proliferation, and reducing blood flow. Under hypoxic conditions, these cells in women show greater expression of TGF-ß1, TGF-ßR1, and Col1a, as well as greater migration, suggesting that an imbalance in TGF-ß1/BMP7 signalling could explain their greater tendency to venous stenosis and fibrosis[42]. One study identified that the genetic polymorphism (SNP) rs1492099 in the AGTR1 gene could increase the risk of NAVF dysfunction in men on HD, by affecting the function of the AGTR1 receptor, related to fibrosis and vascular changes. In women, oestrogen modulates the amount of AGTR1 receptors and the balance between AT1 and AT2, attenuating the SNP effect[43]. Additionally, microRNAs present sex-specific differential profiles, suggesting a specific regulatory mechanism in the female AVF, although no studies addressing this yet exist.

Although venous diameter does not directly influence AVF maturation, it can affect post-surgical velocity and flow, impacting the maturation process. However, anatomical differences are not associated with negative vascular outcomes or predict fistula functionality, and vessel size does not seem to depend on sex according to ultrasonographic criteria[44-46]. To optimise NAVF creation, staff and patient training is fundamental, along with the use of appropriate tools. Non-invasive preoperative evaluation helps select the ideal site, especially in women. Additionally, blood flow monitoring and postoperative surveillance improve success rates, and prior exercise can favour vascular dilation[47].

Information on pregnant women on dialysis is scarce, especially regarding vascular access, as initiating dialysis during pregnancy remains uncommon. CVCs have been shown to be safe, with few complications. Mehandru et al. (2018) described 3 cases of pregnant women with end-stage renal disease who used CVCs, rejecting fistula for aesthetic reasons and fear of procedures. There were no infections; two pregnancies went to term and one ended in spontaneous abortion[48]. Jacques L et al. (2018) reported that 1 in 4 patients with CVC in obstetric care experienced serious complications, mainly infectious, but concluded that CVCs are safe if handled carefully, with rates similar to the general population[49]. Although AVF creation is preferred, the Renal Association Guidelines offer no specific recommendations for vascular access management in pregnant women due to lack of evidence[50]. The risk of aneurysms, favoured by hormonal changes and vascular remodelling, can deter doctors from creating NAVFs in pregnant women. Although a 2012 review reported aneurysms during pregnancy, they have not been documented in pregnant AVFs. Aneurysms, present in 26% of cases, are related to puncture trauma, high flow, MMP-2, and hyperdynamic state. Rigorous follow-up is recommended, despite the lack of evidence on accelerated progression in pregnancy[51].

Women more frequently initiate dialysis with catheters and have less access to AVFs, reflecting possible inequalities in care and anatomical differences. Surgeon's willingness to create fistulas appears to be influenced by gender, reinforcing inequities in access[44], although aesthetic reasons can also favour CVC use in women[12]. Kausz AT et al. (2000) indicate that access choice depends more on the surgeon's discretion than clinical factors[52]. Furthermore, women with CKD face social and economic barriers that limit their access to treatments, especially in patriarchal societies[53].

The transition from catheter to NAVF is longer in women, with a lower probability of obtaining definitive vascular access. Only 30% of women start HD with AVF, although those who use it successfully show greater one-year

survival than men[12]. However, NAVF evolution in women is less favourable, with higher abandonment rates and more catheter-related interventions, affecting its functionality. Even so, NAVF remains a valid option in HD, although it requires multiple interventions for its maintenance[54].

In the pre-dialysis stage, inadequate care has been observed in women, with late diagnoses, poorer nutritional status, and possible aesthetic barriers. However, some studies report that men and women receive similar medical care before starting dialysis[55], and that women are more frequently referred to nephrologists[12]. Despite this, other research indicates that women have less knowledge of their disease, start HD later, and present higher mortality before treatment[56-58]. No significant differences in post-dialysis care by sex were found, although women have more vascular access-related hospitalisations. Studies conducted in the United States show a higher hospitalisation rate in women on HD, especially in young patients[59]. The lower utilisation of NAVF in women could explain this increase in complications and hospitalisations, with an estimated equality in hospitalisation rates having prevented over 30,000 admissions in five years[59]. Nevertheless, a Japanese study found no significant differences in this regard[60].

Study limitations

The main limitation of this review was the scarce number of studies with a gender/sex focus related to vascular access in HD patients. Furthermore, among the articles found, a large part did not meet the inclusion criteria, and others presented inconclusive results. Likewise, the search strategy did not cover all existing databases, which may have led to inadvertently excluding some relevant studies on the topic, by not being included in the selected databases.

Practical considerations

The findings of this review highlight the importance of considering patient sex as a potentially influential variable in vascular access outcomes for HD. In clinical practice, this could lead to a more individualised assessment of the most appropriate access type, considering possible sex-related differences.

Furthermore, health care professionals could benefit from specific training that demonstrates these differences, with the aim of optimising vascular access planning and monitoring, as well as promoting the use of NAVF in women. These considerations could help reduce fistula failure rates and complications, thereby decreasing problems associated with CVC for HD.

In view of these results, we can draw as main conclusions that the difficulties women face in achieving successful vascular access via NAVF are not explained solely by anatomical factors, but by a complex combination of physiological, social, and health care aspects. Immunological, hormonal, and genetic factors, such as lower monocyte levels and higher microRNA activity, affect AVF maturation. Hormonal changes in pregnancy can increase certain risks, although no increased risk of aneurysms or thrombosis has been associated, highlighting the need for more research.

Additionally, inequalities in medical care are determining factors: many women initiate dialysis with catheters, which increases complications and hospitalisations. This situation does not always respond to medical criteria, but to stereotypes, fears, or lack of information. Pre-dialysis care is also less effective in women, exacerbating disparities from early stages.

In conclusion, gender differences in HD access and treatment outcomes are not limited to physiological factors; they also reflect structural barriers and clinical biases that directly affect the quality of care. Promoting gender-sensitive care, improving access to appropriate information, and fostering research focused on these disparities is essential to achieve appropriate, effective, and personalised care.

Conflict of interest

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Factors associated with treatment adherence in people on haemodialysis

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ABSTRACT

Introduction: Treatment adherence in haemodialysis patients is a crucial aspect for improving clinical outcomes and quality of life.

Objectives: To identify the factors associated with treatment adherence in people on haemodialysis.

Methodology: A scoping review was conducted. The search protocol was developed in the SciElo, PubMed, Scopus, ScienceDirect, EBSCO, and Cinahl databases, using the Boolean operators "AND," "OR," "NOT," relating the DeCS-MeSH search terms: "Treatment Adherence and Compliance" AND "Kidney Diseases" AND "Renal Dialysis."

Results: The review identified 36 articles, most from 2014, with 6 developed in Spain, 5 in Brazil and Iran, 4 in the United States, 3 in Indonesia and China, 2 in Australia and India, 1 in Colombia, Korea, Canada, Mexico, United Kingdom, and Turkey. Written in English, Spanish, and Portuguese. Adherence is influenced by biopsychosocial, economic, demographic, clinical, and psychological factors. Studies highlight the importance of education, economic stability, family relationships, mental health, medical team support, and educational strategies.

Conclusions: The complexity of treatment adherence in haemodialysis patients and the need for a comprehensive approach addressing multiple aspects are revealed. The importance of personalised educational programmes, socioeconomic support, effective communication with healthcare professionals, and personalised strategies to improve adherence is emphasised. These findings have important implications for designing interventions that improve quality of life and clinical outcomes in this population.

Keywords: chronic kidney failure; haemodialysis; treatment adherence; risk factors; nursing care.

RESUMEN

Factores asociados a la adherencia al tratamiento en pacientes en hemodiálisis

Introducción: La adherencia al tratamiento en pacientes en hemodiálisis es un aspecto crucial para mejorar los resultados clínicos y la calidad de vida.

Objetivos: Identificar los factores asociados a la adherencia al tratamiento en personas en hemodiálisis.

Metodología: Se realizó una revisión de alcance, el protocolo de búsqueda se desarrolló en las bases de datos SciElo, Pubmed, Scopus, Science direct, EBSCO y Cinahl, con los operadores booleanos “AND”, “OR”, “NOT", relacionando los términos de búsqueda DeCS-MeSH, “Treatment Adherence and Compliance” AND “Kidney Diseases” AND “Renal Dialysis”.

Resultados: La revisión identificó 36 artículos, la mayoría del 2014, desarrollados 6 en España, 5 en Brasil e Irán, 4 en Estados Unidos, 3 en Indonesia y China, 2 Australia e India, 1 en Colombia, Corea, Canadá, México, Reino Unido, Turquía. Escritos en inglés, español, y portugués. La adherencia

es influenciada por factores biopsicosociales, económicos, demográficos, clínicos y psicológicos. Los estudios destacan la importancia de la educación, la estabilidad económica, la relación familiar, la salud mental, el apoyo del equipo médico y las estrategias educativas.

Conclusiones: Se revela la complejidad de la adherencia al tratamiento en pacientes en hemodiálisis y la necesidad de un enfoque integral que aborde múltiples aspectos. Se subraya la importancia de programas educativos personalizados, el apoyo socioeconómico, una comunicación efectiva con los profesionales de la salud y estrategias personalizadas para mejorar la adherencia. Estos hallazgos tienen implicaciones importantes para el diseño de intervenciones que mejoren la calidad de vida y los resultados clínicos en esta población.

Palabras clave: insuficiencia renal crónica; hemodiálisis; adherencia al tratamiento; factores de riesgo; cuidado de enfermería.

INTRODUCTION

Chronic Kidney Disease (CKD) represents a significant global health burden, affecting approximately 850 million people worldwide. It's predicted to be the fifth most common cause of premature death by 2040[1], with an accelerated growth of around 2.4 million annual deaths, representing over 10% of the global population[2]. For individuals with advanced chronic kidney disease (ACKD), the initiation of renal replacement therapy (RRT) becomes necessary[3], with haemodialysis (HD) being an essential component for managing the patient's health condition.

However, the mortality rate for ACKD patients on RRT remains at annual figures ranging between 8% and 9%. Patients on dialysis have the highest rate at 15.9%, compared to 2.6% for those who've received a transplant[4]. Among the difficulties faced by both renal patients and nursing staff in dialysis units is treatment adherence[5,6], which proves a persistent obstacle in caring for these patients. This is even more critical given that a lack of adherence can lead to risks associated with the disease's effects, the treatment's progression, and quality of life, resulting in personal, social, and economic losses[7]. Non-adherence is also linked to higher rates of hospitalisation and mortality[8,9].

Furthermore, other elements can influence adherence, such as the complexity of pharmacological treatment, adverse effects, polypharmacy, the patient-provider relationship, various barriers to obtaining medicines[10], and a lack of education and support from medical personnel[11]. A key aspect in the care of individuals with CKD undergoing dialytic treatment is to achieve adherence to treatment and medical indications[12], to promote treatment efficacy and safety.

Therefore, there's a clear need to identify the factors associated with treatment adherence in individuals on HD.

METHODOLOGY

This study proposed a Scoping Review[13], aiming to conduct a comprehensive analysis of the scientific literature between 2013-2023. This involved addressing a specific research area to identify and summarise the available evidence in a general manner[13]. The main objective was to explore the breadth of existing literature and determine the nature and scope of the research carried out in this particular field. This encompassed identifying the key sources of evidence, synthesising and mapping the main characteristics of the included studies, such as the research designs employed, target populations, evaluated interventions or exposures, and reported outcomes[14].

The review process followed the guidelines put forward by Arksey, O'Malley[14]. The research question that guided the review was: "What are the factors involved in treatment adherence in patients with Chronic Kidney Disease on haemodialysis identified in the literature?"

The search protocol was developed by the researchers using the SciElo, PubMed, Scopus, ScienceDirect, EBSCO, and Cinahl databases from August to October 2023. Searches were conducted in English, Spanish, and Portuguese, and were limited to the 2013-2023 period. Boolean operators "AND", "OR", "NOT" were utilised, which enabled the linking of the following DeCS-MeSH search terms **(table 1)**.

The review and verification process undertaken involved five steps:

Step 1: Database Search.
A comprehensive search was conducted in various databases (search engines such as Scielo, PubMed, Scopus, Sciencedirect, Ebsco, Cinahl) of indexed scientific journals to gather relevant information on the factors influencing treatment adherence in patients with CKD on HD. Pertinent search terms were used to access each database and retrieve studies related to the topic of interest. This search compiled a broad range of relevant information and scientific studies to comprehensively address the factors affecting treatment adherence in this patient population.

Step 2: Eligibility Criteria Review.
Inclusion and exclusion criteria were established to ensure the selection of relevant, high-quality studies

Inclusion criteria: Research articles in Spanish, English, and Portuguese, published between 2013 and 2023, appearing in indexed journals that included experimental, descriptive studies, clinical trials, pilot studies, qualitative studies, and with a score of 7 or higher according to the CASPE methodological quality assessment[15].

Table 1. Identification of Search Terms with DeCS and MeSH Descriptors.

Database	Search Query	Results
SciELO	"Treatment Adherence and Compliance" and "Kidney Diseases" AND "Renal Dialysis"	124
ScienceDirect	"Treatment Adherence and Compliance" and "Kidney Diseases" AND "Renal Dialysis"	70
PubMed	"Treatment Adherence and Compliance" and "Kidney Diseases" AND "Renal Dialysis"	330
CINAHL	"Treatment Adherence and Compliance" and "Kidney Diseases" AND "Renal Dialysis"	126

Exclusion criteria were applied to: thesis papers, dissertations, monographs, letters to the editor, and abstracts from scientific conferences.

Step 3: Data Analysis.
Each identified study was analysed individually, and relevant data were incorporated into a descriptive table that included information on the authors, year of publication, location, main results, and conclusions. Additionally, duplicate documents were excluded to ensure data integrity and avoid repetition in the review.

Step 4: Full-Text Verification.
A full-text reading was verified to confirm each selected study's contribution.

Relevant data were extracted, including study design, participant characteristics, identified factors, strategies employed, main results, and conclusions. These were then systematically summarised.

Step 5: Thematic Analysis.
A thematic analysis16 was conducted on the identified factors and strategies used to improve treatment adherence, as well as the identification of patterns, trends, and gaps in the existing literature. The findings were summarised clearly and concisely. Furthermore, the methodological evaluation of qualitative rigour was carried out using the Spanish Critical Reading Skills Programme (CASPE) form[15].

Through the bibliographic search, a total of 650 potentially eligible studies were identified. Based on the pre-defined selection criteria, 150 documents were excluded. A further 425 were excluded for not being freely available in full text, 6 were duplicate articles, and 33 were removed after reviewing titles and abstracts. A total of 36 articles were ultimately selected for full reading and analysis **(figure 1)**.

These articles were registered in a Microsoft Excel matrix, where information categories were defined following the analysis proposed by Arksey and O'Malley[14]. Information from the articles was collected, and analytical categories consistent with the research's area of interest were assigned and grouped by theme. The study's ethical considerations were ensured, respecting copyright principles in the utilisation and referencing of the analysed material.

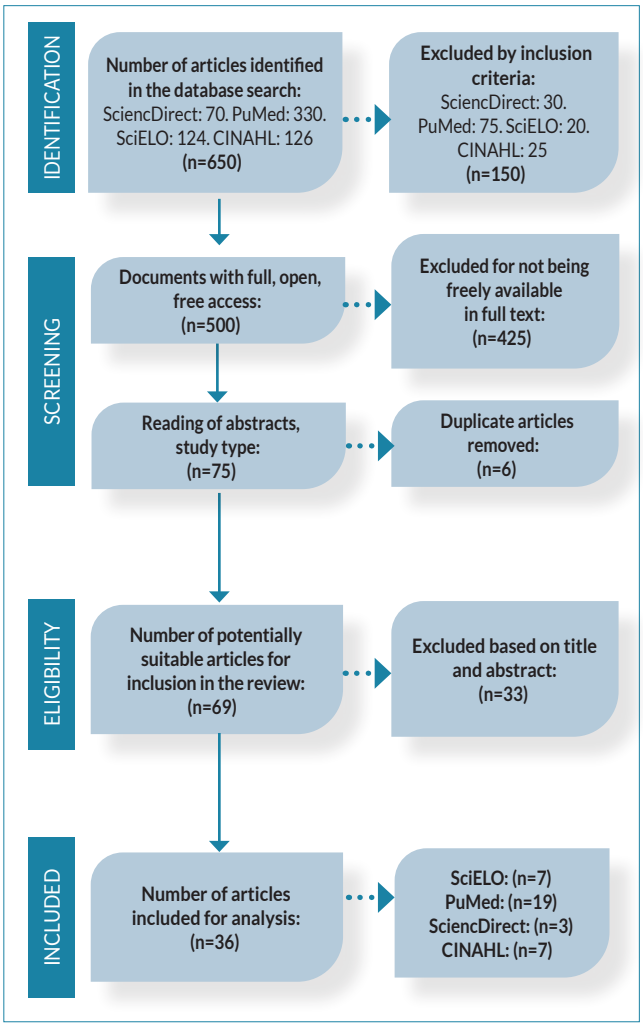

Figure 1. Flow diagram of search strategy and article selection.
Source: Own elaboration.

RESULTS

The review identified a total of 36 articles that met the inclusion criteria. The results showed that the studies were predominantly published in 2014, and were conducted in Spain ((n=6) 16.22%), Brazil and Iran ((n=5) 13.51%), the United States ((n=4) 10.81%), Indonesia and China ((n=3)

8.10%), Australia and India ((n=2) 5.4%), Colombia, Korea, Canada, Mexico, the United Kingdom, and Turkey ((n=1) 2.70%). Of these, the majority were written in English ((n=25) 69.4%), followed by Spanish ((n=7) 19.5%), and Portuguese ((n=4) 11.1%).

The reviewed studies on treatment adherence in patients with chronic kidney disease on renal replacement therapy encompass a variety of research types, such as observational studies, randomised controlled trials, and literature reviews, as shown in **table 2**.

An analysis of the variables associated with the factors involved in pharmacological treatment adherence in individuals on haemodialysis revealed three key themes: biopsychosocial, economic, and demographic factors; the relationship with healthcare professionals; and educational interventions/improvement programmes.

Biopsychosocial, Economic, and Demographic Factors
The literature review allowed us to identify that the factors influencing treatment adherence are related to educational level[17,18,28], socioeconomic status[18,28,46,52], age[21,45,48,51], gender[48], ethnicity or race[21,45], income level[28], medication[21,31,45,49], marital status[45], duration of dialysis[18,21,28,37,45,48], pharmacological regimen[31,45,51] and its side effects[31,49,51], motivation, self-efficacy[18], depression[45,46], dialytic treatment[28,45], hospitalisations and comorbidities45; as well as family functionality[45], hope[20], health conditions, and communication barriers[52].

Relationship with Healthcare Professionals
The relationship between patient, family, and healthcare professionals plays a fundamental role in treatment adherence and decision-making regarding treatment[24,41,44]. Similarly, it's crucial to strengthen the bond between patients and healthcare professionals to facilitate treatment adherence in HD patients[38,41].

Educational Interventions/Improvement Programmes
Studies exploring various interventions to improve treatment adherence in renal patients on HD were identified.

Each study provides unique perspectives and findings to enhance adherence in this specific population, covering aspects from technological tools and education to psychological approaches and the importance of the patient-healthcare professional relationship[19,20,22,23,25-27,29,30,33,35,39,47,48,52].

Table 2. Articles selected for review.

Author/(Year)/Country	Study Type	Sample	Objective	Results	Quality
Torabi et al.[17] (2023), Iran	Randomized, single-blind clinical trial.	70 HD patients.	To compare the effects of a microlearning-based mobile health (mHealth) application with in-person training on treatment adherence and perception in hemodialysis patients.	The mHealth application along with in-person training increased treatment adherence and perception in hemodialysis patients. However, significant improvements in adherence were observed among patients trained with mHealth, especially those based on the microlearning method.	CASPE 8/10
Mirzaei et al.[18] (2023), Iran	Cross-sectional study.	260 HD patients.	To use the Capability-Opportunity-Motivation and Behavior (COM-B) model to identify the most important determinants of medication adherence among patients with end-stage renal disease.	Medication adherence was higher in patients with higher education and employment, and was positively related to income, but inversely to treatment duration. Motivation, self-efficacy, and knowledge were the main determinants of adherence.	CASPE 9/10
Dsouza et al.[19] (2023), China.	Randomized controlled trial.	260 HD patients.	To evaluate the impact of an educational intervention on the level of knowledge and adherence to the treatment regimen among hemodialysis (HD) patients, as well as to describe the association between these variables.	The increase in knowledge about disease management, fluid, and diet adherence in the intervention group was significantly greater than in the control group. Although no significant correlation was found between knowledge and adherence, the latter improved in all aspects: dialysis attendance, shortening episodes, medication, fluid restriction, and diet.	CASPE 10/10

Author/(Year)/Country	Study Type	Sample	Objetive	Results	Quality
Sabouri et al.[20] (2023), Iran	Randomized controlled trial.	80 HD patients.	To determine the effect of positive thinking training on hope and treatment adherence in hemodialysis patients.	Following the intervention, hope and treatment adherence significantly increased in the intervention group. Additionally, significant reductions were observed in blood urea nitrogen levels, phosphate, and interdialytic weight gain in this group, compared to the control group.	CASPE 10/10
Pereira et al.[21] (2022), Brazil.	Cross-sectional study.	374 HD patients.	To evaluate non-adherence to the therapeutic regimen in hemodialysis patients and associated factors.	Patients under 60 years old were more likely to be non-adherent to water restriction, therapy, diet, and medication regimens. Anuric patients were more likely to be non-adherent to water restriction and therapy. Hypoalbuminemia and hypohemoglobinemia increased the likelihood of non-adherence to water restriction, while non-white race was associated with a higher likelihood of therapy non-adherence.	CASPE 8/10
Kim et al.[22] (2022), Korea	Literature review. Meta-analysis.	Not applicable.	To evaluate the effects of treatment adherence improvement programs and secondary outcomes for HD patients.	Treatment adherence improvement programs for HD patients showed a significant effect on various variables: Asian countries, study centers, sample size, study design, intervention types, number of sessions, quality scores, funding, and evidence-based approaches.	Not applicable
Wu et al.[23] (2022), China	Quasi-experimental study.	90 HD patients.	To investigate the effect of self-determination theory on awareness of relevant knowledge, treatment compliance, and self-care level in maintenance HD patients.	Following the intervention, awareness of dialysis principles, diet, fistula protection, and complication prevention increased, as did compliance with diet, fluid intake, dialysis regimen, and overall compliance score. Increases were also observed in total scores for problem-solving, collaboration, emotional processing, self-care activities, self-management, and quality of life. The self-determination theory approach proved effective in improving awareness of HD-related knowledge, treatment compliance, self-care, and quality of life in maintenance HD patients.	CASPE 7/10

Author/(Year)/Country	Study Type	Sample	Objetive	Results	Quality
Rivera et al.[24] (2022), United States	Qualitative study using semi-structured interviews.	32 HD patients.	To explore the experiences of CKD patients and their adherence to CKD treatment plans, and the role their healthcare providers played in supporting their adherence.	Four main themes emerged from the analysis of factors relevant to treatment planning and adherence: patient factors (multiple chronic conditions, motivation, perspectives), provider factors (care, availability/accessibility, communication), treatment planning factors (lack of plan, proactive research attitude, provider-centered treatment goals, and shared decision-making), and responses to the treatment plan (disagreement, perceived capacity deficit, lack of information, and positive feedback).	CASPE 8/10
Sheshadri et al.[25] (2021), United States.	Randomized controlled trial.	30 HD patients.	To examine whether cognitive function impairment is associated with adherence and performance in a walking intervention.	Participants with worse cognitive function assessment results missed more calls and completed fewer weekly goals. Smaller increases in steps were also observed during the intervention and the post-intervention period.	CASPE 8/10
Valsaraj et al.[26] (2021), India	Randomized controlled trial.	67 HD patients.	To examine the effect of cognitive-behavioral therapy (CBT) on adherence to dialysis, fluids, medications, and diet.	At six months, the experimental group showed significant reductions from baseline in interdialytic weight gain, systolic and diastolic blood pressure, while experiencing significant increases in hemoglobin and adherence to dialysis, fluids, and medications. These improvements were significantly greater compared to the control group.	CASPE 10/10
Arad et al.[27] (2021), Iran.	Randomized controlled trial.	66 HD patients.	To determine the effects of a nurse-led patient education program and telephone follow-up on treatment adherence in HD patients.	The results revealed significant differences in the mean scores for HD attendance, medication use, fluid restriction, and dietary recommendations between both groups immediately, at 1 and 3 months post-intervention. Significant differences in laboratory values between the groups were also observed post-intervention, except for serum sodium.	CASPE 7/10
Anisa et al.[28] (2021), Indonesia.	Observational analytical with cross-sectional design.	120 HD patients.	To determine the effect of HD compliance.	The use of HD in patients with chronic renal failure is positively related to high HD knowledge, but is not directly linked to family income. Instead, it is indirectly influenced by family income and treatment duration.	CASPE 7/10

Author/(Year)/Country	Study Type	Sample	Objetive	Results	Quality
Blumrosen et al.[29] (2020), United States.	Literature review.	130 HD patients.	To evaluate the state of the science to determine the importance of a therapeutic alliance for the development of effective interventions that positively impact HD treatment adherence among Black patients.	Only three intervention studies, with a total sample of 130 individuals (mean age: 58.1 years; 53% women), met the established criteria. None of these studies exclusively included Black patients or provided specific data for this group. Although solid evidence is scarce regarding strategies to improve hemodialysis adherence in Black patients with end-stage renal disease, some limited intervention studies have reported positive effects on HD attendance.	Not applicable.
Yangöz et al.[30] (2020), Turkey.	Literature review.	Not applicable.	To raise awareness about nursing care based on Watson's Theory of Human Caring to ensure treatment compliance in individuals undergoing HD therapy.	Watson's Theory of Human Caring advocates for the application of nursing care based on love, respect, compassion, and trust, considering the individual in their totality of mind-body-spirit. This approach ensures the satisfaction of not only physical needs, but also emotional and spiritual ones. We propose using this theory as a conceptual framework for nursing care, applying and evaluating it across different disease groups.	Not applicable
Arenas et al.[31] (2020), Spain.	Prospective study.	105 HD patients.	To understand the influence of phosphate binders on adherence and how to modify it.	The percentage of patients with controlled serum phosphorus levels significantly increased in the group using phosphate binders. The average daily pill count significantly decreased in that group, and all patients used only one phosphate binder, which resulted in improved adherence according to the questionnaire. The possibility of choosing the preferred mode of administration also improved acceptance.	CASPE 7/10
Tayebi et al.[32] (2019), Iran.	Systematic review.	Not applicable.	To detect the most important causes of non-adherence in dialysis patients according to previous studies..	The main reasons for non-adherence to treatment in dialysis patients include patient-related, socioeconomic, psychological, medical care, therapy, and disease factors.	Not applicable
Hjemås et al.[33] (2019), Norway.	Descriptive interventional single-arm study.	69 HD patients.	To investigate patients' knowledge, beliefs, and adherence to phosphate binders among these patients and to evaluate whether personalized education and counseling led by a pharmacist improve adherence and lead to changes in serum phosphate levels.	Knowledge and perception of the need for phosphate binder treatment increased, reducing concerns. Despite this, no increase in self-reported adherence was observed, although scores were already high before the intervention.	CASPE 9/10

Author/(Year)/Country	Study Type	Sample	Objetive	Results	Quality
Harish et al.[34] (2019), India.	Observational study.	60 HD patients.	To evaluate the level of adherence to dietary and fluid restrictions among patients undergoing HD.	The study found regular to good compliance with dietary and fluid restrictions, although this varies among hemodialysis patients. Individualized interventions and constant motivation are required to improve adherence and clinical outcomes.	CASPE 8/10
Wang et al.[35] (2018), China.	Literature review.	817 HD patients.	To explore the effects of nursing intervention on dialysis compliance.	Results revealed that nursing intervention significantly increased dialysis compliance compared to standard care. However, a preliminary analysis indicated that various intervention strategies, such as educational, cognitive, and behavioral approaches, had limited effects on dialysis compliance.	Not applicable.
Lins et al.[36] (2018), Brazil.	Descriptive, cross-sectional study with a quantitative approach.	78 HD patients.	To identify the adherence behavior of chronic kidney disease patients to the therapeutic regimen in its four dimensions: HD, medication use, diet, and fluid restriction.	The domain with the greatest lack of adherence was HD, at 32%, while medication had the highest compliance, at 93.6%. Treatment adherence is dynamic and requires constant monitoring. By offering closer, individualized care, adherence to therapy can be promoted by strengthening the professional-patient relationship.	CASPE 9/10
Qazi et al.[37] (2018), Canada.	Scoping review.	Not applicable.	To examine predictors that might influence the dialysis dropout rate.	The study's findings were inconsistent and inconclusive. The authors have defined dialysis withdrawal in terms of interruption, suspension, death, withdrawal, treatment refusal/cessation, or technique failure.	Not applicable.
Novaes et al.[38] (2017), Brazil.	Descriptive study with a qualitative approach.	41 HD service professionals.	To investigate the perception of healthcare professionals regarding the factors that interfere with HD treatment adherence.	Results were divided into four discourse classes: the professional-patient bond as initial support; patient knowledge about the disease and its treatment for adherence; depersonalization linked to knowledge deficit and fear of catheter implantation; and the alliance between patient, family, and professionals to promote self-care.	CASPE 9/10
Ojeda et al.[39] (2017), Spain.	Prospective longitudinal observational cohort study.	Sample of 42 HD patients	To evaluate the effect of nursing consultation for renal patients on HD on therapeutic compliance.	Nursing consultation improves therapeutic adherence to diet and medication, correlating with increased time dedicated to treatment and greater contact with the main caregiver.	CASPE 8/10
Neto et al.[40] (2017), Brazil.	Scoping review.	Not applicable.	To examine predictors that might influence the dialysis dropout rate.	When RRT is not considered beneficial for survival or quality of life, conservative treatment and palliative care can be considered as alternatives. In Brazil, renouncing RRT can be ethically and legally accepted as part of the right to a dignified death.	Not applicable.

Author/(Year)/Country	Study Type	Sample	Objetive	Results	Quality
Endang et al.[41] (2017), Indonesia.	Descriptive correlational design.	7 HD patients.	To understand the factors that influence patient compliance with fluid restriction..	Patient adherence to therapy does not depend on demographic factors, but on the quality of interaction with healthcare workers and other aspects. Further investigation is suggested into factors affecting adherence, such as psychological (beliefs, motivation), socioeconomic, and social support.	CASPE 8/10
Endah et al.[42] (2016), Indonesia.	Descriptive cross-sectional.	101 HD patients.	To understand the relationships between treatment compliance and quality of life, which can be measured using the Morisky Medication Adherence Scale and surveyors and the World Health Organization Quality of Life instrument.	The relationship between medication adherence and quality of life was significant in all aspects. Treatment adherence was found to be linked to the quality of life of hemodialysis patients.	CASPE 8/10
Villegas et al.[43] (2016), Colombia.	Literature review.	Not applicable.	To understand the health impact of therapeutic non-adherence to renal replacement therapies (RRT).	Studies indicate low commitment in these patients, which increases the risk of mortality and hospitalization in those undergoing hemodialysis and peritoneal dialysis. Complex intervention strategies are required that address various aspects affecting therapeutic adherence.	Not applicable.
Hussain et al.[44] (2015), United Kingdom.	Systematic review.	206 patients.	To explore how and why different factors mediate decisions about dialysis treatment.	Decision-making depends on personal resources. Healthcare professionals prioritize biomedical factors and seek to prolong life. Both patients and professionals feel powerless regarding dialysis withdrawal. Decision-making in end-stage chronic kidney disease is complex and evolves towards death. Factors are diverse and affect patients and professionals differently. More training and research are needed in open communication and shared decision-making.	Not applicable.
Ghimire et al.[45] (2015), Australia.	Literature review.	Not applicable.	To identify factors associated with non-adherence to pharmacological treatment in patients undergoing HD.	Common factors associated with non-adherence include young age, non-Caucasian ethnicity, disease affecting family life, being a smoker, and being single, divorced, or widowed. Disease-related factors are longevity on hemodialysis, recurrent hospitalization, depressive symptoms, and concomitant diseases such as diabetes and hypertension. Medication-related factors, such as daily pill count and total pill burden, number of phosphate binders, and regimen complexity, were also associated with poor adherence.	Not applicable.

Author/(Year)/Country	Study Type	Sample	Objetive	Results	Quality
Huertas et al.[46] (2014), Spain.	Observational cross-sectional study.	35 HD patients.	To evaluate adherence to pharmacological treatment in patients on chronic HD.	Non-adherent patients have higher depression scores than adherent patients. Anxiety, cognitive impairment, and social support do not have a significant relationship with compliance.	CASPE 8/10
Murali et al.[47] (2014), Australia.	Literature review.	Not applicable.	To summarize the existing literature on randomized controlled trials (RCTs) evaluating adherence interventions in CKD patients.	Most interventions focused on patient factors and included educational and cognitive interventions. Most patients showed improvements in some outcomes. Changes in phosphate and interdialytic weight gain were the most common outcomes, and both significantly improved in the meta-analysis.	Not applicable.
Clark et al.[48] (2014), Pennsylvania.	Secondary analysis using baseline data from an ongoing randomized clinical trial.	122 HD patients.	To identify characteristics of HD patients most likely to experience difficulties in complying with sodium restrictions associated with their dietary regimen.	Findings indicate that younger patients and women face more difficulties with the hemodialysis regimen. Individualizing counseling and interventions for these individuals could be considered.	Not applicable.
Rueda et al.[49] (2014), Spain.	Observational, descriptive, retrospective cohort study.	130 HD patients.	To analyze pharmacological adherence in HD patients.	The main cause of non-adherence is forgetfulness, followed by drug side effects.	CASPE 7/10
Cazorla et al.[50] (2013), Spain.	Cross-sectional study.	106 HD patients.	To determine the degree of therapeutic adherence to bone-mineral metabolism drugs and to identify the most relevant factors influencing adherence to this type of treatment.	The main reason for non-adherence to medication was increased water consumption, followed by pill size and dislike of lanthanum carbonate. Additionally, they acknowledge receiving dietary information. Treatment adherence is related to knowledge and understanding of medical-dietary treatment, being key factors for improving compliance.	CASPE 9/10
Arenas et al.[51] (2013), Spain	Epidemiological, multicenter, case series registry with prospective data collection	181 HD patients.	To evaluate therapeutic compliance in hyperphosphatemia patients on HD and its influence on phosphatemia during 6 months of follow-up.	Patients older than 60 years are more compliant than younger ones. Causes of non-compliance include pill size and quantity, increased water intake, and gastric intolerance. Phosphorus levels decrease at the end of the study.	CASPE 8/10
Martins et al.[52] (2013), Brazil.	Cross-sectional study.	502 HD patients.	To evaluate adherence to phosphate binders among hemodialysis patients and to explore potentially modifiable factors associated with low adherence to phosphate binders.	Results show that better care from dialysis staff and the nephrologist can reduce non-adherence to phosphate binders in hemodialysis patients.	CASPE 8/10

Fuente: Elaboración propia.

DISCUSSION

The findings from this scoping review have enabled us to identify the following points. There's an influence of educational factors[18,49,50,52] and socioeconomic factors[18] on medication adherence; having higher education and employment is crucial for adherence to treatment. Furthermore, age, ethnicity, income level, medication, marital status, and the duration of dialysis are all linked to treatment adherence[18,37,45,48,50].

The review's findings indicate that patients under 60 years of age, those who are anuric, have low albumin or haemoglobin levels, and who self-identify as non-white are more likely to be non-adherent to treatment[21]. Moreover, patient knowledge and treatment duration are key determinants of adherence[50], whilst family income has an indirect impact[28].

The use of phosphate binders significantly improves phosphorus levels and reduces the daily pill count, leading to greater adherence[31]. Likewise, flexibility in medication administration improves satisfaction and increases adherence to the pharmacological regimen[31]. However, patients who experience side effects from medication tend to discontinue its use[28].

Other results show that clinical aspects impacting adherence are related to depression[46], HD, frequent hospitalisations, and comorbidities such as diabetes and arterial hypertension[45]. Carrying out a psychological intervention can be beneficial to improve adherence and hope in patients[20]. Regarding treatment, non-adherence to medication is associated with the daily count of prescribed pills, the total burden of required drugs, and the complexity of the medication regimen[45].

Conversely, an association has been identified between family functionality[45] and treatment adherence, suggesting that the family environment plays a crucial role in adherence; that is, in functional families, patients adhere to treatment to a greater extent. Similarly, it's reported that motivated patients show greater treatment adherence[18]. This demonstrates a link between family functionality, self-esteem, and treatment adherence; therefore, a multifaceted approach that includes family support and attention to psychological factors is considered necessary to improve treatment adherence[18].

Other authors describe medical conditions[21,45] and communication[24,32,52] as reasons for non-adherence; patients with cerebrovascular disease or high parathyroid hormone levels experience greater difficulties in following treatment. Additionally, medical conditions and barriers to understanding the information provided play a crucial role in non-adherence to treatment[52].

The relationship between the patient and healthcare professionals plays a fundamental role in treatment administration and adherence, particularly in chronic conditions like CKD41. Decision-making in kidney disease is a complex and dynamic process that evolves over time. It involves patients, healthcare professionals, and families, and there are multifaceted factors at play that need to be studied in relation to open communication and shared decision-making[44]. Effective communication and a comprehensible treatment structure tailored to the patient's needs are necessary. Additionally, it's crucial to address the patient's perceptions and reactions to treatment to improve adherence[24].

It is important to strengthen the professional-patient bond, especially in the initial stages of treatment, as well as recognise the relevance of patient knowledge about their disease as a crucial factor for adherence[38]; depersonalisation and fear arise due to a lack of information about catheter implantation and can be a significant obstacle to adherence. Adherence is influenced by close collaboration among the patient, family, and healthcare staff; consequently, maintaining a positive relationship among them is necessary[41].

The use of a mobile health (mHealth) application[17], telephone follow-up[27], and text messages[29] are effective in improving treatment adherence in CKD patients on HD. The microlearning method with traditional in-person training shows a significant increase in treatment adherence, suggesting that this type of tool can offer long-term benefits in patient adherence due to the constant availability of information and reminders provided by these applications[17].

Some authors believe that training patients in the use of positive thinking can have a tangible impact on hope and treatment adherence[20]. However, others suggest that, while educational interventions improve adherence to dietary restrictions, this doesn't correlate with an increase in patient knowledge; this indicates that adherence can be influenced by factors other than education[19].

The findings highlight how self-determination theory, when appropriately applied, can enhance knowledge, adherence, and quality of life in HD patients[23]. Other authors support the idea of education as an effective tool that positively impacts treatment adherence[22,33,47,52]. A direct relationship was found between cognitive impairment and lower adherence to interventions, suggesting the need to consider cognitive health when developing or adapting interventions for these patients[25,26]. The use of cognitive-behavioural therapy improves adherence, with significant improvements in various clinical parameters after the intervention[26].

Personalised care and attention are essential, especially using Watson's Theory of Human Caring as a guide to improve adherence[30]. Similarly, nursing interventions aimed at improving dialysis adherence are crucial; although educational and behavioural strategies may have limited impact, it's important to strengthen nursing care in clinical routine and nursing consultations to improve it[35,39,48].

In conclusion, this literature review reveals that treatment adherence in haemodialysis patients is a multifaceted

phenomenon, involving educational, socioeconomic, psychosocial, clinical, and demographic aspects. A holistic approach that includes technology, family support, and the participation of healthcare professionals, along with patient education and psychological support, appears to be key to improving adherence in this group of patients.

This exploration has important implications for healthcare professionals, public policy makers, and healthcare service providers. By identifying the factors involved in pharmacological treatment adherence in individuals on haemodialysis, it enables the construction and development of care strategies with improved health outcomes and greater well-being for individuals.

Therefore, the need for a comprehensive approach is emphasised, involving patient education, socioeconomic support, a relationship of trust and collaboration with the medical team, and personalised strategies to improve treatment adherence. This is essential for achieving optimal therapeutic results and enhancing the overall quality of life for patients with chronic kidney disease on haemodialysis.

The main limitations of this review include the time lag related to new publications appearing daily in databases, restricted access to articles, and the geographical location of the research which made access difficult. These limitations were controlled by conducting the search over an extensive period, employing databases that could provide access to full articles from various contexts.

Conflict of interest

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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.

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Factors related to depression in patients with dialysis chronic kidney disease: a cross-sectional study

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ABSTRACT

Introduction: Depression is a frequent yet underrecognized problem among patients with chronic kidney disease undergoing dialysis. The factors related to depression in dialysis patients appear to be varied.

Objetives: To identify clinical and demographic factors related to depression in patients receiving dialysis.

Material and Method: A cross-sectional study was conducted with 50 patients from private hospital in Indonesia. Data collection includes demographic, health-related data, and depression. To identify the depression status, 20 items of Zung Self-Rating Depression Scale were utilized in this study. The data analysis includes univariate, bivariate and multivariate analysis. The dependent variable was analyzed using non-parametric analysis, and to determine the related factors of depression, regression analysis was used in this study.

Results: The average depression score was 31.1 (10.52), indicating no clinical depression in most participants. No demographic variables were associated with depression. Prescribed anti-hypertension and angiotensin-converting enzyme inhibitors were the predictors of depression in patients undergoing dialysis.

Conclusions: Patientes with chronic kidned disease and untreated hypertension experienced higher depression. The use of antihypertensive medications, particularly angiotensin-converting enzyme inhibitors, was associated with lower depression scores in this sample of patients undergoing dialysis.

Keywords: depression; kidney disease; dialysis

RESUMEN

Factores relacionados con la depresión en pacientes con enfermedad renal crónica en diálisis: un estudio transversal

Introducción: La depresión es un problema frecuente, aunque poco reconocido, entre los pacientes con enfermedad renal crónica sometidos a diálisis. Los factores asociados a la depresión en estos pacientes parecen ser diversos.

Objetivos: Identificar los factores clínicos y demográficos relacionados con la depresión en pacientes que reciben diálisis.

Material y Método: Se realizó un estudio transversal con 50 pacientes de un hospital privado de Indonesia. La recogida de datos incluía datos demográficos, datos relacionados con la salud y la depresión. Para identificar el estado de depresión, en este estudio se utilizaron 20 ítems de la escala de depresión autocalificada de Zung. El análisis de los datos incluyó análisis univariante, bivariante y multivariante. La variable dependiente se analizaron mediante un análisis no paramétrico y, para determinar los factores relacionados con la depresión, se utilizó un análisis de regresión.

Resultados: La puntuación media de la escala de depresión fue de 31,1 (10,52), lo que indica ausencia de depresión clínica en la mayoría de los participantes. Ninguna variable demográfica

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se asoció con la depresión. Los antihipertensivos prescritos y los inhibidores de la enzima convertidora de angiotensina fueron los factores predictivos de la depresión en pacientes con ERC sometidos a diálisis.

Conclusiones: Los pacientes con enfermedad renal crónica e hipertensión no tratada experimentaron mayor depresión. El uso de medicación antihipertensiva, en particular de inhibidores de la enzima conversora de la angiotensina, se asoció a menores puntuaciones de depresión en esta muestra de pacientes en tratamiento con diálisis.

Palabras clave: depresión; enfermedad renal; diálisis.

INTRODUCTION

In 2017, chronic kidney disease (CKD) affected approximately 850 million people worldwide, doubling from 422 million in 2014[1]. Due to this number, CKD is a significant global health issue and contributes to economic burden[2]. Moreover, it is projected that 2040 CKD will rank among the top five leading causes of mortality worldwide[1]. Regrettably, the incidence of CKD in Indonesia is documented insufficiently[3]. Nevertheless, a nationwide survey in 2018 conducted in Indonesia revealed that the prevalence of CKD was 0.5% among a total of 389,093 respondents in that study[3]. This number is like the prevalence in 2023, accounting for 0.5% of the total population in Indonesia[4]. Patients with CKD encounter a range of signs and symptoms, both physical and psychological[5]. Depression is one of the psychological symptoms that are underreported in patients with CKD[6]. Currently, there is a heightened prevalence of depression among people with CKD. The prevalence varied from 20% to 26% in previous decades[7], and the average prevalence has recently spiked to 27.6%[6].

Depression in this disease is related to various factors and bidirectional between the depression and the factors[8]. The related factors are demographics, symptoms of CKD, genetics, and disease-related factors[8–10]. The consequences of depression in patients with CKD were detrimental, including poor adherence to treatment, increased hospitalization, reduced quality of life, and even mortality due to cardiovascular events[6-8]. Recent studies about related factors of depression were done in many countries[9-10]. However, research on this issue was limited in Indonesia. Most of the studies in Indonesia focus on determining the extent of depression and examining the correlation between some variables and depression. Many surveys were also done in general hospitals with low-middle income social statuses. Given the importance of identifying the contributing causes of depression, particularly in the context of private hospitals in Indonesia, it is crucial to conduct this research.

MATERIAL AND METHOD

This was a cross-sectional analytical study, conducted from July to November 2022 in a private hospital in Jakarta, Indonesia. Most of the patients who come to this hospital have middle income family. The ethical permission was obtained from the Ethic Board Universitas Esa Unggul with number 0922-10.011 /DPKE-KEP/FINAL-EA/UEU/X/2022. The population was patients with CKD undergoing dialysis. The inclusion criteria were diagnosed with CKD and undergoing dialysis by the nephrologist, should be adults based on Indonesia law (>18 years old), able to communicate in Bahasa Indonesia, and have stable vital signs. The exclusion criteria were having unstable vital signs and being diagnosed with mental illness. The number of respondents participating in this study was 50 patients. This number is considered an adequate sample size for the regression analysis[11].

The data collected in this study included demographic data such as age, gender, marital status, educational background, and occupation. The collected health-related data were CKD duration, dialysis duration, dialysis frequency, type of dialysis, comorbidity, and medication. The Zung Self-Rating Depression Scale (ZDS) was used to determine depression level. This scale was developed in 1965 by Zung and consists of 20 items rated on a Likert scale ranging from 1 to 4 (ZUNG, 1965). This scale demonstrates strong validity and reliability in both its native language and in Bahasa Indonesia. Of the twenty items, ten are negative statements[1,3,4,7-10,13,15,19] with a score of 1-4, whereas the other ten items are positive comments. The lowest score achieved by ZDS was 20, while the highest score reached 80. Depression symptoms can be identified if the score is 40[12].

Data was analyzed using the Statistical Package for Social Science (SPSS) version 23. Univariate analysis was performed, including frequency and percentage for categorical data, mean, standard deviation, and range for numerical data. The normality of the data was assessed using the Kolmogorov-Smirnov test, Shapiro-Wilk test, and histogram. Due to the abnormality of dependent variables, the bivariate analysis in this study was the Spearmen test, Mann-Whitney test, and Kruskal Wallis test. The statistical method of Ordinary Least Squares regression (OLS) was employed to identify the factors associated with depression. A number 50 sample size is assumed to be enough in regression test[13]. Moreover, to ensure the results of OLS, a bootstrapped regression analysis was performed in this study[14]. All alpha levels for inferential analysis were set at 0.05.

RESULTS

Demographic, Health Related Data and Bivariate Analysis

The demographic data and health-related data are shown in **table 1** and **table 2**. In this study, more than half the respondents were younger, with an average age of 54.31 (12.83) and male. Most of them are married, and over 50% have an occupation. From health-related data, all the respondents had dialysis using hemodialysis. Most respondents have

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Table 1. Demographic data of respondents (n=50).

Characteristics	n	%	M	SD	Range	p	r/U/H
Age			54.31	12.83	52.60	0.23	0.17
< 60 years old	33	66				0.47	-0.71
≥ 60 years old	17	34					
Gender						0.18	-1.33
Male	33	66					
Female	17	17					
Marital status						0.15	-1.40
Single	5	10					
Married	45	90					
Educational Background						0.99	0.04
Elementary school	7	14					
Junior high school	13	26					
Senior high school	20	40					
Higher education	10	20					
Occupation						0.25	2.70
Unemployed/housewife	20	40					
Non office worker	18	36					
Office worker	12	24					

Table 2. Health related data of respondents (n=50).

Characteristics	n	%	M	SD	Range	p	r/U/H
CKD duration (months)			29.22	17.04	83.00	0.59	0.07
Dialysis duration (months)			27.35	17.02	83.50	0.74	0.07
Dialysis frequency (per week)			2.34	0.51	2	0.07	-0.25
Dialysis						NA	NA
Hemodialysis	50	100					
Dialysis peritoneal	0	0					
Comorbidity							
Hypertension	42	84				0.90	-0.12
Diabetes Mellitus	23	46				0.69	-0.39
Anemia	9	18				0.80	-0.24
Medications							
Calcium supplement	44	88				0.27	-1.08
Multivitamin	36	72				0.72	-0.35
Folic acid	34	68				0.09	-1.69
Anti hypertension	34	68				0.00**	-2.63
Diuretic	19	38				0.08	-1.69
ARBs	17	34				0.73	-0.34
Betablockers	15	30				0.30	-1.02
ACEi	7	14				0.00**	-2.64
Antilipidemic	7	14				0.32	-0.97

CKD: (Chronic Kidney Disease), **ARB:** (Angiotensin II receptor blockers), **ACEi:** (Angiotensin-converting enzyme inhibitors).

comorbidities, such as hypertension, and were prescribed calcium supplements.

Based on the bivariate analysis, there was no correlation between any of the demographic variables and depression. However, from health-related data, only medicine associated with depression was found, precisely anti-hypertensive drugs and angiotensin-converting-enzyme inhibitors (ACEi). The borderline p-value was influenced by dialysis frequency and diuretic usage. **Figure 1** displays the average value of ZDS as 31.1 with a standard deviation of 10.52. Most of the participants indicated a low ZDS score.

Factors Related to Depression

In regression analysis, four independent variables were entered based on the p-value from bivariate analysis. **(table 3)**. The included variables have a *p*-value<0.1 in the bivariate analysis, including anti-hypertension, ACEi, diuretics, and dialysis frequency. All these variables explain 51.7% of the variance (R^2 was 26.7, F 3.2, *p<0.05*). In OLS analysis, only anti-hypertension is found to be an important factor of depression. Those prescribed anti-hypertension had lower depression scores than those who were not. It is shown that Bootstrap regression was done in this study to confirm the determinant factors of depression. The bootstrap sample included was 1000. The findings support the OLS regression analysis that those who had anti-hypertension tended to have lower depression scores. Moreover, in bootstrap analysis, prescribed ACEi also reduces the score of depression score **(table 4)**.

Based on **table 5**, it shows that not all hypertension respondents are prescribed for anti-hypertension (31%). Most of the respondents (83.3%) also did not receive ACEi.

DISCUSSION

The patients with CKD who underwent dialysis in this study were relatively young compared to a prior study[15]). The survey by Kovesdy (2022)[15] provided an updated analysis of global CKD and reported that CKD was higher in aged people, especially those with an age >70 years old[15]. Different findings in Indonesia's health ministry report revealed that younger people, with an average age of 44.3 (15.1) years old, were affected by this condition[3]. CKD in younger individuals is linked to obesity, hypertension, hyperlipidemia, and diabetes[16]. Moreover, in this study, most of the respondents had hypertension as comorbidities. The prevalence of hypertension as a comorbidity in Indonesia, as found in a national survey, was only 40.8%[3]. In comparison, the current finding indicates a greater prevalence. Hypertension, which is a significant risk factor for several conditions such as kidney disease[17], is increasing in Indonesia. A substantial proportion of 34.1% of the population was impacted, encompassing both younger individuals and a wide range of other age groups. Indonesia is concerned about this condition and aims to mitigate risk factors, such as hypertension, to lower the prevalence of chronic diseases like CKD[18].

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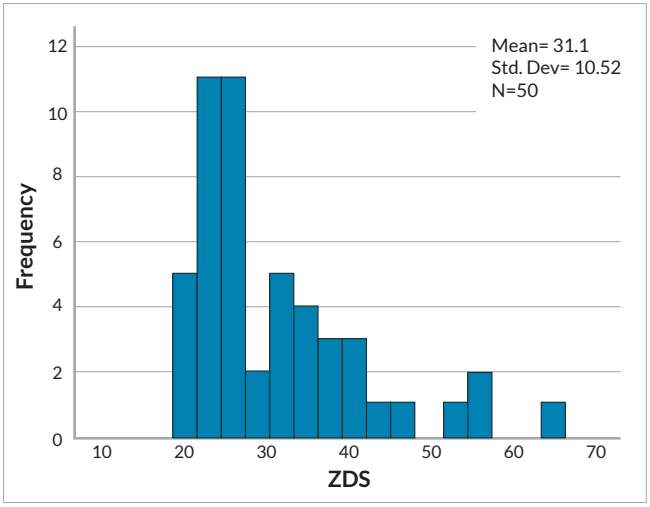

Figure 1. ZDS score of respondents (n=50).

In this study, none of demographic data associated with or became the important factor of depression in patients with CKD. This finding was different from previous studies that found a correlation between sociodemographic and marital status associated with depression[10]. However, age was identified as the important factor influencing depression in studies conducted by Mosleh et al.[9,19]. The findings of this study indicate that the average age of patients with CKD was lower. However, the increased age was an important factor in depression in previous studies[9,19].

This study identified a significant association between anti-hypertension usage and depression, indicating that it is an important factor of depression in patients with CKD. According to the findings, individuals who take anti-hypertension medication exhibited a lower level of depression compared to those who did not receive it. Further investigation has revealed not all patients with CKD with hypertension as the comorbidity receive anti-hypertension. Despite this high prevalence of hypertension among patients with CKD, not all patients with this condition receive appropriate treatment[3]. Patients with CKD need to maintain their blood pressure to prevent cardiovascular disease. It has been known that uncontrolled blood pressure is linked to cardiovascular mortality in patients with CKD[8]. Prescribed anti-hypertension might lead to stable blood pressure and stable CKD conditions and make the patients have lower depression scores. As depression in patients with CKD is multifactorial, those with depression can lead to uncontrolled blood pressure, and versa vera[8,20].

In this study, the use of ACEi medicine was related to depression and identified as an important factor of depression. However, regression analysis demonstrated no significant influence as a predictor of depression. Following the bootstrap regression analysis, the magnitude of ß was shown was comparable to that of anti-hypertension. This finding suggests that patients

Table 4. Bootstrapped regression coefficients associated with p values and 95 percent confidence limits (1000 bootstrapped).

Predictor variables	B	Bias	Std. Error	p-value	Bootstrap 95% Confidence Interval for B	
					Lower Bound	Upper Bound
(Constant)	50.57	-0.28	9.60	<0.00	31.13	69.40
Age	-0.09	0.00	0.10	0.32	-0.29	0.11
Dialysis frequency	-4.23	0.15	2.59	0.11	-9.27	0.73
Diuretic	3.84	-0.21	2.80	0.17	-1.87	8.88
Anti hypertension	-7.03	0.08	3.32	0.03*	-13.57	-0.71
ACEi	-6.78	-0.14	3.05	0.03*	-13.61	-1.54

ACEi: (Angiotensin-converting-enzyme inhibitors).

Table 5. Hypertension medication cross tabulation (n=50).

		Hypertension n	%	No hypertension n	%
Hypertension medication	Receive AH	29	69.0%	5	62.5%
	Not receive AH	13	31.0%	3	37.5%
		42	100%	8	100%
	Receive ACEi	7	16.7%	0	0%
	Not receive ACEi	35	83.3%	8	100%
		42	100%	35	100%

ACEi: (Angiotensin-converting-enzyme inhibitors).

Table 3. Ordinary least square regression coefficients associated with p values and 95 percent confidence limits associated with the selected predictor variables (n=50).

Predictor variables	Unstandardized Coeficients			*t/f*	p-value	95% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	50.57	9.89		5.11	<.001	30.63	70.51
Age	-0.09	0.11	-0.11	-0.83	0.40	-0.33	0.13
Dialysis frequency	-4.23	2.62	-0.20	-1.61	0.11	-9.52	1.05
Diuretic	3.84	2.79	0.17	1.37	0.17	-1.78	9.47
Anti hypertension	-7.03	3.05	-0.315	-2.29	0.02*	-13.19	-0.86
ACEi	-6.78	4.28	-0.22	-1.58	0.12	-15.40	1.84

ACEi: (Angiotensin-converting-enzyme inhibitors).

who were previously prescribed ACEi had a lower incidence of depression compared to those who were not prescribed ACE inhibitors. ACEi is beneficial in reducing albuminuria and slowing the progression of kidney disease[5]. Evidence shows that using ACEi therapy controls hypertension in CKD conditions, resulting in better cardiovascular outcomes[21]. However, despite this benefit, in this current study found that only 16.7% of patients with CKD and hypertension receive ACEi. This finding highlights a gap between theoretical and clinical practical in Indonesia, even in a private hospital. Further study is needed to examine the factors related to the low usage of ACEi in patients with CKD.

Study Limitation

This study has several limitations. First, the rela-tively small sample size may limit the statistical power to detect associations and the generalizability of the findings. Nonetheless, the number of predictors included in the regression model adhered to established methodological recommendation[13]. Additionally, a bootstrap resampling approach was employed to enhance the robustness of the estimates. Despite these measures, caution is warranted when extrapolating the results beyond populations with similar demographic and clinical characteristics.

CONCLUSION

This study found that patients with chronic kidney disease (CKD) undergoing dialysis exhibited notable levels of depressive symptoms. Among these patients, those with hypertension who were not receiving antihypertensive treatment, particularly ACEi, reported higher depression scores. These findings suggest a potential association between hypertension management and the psychological well-being of individuals with CKD. However, the cross-sectional nature of the study and the limited sample size constrain the interpretation of causal relationships. Further research, ideally through longitudinal or interventional designs, is needed to explore these associations more robustly.

Acknowledge

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Conflict of interest

We stated that there is no conflict of interest that was found in this study.

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- All works submitted to the 50th National SEDEN Congress related to the field of kidney transplantation are eligible.
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- Works must be unpublished and comply with all submission guidelines for the 50th National SEDEN Congress.
- The submission deadline will be the same as that established for other submissions to the 2025 SEDEN Congress.
- The jury will consist of the SEDEN Scientific Committee for Abstract Evaluation.
- The award will be presented during the inaugural session of the 50th National SEDEN Congress (2025).
- The winning work will be made available to the *Enfermería Nefrológica* journal for possible publication, at the discretion of the editorial committee. Authors must cite the work's origin as a SEDEN Award if using or publishing it later.
- To receive the award, the work must be presented at the 50th SEDEN Congress, and the presenter must be one of the listed authors. Presentations by individuals not involved in the authorship will not be accepted.
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Expert consensus on a nursing care report for haemodialysis patients in transition (The Nomad Patient Project)

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ABSTRACT

Introduction: Continuity of care is vital for patient safety during healthcare transitions, where nursing care reports facilitate coordination and reduce risks.

Objectives: To reach a consensus on additional fields that should be included in the nursing care report for haemodialysis patients transitioning between care centres.

Material and Method: We conducted an exploratory study divided into 2 rounds. In Round #1, an expert committee designed a questionnaire based on literature review and Gordon's functional health patterns system, to determine the additional fields. In Round #2, a modified Delphi technique was applied in 2 rounds to reach consensus on the additional fields. 56 experts participated in the first round and 14 in the second. Consensus was considered when at least 80% approved an additional field.

Results: Consensus was reached on 54 of the 57 additional fields presented in Round #1 to be included in the report, such as the originating centre, need for medical transport, number of weekly dialysis sessions, duration of each session, and specific vascular access data. Elements related to the patient's health according to Gordon's patterns were also agreed upon, highlighting aspects such as blood glucose control, presence of muscle cramps, and use of aids for night-time rest.

Conclusions: The study successfully developed a standardised nursing care report for haemodialysis patients in transition, aiming to improve safety and continuity of care.

Keywords: haemodialysis; continuity of patient care; patient care planning; delphi technique; patient transfer; nursing records.

RESUMEN

Consenso de expertos para un informe de cuidados de enfermería en pacientes en hemodiálisis en transición (Proyecto Paciente Nómada)

Introducción: La continuidad de cuidados es vital para la seguridad del paciente durante transiciones sanitarias, donde los informes de cuidados de enfermería facilitan la coordinación y reducen riesgos.

Objetivos: Alcanzar un consenso sobre los campos adicionales que deberían incluirse en el informe de cuidados de enfermería de pacientes en hemodiálisis en transición entre centros asistenciales.

Material y Método: Estudio exploratorio dividido en dos fases. En la primera, un comité de expertos diseñó un cuestionario basado en la revisión bibliográfica y el sistema de patrones funcionales de Gordon, para determinar los campos adicionales. En la segunda fase se aplicó una técnica Delphi modificada en dos rondas para consensuar los campos adicionales. Participaron 56 expertos en la primera ronda y 14 en la segunda. Se consideró consenso cuando al menos el 80% aprobaban un campo adicional.

Resultados: Se consensuaron 54 de los 57 campos adicionales presentados en la primera ronda para incluir en el informe, como el centro de origen, necesidad de transporte sanitario, número de sesiones dialíticas semanales, duración de cada sesión, y datos específicos del acceso vascular. También se consensuaron elementos relacionados con la salud del paciente según los patrones de Gordon, destacando aspectos como control de glucemia, presencia de calambres musculares y uso de ayudas para el descanso nocturno.

Conclusiones: El estudio logró desarrollar un informe de cuidados de enfermería estandarizado para pacientes en hemodiálisis en transición, con el fin de mejorar la seguridad y continuidad de cuidados.

Palabra clave: hemodiálisis; continuidad de la atención al paciente; planificación de atención al paciente; técnica Delphi; transferencia de pacientes; registros de enfermería.

INTRODUCTION

Chronic diseases are a determining factor in the utilisation of health care services and pose a significant challenge for health systems globally[1–3]. Chronic kidney disease presents a major public health challenge, with end-stage patients requiring haemodialysis treatment to sustain life.4 This renal replacement therapy profoundly impacts patients' quality of life, necessitating careful nursing management to ensure the best possible outcomes. The transition between health care facilities, such as during travel or relocation, presents a critical challenge in maintaining uninterrupted continuity of care for this vulnerable population[4].

Continuity of care for patients undergoing haemodialysis treatment is an essential component in ensuring their safety, preserving their quality of life, reducing associated risks, and optimising clinical outcomes[5–7]. Transitional care is defined as "a set of actions designed to ensure the coordination and continuity of health care as patients transfer between different locations or different levels of care within the same location"[8]. The definition of continuity of care proposed by Haggerty et al.[9] focuses on the care of an individual patient over time and includes three fundamental components: relational continuity, referring to interpersonal interactions; informational continuity, related to communicative interactions; and management continuity, including coordination activities. This concept is recognised as an essential element for providing high-quality healthcare[10,11] and is linked to benefits such as more effective preventive care, reduced hospitalisation rates, and increased patient satisfaction[12,13].

In Spain, Law 41/2002, of 14 November, regulating patient autonomy and rights and obligations concerning clinical information and documentation, indicates that, among other contents of the patient's clinical record, it shall include the evolution and planning of nursing care, including a Nursing Care Report (NCR)[14]. Annex IX of Royal Decree 572/2023 includes the minimum mandatory data set for the NCR, in addition to a series of recommended (but not mandatory) fields[15]. Current nursing care reports often lack specific fields required to comprehensively document the unique needs of haemodialysis patients, which can compromise the quality and safety of care during transitions between care centres[16].

To address this gap, this study aims to achieve national consensus on additional elements that should be included in the nursing care report.

MATERIAL AND METHOD

Design

We conducted an exploratory study divided into 2 phases: the first involved finalising a questionnaire that included an initial proposal of fields to be agreed upon, while the second focused on reaching a consensus on the standardised NCR for the transitioning haemodialysis patient[17]. Both phases were carried out between March and December 2024.

Expert Selection

The finalisation phase involved a committee of experts comprising the 11 members of the board of directors of the Spanish Society of Nephrology Nursing (SEDEN) and nursing supervisors from 25 haemodialysis units with experience in caring for patients in transit between centres representative of the national geography. Supervisors with these characteristics were selected because, as those responsible for allocating places in the receiving centre for these patients, they possess first-hand knowledge of the clinical-care information needs that the NCR should include. Of these 36 experts invited to participate in this phase, 16 accepted: 3 members of the SEDEN board and 13 supervisors.

Item Development

Based on a previous literature review,[18–20] in addition to their clinical and management experience, the expert committee identified key aspects to include, following Marjory Gordon's functional health patterns system for assessment[21], which allowed for the development of specific questions and the design of the final questionnaire.

Data Collection: Delphi Technique

A modified online ranking Delphi technique was used in the consensus phase. Expert group selection was performed

via convenience sampling. Project coordinators directly contacted participants via email to request their collaboration. Inclusion criteria were more than 5 years of experience in nephrology nursing, professional activity in a haemodialysis unit, and active clinical practice during the study period. The exclusion criterion was not providing informed consent. All criteria were guaranteed to be represented in the group. Furthermore, the anonymity of participating experts was preserved to prevent potential influences among them.

Two rounds were conducted to reach consensus on the fields using the Delphi technique:

- An initial paper-based round during the SEDEN National Congress in November 2024.
- A second round in December 2024 via an online questionnaire created with Google Forms and sent via e-mail.

The questionnaire's structure included 3 main parts. The first part explained the study's objectives and requested informed consent from participants. Additionally, four specific data points were collected: email address, age, whether years of nursing experience were greater or fewer than five years, and whether the time since joining the haemodialysis area was greater or fewer than twelve months.

The second part of the form addressed the importance of including patient demographic data, as well as relevant information on vascular access and each of Marjory Gordon's established functional health patterns[21].

Finally, the third and last part of the questionnaire focused on assessing the essential sections included in the second part, evaluating their relevance and breadth.

Questions were dichotomous (yes or no). At the end of each part, an open field was available for providing additional information or fields not covered in the initial questionnaire. These fields, if deemed relevant by the coordinators, were included in the second round, along with the fields from the first round.

Data Analysis

A descriptive analysis was performed with absolute and relative frequencies for each field. Consensus was considered achieved when 80% of participants indicated that a field was relevant for inclusion in the NCR for the mobile patient in the second round.

Ethical Considerations

This study was conducted in full compliance with international ethical standards established in the Declaration of Helsinki. The invitation to participate in the expert panel was accompanied by a participant information sheet, which included details on the study's development using the Delphi methodology, the benefits of participating in the study, data confidentiality, and the voluntary nature of participation. Participants did not view the online questionnaire items until they agreed to participate, after reading the participant information sheet, giving their consent by clicking on a question to that effect.

The processing, communication, and transfer of personal data for all participants complied with the provisions of Organic Law 3/2018, of 5 December, on Personal Data Protection and Guarantee of Digital Rights[22].

RESULTS

A total of 56 experts participated in the first round, and 14 in the second one. The expert panel was characterised by most women, from public centres, aged over 46 years, with extensive clinical experience as nephrology nurses and more than 2 years of experience in a haemodialysis unit **(table 1)**.

Table 1. Demographic and professional characteristics of the expert panels in each round.

Característica	Round 1 (n=56)	Round 2 (n=14)
Woman	87.50%	92.80%
Works in a public centre	54%	71%
Over 46 years old	58.90%	78.60%
Experience as a nephrology nurse >6 years	96.40%	100%
Experience in haemodialysis >2 years	96.40%	92.90%

A total of 54 of the 57 additional fields presented in the first round were agreed upon for inclusion in the report. During the first round, 9 additional fields were suggested: 2 in demographic and clinical data, 2 concerning vascular access, and 7 in Gordon's functional health patterns (**tables 2, 3**, and **4**). The expert panel achieved a high degree of consensus in both rounds regarding the inclusion of the following fields related to demographic and clinical data **(table 2)**:

- Originating centre.
- Accommodation at destination.
- Need for medical transport.
- Number of days of stay.
- Emergency contact.
- Haemodialysis treatment: Hospital-based or home-based.
- Allergies.
- Requires own monitor.

In the first round, the items "Number of dialytic treatment sessions per week" and "Duration of each haemodialysis session" were suggested, both achieving 100% consensus in the second round **(table 2)**.

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Table 2. Acceptance percentage for including additional demographic and clinical data in the nursing care report for transitioning haemodialysis patients, by round.

Item	Round 1 (n=56)	Round 2 (n=14)
Originating centre	98.20%	100%
Accommodation at destination	91.10%	100%
Need for medical transport	100%	-
Number of days of stay	98.20%	100%
Emergency contact	98.20%	100%
Haemodialysis treatment: Hospital-based or home-based	92.90%	92.90%
Allergies	100%	100%
Requires own monitor	85.70%	85.70%
Number of dialytic treatment sessions per week*	—	100%
Duration of each haemodialysis session*	—	100%

* Items suggested in the first round, incorporated into the second round.

Table 3, illustrates the acceptance percentages for the inclusion of vascular access data in the NCR, disaggregated by each evaluation round.

For arteriovenous fistula, the fields with the highest consensus in both rounds were fistula type (native or prosthetic) and anatomical location, both with 100% acceptance in both rounds. Other fields with high acceptance included needle gauge for puncture (92.90% in both rounds) and usual blood pump flow (96.40% in the first round and 100% in the second). However, acceptance for the inclusion of data on fistula oedema did not reach the established 80% consensus threshold (78.60%). Regarding the central venous catheter, the fields with the highest consensus were location and functional status (normally functioning or dysfunctional), both with 100% acceptance in both rounds. Consensus for the inclusion of data on insertion date and blood pressure showed slight variation between rounds, with 88% and 82.15% in the first round, and 86% and 93% in the second round, respectively.

Table 4, illustrates the approval percentages for the inclusion of data according to Gordon's functional health patterns, disaggregated by each evaluation round.

General Health and Health Perception/Management Patterns
Within this pattern, haemodynamic status (blood pressure, heart rate, and temperature) obtained a high degree of acceptance in both rounds (92.9%). Similarly, immunisation vs Hepatitis B received broad agreement (96.4% in round 1 and 85.7% in round 2). Treatment adherence and the use of assistive devices also registered majority support, although they showed a slight decrease in the second round.

Table 3. Acceptance percentage for including vascular access data (Arteriovenous Fistula and Central Venous Catheter) in the nursing care report for transitioning haemodialysis patients, by round.

Arteriovenous Fistula Fields	Round 1 (n=56)	Round 2 (n=14)
Type (native or prosthetic)	100%	100%
Anatomical location	100%	100%
Date of creation	89.3%	85.7%
Needle gauge for puncture	92.9%	92.9%
Hemostasis time	96.4%	100%
Edema	80.4%	78.6%
Signs of ischemia in distal areas: – Coldness, pallor, etc.	87.5%	85.7%
Signs of venous hypertension: – Hyperpigmentation, digital ulcers, etc.	83.9%	85.7%
Evaluation of proximal stenosis: – Presence of hematomas, etc.	83.9%	85.7%
Usual blood pump flow	96.4%	100%
Usual blood pressure	85.7%	92.9%
Usual venous pressure	89.3%	92.9%
Date of first use	75%	71.4%
Last nursing assessment (presence of thrill, bruit, and pulse)	78.6%	78.6%
Has fistulography been required in the last six months? *	—	/ 50%
Central Venous Catheter Fields	**Round 1 (n=56)**	**Round 2 (n=14)**
Location	98%	100%
Date of placement	88%	86%
Functioning properly	100%	100%
Malfunctioning	100%	100%
Causes of malfunction	95%	100%
Blood pump flow	95%	95%
Blood pressure	82.15%	93%
Venous pressure	88%	93%
Anticoagulant treatment for catheter lock	96%	100%
Date of last dressing change *	—	78.6%

* Items suggested in the first round, incorporated into the second round.

Nutritional-Metabolic Pattern
The inclusion of information on nutrition during or at the end of the dialysis session achieved 97.8% initial approval and 85.7% in the final round. Blood glucose control and insulin treatment maintained a constant agreement of 92.9% in both rounds.

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Table 4. Acceptance percentage for including health status information based on Marjory Gordon's functional health patterns in the nursing care report for transitioning haemodialysis patients, by round.

PATTERN	INFORMATION	Round 1 (n=56)	Round 2 (n=14)
Health Perception-Health Management	General status during session: blood pressure, heart rate, and temperature	92.90%	92.90%
	Immunised for Hepatitis B virus	96.40%	85.70%
	Treatment adherence	87.50%	85.70%
	Use of assistive devices: cane, crutch, walker, or wheelchair	94.60%	85.70%
	Individual's perception of their health*	—	58.90%
	Management of risks and general care behaviours*	—	64.30%
	Degree of mobility via Barthel scale assessment*	—	78.60%
	INR determination*	—	35.70%
Nutritional-Metabolic	Nutrition during or at the end of treatment session	97.80%	85.70%
	Requires blood glucose control and insulin treatment	92.90%	92.90%
	Type of foods consumed during the session	78.30%	57.10%
	Last bioimpedance data, if available*	—	64.30%
Elimination	Maintains residual diuresis?	94.60%	92.90%
	Is a urostomy carrier?	83.90%	100%
	Is a colostomy carrier?	87.50%	100%
	Residual diuresis volume	78.60%	64.30%
	Pattern of faecal elimination (daily, every 48 hours, every 72 hours or more)	53.60%	
Sleep-Rest	Patient's description of sleep quality	77.80%	50%
Activity-Exercise	Uses aids for nocturnal rest during haemodialysis treatment	94.40%	100%
	Has any neuromuscular deficit limiting daily physical autonomy?	84.30%	83.30%
	Commonly experiences muscle cramps during the dialytic technique?	96.10%	100%
Cognitive-Perceptual	Level of consciousness	96.20%	85.70%
	Presence of pain	94.30%	92.90%
	Presence of communication difficulty, in language or idiom	100%	100%
	If pain present, VAS scale and pain location	84.90%	78.60%
Role and Relationships	Lives alone	90%	91.70%
	Has a non-family carer at home?	88%	91.70%
	Lives in a residential care home?	94%	91.70%
	Lives in a family unit with spouse and/or children?	72%	100%
Coping-Stress Tolerance	Has a good pattern of adaptation and coping when changes are suggested during the treatment session?	100%	84.60%
	Consumes any substance that might affect tolerance during the session?	92.30%	92.30%

* Items suggested in the first round, incorporated into the second round.

Elimination Pattern

Measurement of residual diuresis obtained 94.6% approval in the first round and 92.9% in the second. Meanwhile, urostomy or colostomy carrier status experienced increasing acceptance, reaching 100% at the conclusion of the rounds.

Activity and Exercise Pattern

Data on neuromuscular deficits and muscle cramps during the dialysis technique received robust support (96.1% in round 1), reaching full agreement (100%) for cramps in the second round. Likewise, the need for aids for nocturnal rest was unanimously supported at the end of the process.

Cognitive-Perceptual Pattern

Level of consciousness and pain assessment maintained high acceptance, though with a slight drop in the second round. The detection of communication difficulties, for its part, remained unchanged at total agreement (100%).

Role and Relationships Pattern

Living alone, having a carer, and residing in a care facility achieved majority support in both rounds, showing minimal variations between them.

Coping and Stress Tolerance Pattern
The item related to coping strategies showed a reduction in its level of agreement in the second round, while information on substance use maintained the same high approval on both occasions.

DISCUSSION

This study successfully achieved a consensus on the inclusion of several key fields within the NCR for transitioning haemodialysis patients. Unanimous agreement was reached on incorporating demographic and clinical information, such as the originating centre, accommodation at destination, need for medical transport, number of weekly sessions, and duration of each dialytic session. Consensus was also reached on including aspects related to vascular access and health status according to Marjory Gordon's functional health patterns. However, some fields, such as the assessment of arteriovenous fistula oedema and the patient's perception of their health status, did not reach the established 80% agreement threshold.

Nursing assessment according to Gordon's Patterns also showed a high degree of agreement on several fundamental aspects.

In the health perception and management pattern, the assessment of general status during the session (92.9%), treatment adherence (87.5%), and immunisation vs hepatitis B (96.4%) were highly supported items. However, items suggested in the first round and incorporated into the second generated debate due to variability in the consensus achieved. These items were the patient's perception of their health (58.9%), management of risks and general care behaviours (64.30%), degree of mobility assessed using the Barthel scale (78.60%), and INR determination (35.70%).

The patient's perception of their health is a subjective indicator that can vary depending on the patient's emotional and cognitive state at the time of assessment. Although self-perception of health is recognised to be associated with disease progression and quality of life[23], its value in an NCR may be limited if not complemented by other objective clinical indicators.

The management of risks and general care behaviours is a relevant aspect of continuity of care, as it influences the prevention of complications and treatment adherence. However, its detailed assessment may require more extensive methods that are not feasible in an NCR. According to the World Health Organisation [24], effective risk communication is fundamental in healthcare, but critical information should be prioritised in transfer situations.

The degree of mobility assessed using the Barthel scale has shown greater acceptance, possibly due to its usefulness in determining the patient's level of functional dependence and its direct impact on care planning [25]. It could be important for care planning at the new centre, so its inclusion in the NCR might be justified. Although its justification is appropriate, approval was not reached.

Finally, INR determination received minority support from experts, which could be explained by its relevance only in patients on anticoagulant therapy. Although INR is crucial in managing patients at thrombotic or haemorrhagic risk[26], its inclusion may not be a priority in all cases and should be considered based on the individual clinical context.

In the nutritional-metabolic pattern, nutrition during dialysis (97.8%) and glycaemic control in insulin-dependent patients (92.9%) were widely supported, due to their positive impact on recovery, prevention of malnutrition, and clinical stabilisation of the patient during treatment[27,28].

In the elimination pattern, the assessment of residual diuresis (94.6%) and the identification of colostomies (87.5%) obtained a high level of agreement. Monitoring residual diuresis is key, as preserving partial renal function improves treatment adaptation and survival[29]. However, the lower support observed regarding the faecal elimination pattern (53.6%) can be explained by the lesser relevance this aspect has during treatment planning for centre transfers. Faecal elimination in these patients does not have an immediate and direct impact on the dialysis process, as it is not associated with critical alterations in fluid balance or renal function. Faecal evacuation management in haemodialysis tends to be considered less of a priority compared to other interventions addressing fluid overload or blood pressure control[30].

In the activity and exercise pattern, the importance of detecting muscle cramps during haemodialysis (96.1%) and the use of assistive devices for mobility (94.6%) was highlighted. These aspects achieved majority support from experts, as muscle cramps are associated with hypovolaemia and alterations in sodium levels[31], being relevant during patient transfer. Furthermore, the use of mobility aids promotes functionality, prevents complications, and promotes patient independence, key aspects in the NCR.

In the sleep and rest pattern, sleep quality was assessed with less agreement (50%), although the use of aids for rest during treatment received a high level of support (94.4%) crucial for patient recovery and well-being during the session.

The assessment of the level of consciousness (96.2%) and the presence of pain (94.3%) were widely accepted within the cognitive-perceptual pattern. These two items can negatively affect the patient's experience[32]. The degree of consensus obtained for these two items is consistent, as it underlines the importance of monitoring these aspects to improve patient comfort.

In the role and relationships pattern, factors such as living alone (90%), having a non-family carer (88%), or living in a family unit with a spouse and/or children (100%) were items with majority support from experts. These favourable results

for the first two items are consistent, given that the quality of social support is a determining factor in the quality of life of haemodialysis patients. Those who live alone or lack adequate support may face greater emotional and physical difficulties[33].

Finally, in the coping and stress tolerance pattern, the patient's ability to adapt to changes during the session (100%) and the assessment of substance use that might affect their tolerance (92.3%) were aspects of high agreement. The acceptance of including these items by professionals reflects their great importance. According to Pereira et al.[33], the psychological adaptation of patients to physical and emotional changes during haemodialysis is crucial for maintaining emotional balance and stress tolerance, which improves treatment adherence.

Gordon emphasises that a structured and standardised approach to care documentation is essential to ensure continuity of care, especially for patients with complex needs such as those undergoing haemodialysis treatment. Standardisation of the report contributes to a comprehensive approach to patient needs and facilitates the transition between different professionals[21].

The inclusion of agreed-upon fields in the NCR is fundamental for continuity of care and patient safety. Standardised and structured information in the NCR allows nursing professionals to ensure a seamless transition, facilitating coordination between centres and reducing risks associated with the transfer of haemodialysis patients. Previous studies have shown that adequate continuity of care reduces hospitalisation rates and improves patient satisfaction and treatment adherence[5,7]. Furthermore, appropriate recording of information on vascular access and critical clinical data contributes to the prevention of complications and optimisation of therapeutic management for these patients[4,19].

While the unified NCR proposal represents a significant advance in the care of haemodialysis patients, its implementation carries several challenges. These include the harmonisation of criteria among centres[34], staff training in its use, integration with digital health systems[35], and compliance with privacy regulations[35].

The use of this NCR not only benefits patients but also health care professionals and the health system. Improved communication between centres optimises resource allocation and allows for more efficient monitoring of the patient's status. Furthermore, it contributes to patient and family satisfaction by providing a safer and more coordinated transition. Its application could also serve as a basis for future research on its impact on care quality and the reduction of adverse events.

However, the study presents some limitations. Firstly, the drastic decrease in the number of participants between the first and second rounds (from 56 to 14 experts, approximately a 25% response rate) could have compromised the representativeness and robustness of the final consensus, introducing a potential selection bias towards those professionals with greater availability or motivation, thus limiting both the interpretation and generalisation of the results. Additionally, while the Delphi method is a widely used technique for achieving consensus in healthcare, it is subject to biases derived from expert selection and subjective interpretation of responses[17]. Finally, the lack of consensus on some fields suggests the need for additional studies to explore their importance in clinical practice.

In conclusion, this study achieved consensus on identifying essential fields to include in the NCR for transitioning haemodialysis patients. Incorporating these elements could improve the continuity and quality of care, ensuring a safe transition between centres and optimising clinical outcomes. Nevertheless, further research is needed on fields that did not achieve consensus, as well as to evaluate the implementation and effectiveness of the NCR in clinical practice.

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Conflict of interest
None declared.

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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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Effectiveness of an individual educational intervention related to self-care management capacity in people on haemodialysis

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ABSTRACT

Introduction: In many cases, haemodialysis patients lack tools that allow them to develop self-care practices and adapt to the changes associated with their treatment.

Objectives: The present study aimed to evaluate the effectiveness of an educational intervention on the self-care management capacity in people on haemodialysis.

Material and Method: We conducted a quantitative, pre-experimental, interventional, single-centre study. A sample of 77 haemodialysis patients was included from November 2023 through June 2024. To evaluate self-care management capacity, the Appraisal of Self-Care Agency Scale (ASA-A) and a self-designed questionnaire on Self-Care Activities in Haemodialysis (SAH), validated by experts, were used. The educational intervention was carried out individually during haemodialysis sessions, with periodic evaluations to identify acquired knowledge and areas requiring reinforcement.

Results: The mean pretest scores were 81.46 and the post-test scores were 84.22. A Student's t-test for related samples was performed, and the results showed a statistically significant value in self-care management capacity (t=-3.469, p=0.001), indicating that the observed difference is attributable to the intervention.

Conclusions: The importance of establishing an educational programme in haemodialysis, led by nursing professionals with an educator profile, was confirmed to follow up on patients and strengthen their self-care capabilities.

Keywords: haemodialysis; education; self-care; self-management.

RESUMEN

Efectividad de una intervención educativa individual relacionada con la capacidad de autogestión del autocuidado en personas en hemodiálisis

Introducción: En muchos casos, los pacientes en hemodiálisis carecen de herramientas que les permitan desarrollar prácticas de autocuidado y adaptarse a los cambios asociados a su tratamiento.

Objetivos: El presente estudio tuvo como objetivo evaluar la efectividad de una intervención educativa en la capacidad autogestión del autocuidado en personas en hemodiálisis.

Material y Método: Estudio cuantitativo, preexperimental, de intervención y unicéntrico. Se incluyó una muestra de 77 pacientes en hemodiálisis de noviembre de 2023 a junio de 2024. Para evaluar la capacidad de autogestión del autocuidado, se utilizó la escala Appraisal of Self-Care Agency Scale (ASA-A) y un cuestionario sobre Actividades de Autocuidado en Hemodiálisis (AAH) de diseño propio, validado por expertos. La intervención educativa se llevó a cabo de manera individual durante las sesiones de hemodiálisis, con evaluaciones periódicas para identificar los conocimientos adquiridos y aquellos que requerían reforzarse.

Resultados: Los puntajes promedios del pretest fueron de 81,46 y para el postest fue de 84,22. Se realizo la prueba t de Student para muestras relacionadas cuyos resultaron arrojaron un valor estadisticamente significativo en la capacidad de autogestión del autocuidado (t=-3,469, p=0,001), lo que indica que la diferencia observada es atribuible a la intervención.

Conclusiones: Se comprobó la importancia de establecer un programa educativo en hemodiálisis, dirigido por profesionales de enfermería con perfil de educadores, para dar seguimiento a los pacientes y fortalecer sus capacidades de autocuidado.

Palabras clave: hemodiálisis; educación; autocuidado; autogestión.

INTRODUCTION

Comprehensive care for haemodialysis patients is a complex process requiring a series of activities aligned with personal interests, goals, and needs. In many cases, patients lack the tools to develop self-care and adapt to new changes[1].

In Mexico, the healthcare system does not have a single census of patients with chronic kidney disease (CKD), which makes it difficult to know and predict which patients require one of the renal replacement therapies[2]. As a consequence, it has been observed that most enter a dialysis programme in uraemic conditions and with a sub-optimal cognitive state to comprehend the care they should follow.

From the perspective of Dorothea Orem's Self-Care Agency Model, self-care is defined as the autonomous and deliberate capacity to care for oneself and implies an inherent responsibility[3]. For CKD patients on dialysis, this capacity demands a change in their lifestyle. To achieve this, individuals must possess the ability to reason and understand their health status, allowing for informed decision-making. Self-management of self-care, for its part, refers to the individual's capacity to perform productive actions through judgments and decisions about what they can, should, and are willing to do for their own well-being[4].

Various factors can affect self-care capacity in these patients, including advanced age, low educational level, depression and low perception of harm, medication side effects, health beliefs and attitudes, unclear instructions, lack of communication with the healthcare team, complexity of the therapeutic regimen, poor understanding of the reasons for therapy, socioeconomic difficulties, and substance abuse[5,6].

In haemodialysis units, educational activities often focus on delivering group information sessions without considering a comprehensive and individualised approach. Former studies have demonstrated that individual (one-to-one) education facilitates the acquisition of knowledge, exchange of ideas, and skills necessary for proper disease management, achieving, among other things, the exchange of ideas and emotions between the learner (care recipient) and instructor, which is fundamental in the context of haemodialysis[7].

The present study aimed to evaluate the effectiveness of an educational intervention on self-management of self-care capacity in individuals undergoing haemodialysis.

MATERIAL AND METHOD

Design and scope of application: We conducted a quantitative, pre-experimental, interventional, single-centre study from November 2023 through June 2024, at a private renal care clinic in the State of Mexico.

Population and sample: The population consisted of adult patients undergoing haemodialysis therapy. total of 77 patients were included in the study, 37 from the morning shift and 40 from the afternoon shift. Inclusion criteria were being older than 18 years, undergoing conventional haemodialysis treatment, being oriented in time, place, and person, and providing informed consent to participate in the research. Patients with sensory difficulties that could compromise data collection were excluded, and a non-probability convenience sampling method was chosen.

Instruments: To measure patients' perception of their ability to perform self-care activities, the Spanish version of the Appraisal of Self-Care Agency Scale (ASA-A) was used[8], Developed by Edilma de Reales, this instrument consists of 24 Likert-type items ("never," "almost never," "almost always," and "always"), demonstrating high reliability with a Cronbach's alpha coefficient of 0.81, validated in the Mexican population[9,10],

To define the characteristics of the educational programme, the patients' profiles were considered, leading to the design of a Haemodialysis Self-Care Activities (HSCA) instrument. This instrument underwent a validation process by nephrology nursing experts to ensure its content and structure. The instrument is divided into several sections: sociodemographic data, assessment of vascular access characteristics, presence of pruritus, cramps, muscular or joint pain, fluid retention, pharmacological adherence, nutrition, recreation, exercise, and a subjective assessment scale to determine uraemic status **(appendix 1)**.

The instruments in this research were applied at two time points (pre-test and post-test) with a three-month interval, to enhance the temporal stability reliability of the intervention.

Methodological procedure: Data collection was carried out during haemodialysis sessions. Firstly, the purpose and scope of the research were explained in detail, ensuring each participant understood the importance of their collaboration. Secondly, the informed consent form was presented, signed, and the assessment instruments were then administered. Thirdly,

participants received support and advice to complete the instruments, which took approximately 20 to 30 minutes per patient.

During an implementation period, educational sessions were conducted. These consisted of one-to-one encounters, lasting 15 to 30 minutes, addressing topics such as chronic kidney disease, haemodialysis, vascular access care, diet and fluid management, therapeutic adherence, and self-care. At the end of each intervention, information accompanied by written support (a leaflet) related to the educational programme was provided. During this same period, an examination was administered to assess the level of knowledge and identify topics the patient had not understood, so they could be revisited.

In the post-intervention phase, the ASA-A and HSCA instruments were reapplied three months after their initial administration, with the aim of evaluating self-management of self-care capacity.

Data analysis: Data analysis and evaluation were performed using SPSS statistical software version 25. In this process, frequencies, standard deviation, maximums, minimums, and average values of the results were calculated.

For the analysis of variable normality, the Kolmogorov-Smirnov (K-S) test was used, as the sample size was >50. For inferential analyses, Student's t-test for related samples was employed to identify differences before and after the intervention. Differences were considered statistically significant with P values ≤0.05.

Ethical and Legal Aspects: In full compliance with Article 16 of Mexico's General Health Law[11], this research adheres to strict ethical and scientific requirements (autonomy, beneficence, justice), with measures implemented to protect the dignity, rights, safety, and well-being of research participants. Prior to the study, informed consent was requested, and its nature was explained in detail.

RESULTS

The mean age of the sample was 43.3±10.7 years, of which 41.5% (n=32) were men and 58.4% (n=45) were women, aged between 22 and 65 years. Educational attainment was distributed as follows: primary education 7.7% (n=6), secondary education 45.4% (n=35), pre-university 36.3% (n=28), and university 10.3% (n=8). For the family support category, results reported 67.4% (n=52) for patients with support and 32.4% (n=25) for those without **(table 1)**.

Figure 1 shows the descriptive measures of the intervention phases (pretest and posttest) to assess self-care self-management capacity. It is evident that the mean scores in the posttest are higher *vs* the pretest.

Table 2 illustrates the mean scores for the assessment of self-management of self-care capacity, with the most representative results for the gender category where men had mean scores of 80.8 (±7.82) and women 81.91 (±8.31). For the educational level category, the lowest average scores corresponded to primary level 75.16 (±9.92) and the highest to university level 83.12 (±6.93). Finally, the arithmetic means for the category with and without family support were 81.69 (±8.23) and 81.00 (±7.90), respectively.

Table 1. Sociodemographic data of patients on haemodialysis.

Sociodemographic Data	n	(%)
Sex		
Female	45	58.4
Male	32	41.5
Marital status		
Single	25	32.4
Married	35	45.4
Widowed	2	2.5
Common-law union	8	10.3
Divorced	7	9.0
Educational level		
Primary	6	7.7
Secondary	35	45.4
High school	28	36.3
Bachelor's degree	8	10.3
Employment		
Yes	62	80.5
No	15	19.5
Time on hemodialysis		
<5 years	51	66.1
>5 years	26	33.2
Family support		
Yes	52	67.4
No	25	32.4

Nota: N: number of cases; **%:** representative percentage.

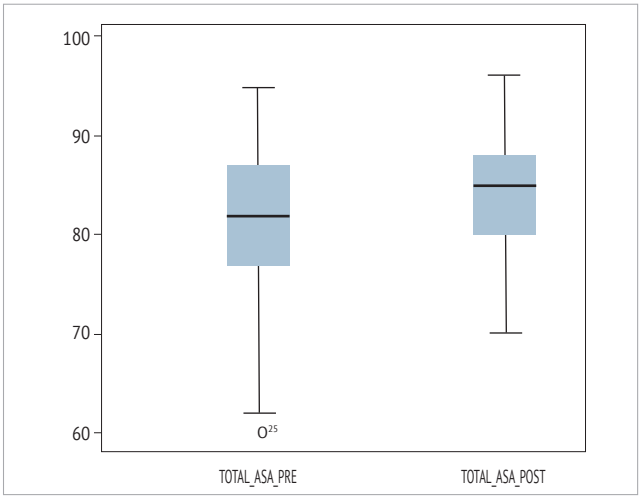

Figure 1. Sele-management capacity for self-care, pre-test and post-test.

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Table 2. Sociodemographic variables related to self-care self-management capacity before and after the educational intervention.

	Category	ASA Pretest						ASA Posttest			
		N	M	DE	Min	Max		M	DE	Min	Max
Sex	Female	45	81.91	8.31	60	95		84.77	6.08	70	96
	Male	32	80.84	7.82	62	90		83.43	6.32	71	96
Educational level	Primary	6	75.16	9.92	65	93		80.66	6.12	70	88
	Secondary	35	81.85	7.58	60	95		83.34	6.56	72	96
	High school	28	81.85	8.40	62	95		85.32	5.61	71	96
	Bachelor's degree	8	83.12	6.93	73	93		86.87	5.46	79	96
Marital status	Single	25	81.52	7.71	60	92		83.52	6.51	72	96
	Married	35	81.77	8.12	63	95		84.82	5.39	70	93
	Widowed	2	79.00	2.82	77	81		84.00	7.07	79	89
	Divorced	8	82.28	8.30	69	95		84.28	8.67	73	96
	Common law union	7	79.87	10.84	62	92		83.75	7.24	71	92
Age	≤30	8	78.37	10.58	62	90		81.25	5.36	71	87
	31–43	34	81.29	7.66	60	95		84.44	6.95	72	96
	44–54	22	80.90	8.46	63	92		84.36	6.12	70	96
	55+	13	84.76	7.36	70	95		85.23	4.38	79	93
Time on hemodialysis	<5 years	51	81.74	7.78	60	95		84.41	5.63	71	96
	>5 years	26	80.92	8.76	65	95		83.84	7.23	70	96
Family support	Yes	52	81.69	8.23	60	95		84.82	6.11	71	96
	No	25	81.00	7.90	65	95		82.96	6.24	70	96

N = 77; **N:** frequency; **M:** mean; **SD:** standard deviation; **Min:** minimum; **Max:** maximum.

The educational intervention had a significant impact on improving the care and preservation of the arteriovenous fistula with an 82.43% increase vs the first measurement, while maintaining a clean dressing showed only a 12.90% increase, which was the lowest score.

In relation to signs and symptoms **(table 4)**, the educational programme had a significant impact, as there was a considerable decrease following programme implementation, with the most representative results being a reduction in pruritus by 29.87% (n=23), pain by 20.78% (n=16), and skin lesions by 11.69% (n=9).

Finally, a Student's t-test for related samples was applied to evaluate the effectiveness of the self-care management intervention programme, as assessed by the ASA-A instrument. The results indicated a statistically significant difference between the two measurements, t(76)=-3.4, P=0.001. The observed differences between the means were -2.76, with this difference favouring the post-test.

Table 3. Care and maintenance of arteriovenous fistula (AVF) and central venous catheter (CVC) before and after the educational intervention.

Indicator	Pre-intervention	Post-intervention	Increase %
Knowledge of AVF care and maintenance	8 patients	45 patients	80.43% (n=37)
CVC dressing fixation	25 patients	31 patients	19.35% (n=6)
Maintenance of dry CVC dressing	24 patients	31 patients	22.58% (n=7)
Maintenance of clean CVC dressing	27 patients	31 patients	12.90% (n=4)

N= 46 patients with arteriovenous fistula; **N=** 31 patients with central venous catheter. Original source.

DISCUSSION

The results obtained in the study allowed us to evaluate how the implementation of an educational intervention programme influences the self-management capacity of self-care in patients during haemodialysis through individualised information sessions. For this, we considered demographic, clinical, and socialisation variables, as well as those directed at vascular access care, presence of pruritus, oedema, cramps, and muscle pain, among others. The findings identified a positive effect on self-management capacity and the development of self-care skills. This aligns with Griva et al.[12] and Ren et al.[13], who concur that poor adherence to

Table 4. Improvement of signs and symptoms in hemodialysis patients before and after the educational intervention.

Indicator	Pre-intervention	Post-intervention	Decrease %
Pruritus	40 patients	17 patients	29.87% (n=23)
Skin lesions due to pruritus	19 patients	10 patients	11.69% (n=9)
Cramps	13 patients	6 patients	9.09% (n=7)
Edema	18 patients	11 patients	9.09% (n=7)
Muscle or joint pain	39 patients	23 patients	20.78% (n=16)

N=77. Original source.

haemodialysis therapy is associated with a lack of effective interventions and that long-term educational programmes offer better results.

The programme contributed to improved vascular access care, reduced pruritus and skin lesions, cramps, muscle and joint pain, oedematous syndrome, as well as better acceptance of consuming low-sodium foods and avoiding excessive water intake. Improvements in blood pressure readings, important for cardiovascular health, and increased pharmacological adherence were also observed. However, current evidence is inconclusive.

Following the knowledge-attitude-behaviour model[14] included in the educational intervention programme, positive behavioural changes were confirmed from a comprehensive approach to knowledge acquisition, similar to the study by Keivan et al.[15], but not for symptoms related to sleep and dialysis.

Patients reported increased participation in sociocultural activities, which promotes social and occupational integration[16,17].

It is relevant to note that the haemodialysis educational programme can address different topics[18,19], for example, information on food preparation, the importance of regular exercise, sleep hygiene, sexuality, and training for emergency situations, such as earthquakes or fires. To achieve this, the contribution of nephrologists, nutritionists, social workers, and psychologists is required, from a patient-centred care and collaborative work approach[20].

Considering continuous education, individualised training, and systematisation is proven to improve clinical indicators and patient empowerment as an active agent in their treatment[6,21]. This could form the basis for a haemodialysis nursing consultancy model in the immediate future as a key strategy to strengthen self-care and improve therapeutic adherence. The creation of the nurse consultant role would involve constant monitoring of therapeutic compliance, resolving specific doubts, adapting strategies to changing patient needs, and ensuring effective communication that reinforces trust and continuity of care[22].

Among the limitations of our study, it is important to mention, among others, its single-centre nature. Another possible limitation is that the programme was directed at patients without physical limitations; therefore, these interventions in individuals with hearing or visual problems will require other auxiliary instruments, such as educational materials to address these disabilities. Nevertheless, the study demonstrates the importance of evaluating self-management capacity for self-care, implementing an individualised educational programme, and including the role of the nurse educator.

Finally, it is important to consider patients' educational level, age, time on therapy, and the profile of the nurse guiding the patient on self-care as described by Natti et al.[23]. These variables are relevant for the success of the haemodialysis educational programme with the inclusion of innovative, easy-to-understand dynamics (e.g., playful activities, short videos, infographics, leaflets). Regarding the Nurse's Role, mastery of educational competencies, communication techniques, adult learning, planning, evaluation of training programmes, a motivating attitude, and support for performing activities are required[24], with benefits and strategies that favour continuous and individualised follow-up.

In light of these results in our study group, we can observe that implementing an individual education programme for haemodialysis patients can improve self-management capacity for self-care. Healthcare professionals should continue to promote self-management and self-care, constituting a crucial aspect for these patients.

Conflict of interest
None declared.

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ANNEX 1. Self-Care Activities in Haemodialysis (SCAH)

Name: ..... Sex: ..... Age: ..... Educational level: ..... Marital status: ..... Occupation: .....
Time in programme: ..... Weekly sessions: ..... Hours per session: ..... Family support: Yes ( ) No ( )
By whom:: .....

1. Assessment of Vascular Access Characteristics

Arteriovenous fistula (AVF)				Central venous catheter (CVC)			
Criteria to assess:		Yes	No	Criteria to assess:		Yes	No
Presence of:	Thrill:			Presence of:	Dry:		
	Bruit:				Secure:		
	Haematoma:				Clean:		
Signs of infection:	Erythema:				Blood residue:		
	Pain:				Serous or purulent discharge		
	Warmth:						
	Serous or purulent discharge:						
Steal syndrome (cold hand/arm):				Other (specify)			
Fistula area clean:							
Knowledge of AVF care measures:							

2. Clinical Assessment and Interview

Pruritus: Yes ☐ No ☐
Skin lesions caused by pruritus: Yes ☐ No ☐
Cramps: Yes ☐ No ☐
Joint or muscle pain: Yes ☐ No ☐

3. Oedema (Godet's scale) pre-HD height, weight, and blood pressure

Godet's scale: 1 ☐ 2 ☐ 3 ☐ 4 ☐
Skin lesions caused by pruritus: Yes ☐ No ☐
Cramps: Yes ☐ No ☐
Joint or muscle pain: Yes ☐ No ☐
Height: ..... cm
Pre-HD weight: ..... kg Post-HD weight: ..... kg
Dry weight: ..... kg
Pre-HD blood pressure Post-HD blood pressure

4. Medication Adherence

Takes medication at prescribed times: Yes ☐ No ☐
Takes all prescribed drugs daily: Yes ☐ No ☐
Number of drugs taken daily 1-3 ☐ 4-5 ☐ More than 6 ☐
Drugs that cause problems?
Specify: .....

5. Diet

Follows dietary recommendations: Yes ☐ No ☐
Follows diet only when feeling unwell: Yes ☐ No ☐
Difficulty consuming low-salt or salt-free foods: Yes ☐ No ☐
Problems with fluid intake: Yes ☐ No ☐

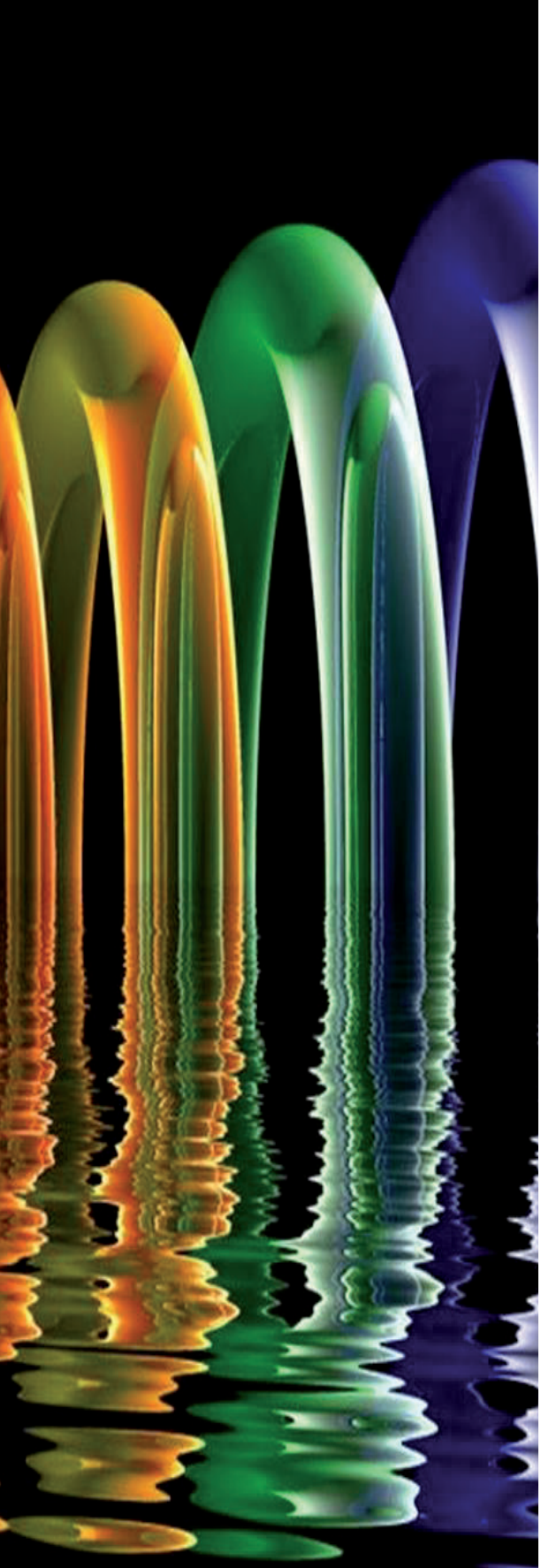
6. Leisure and Exercise Activities

Performs activities of daily living: Yes ☐ No ☐
Takes holidays at least once a year: Yes ☐ No ☐
Attends cinema or theatre occasionally: Yes ☐ No ☐
Participates in recreational, religious, or social groups: Yes ☐ No ☐
Exercises 1–3 times per week: Yes ☐ No ☐

7. Subjective Assessment of Uraemic State

Rate each item: High (5) ☐ Moderate (3) ☐ Low (1) ☐
Insomnia: ..... Reversed circadian rhythm: .....
Weakness (lack of energy): ..... Dysgeusia: .....
Anorexia: .....
Vomiting (>1 day per week): ..... Nausea: .....
Score: .....

Other Relevant Data: .....



Lola Andreu AWARD 2024-2025

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Prevention of tunneled haemodialysis catheter-related dysfunction and bacteraemia using a closed-system connector with a neutral valve: a quasi-experimental before and after study

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ABSTRACT

Introduction: The use of tunneled central venous catheters in haemodialysis is frequently associated with catheter-related bacteraemia. The closed-system connector with a neutral valve emerges as an alternative to reduce this risk by limiting manipulation of the catheter lumen.

Objective and Hypothesis: To evaluate whether the systematic use of closed-system connectors with a neutral valve decreases the rate of catheter-related bacteraemia. It was hypothesised that its use would significantly reduce both complications.

Material and Method: We conducted a retrospective, quasi-experimental, before-after study in a regional hospital over 12 months. A total of 62 catheters in 55 patients were included. Rates of catheter-related bacteraemia per 1,000 catheter-days were evaluated, in addition to parameters on catheter function. Statistical tests for proportion comparison and Pearson's regression were applied.

Results: The rate of catheter-related bacteraemia was reduced from 1.25 to 0.15 per 1,000 catheter-days after the introduction of closed-system connectors with a neutral valve. A total of 100% of the catheters maintained desirable arterial and venous pressure values, 95.2% an adequate blood flow, and 40.3% achieved optimal dialysis dose, with lower performance in males.

Conclusions: The use of closed-system connectors with a neutral valve significantly decreased infections without affecting catheter function. Robust multicentre studies are needed to confirm effectiveness.

Keywords: central venous catheters; haemodialysis; catheter-related infections; needleless connectors/neutral valve; before and after controlled studies.

ABSTRACT

Prevención de la disfunción y bactiriemia relacionadas con el catéter de hemodiálisis tunelizado mediante un conector de sistema cerrado con válvula neutra: estudio cuasi-experimental antes-después

Introducción: El uso del catéter venoso central tunelizado en hemodiálisis se asocia frecuentemente con bacteriemia relacionada con el catéter. El conector de sistema cerrado con válvula neutra surge como alternativa para reducir este riesgo al limitar la manipulación del lumen del catéter.

Objetivos e Hipótesis: Evaluar si el uso sistemático de conectores de sistema cerrado con válvula neutra disminuye la incidencia de bacteriemias relacionadas con el catéter. Se planteó como hipótesis que su uso reduciría significativamente ambas complicaciones.

Material y Método: Estudio cuasi-experimental retrospectivo, tipo antes-después, en un hospital comarcal, durante 12 meses. Se incluyeron 62 catéteres en 55 pacientes. Se evaluaron tasas de bacteriemia relacionada con el catéter por 1.000 días-catéter, además de parámetros sobre función del catéter. Se aplicaron pruebas estadísticas de comparación de proporciones y regresión de Pearson.

Resultados: La tasa de bacteriemia relacionada con el catéter se redujo de 1,25 a 0,15 por 1.000 días-catéter tras la introducción de los conectores de sistema cerrado con válvula neutra. El 100% de los catéteres mantuvo valores deseables de presión arterial y venosa, el 95,2% un flujo de sangre adecuado y el 40,3% alcanzó dosis de diálisis óptima, con menor rendimiento en varones.

Conclusiones: El uso de conectores de sistema cerrado con válvula neutra disminuyó de forma significativa las infecciones sin afectar el funcionamiento del catéter. Se necesitan estudios multicéntricos robustos para confirmar efectividad.

Palabras clave: catéteres venosos centrales; hemodiálisis; infecciones relacionadas con catéteres; conectores sin aguja/con válvula neutra; estudios controlados antes y después.

INTRODUCTION

The use of tunneled central venous catheters (TCVCs) is an alternative to arteriovenous fistulas (AVFs) for renal replacement therapy in haemodialysis (HD). However, TCVCs are not without complications, with catheter-related bacteraemia (CRB) being one of the most significant. CRB represents a major cause of morbidity, mortality, hospitalisation, and increased healthcare costs in this patient population[1,2].

With the aim of reducing these infection rates, devices such as the closed-system connector with a neutral valve (CSCNV) have been developed. This sterile, disposable valve is indicated for use in chronic HD, haemofiltration, haemodiafiltration, and apheresis. This device acts as a mechanically and microbiologically closed system, connected to the TCVC lumens on the first session day of the week, replacing the traditional cap, and can remain in place for a maximum of 7 days[3,4]. Its design reduces the catheter lumen's exposure to the environment, minimising manipulation and, consequently, the risk of intraluminal contamination.

Clinical practice guidelines have proposed various strategies, including the use of CSCNVs. However, the updated 2017 Centers for Disease Control and Prevention (CDC) guideline cautions that the available evidence for its specific use in HD is still limited and does not permit its widespread recommendation, restricting its indication to selected cases. Despite this cautious recommendation, recent studies have provided data supporting the efficacy of these devices in reducing infectious events and catheter dysfunction. The randomised clinical trial by Bonkain et al.[5] showed a significant reduction in both catheter dysfunction and associated bacteraemia with the use of CSCNV in a cohort of HD patients. In the same vein, research by Brunelli et al.[6] and Guembe et al.[7] have reported a reduction in colonisation and infection rates when using Tego™-type connectors. Similarly, interventional studies such as that by Weiss and Qureshi[8] and the cluster trial by Brunelli et al.[9] reinforce the potential of these devices as part of prevention strategies in routine clinical practice. Furthermore, a more recent study in a paediatric HD population by Nau et al.[10] has shown similar benefits with devices like ClearGuard™, suggesting broader applicability in vulnerable groups. In this context, it is clinically relevant to evaluate the impact of introducing CSCNVs in preventing infectious complications in HD units. This study aims to provide new evidence from real-world practice, complementing existing clinical trials and contributing to the justification of future clinical guideline updates.

The hypothesis of our study was that the implementation of CSCNV in HD TCVCs would significantly reduce the incidence of CRB and the rate of catheter dysfunction, compared to direct connection. The study's objective was to evaluate the impact of introducing the CSCNV in HD TCVCs on the incidence of CRB and the rate of catheter dysfunction.

MATERIAL Y METHOD

Study Design
We conducted a retrospective quasi-experimental "before-and-after" study with patients with TCVCs on HD treatment at a district hospital.

The 'before' period (direct connection) was conducted between March 2021 and March 2022. The 'after' period (CSCNV use) was conducted between April 2022 and April 2023.

This report has been drafted in accordance with the TREND (Transparent Reporting of Evaluations with Nonrandomised Designs) statement[11].

Participants
Adult patients on HD treatment via TCVCs, who had 3 weekly sessions during the study period, were included. Patients receiving antibiotic treatment during the evaluation period, patients with NTCVCs, and patients who refused to participate in the study were excluded.

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Participant selection was nonrandomised. Recruitment was performed via consecutive sampling, including all patients who met the established inclusion criteria. Informed consent was obtained from patients to access their computerised clinical data.

Interventions Under Study

During the 'before' period (direct connection), TCVCs were connected directly to the HD circuit lines, using sterile caps after sealing for inter-dialysis periods. Each manipulation required thorough cleaning of the connection point with alcoholic chlorhexidine. There was no additional barrier mechanism between the catheter and the infusion system, which could increase the risk of contamination during manipulation.

During the 'after' period (CSCNV use), DiaSeal® neutral valves from B. Braun[4] were employed. This is a needle-free, Luer-activated connector designed for central venous catheters (CVCs) in extracorporeal therapies. It features an internal silicone mechanism that keeps the catheter closed between sessions, automatically opening when a male Luer cone is connected, allowing for direct and adequate flow for treatments such as HD. Its closed design eliminates the need for additional caps, permitting continuous use for up to 7 days[4]. This CSCNV has an internal priming volume of 0.09 mL and allows for blood sample collection. Its smooth surface facilitates disinfection, contributing to reducing the risk of catheter-related infections[4]. These devices were replaced every 7 days or sooner if signs of deterioration were present, according to the manufacturer's recommendations[4]. Nursing staff received prior training through theoretical and practical sessions on proper use, sterile connection/disconnection technique, and replacement criteria for the neutral valves.

The catheter lock protocol was the same during both periods. A low-concentration sodium heparin solution (1,000 IU/mL) was used after each catheter use to maintain patency and prevent thrombus formation.

Allocation Method

This study was not randomised, as it was a quasi-experimental before-and-after analysis based on the institutional implementation of a new protocol. The change in catheter management (introduction of CSCNV) was applied institutionally and simultaneously across the entire unit on a specific date, which excluded the possibility of individual intervention assignment. The comparison was made between data collected during the 12 months following the implementation of the new protocol and the 12 months prior, thus ensuring a fixed temporal criterion that avoided targeted patient selection. To minimise potential selective assignment biases, all consecutive patients meeting the inclusion criteria in both periods were included, with no exclusion based on clinical characteristics or outcomes. Furthermore, data were obtained electronically through the electronic health record system, which ensured objective and systematic collection of variables.

Blinding

Both participants, the nurses administering the intervention, and the researchers assessing the outcomes were aware of the participants' assignment to the studied alternatives.

Unit of Analysis

The unit of assignment was the TCVCs of the patients recruited during the study. Of note, each catheter replacement was counted as a new unit of analysis, so the same patient could contribute more than one catheter during the study period.

Variables

CRBs were collected during both study periods. CRB was defined as a clinical picture compatible with sepsis, without another apparent infectious focus, when the following diagnostic criteria were met[12-14]:

1. Presence of clinical signs of systemic infection, such as fever, chills, or hypotension, in a catheterised patient.
2. Microbiological confirmation by at least two positive blood cultures: one obtained from the catheter lumen and one from a peripheral line, with isolation of the same microorganism in both.
3. Absence of an alternative infectious focus to explain the clinical picture.
4. Blood cultures drawn within 2 hours of symptom onset.

CRB data corresponding to both study periods were collected. The incidence rate of bacteraemia was calculated as the number of CRBs/TCVC follow-up days per 1,000, for each study period.

Evaluation of catheter dysfunction was performed by analysing technical parameters collected during each HD session, in accordance with KDOQI[15] and Spanish multidisciplinary group vascular access guidelines[16]. The indicators considered were:

- Arterial pressure (AP): desirable AP values were considered to be between -200 and -250 mmHg.
- Venous pressure (VP): desirable VP values were considered to be between 100 and 250 mmHg.
- Effective blood flow (Qb): desirable flows were considered to be ≥300 mL/min.
- Dialysis adequacy (Kt): calculated using ionic dialysance by the HD monitor. Desirable Kt values were defined as >45 L in men and >40 L in women.

Measurements were systematically performed during the period of each catheter's use, considering all records obtained during HD sessions.

Statistical Analysis

Regarding the technical parameters of the catheter (VP, AP, Qb, and Kt), these were evaluated only during the period with CSCNV use. Quantitative variables were described using measures of central tendency (mean, median) and

dispersion (standard deviation), according to the nature and distribution of the data. Qualitative variables were expressed as absolute and relative frequencies (%). For desirable and undesirable value parameters, 95% confidence intervals were calculated using the Wilson method, suitable for small samples. Additionally, a TOST (Two One-Sided Tests) equivalence test was applied, using the Welch-Satterthwaite method for calculating degrees of freedom, to verify that the combined means of each variable were within the acceptable limits defined by KDOQI guidelines[15].

To evaluate the clinical efficacy and technical operating parameters of the catheters, all devices included in the study were considered, with no loss to follow-up recorded in the database. Comparison of CRB incidence before and after CSCNV implementation was performed using a difference of proportions test, applying a z-test for rate comparison. Given that CRB events were infrequent, a Pearson regression model adjusted for the number of catheter-days as an exposure variable was additionally used to confirm the robustness of the obtained results.

No multivariate adjustments were made because the study design (before-and-after with universal protocol application) did not involve comparisons between subgroups or control of independent variables. However, clinical parameters were analysed stratified by sex to consider possible physiological differences.

A statistical significance level of $p<0.05$ was adopted for all tests. Statistical analysis was performed using R software, version 4.3.1 (R Foundation for Statistical Computing, Vienna, Austria).

Ethical Considerations

The study was approved by the Clinical Research Ethics Committee for Medicines (CEIm) of Girona on July 13th, 2022, with approval code 11/2022. All patients were verbally and in writing informed about the study's purpose and provided their written informed consent. Participation was voluntary, and patients could withdraw at any time.

The confidentiality of data for patients participating in the study was maintained according to the provisions of Organic Law 3/2018, of 5 December, on Personal Data Protection and Guarantee of Digital Rights (LOPDGDD). The study was conducted in accordance with the Ethical Principles established in the most recent version of the Declaration of Helsinki (19th World Medical Assembly, 1964) or the Good Clinical Practice Standards, always applying the norm that offered the most protection to the patient.

RESULTS

During the study period, 62 TCVCs (all Palindrome™ Precision H17 type) corresponding to 55 adult patients were analysed **(figure 1)**, with a distribution of 42% men and 58% women, and a mean age of 65.2±12.3 years. In the 'before' period, 6,418 catheter-days were analysed, while in the 'after' period, 12,970 catheter-days were recorded.

During the 'before' period (CSCNV use), 4 episodes of CRB were documented in a total of 6,418 catheter-days, corresponding to a CRB rate of 1.25 episodes per 1,000 catheter-days. In the 'after' period (direct connection), 2 episodes were recorded in 12,970 catheter-days, yielding a CRB rate of 0.15 episodes per 1,000 catheter-days. The difference between both periods was statistically significant ($p=0.047$).

Regarding TCVC dysfunction technical values, as shown in **table 1**, a statistically significant difference in VP between sexes was revealed, with a higher proportion of compliance in women ($p=0.01$). No significant differences by sex were observed in AP, Qb, and Kt, although a non-significant trend towards greater compliance in women was evident. It is worth noting that, despite this trend, the mean Kt in litres was significantly higher in men ($p<0.05$). Qb was adequate in 89.1% of cases.

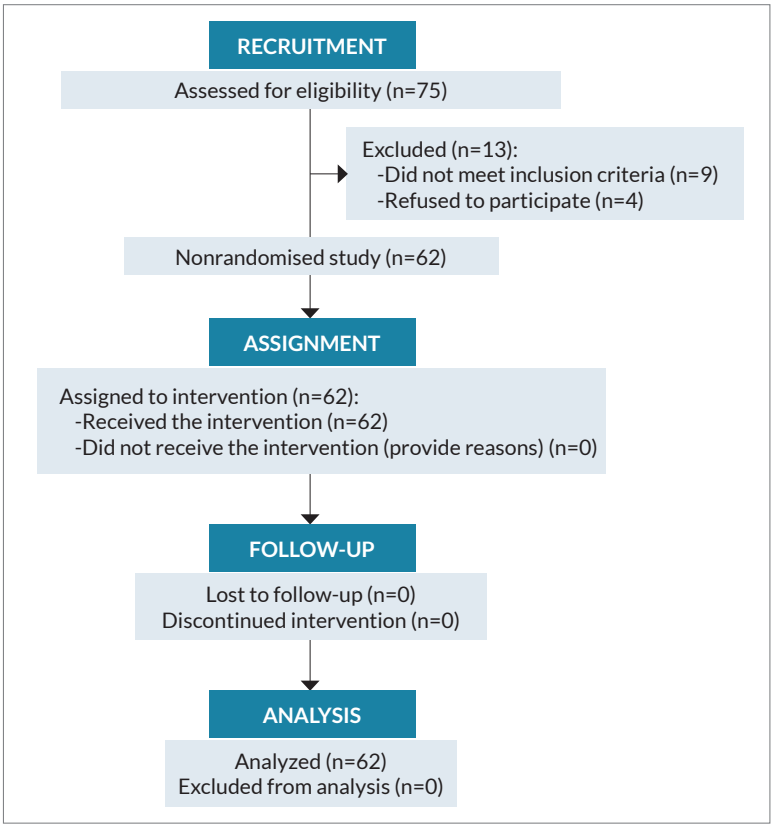

Figure 1. Participant flow diagram based on the TREND (Transparent Reporting of Evaluations with Nonrandomised Designs) statement.

Table 1. Comparison of dialysis parameter adequacy as Indicators of TCVC dysfunction, by period (n=62) and by sex (men n=26, women n=36).

Parameter	Group	Desirable Value n (%)	Undesirable Value n (%)	95%CI	p
Venous Pressure	Total	61 (98.3%)	1 (1.7%)	96.2–100	0.01
	Men	25 (96.1%)	1 (3.9%)	89.7–100	
	Women	36 (100%)	0 (0%)	100–100	
Arterial Pressure	Total	62 (100%)	0 (0%)	100–100	–
	Men	26 (100%)	0 (0%)	100–100	
	Women	36 (100%)	0 (0%)	100–100	
Kt (mean)	Total	25 (40.3%)	37 (59.7%)	48.2–54.2	0.33
	Men	10 (38.5%)	16 (61.5%)	44.9–55.1	
	Women	15 (41.7%)	21 (58.3%)	46.5–53.5	
Kt (median)	Total	33 (53.3%)	29 (46.7%)	48.3–55	0.47
	Men	12 (46.1%)	14 (53.9%)	43–55	
	Women	21 (58.3%)	15 (41.7%)	46.5–53.5	
Blood Flow	Total	59 (95.2%)	3 (4.8%)	90.1–100	0.09
	Men	24 (92.3%)	2 (7.7%)	83–100	
	Women	35 (97.2%)	1 (2.8%)	91.6–100	

N: number; **%:** percentage; **95%CI:** 95% confidence interval.

No adverse effects directly attributable to the use of CSCNVs were recorded during the study period. No technical complications related to their use were documented either.

DISCUSSION

In the present study, a reduction in the CRB rate was observed after the incorporation of CSCNVs for CVCs in patients on HD treatment via a TCVC. These findings support the hypothesis that the use of devices designed to reduce catheter lumen manipulation can positively impact CRB prevention. This effect has been previously documented by Albalate et al.[19] and Crehuet et al.[20], who highlighted that correct manipulation of catheter connections, along with the use of appropriate devices, can significantly limit the entry of microorganisms through one of the main critical points of contamination: the connections.

In addition to the device *per se*, organisational factors, such as specific training of healthcare personnel, the availability of safe disconnection systems, and an adequate patient/nurse ratio, may have contributed to the observed effect. This multifactorial nature has also been noted in previous studies such as those by Cobo et al.[21] and Bouza et al[22], who reported reductions in CRB rates when using CSCNVs instead of conventional caps or direct connections. Furthermore, Martin et al.[23] reported that the use of chlorhexidine for disinfection of catheter hubs was equally effective, achieving a CRB rate of 1.8 per 1,000 catheter-days.

Regarding the clinical parameters analysed (VP, AP, and Kt), the results were consistent with those reported in previous research on CSCNV use. No statistically significant differences were observed in VP and AP before and after CSCNV implementation, although slight increases with no clinical relevance were recorded. As for the Kt value, overall results were considered adequate; however, in the subgroup of male patients, 61.5% presented a volume below 45 L, suggesting suboptimal dialysis adequacy in this group during the post-intervention period.

The results of the present study are consistent with previous evidence. Bonkain et al.[24] in a randomised clinical trial, demonstrated that the use of a CSCNV significantly reduced both catheter dysfunction and CRB rates vs a control group. Similarly, Brunelli et al.[25] observed, in a retrospective study, a significant decrease in CRB incidence with the use of the Tego™ connector, a needle-free and closed-system device. Guembe et al.[26] reinforced these findings by showing a reduction in bacterial colonisation of catheters with the use of the same connector, although without significant clinical differences in CRB incidence, suggesting a potential early protective effect.

Other studies have also provided relevant evidence. Weiss and Qureshi[27], through a quality improvement initiative, reported a notable reduction in CRB rates after the introduction of a new CVC cap, highlighting the value of these interventions in real clinical contexts with high variability in care practices. For their part, Brunelli et al.[28], in a multicentre cluster clinical trial, provided solid evidence on the efficacy of various devices, including the Tego™ connector, confirming its superiority over conventional techniques.

In a less explored context, the study by Nau et al.[29] offered a paediatric perspective by evaluating the use of ClearGuard HD® in children undergoing HD. The results also showed a reduction in infections, extending the potential benefit of these devices to traditionally underrepresented populations.

Overall, the available evidence, including that from the present study, supports the use of CSCNVs for HD as a possible strategy to reduce bacteraemia in patients with TCVCs. Several limitations should be considered when interpreting these results. Firstly, it is a single-centre study, which limits the generalisation of results to other institutions with different organisational, infrastructural, or population characteristics. Additionally, as a retrospective design, there is a risk of case loss due to incomplete or inaccurate records in clinical information systems, which could introduce selection bias. Another aspect to consider is the possibility of temporal biases, given that data were collected over a specific period without control over possible changes in clinical practices, management protocols, or population characteristics over time, which could have influenced the observed results. Likewise, a concurrent control group was not included, which limits the ability to establish direct comparisons between the intervention (use of a neutral valve) and other alternatives or previous practices. This makes it difficult to attribute the observed effects exclusively to the evaluated intervention. Although the retrospective design minimises the risk of the Hawthorne effect, as there was no active intervention during data collection, the possibility of changes in the behaviour of healthcare personnel during the period in which the devices were introduced or consolidated cannot be completely ruled out, especially if there were parallel training or institutional changes, which could have influenced the quality of care and the outcomes.

As future considerations, to strengthen the evidence and overcome the above-mentioned limitations, firstly, it is suggested to conduct multicentre studies that include the participation of different types of institutions and care contexts. Furthermore, it is essential to design prospective research using more robust methodologies, such as cluster randomised trials.

In conclusion, the evidence gathered, both in the present study and in the specialised literature, supports the use of needle-free connectors and CSCNVs as an effective strategy to reduce the incidence of CRB in HD patients with TCVCs. Despite differences in exposure (catheter-days) between the compared periods, the magnitude of the observed decrease suggests a possible beneficial association between CSCNV use and the prevention of infectious events, consistent with available evidence.

From a functional perspective, no clinically relevant alterations were observed in parameters such as AP or VP, although a significant difference by sex in VP was identified, and suboptimal Kt values in the male subgroup, highlighting the importance of individualised monitoring of dialysis adequacy.

Collectively, CSCNVs should be considered an integral part of infection prevention bundles in HD units, especially for patients with long-term catheters or those with any risk factor for developing CRB.

Conflict of interest
None declared.

Funding
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Nursing care plan for a psychologically complex patient undergoing pancreas-kidney transplant

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ABSTRACT

Case Description: A 35-year-old male, diabetic Type I since age 11, developed Stage 5 chronic kidney disease secondary to diabetic nephropathy. He has been undergoing haemodialysis since March 2023. In August 2023, he was offered the possibility of undergoing a pancreas-kidney transplant, which was performed in February 2024.
From a psychological perspective, the patient has a past medical history of previous voluntary discharge requests and, during hospitalisation, shows resistance to remaining admitted, which poses a risk to graft viability and postoperative evolution.

Care Plan Description: The nursing care plan was implemented in the Intensive Care Unit during the immediate postoperative period. An assessment of the patient's altered needs was performed following Virginia Henderson's 14 Needs model, identifying the diagnosis of ineffective health maintenance behaviours as a priority.

Plan Evaluation: Upon hospital discharge, the proposed care plan was evaluated. Throughout the hospitalisation, the altered patterns were resolved, preventing premature voluntary discharge, which ensured his clinical stability.

Conclusion: A care plan based on health education, psychological support, and interdisciplinary collaboration can be key to improving therapeutic adherence and clinical evolution in transplanted patients with difficulties in health maintenance. This case reinforces the need for personalised nursing strategies to ensure treatment continuity and optimise long-term outcomes.

Keywords: pancreas-kidney transplant; chronic kidney disease; diabetes mellitus; diabetic nephropathy; intensive care unit; nursing care plan.

RESUMEN

Plan de cuidados de enfermería en paciente psicológicamente complejosometido a trasplante-páncreas-riñón

Descripción del caso: Varón de 35 años, diabético tipo I desde los 11, desarrolla una enfermedad renal crónica en estadio 5 secundaria a nefropatía diabética. En tratamiento con hemodiálisis desde marzo de 2023.
En agosto de 2023 se le propone la posibilidad de someterse a un trasplante páncreas-riñón, realizándose en febrero de 2024.
Desde el punto de vista psicológico, el paciente presenta antecedentes de solicitudes de alta voluntaria previas y, durante la hospitalización, muestra resistencia a permanecer ingresado, lo que supone un riesgo para la viabilidad del injerto y su evolución postoperatoria.

Descripción del plan de cuidados: El plan de cuidados de enfermería se implementó en la Unidad de Cuidados Intensivos, durante el postoperatorio inmediato. Se realizó una valoración de las necesidades alteradas del paciente siguiendo el modelo de 14 Necesidades de Virginia Henderson, identificando como prioritario el diagnóstico de conductas ineficaces de mantenimiento de la salud.

Evaluación del plan: Al alta hospitalaria, se realizó la evaluación del plan de cuidados propuesto. A lo largo de la hospitalización, se solventaron los patrones alterados, previniendo el alta voluntaria prematura, lo que garantizó su estabilidad clínica.

Conclusión: Un plan de cuidados basado en la educación sanitaria, el apoyo psicológico y la colaboración interdisciplinar puede ser clave para mejorar la adherencia terapéutica y la evolución clínica en pacientes trasplantados con dificultades en el mantenimiento de la salud. Este caso refuerza la necesidad de estrategias personalizadas de enfermería para garantizar la continuidad del tratamiento y optimizar los resultados a largo plazo.

Palabras clave: trasplante páncreas-riñón; enfermedad renal crónica; diabetes mellitus; nefropatía diabética; unidad de cuidados intensivos; plan de cuidados de enfermería.

INTRODUCTION

Pancreas-kidney transplantation (PKT) is a surgical procedure that involves implanting a pancreas (from a deceased donor) and a kidney (from a living or deceased donor) simultaneously or subsequent to a prior kidney transplant in a patient with no obvious pancreatic damage, but with difficult-to-control diabetes mellitus (DM) and secondary nephropathy[1].

Initially, PKT was considered the treatment of choice for patients with T1DM and chronic kidney disease (CKD); however, it has now been suggested that some T2DM patients younger than 50 years, with a body mass index (BMI) < 30 kg/m2 and insulin-dependent, could also benefit from this transplant[2].

Diabetic nephropathy is one of the microangiopathic complications of DM. Renal replacement therapy is an option; however, the survival of diabetic patients on dialysis is lower than that of non-diabetic patients, primarily due to an increased risk of cardiovascular mortality and infections arising from DM complications[3].

Therefore, PKT is currently the best therapeutic option for diabetic patients with chronic kidney disease, despite the potential complications that may arise from undergoing this double surgical procedure[4].

The first PKT was performed in December 1966 at the University of Minnesota on a diabetic patient undergoing dialysis, resulting in the function of both organs. Since then, it is estimated that over 50,000 diabetic patients have received transplants in more than 200 centres worldwide. Currently, PKT is the most frequent modality among pancreas transplants, representing 75% to 80% of pancreatic transplants performed globally[5].

In Spain, the first PKT was performed 34 years ago in Barcelona. Today, reviewing data from the National Transplant Organisation (ONT), we can see that Spain, in recent years, the number of pancreas transplants is approximately 90 transplants per year, with PKT being the most common modality[5].

In Castile and León, the only authorised centre for this type of transplant is CAUSA, and in the last year (2023), a total of 5 PKTs were performed out of the 86 carried out across Spain[6].

PKT is primarily indicated for T1DM patients with CKD on dialysis or pre-dialysis; however, in recent years, patients with T2DM who meet the necessary requirements have also been included. Furthermore, the age limit criterion has been extended, yielding good results. Despite this, the number of patients undergoing PKT remains low, not exceeding 7.7%[7].

A fundamental objective for increasing the probability of PKT success is meticulous patient selection, such that, among other things, secondary lesions due to diabetes are still reversible[3].

In addition to clinical criteria, it is essential to assess patient adherence to immunosuppressive treatment, as graft rejection remains one of the main causes of transplant loss. Lack of therapeutic compliance, often related to psychological and social factors, can compromise the survival of both the graft and the patient. Therefore, adequate mental health and effective emotional support are key aspects in the selection and follow-up of PKT candidates[8].

CASE REPORT

A 35-year-old man was admitted to the Intensive Care Unit (ICU) after undergoing surgery for a PKT. Diagnosed with T1DM since the age of 11, he developed Stage 5 CKD due to diabetic nephropathy due to poorly controlled DM.

He had on haemodialysis since March 2023, 2 times a week (Mondays, Wednesdays, and Fridays) for four hours daily. He had a double-lumen central venous catheter inserted in the right subclavian vein, through which he received dialysis; previously, he had a native arteriovenous fistula that was now occluded.

In August 2023, he was offered the possibility of undergoing a PKT. He accepted and was placed on the waiting list for this procedure. In September of the same year, he was called as a

reserve, but the transplant was not performed until February 2024, when he received another call.

From a psychological perspective, he experienced episodes of anxiety and nervousness, but reported never having been assessed by psychiatry or undergoing any psychiatric treatment. During his ICU admission, he was very agitated, leading to a psychiatric consultation, which resulted in the prescribing of medication.

The patient had a significant history of requesting voluntary discharge against medical advice, and this also occurred at the beginning of his recovery, despite being in the ICU. In this instance, however, the healthcare team refused to grant it due to the life-threatening risk it would entail.

Finally, after five days in the ICU, he was discharged to the transplant unit's inpatient ward.

Ethical Considerations:
For the handling of all confidential patient information, prior approval was obtained from the Research Ethics Committee for Medicinal Products (CEIm; PI2024 02 1525-TFG); subsequently, access to the patient's medical record was requested from Salamanca Hospital. Finally, the patient's informed consent was obtained, both verbally and in writing.

NURSING ASSESSMENT ACCORDING TO VIRGINIA HENDERSON'S 14 NEEDS MODEL

Need 1: Normal Breathing
In the immediate postoperative period, the patient remained intubated and connected to invasive mechanical ventilation; he was extubated four hours later. He presented no serious respiratory complications, although he required oxygen therapy with a Ventimask, which was progressively weaned as tolerated.

Nursing staff closely monitored the patient's respiratory status, collaborating in the early detection of signs of deterioration and in the implementation of preventive measures to optimise pulmonary function. A collaborative problem related to the risk of respiratory insufficiency was identified, for which action was taken in coordination with the medical team.

Additionally, he experienced pain during coughing episodes, leading to ineffective secretion clearance, requiring nursing interventions such as pain control and support with lung expansion techniques to promote ventilation and prevent complications.

Need 2: Eating and Drinking
The patient had a nasogastric tube on gravity drainage with bilious content during the initial hours.

He was to remain nil by mouth with intravenous fluids until evolution was assessed. The day after the intervention, oral fluid intake began with significant restriction, and three days later, enteral nutrition at 80 mL/h, which was well tolerated. Regarding blood glucose levels, he initially presented with elevated readings, so a continuous insulin infusion was initiated according to the unit's protocol[9].

Need 3: Elimination
The patient was carrier of an 18-Fr Foley catheter with 3 lumens, and significant haematuria was observed. Regarding bowel movements, he had two with difficulty during his ICU stay.

Need 4: Movement
During the first 24 hours post-intervention, the patient was to maintain complete bed rest; thereafter, mobilisation was limited to transfer from bed to chair twice a day for a minimum of 4 consecutive hours each time.

Need 5: Rest/Sleep
This need was not altered.

Need 6: Dressing/Undressing
Not assessable, as the patient in the ICU remained undressed.

Need 7: Temperature
The patient had continuous monitoring of skin temperature. At 48 hours post-intervention, a febrile episode was objectively noted, likely associated with pancreatitis.

Nursing staff closely monitored the patient's thermal evolution, promptly identifying signs of complication and applying non-pharmacological measures for thermal comfort. Fever was considered a collaborative problem, in which nursing acted in coordination with the medical team for its diagnosis and treatment.

Need 8: Hygiene/Skin
Not assessable, as hygiene was performed in bed by healthcare staff.

Need 9: Avoiding Dangers/Safety
As a result of the immunosuppression induced in the patient to prevent PKT rejection, there was a high risk of infection. Additionally, he had surgical wounds and 2 Jackson-Pratt drains with bulbs on suction; the right one was pancreatic with a larger volume of content, and the left one was renal with less content but more haematous.

With substantially reduced mobility, there was also a risk of thrombus formation.

Finally, the patient had a significant history of voluntary discharges; in this case, he also wished to take a discharge vs medical advice, which posed a great risk to his life.

Need 10: Communication
The patient presented no alteration of this need.

Need 11: Beliefs/Values
No alteration of this need was observed.

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Need 12: Working/Accomplishing
This need was altered. The patient required bed rest following his surgical intervention.

Need 13: Recreation
Not assessable in the context of an ICU hospitalisation.

Need 14: Learning
A lack of patient knowledge about his health status was observed, reflected in his persistent insistence on obtaining a voluntary discharge.

NURSING CARE PLAN

The individualised nursing care plan, implemented during the patient's ICU admission, is described below, following the NANDA diagnostic taxonomy and its corresponding Nursing Outcomes Classification (NOC) and Nursing Interventions Classification (NIC) results. The NNNConsult electronic tool[10] was used for this purpose.

Table 1. Nursing care plan for identified nursing diagnoses/collaborative problems.

NANDA: INEFFECTIVE BREATHING PATTERN [00032]	
NOC	**Indicators**
Respiratory status: ventilation [0403]	- Resting dyspnea [40313] - Sputum accumulation [40331]
NIC	**Activities**
Respiratory monitoring [3350]	- Monitor respiratory rate, rhythm, depth, and effort. - Assess chest symmetry and use of accessory muscles. - Evaluate abnormal breathing patterns and sounds. - Continuously monitor oxygen levels via pulse oximetry. - Report any signs of respiratory deterioration to the medical team for evaluation and treatment.
Oxygen therapy [3320]	- Administer supplemental oxygen with the appropriate device as prescribed by the physician. - Collaborate with the medical team to adjust oxygen flow based on pulse oximetry and/or arterial blood gases.
Chest physiotherapy [3230]	- Teach the patient to perform breathing exercises with an incentive spirometer as soon as tolerated after surgery. - Monitor patient tolerance during and after the procedure using pulse oximetry. - Facilitate secretion mobilization through postural changes and non-invasive techniques.
Acid-base balance monitoring [1920]	- Obtain arterial blood gases for acid-base balance analysis. - Assist in interpreting arterial blood gas values in coordination with the medical team. - Compare the current state with previous results to detect patient status changes.
NANDA: IMPAIRED SWALLOWING [00103]	
NOC	**Indicators**
Swallowing status [1010]	- Gastric reflux [101014]
Enteral feeding through tube [1056]	- Change the nasal tube anchoring dressing every 24 hours and adjust the tube support point on the nose. - Check the insertion depth (cm) of the tube at the nostril. - Elevate the head of the bed 30 to 45° during feeding. - Verify the correct infusion rate of the feeding pump. - Pause feeding and flush the tube every 4–6 hours during continuous feeding. - Before resuming feeding, use gravity for one hour to check for gastric residuals. - Monitor proper hydration and electrolyte levels.
NANDA: RISK FOR UNSTABLE BLOOD GLUCOSE LEVEL [00179]	
NIC	**Activities**
Blood glucose level [2300]	- Blood glucose concentration [230001]

NIC	Activities
Hypoglycemia Management [2130]	- Identify signs and symptoms of hypoglycemia. - Routinely monitor blood glucose. - Review events prior to hypoglycemia to determine the possible cause. - Administer continuous infusion of 5% dextrose solution and adjust the rate according to the patient's blood glucose.
Medication Administration: Intradermal [2312] (and intravenous in critical care)	- Follow the "five rights" rule for medication administration. - Check drug expiration dates. - Follow the protocol guidelines of the unit. - Correctly prepare the dose and dilution for continuous infusion. - Document the administration.
NANDA: IMPAIRED URINARY ELIMINATION [00016]	
NOC	**Indicators**
Renal function [0504]	- Hematuria [50414]
Urinary elimination [0503]	- Visible blood in urine [50329]
NIC	**Activities**
Urinary catheter care [1876]	- Change the Foley catheter every 30 days. - Use sterile technique for catheter insertion. - Ensure the drainage bag remains unclamped and below bladder level. - Empty the urine bag before it becomes completely full. - Carefully record and monitor the appearance of urine every hour. - Perform daily genital hygiene with water and soap.
NANDA: IMPAIRED PHYSICAL MOBILITY [00085]	
NOC	**Indicators**
Body position: self-initiated [0203]	- Moves from prone to supine [20301] - Moves from lying to sitting [20302]
Transfer performance [0210]	- Transfer from bed to chair [21001] - Transfer from chair to bed [21002]
NIC	**Activities**
Self-care assistance [1800]	- Provide help until the patient is fully able to perform self-care independently.
Self-care assistance [1806]	- Select transfer techniques appropriate for the patient. - Identify methods to avoid injury during transfer. - Assist the patient to walk, using the caregiver's body as a human crutch if necessary.
Bedridden patient care [740]	- Explain the reasons for bed rest. - Position the patient with proper body alignment. - Keep bed linens clean, dry, and wrinkle-free. - Raise bed rails as appropriate. - Monitor skin condition. - Facilitate small changes in body posture. - Perform hygiene in bed.
NANDA: IMPAIRED PHYSICAL MOBILITY [00085]	
NOC	**Indicadores**
Thermoregulation [0800]	- Increased skin temperature [80001] - Hyperthermia [80019]
NIC	**Activities**
Temperature Regulation [3900]	- Establish a continuous temperature monitoring device. - Monitor skin temperature and colour. - Observe and record signs of shivering, sweating, and other symptoms associated with fever.

	- Notify the medical team of the presence of fever for etiological evaluation and treatment. - Apply physical thermal comfort measures, such as cold compresses or changing bed linens, according to patient tolerance. - Administer antipyretics as prescribed and assess their effectiveness.
NANDA: RISK FOR INFECTION [00004]	
NOC	**Indicators**
Risk Control [1902]	- Recognizes personal risk factors [190201] - Controls environmental risk factors [190202] - Develops effective risk control strategies [190204]
Immune Status [0702]	- Skin integrity [70208] - Antibody titers [70212] - Absolute leukocyte count [70214]
NIC	**Activities**
Protection Against Infections [6550]	- Follow precautions for immunocompromised patients. - Limit the number of visitors and ensure handwashing upon entering and leaving the patient's room using appropriate antimicrobial soap. - Ensure aseptic handling of all intravenous lines. - Administer prescribed antibiotic treatment.
Wound Care [3660]	- Monitor wound characteristics during each dressing change. - Monitor the quantity and type of drainage from each drain. - Perform aseptic wound care every 24 hours or as needed. - Clean with normal saline and use appropriate materials based on wound status and evolution. - Change dressings during each care session and according to exudate amount. - Document wound location, size, and appearance.
NANDA: RISK FOR THROMBOSIS [00291]	
NOC	**Indicators**
Risk Control: Thrombi [1932]	- Avoid sitting for long periods [193216]
NIC	**Activities**
Embolism Precautions [4110]	- Use compression stockings and administer low molecular weight heparin subcutaneously every 24 hours. - Perform thorough and routine assessment of lower limbs. - Recommend frequent foot and leg exercises. - Encourage early mobilization or ambulation, as tolerated.
NANDA: INEFFECTIVE HEALTH MAINTENANCE BEHAVIORS [00292]	
NOC	**Indicators**
Health Promotion Behavior [1602]	- Uses behaviors to avoid risks [160201] - Supervises risks of personal behavior [160203] - Uses effective stress reduction techniques [160205]
NIC	**Activities**
Counseling [5240]	- Establish a therapeutic relationship based on trust and respect. - Provide objective information as needed and appropriate. - Practice reflection and clarification techniques to facilitate the expression of concerns. - Discourage decision-making when the patient is under significant stress.
Behavior Modification [4360]	- Determine the patient's motivation for behavior change. - Reinforce constructive decisions regarding health needs. - Encourage the patient to examine their own behavior. - Facilitate family involvement in the behavior modification process.

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NANDA: DEFICIENT KNOWLEDGE [00126]	
NOC	**Indicators**
Knowledge: therapeutic regimen [1813]	- Benefits of treatment [181301] - Self-care responsibilities for ongoing treatment [181302] - Disease process [181310]
Motivation [1209]	- Develops an action plan [120902] - Initiates goal-directed behaviors [120905] - Maintains positive self-esteem [120907]
NIC	**Activities**
Teaching: disease process [5602]	- Assess the patient's level of knowledge regarding the intervention and postoperative process. - Provide the necessary information. - Provide reassurance regarding the patient's condition.
Teaching: procedure/treatment [5618]	- Reinforce the patient's trust in the healthcare staff involved. - Explain the purpose of the treatment. - Inform the patient about how they can contribute to their recovery. - Give the patient time to ask questions and express concerns.

Table 2. Evaluation of the Care Plan.

	EVALUACIÓN DEL PLAN DE CUIDADOS				
NANDA Nursing Diagnosis	**NOC Outcome**	**INDICATORS**	**EVALUATION SCALE**	**INITIAL SCORE**	**FINAL SCORE**
Ineffective Breathing Pattern [00032]	Respiratory Status: Ventilation [0403]	Dyspnoea at rest [40313]	Scale 14	2	5
		Sputum accumulation [40331]	Scale 14	3	4
Impaired Swallowing [00103]	Swallowing Status [1010]	Gastric reflux [101014]	Scale 14	1	5
Risk for Unstable Blood Glucose Level [00179]	Blood Glucose Level [2300]	Blood glucose concentration [230001]	Scale 2	2	4
Impaired Urinary Elimination [00016]	Renal Function [0504]	Hematuria [50414]	Scale 14	2	5
	Urinary Elimination [0503]	Visible blood in urine [50329]	Scale 1	2	5
Impaired Physical Mobility [00085]	Body Position: Self-Initiated [0203]	Moves from prone to supine [20301]	Scale 1	2	4
		Transfers from chair to bed [21002]	Scale 1	1	4
	Transfer Performance [0210]	Moves from lying to sitting [21001]	Scale 1	1	3
		Transfer from sitting to bed [21002]	Scale 1	2	4
Hyperthermia [00007]	Thermoregulation [0800]	Increased skin temperature [80001]	Scale 14	2	5
		Hyperthermia [80019]	Scale 14	2	5

Risk for Infection [00004]	Risk Control [1902]	Recognises personal risk factors [190201]	Scale 13	2	3
		Recognises environmental risk factors [190202]	Scale 13	2	3
		Develops effective risk control strategies [190204]	Scale 13	2	3
	Immune Status [0702]	Skin integrity [70208]	Scale 1	2	4
		Antibody titer [70208]	Scale 1	1	1
		Absolute leukocyte count [70214]	Scale 1	1	1
Risk for Thrombosis [00291]	Thrombus Risk Control [1932]	Avoids sitting for long periods [193216]	Scale 13	1	1
Ineffective Health Maintenance Behaviours [00292]	Health Promoting Behaviour [1602]	Uses behaviours to avoid risks [160201]	Scale 13	1	3
		Supervises risks of personal bevahiour [160203]	Scale 13	1	3
		Uses effective techniques to reduce stress [160205]	Scale 13	1	2
Deficient Knowledge [0012]	Knowledge: Therapeutic Regimen [181]	Benefits of treatment [181301]	Scale 20	2	3
		Self-carer esponsibilities for ongoing treatment [181302]	Scale 20	2	3
		Disease process [181310]	Scale 20	2	3
	Motivation [1209]	Develops an action plan [120902]	Scale 1	2	4
		Initiates goal-directed behaviours [120905]	Scale 1	1	1
		Develops positive self-esteem [120907]	Scale 1	1	1

DISCUSSION

Chronic kidney disease (CKD) is one of the most serious complications that can develop in individuals with diabetes mellitus (DM), and once at advanced stages, pancreas-kidney transplantation (PKT) is considered the best therapeutic option to improve quality of life and reduce mortality[1]. However, transplant success depends not only on the surgical procedure but also on rigorous postoperative follow-up and patient adherence to immunosuppressive treatment[11].

In the presented case, the patient was admitted to the ICU with multiple altered needs, both clinically and psychologically[12]. While his haemodynamic stability and physical improvement were achieved through close monitoring and specific care, his initial refusal to be admitted and his lack of awareness regarding the importance of post-surgical treatment posed a significant challenge for the nursing team.

Nursing staff implemented a care plan based on a comprehensive assessment of his needs, addressing not only physiological alterations but also psychosocial factors that could interfere with his recovery. Counselling and behaviour modification strategies were applied with the aim of improving his adherence to treatment and minimising the risk of premature hospital discharge. Health education and emotional support played a fundamental role in this process, enabling the patient to gain a greater awareness of his situation and the necessity of continuing with hospital care[13].

Former studies have shown that transplant patients with difficulties in maintaining health face a higher risk of post-surgical complications and graft loss due to a lack of therapeutic adherence[14]. Nursing intervention, through a trust-based approach and clarification of doubts, has proven effective in modifying attitudes of refusal and fostering responsible decision-making in the recovery process[15].

CONCLUSIONS

The appropriate identification of the patient's needs and the application of an individualised care plan yielded favourable results in his clinical evolution. The combination of close monitoring, an interdisciplinary approach, and effective psychological support were key to achieving patient stability, reducing anxiety, and improving his commitment to treatment. This case reinforces the relevance of the nursing role in the postoperative care of transplant patients, highlighting its impact not only on clinical control but also on adaptation to the new situation, reducing anxiety and promoting self-care behaviours that ensure long-term graft survival.

Conflicts of interest

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Nursing care in the management of opportunistic infections and postoperative complications in a kidney transplant patient

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ABSTRACT

Introduction: Renal transplantation requires immunosuppressive treatment to prevent graft-host rejection, with an increased risk of opportunistic infections. This risk is higher in the late post-transplant phase and in patients with a past medical history of rejection, potentially leading to severe complications requiring hospitalisation.

Case Report Description: The case of a renal transplant patient admitted for fever and lymphadenopathy is presented, diagnosed with pulmonary tuberculosis and disseminated aspergillosis. During her hospitalisation, she suffered complications requiring an ostomy and temporary haemodialysis due to her critical condition.

Care Plan Description: Care plan was designed through an initial assessment and weekly re-evaluations according to Marjory Gordon's functional patterns. Fifteen days after admission, the diagnoses of readiness for enhanced knowledge, potential complication: infection, and risk for electrolyte imbalance were established as priorities. Nursing intervention focused on infection control, treatment management, and patient and family education.

Care Plan Evaluation: The care plan was evaluated weekly, with adjustments made according to clinical evolution. After a length of stay of 42 days, the established objectives were achieved, with subsequent follow-up at the post-transplant nursing consultation.

Conclusions: This case highlights the importance of comprehensive assessment from admission and the intervention of a multidisciplinary team to optimise care, prevent complications, and provide health education. Furthermore, it emphasises the role of nursing in emotional support and adapting the transplant patient to the physical and social changes resulting from their illness.

Keywords: renal transplant; immunosuppressive therapy; opportunistic infections; nursing care; postoperative complications; patient education as topic.

RESUMEN

Cuidados de enfermería en el manejo de infecciones oportunistas y complicaciones postquirúrgicas en una paciente trasplantada renal

Introducción: El trasplante renal requiere tratamiento inmunosupresor para prevenir el rechazo injerto-huésped, con mayor riesgo de infecciones oportunistas. Este riesgo es mayor en la fase tardía postrasplante y en pacientes con antecedentes de rechazo, pudiendo derivar en complicaciones graves que requieran hospitalización.

Descripción del caso clínico: Se presenta el caso de una paciente trasplantada renal que ingresó por fiebre y adenopatías, siendo diagnosticada de tuberculosis pulmonar y aspergilosis diseminada. Durante su hospitalización, sufrió

complicaciones que requirieron una ostomía y hemodiálisis temporal debido a su estado crítico.

Descripción del plan de cuidados: El plan de cuidados se diseñó mediante una valoración inicial y reevaluaciones semanales según los patrones funcionales de Marjory Gordon. A los 15 días de ingreso, se establecieron como prioritarios los diagnósticos de disposición para mejorar los conocimientos, complicación potencial: infección y riesgo de desequilibrio electrolítico. La intervención enfermera se enfocó en el control de infecciones, manejo del tratamiento y educación del paciente y su familia.

Evaluación del plan de cuidados: El plan de cuidados se evaluó semanalmente, realizando ajustes según la evolución clínica. Tras 42 días de ingreso, se lograron los objetivos establecidos, con seguimiento posterior en consulta de enfermería postrasplante.

Conclusiones: Este caso destaca la importancia de una valoración integral desde el ingreso y la intervención de un equipo multidisciplinario para optimizar la atención, prevenir complicaciones y proporcionar educación sanitaria. Además, resalta el papel de la enfermería en el apoyo emocional y la adaptación del paciente trasplantado a los cambios físicos y sociales derivados de su enfermedad.

Palabras clave: trasplante renal; terapia inmunosupresora; infecciones oportunistas; cuidados de enfermería; complicaciones postoperatorias; educación del paciente como tema.

INTRODUCTION

Infections represent one of the primary complications in patients undergoing renal transplantation, due to the immunosuppressive treatment required to prevent graft rejection. This therapeutic regimen, typically comprising a calcineurin inhibitor, an antimetabolite, and a corticosteroid, compromises the host's immune response, significantly increasing the risk of opportunistic viral, fungal, and bacterial infections[1,2]. The incidence of these infections varies according to the post-transplant period, with community-acquired infections being more frequent in the late phase, i.e., more than 365 days after transplantation[3,4].

Furthermore, an ostomy is a surgical procedure involving the externalisation of an intestinal segment through the abdominal wall, requiring the immediate placement of a collection bag for the elimination of faeces. This device plays a fundamental role in maintaining patient hygiene, protecting the peristomal skin from irritation, and preventing associated complications. To ensure adequate adaptation, it is essential to use a transparent bag, fitted to the morphology of the stoma, allowing for its observation and preventing constriction of the surrounding tissue[5].

CASE PRESENTATION

A 31-year-old woman, blood group B Rh positive, with a history of chronic kidney disease of undetermined aetiology since 2008, requiring renal replacement therapy via peritoneal dialysis for 4 years. In 2013, she received a cadaveric renal transplant, presenting positive anti-donor specific antibodies (LSA) for class II and a baseline creatinine at discharge of 1.0 mg/dL. Subsequently, she underwent 2 renal biopsies due to acute graft dysfunction, revealing episodes of acute cellular rejection. Her clinical history includes opportunistic infections, such as cytomegalovirus infection in June 2018 and recurrent urinary tract infections.

In May 2023, she was admitted with nocturnal fever, diaphoresis, odynophagia, cervical and inguinal lymphadenopathy, and acute graft dysfunction. A multi-pronged diagnostic approach was undertaken using blood cultures, pharyngeal swab cultures, acid-fast bacilli (AFB) smears, and excisional biopsy of cervical and inguinal lymph nodes, confirming pulmonary tuberculosis via AFB in sputum. In June 2023, the inguinal lymph node biopsy revealed disseminated fungal infection by aspergillosis.

During her hospitalisation, she presented with sudden haemodynamic deterioration requiring vasopressor amines and an acute abdominal condition. Abdominopelvic computed tomography revealed intestinal perforation, leading to urgent exploratory laparotomy. In the immediate postoperative period, she developed acute graft dysfunction, requiring the placement of a non-tunnelled vascular access for renal replacement therapy and a central venous catheter due to a state of shock. Subsequently, a soft tissue infection was identified at the Penrose drain exit site. Following haemodynamic stabilisation and two haemodialysis sessions, she showed improvement in renal function, allowing for the reinitiation of immunosuppression.

NURSING ASSESSMENT

A nursing assessment was conducted according to Marjory Gordon's functional health patterns upon admission **(table 1)**, in addition to weekly periodic evaluations.

CARE PLAN

The care plan was developed using NANDA taxonomies for nursing diagnoses, NOC for outcome criteria, and NIC for nursing interventions **(table 2)**.

The diagnoses identified upon patient admission were related to late infectious complications of renal transplantation: impaired tissue integrity (00044), impaired physical mobility (00085), readiness for enhanced knowledge (00161), risk for electrolyte imbalance (00195), potential complication: infection (10024).

Table 1. Nursing assessment on admission according to Marjory Gordon's functional patterns.

Pattern	Assessment Data
Pattern I: Health perception and management	- Personal history: Chronic kidney disease diagnosed in 2008, requiring peritoneal dialysis for 4 years (2004–2008). - Cadaveric donor kidney transplant in 2013. - History of opportunistic infections: cytomegalovirus in 2018 and recurrent urinary infections since 2019. Complete vaccination schedule. - Good adherence to immunosuppressive treatment. Regular follow-up in medical consultations. - Expresses interest and commitment to the therapeutic regimen. - Fall risk assessment using the Downton scale: 3 points (moderate risk).

Pattern II: Nutritional-metabolic	- Height: 160 cm; Weight: 55 kg; Body Mass Index (BMI): 21.5 kg/m².
	- Nutritional risk assessment:
	  - Norton Scale: 18 points (low risk of pressure ulcers).
	  - Malnutrition Universal Screening Tool (MUST): 2 points (high risk of malnutrition).
	  - Mini Nutritional Assessment (MNA): no indication for nutritional supplements, no chewing problems or dysphagia.
	- No nausea or vomiting.
	- Adequate hydration status.
	- Afebrile.
	- Carrier of a central venous catheter in the left jugular region (No. 9G) and a hemodialysis catheter in the right jugular region (No. 12G).

Pattern III: Elimination	- Presents oliguria. - Preserved fecal continence, with a daily bowel movement pattern.
Pattern IV: Activity and Physical exercise	- Baseline oxygen saturation of 95%. - Absence of dyspnea. - Blood pressure: 115/60 mmHg. - Heart rate: 60 bpm. - Partial dependence for performing basic and instrumental activities of daily living.
Pattern V: Sleep and rest	- Preserved sleep pattern, no disturbances or insomnia.
Pattern VI: Cognitive and Perceptual	- Conscious and oriented in all 3 spheres. - No communication alterations or sensory deficits present. - Pain assessment using the Visual Analog Scale (VAS): 0 points (no pain). - Requires specific health education regarding her clinical condition and treatment.
Pattern VII: Self-concept and self-esteem	- No alterations identified. - Stable mood, calm patient.
Pattern VIII: Role and relations	- Family support.
Pattern IX: Sexuality and reproduction	- No reported issues.
Pattern X: Coping and stress tolerance	- Preserved coping ability, no signs of anxiety or significant stress.
Pattern XI: Values and beliefs	- No alterations identified in this area.

Of the diagnoses identified in the weeks following admission, readiness for enhanced knowledge (000161), potential complication: infection (10024), and risk for electrolyte imbalance (00195) were established as priorities[6].

EVALUATION OF THE CARE PLAN

From hospital admission, a health education programme (HEP) was implemented, aimed at both the patient and her family, with the objective of providing information about the reason for hospitalisation, associated risks, and planned procedures. The main axes of the HEP included stoma assessment and management, fluid and electrolyte control, prevention and management of

Table 2. Care plan with NANDA-NOC-NIC taxonomies during the weeks following admission.

NANDA	NOC	NIC
(000161) Readiness for enhanced knowledge. Manifested by the expressed desire to improve learning.	**(1829)** Knowledge: Ostomy care. Indicators: - 182902: Ostomy dressing. - 182901: Ostomy function. - 182907: Stoma complications. - 18915: Procedure for changing the ostomy bag. Initial score: 4 points. Target score: 20 points. **(1808)**	**(5606)** Individual teaching - Assess the patient's current level of knowledge and understanding. - Instruct the patient. - Allow time for questions and concerns. **(0480)** Ostomy care - Monitor possible postoperative complications. - Monitor stoma healing. - Assist the patient in practicing self-care. - Instruct the patient and family on care techniques.
(10024) Potential complication: Infection. Due to handling and immunosuppressive therapy, manifested by fever. **(00205)** Risk of shock.	**(1924)** Identifies infection risk in daily activities. Indicators: - 192404: Identifies infection risk in daily activities. - 192406: Identifies signs and symptoms. - 192415: Practices hand hygiene. Initial score: 4 points. Target score: 20 points. **(0703)** Infection severity. - 070307: Fever. - 070329: Hypothermia. - 070312: Chills. - 070326: Elevated leukocyte count. Initial score: 4 points. Target score: 20 points.	**(4054)** Central venous access management: Central insertion. - Determine catheter placement. - Follow institutional guidelines, protocols, policies, and procedures. - Provide information regarding the catheter. - Avoid use until placement is confirmed by baseline chest X-ray. - Perform catheter care. - Replace IV administration sets regularly. - Monitor for complications. - Inspect the insertion site daily. **(4255)** Shock management: Sepsis. - Determine sepsis risk level. - Use appropriate screening tools once risk is established (SOFA). - Identify risk situations (immunosuppression and invasive procedures). - Evaluate vital signs and lab values. - Remove any infection source. - Administer broad-spectrum antibiotics as prescribed. - Apply vasopressors if hypotension persists with MAP <65 mmHg. - Use aseptic techniques for all immunocompromised patients.
(00195) Risk for electrolyte imbalance. Related to acute kidney failure.	**(0504)** Renal function. Indicators: - 050418: Weight gain. - 050438: Edema Initial score: 6 points. Target score: 10 points.	**(2080)** Fluid/electrolyte management. - Determine baseline hydration status (overload, dehydration, normovolemia). - Monitor hydration status (moist mucosa, rapid pulse, blood pressure, skin turgor) as appropriate. - Monitor vital signs and hemodynamic status. - Monitor daily weight and assess progress. - Administer IV therapy at room temperature as prescribed.
(00118) Disturbed Body Image. Manifested by actual change in structure or function, related to surgical procedures.	(1205) Self-esteem. Indicators: - 12501: Verbalizations of self-acceptance. - 120511: Level of confidence. - 120519: Feelings about oneself. Initial score: 10 points. Target score: 14 points.	(5270) Emotional support. - Listen to expressions of feelings and beliefs. - Discuss emotional experiences with the patient.

septic shock, and central venous catheter care. The patient was informed about the location of her vascular access and the necessary care, and maintenance procedures were carried out, including proper care and management of the catheters[7].

After 3 weeks of admission, the following objectives were achieved:

- Readiness for enhanced knowledge: The patient demonstrated the ability to recognise and explain her clinical status, autonomously perform ostomy care, and independently assume self-care.
- Potential complication: infection and risk of septic shock: During hospitalisation, she presented with infection associated with the surgical procedure, with haemodynamic instability. Measures for infection control and prevention, central venous catheter and ostomy management, as well as monitoring and treatment of shock and fluid and electrolyte disorders, were implemented. Follow-up was scheduled in the renal transplant, general surgery, ostomy nursing, and vascular access nursing clinics. The final NOC score was 16 points.
- Risk for electrolyte imbalance: Resolution of oedema, improvement in creatinine levels to baseline values, and normalisation of biochemical parameters were evidenced. The final outcome score was 10 points.
- Disturbed body image: Adequate adaptation of the patient to her new image resulting from hospital complications was observed. Consultation with the psychology team was proposed, which was accepted, establishing weekly visits for individual and family therapy. The final outcome score was 15 points[8].

One month into hospitalisation, the patient persisted with the diagnosis of risk for electrolyte imbalance and the potential complication of infection, in the context of her immunosuppressed state secondary to immunosuppressive treatment aimed at preventing renal graft rejection. Given this condition, the need for continuous follow-up in the renal transplant and infectious disease clinics after hospital discharge was established, with the aim of monitoring clinical evolution and preventing possible post-transplant complications. Similarly, the central venous catheter was removed without incident, ensuring its proper evolution. For stoma follow-up and optimisation of self-care, specific monitoring was scheduled in the ostomy nursing clinic, ensuring continuity of care and the patient's progressive adaptation to her new condition.

Multidisciplinary Team Intervention

To achieve the proposed objectives, the coordinated intervention of a multidisciplinary team was required, including:

- Nephrology nursing: Responsible for the care of the transplant patient with systemic infectious complications and ostomy. They were in charge of continuous assessment of the clinical state and health education directed at the patient and her family.
- Stoma therapy nursing: Specialists in the assessment, evolution, and management of the ostomy, providing health education and advice on self-care.
- Nephrologists, infectologists, and general surgeons: Responsible for the supervision of infectious complications associated with immunosuppression and the surgical procedure, as well as the follow-up of clinical and biochemical parameters and the patient's general evolution.
- Psychology team: Intervened in addressing body image disturbance, providing individual and family psychological therapy to favour the patient's adaptation to physical changes derived from her clinical process.

This interdisciplinary approach allowed for comprehensive care, optimising the patient's evolution and facilitating her progressive reintegration into daily life with adequate management of her post-transplant health status.

DISCUSSION

Health education provided by nursing staff, along with the intervention of a multidisciplinary team, is fundamental to ensuring adequate learning in complication surveillance, management of specific care, and the prevention and early detection of possible adverse events[9,10]. In critically ill transplant patients, proper management of devices such as the central venous catheter and ostomy is essential, given that their mismanagement can lead to serious complications such as bacteraemia, central venous catheter exit site infection, or stoma retraction, significantly prolonging hospital stay and increasing associated morbidity and mortality[11].

Furthermore, it is essential to provide comprehensive support to the patient and their family, facilitating adaptation to the physical, emotional, and social changes that this new stage entails. For this, the design of an individualized care plan should include follow-up by the psychology team and the implementation of family therapy, thus promoting better adherence and quality of life in the transplant patient[12,13].

Renal transplantation remains the most effective therapeutic option for patients with chronic kidney disease requiring renal replacement therapy. According to data from the Mexican Social Security Institute, the overall survival of deceased donor graft recipients is 91.18%, while graft function reaches 84.19% 1 year after the transplant. These results reinforce the key role of nursing in all phases of the transplant process, from the early to the late period, underscoring the need for specialized and continuous care that responds to the specific needs of each patient[14,15].

CONCLUSIONS

This case report highlights the complexity of managing a renal transplant patient with infectious and surgical complications, emphasising the importance of early intervention and a multi-

disciplinary approach to optimise clinical outcomes. Adequate health education, provided to both the patient and her family, has proven to be a fundamental pillar in the prevention of complications and in promoting autonomy in self-care.

Similarly, continuous assessment of the patient's clinical status allowed for the early identification of complications such as opportunistic infection and fluid and electrolyte imbalance, enabling timely management and reducing the risk of haemodynamic deterioration. The implementation of an individualized care plan, including strict monitoring of the central venous catheter and ostomy, contributed to a favourable evolution and minimisation of associated risks. The role of nursing in post-transplant follow-up is essential, both in monitoring signs of rejection and infection, and in emotional and psychosocial support. The inclusion of the psychology team in the care process favoured the acceptance of physical changes derived from the surgical process, facilitating the patient's adaptation to her new condition.

Finally, this case underscores the need for standardised care protocols in transplant patients, ensuring a comprehensive approach that encompasses not only clinical stability but also the patient's quality of life and psychosocial well-being in the post-transplant context.

Conflicts of interest

The authors declare no conflicts of interest linked to the research, authorship, and/or publication of this manuscript.

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- The winning paper will be made available to the journal *Enfermería Nefrológica* for possible publication, subject to the decision of the editorial committee. Should the authors subsequently use the work and/or its data, they must acknowledge its origin as a SEDEN Award.
- To be eligible for the award, the paper must be presented at the 50th National SEDEN Congress by one of the listed authors. Presentation by individuals not included among the authors will not be accepted.
- Any eventuality not provided for in these rules will be resolved by the SEDEN Executive Board.
- The Award will consist of a prize of €1,000.
- The Award may be declared void.

DIAVERUM

*This award is subject to the tax withholdings established by law.

CONFERENCES

Kuala Lumpur, Malaysia – September 6–7, 2025

XXXIX Annual Congress of the Malaysian Society of Nephrology
Website: https://www.ispdkl2025.com

LIII INTERNATIONAL CONFERENCE EDTNA/ERCA

Porto, Portugal – October 11–14, 2025
EDTNA/ERCA Secretariat
Ceskomoravská 19, 190 00 Prague 9, Czech Republic
Phone: +420 284 001 422
Email: secretariat@edtnaerca.org

L NATIONAL CONGRESS OF THE SPANISH SOCIETY OF NEPHROLOGY NURSING (SEDEN)

Oviedo, Spain–October 2025
Scientific Secretariat:
SEDEN
C/ de la Povedilla 13, Bajo Izq. 28009 Madrid
Phone: +34 914 093 737
Email: seden@seden.org
Website: www.congresoseden.es

AWARDS

LOLA ANDREU RESEARCH AWARD 2025

Open to all original articles published in issues 27/4, 28/1, 28/2, and 28/3, not previously published elsewhere.
Award Amount: €1,500
Information:
Phone: +34 914 093 737
Email: seden@seden.org

JANDRY LORENZO GRANT 2025

Supports members conducting research or studies to expand knowledge in the field of nephrology nursing.
Award Amount: €1,800
Information:
Phone: +34 914 093 737
Email: seden@seden.org
Website: www.seden.org

ÍÑIGO ÁLVAREZ DE TOLEDO AWARDS 2025

XXV Edition of the Nephrology Nursing Research Awards.
II Edition of the Awards for Humanization in the Socio-healthcare of People with Kidney Disease.
Award Amount: €5,000
More information:
Phone: +34 914 487 100
Fax: +34 914 458 533
Email: info@friat.es
Website: www.fundacionrenal.com

ORGAN AND TRANSPLANT DONATION AWARD 2025

Aimed at encouraging the work of nephrology nursing professionals in the field of kidney transplantation.
Award: Registration for the L National Congress
Information:
Phone: +34 914 093 737
Email: seden@seden.org
Website: www.seden.org

PERITONEAL DIALYSIS AWARD 2025

Intended to promote the work of nephrology nurses in the field of peritoneal dialysis.
Award: Registration for the LI National Congress
Information:
Phone: +34 914 093 737
Email: seden@seden.org
Website: www.seden.org

ADVANCED CHRONIC KIDNEY DISEASE (ACKD) AWARD 2025

Highlights the work of nephrology nurses in the field of advanced chronic kidney disease (ACKD).
Award: Registration for the LI National Congress
Information:
Phone: +34 914 093 737
Email: seden@seden.org
Website: www.seden.org

PALEX AWARD FOR VASCULAR ACCESS AND NEW TECHNOLOGIES 2025

Aimed at promoting nursing research and encouraging innovation among nephrology nursing professionals.
Award Amount: €1,200
Information:
Phone: +34 914 093 737
Email: seden@seden.org
Website: www.seden.org

RENAL FOUNDATION AWARD FOR EXCELLENCE IN COMMUNICATION 2025

This award aims to highlight excellence in the communication of oral presentations delivered at our national congress, recognizing both the content and the quality of the presentation.
Prize: €1,000
Information: Tel: 914093737
Email: seden@seden.org

MEETINGS

XXXVIII NATIONAL CONFERENCE FOR PEOPLE WITH KIDNEY DISEASE

Málaga, November 2025
National Federation ALCER
C/ Don Ramón de la Cruz, 88 – Office 2
28006 Madrid
Tel: 915610837
Fax: 915643499
Email: amartin@alcer.org
www.alcer.org

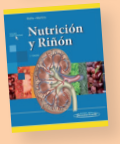
The journal of the Spanish Society of Nephrology Nursing will announce in this section all information about scientific activities related to Nephrology that is sent to us by Scientific Associations, Healthcare Institutions, and Training Centers

BOOKS FOR MEMBERS

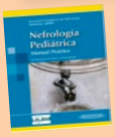
Books with discounts for SEDEN members

Tratado de Diálisis Peritoneal
Autor: Montenegro Martínez J.
Editorial: Elsevier España.
Pedir a SEDEN.
P.V.P: 177,60 € (IVA incluido)

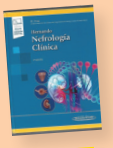
La Enfermería y el Trasplante de Órganos
Autor: Lola Andreu y Enriqueta Force.
Editorial Medica Panamericana.
Agotado. Pedir a SEDEN.
P.V.P: 33,25 € (IVA incluido)



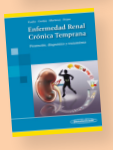
Nutrición y Riñón
Autor: Miguel C. Riella.
Editorial Médica Panamericana.
P.V.P: 87,40 € (IVA incluido)



Nefrología Pediátrica
Autor: M. Antón Gamero, L. M. Rodríguez.
Editorial Médica Panamericana.
P.V.P.: 70,30 € (IVA incluido)



Nefrología Clínica
Hernando.
Editorial Panamericana.
Papel y Digital: 209,95 € (IVA incluido)



Enfermedad Renal Crónica Temprana (eBook Online)
Autor: A. Martín, L . Cortés, H.R. Martínez y E. Rojas.
Editorial Médica Panamericana.
P.V.P.: 32,30 € (IVA incluido)

Investigación en enfermería. Desarrollo de la práctica enfermera basada en la evidencia
Autor: Grove, S.
Editorial: Elsevier.
P.V.P.: 55,41 € (IVA incluido)

Los diagnósticos enfermeros (eBook)
Autor: Luis Rodrigo Mª T.
Editorial: Elsevier España.
P.V.P.: 36,39 € (IVA incluido)

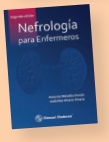
Vínculos de Noc y Nic a Nanda-I y Diagnósticos médicos
Autor: Johnson M.
Editorial: Elsevier España.
P.V.P.: 44,54 € (IVA incluido)

Clasificación de Resultados de Enfermería (NOC): Medición de Resultados en Salud
Autor: Edited by Sue Moorhead.
Editorial Elsevier España.
P.V.P.: 81,18 € (IVA incluido)

Gestión de los cuidados enfermeros y liderazgo
Autor: Huber D.
Editorial Elsevier España.
P.V.P.: 57,79 € (IVA incluido)

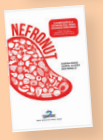
Lenguaje Nic para el aprendizaje teórico-práctico en enfermería
Autor: Olivé Adrados…
Editorial Elsevier España.
P.V.P.: 45,02 € (IVA incluido)

Introducción a la investigación en Ciencias de la Salud
Autor: Edited by Stephen Polgar…
Editorial Elsevier España.
P.V.P.: 33,07 € (IVA incluido)



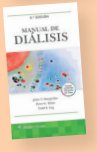
Nefrología para enfermeros
Autor: Méndez Durán, A.
Editorial: Manual Moderna.
P.V.P.: 45,35 € (IVA incluido)

Escribir y publicar en enfermería
Autor: Piqué J, Camaño R, Piqué C.
Editorial: Tirant Humanidades.
P.V.P.: 25 € (IVA incluido)



NEFRONUT. La Alimentación en Enfermedad Renal Crónica Explicada de Forma Gráfica. Infografías para Pacientes, Cuidadores y Profesionales de la Salud
Nissenson, A. - Fine, R.
Editorial: Elservier España.
P.V.P.: 27,55 € (IVA incluido)

Manual de diagnósticos enfermeros
Autor: Gordin M.
Editorial: Mosby.
P.V.P.: 34,90 € (IVA incluido)



Manual de diálisis
Autor: Daurgidas J.
Editorial: Wolters Kluwer.
Precio: 92, 56 € (IVA incluido)

Procedimientos y Protocolos con Competencias Específicas para Enfermería Nefrológica
Autor: Crespo, R. Casas, R. SEDEN (Sociedad Española de Enfermería Nefrológica)
Editorial: Aula Médica.
P.V.P.: 21,74 € (IVA incluido)

Práctica basada en la evidencia
Autor: Orts Cortés.
Editorial: Elsevier.
Precio: 20,45 € (IVA incluido)

Investigación cualitativa
Autor: Azucena Pedraz.
Editorial: Elsevier.
Precio: 20,33 € (IVA incluido)

Guía Práctica de Enfermería Médico-Quirúrgica
Autores: Sharon L. Lewis- Linda Bucher.
Editorial: Elsevier.
Precio: 35,66 € (IVA incluido)

La Alimentación en la Enfermedad Renal Crónica Recetario Práctico de Cocina para el Enfermo Renal y su Familia
Autores: Fernández, S, Conde, N, Caverni, A, Ochando, A.
Editorial: Alcer.
Precio: 33,44 € (IVA Incluido)

Manual de Tratamiento de la Enfermedad Renal Crónica
Autor: Daugirdas, J.
Editorial: Wolters Kluwer.
Precio. 79,04 € (IVA Incluido)

Manual de Trasplante Renal
Autor: Danovitch, G.
Editorial: Wolters Kluwer.
P.V.P: 74,10 € (IVA Incluido)

Investigación en metodología y lenguajes enfermeros
Autor: Echevarría Pérez P.
Editorial: Elsevier.
Precio. 33,96 € (IVA Incluido)

Proceso de Cuidado Nutricional en la Enfermedad Renal Crónica. Manual para el Profesional de la Nutrición
Autor: Osuna I.
Editorial: Manual Moderno
P.V.P: 36,10 € (IVA incluido)

Diagnósticos enfermeros. Definiciones y clasificación. 2024-2026
Autores: T. Heather Herdman & NANDA International & Shigemi Kamitsuru.
Editorial: Elsevier.
P.V.P: 33,44 € (IVA Incluido)

The discount will be applied to the pre-VAT price.

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I am interested in the following books:

- ☐ "Tratado de Diálisis Peritoneal". Montenegro Martínez J.
- ☐ "La enfermería y el Trasplante de Órganos". Lola Andreu y Enriqueta Force
- ☐ "Nutrición y Riñón". Miguel C. Riella
- ☐ "Nefrología Pediátrica". M. Antón Gamero, L. M. Rodríguez
- ☐ "Nefrología Clínica". Hernando
- ☐ "Enfermedad Renal crónica Temprana (eBook Online)". A. Martín, L. Cortés…
- ☐ Investigación en enfermería. Desarrollo de la práctica enfermera basada en la evidencia. Grove, S.
- ☐ "Los Diagnósticos Enfermeros". Luis Rodrigo, M. T.
- ☐ "Vínculos de Noc y Nic a Nanda-I y Diagnósticos médicos". Johnson M.
- ☐ "Clasificación de Resultados de Enfermería (NOC): Medición de Resultados en salud". Edited by Sue Moorhead.
- ☐ "Gestión de los cuidados enfermeros y liderazgo". Huber D.
- ☐ "Lenguaje Nic para el aprendizaje teórico-práctico en enfermería" Olivé Adrados
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- ☐ "Escribir y publicar en enfermería". Piqué J, Camaño R, Piqué C.
- ☐ "NEFRONUT. La Alimentación en Enfermedad Renal Crónica Explicada de Forma Gráfica. Infografías para Pacientes, Cuidadores y Profesionales de la Salud". Padial, M. Olveira, G. Rebollo, A.
- ☐ "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.

Send to SEDEN.: seden@seden.org

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.

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